2025 Abstracts

Impact of Pharmacy-Evaluation Tool on Implementing Guideline-Directed Medical Therapy (GDMT) in Heart Failure (HF) Patients

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Purpose: Optimal GDMT reduces mortality by over 70% and improves quality of life in heart failure with reduced ejection fraction (HFrEF) patients, yet it remains underutilized. Data on heart failure with preserved ejection fraction (HFpEF) patients are also limited. Pharmacy-driven strategies have shown success in initiating GDMT for HF. This study evaluates a pharmacy evaluation toolâ€™s effectiveness in optimizing GDMT for hospitalized HF patients.
Methods: This is an Institutional Review Board (IRB)-approved retrospective single-center study conducted at an academic healthcare center. All inpatients with HF were evaluated for inclusion between September 1, 2024, and October 31, 2024. The study included patients aged 18 and older diagnosed with HFrEF or HFpEF. Patients admitted to hospice or the ICU were excluded. A heart failure evaluation tool was developed to assess patientsâ€™ medication regimens and opportunities for improvement. Patients with heart failure who were evaluated by the pharmacy will be compared to those who were not seen by the pharmacy during the study period. The primary outcome is the pharmacy intervention acceptance rate as a measure of GDMT optimization. The secondary outcomes include the rates of hospital readmission within 30 and 60 days.
Results: One hundred forty-six patients with HF were included in the study. Pharmacy interviewed 53 (~36%) of the patients and 93 did not have an interview. Patient charts that were reviewed until now included patients who were interviewed with the pharmacy. Guidelines Directed Therapy was recommended by the pharmacy to 44 (84.6%) patients. In this group, 14 (31.8%) patients were prescribed all four GDMT and Sodium-Glucose Cotransporter 2 inhibitors (SGLT2i). The final results will be presented upon complete analysis of the data.
Conclusions: Conclusions will be presented upon a complete analysis of the data.

Learning Objectives:

Identify gaps and barriers in the current implementation of guideline-directed medical therapy (GDMT).
Recognize opportunities for pharmacy to enhance GDMT in the inpatient setting.

Self Assessment Questions:

Which of the following is a common barrier to the effective implementation of GDMT in heart failure patients?
A. Lack of standardized protocols for GDMT initiation and titration
B. Overwhelming patient adherence to prescribed therapies
C. Excessive availability of resources for medication management
D. Consistent interdisciplinary communication and collaboration
Which of the following is a potential opportunity for pharmacists to improve GDMT in the inpatient setting?
A. Avoiding patient education on GDMT medications
B. Reducing communication with other healthcare providers
C. Leading evidence-based medication plan during care transitions
D. Limiting their role to dispensing medications only
Q1 Answer: A Q2 Answer: C
APCE Universal Activity Number 0121-9999-25-820-L99-P

Decreasing UH Discharge Delays from Taubman Outpatient Pharmacy

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University of Michigan Health (UMH) Meds-to-Beds is a transitions of care (TOC) program provided through UMH Taubman Ambulatory Care Pharmacy (ACP). Through this program, patients can receive discharge prescriptions at bedside. The program aims to improve patient medication access and experience of care through providing convenient delivery of discharge prescriptions. This program involves a multidisciplinary team including unit nurses, providers, care managers, community pharmacist and pharmacy technicians collaborating to improve medication adherence and optimize patient care post-discharge. Patients are enrolled in the program via a consult order placed by the care team through the electronic health record (EHR). Our technicians fill, prepare and deliver the prescriptions to the patient rooms. Wait times for these deliveries can be affected by a variety of factors, including understaffing, delays in receiving discharge orders, and insurance billing issues. Furthermore, the demand for the program regularly exceeds our capacity. We hypothesize that providing delivery via pneumatic tube (P-tube) system will improve delivery times and increase the number of patients served. The study will include University of Michigan Health (UMH) patients who are unable to ambulate or are under isolation precaution, and who have a MiRx Express consult submitted via the EHR. Consultation metrics will be documented weekly using an Excel spreadsheet. The primary outcome will assess the P-tube systems' impact on volume of MiRx Express consult request by measuring the number of deliveries fulfilled daily to achieve a fulfillment rate of â‰¥ 85% from February 2025 to June 2025. Exclusion criteria include discharge patients who are ambulatory to our outpatient pharmacy, not under isolation precautions, and who are prescribed controlled substances, large bulk medications, or medications on the â€œdo not tubeâ€list as per UMH policy. Data analysis is currently in progress. Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Define the key metrics (e.g. fulfillment rates, delivery volumes) to evaluate the effectiveness of the P-tube system and its impact on UMHS Meds-to-Beds Program.

Recognize factors that contribute to delays in Meds-to-Beds delivery.

Self Assessment Questions:

Which of the following factors could impact the Meds-to-Bed program delivery wait times ?

A. Availability of staff

B. Insurance billing issues

C. Delays in discharge orders

D. All the above

What is the target fulfillment rate for MiRx Express consult request for the duration of the study?

A. 0.7

B. 0.85

C. 0.9

D. 1

Q1 Answer: D Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-748-L04-P

Comparison of Exposures to Antihistamines With and Without Anticholinergic Activity Reported to Poison Centers

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Purpose: Antihistamines are widely used and readily available medications in the United States. While they can be grouped into the same class mechanistically, the side effect profile can differ significantly between individual medications. For example, all first-generation antihistamines cause sedation, but frequency and severity of tachycardia, urinary retention, flushing, decreased bowel motility, and mydriasis vary depending on potency of muscarinic acetylcholine antagonism, and diphenhydramine is uniquely associated with seizures, EKG interval prolongations, and dysrhythmias in poisoning. This study was designed to determine if antihistamines without significant antimuscarinic effects can be managed differently from more potent agents.

Methods: This was a retrospective observational study comparing exposures to antihistamines with and without antimuscarinic activity reported to Americaâ€™s Poison Centers. We requested all single-agent exposures to hydroxyzine, meclizine, and first-generation antihistamines, as well as selected second-generation antihistamines as a control group, reported to the National Poison Data System (NPDS) from January 1, 2018, to December 31, 2023. Cases were grouped into an anticholinergic group, an antihistamine group, and a control group (second-generation antihistamines). Cases without specified age, cases not followed to a known outcome, and medications that could not be accurately grouped into one of the three cohorts were excluded. Reported substances were grouped into an anticholinergic group, an antihistamine group, and a second-generation antihistamine group were included as a control. Standard NPDS definitions were used for analysis of CNS depression, hemodynamic dysfunction, cardiac dysfunction, and medical outcome. The primary endpoint was the incidence of mechanical ventilation in each medication group. Secondary outcomes included seizures, CNS depression, hemodynamic dysfunction, cardiac dysfunction, and hallucinations.

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

Learning Objectives:

Identify the toxicities of hydroxyzine, first-generation antihistamines, and second-generation antihistamines.
Discuss the trends of mechanical ventilation seen with varying antihistamines.

Self Assessment Questions:

Which antihistamine would exhibit the most severe toxic effects if ingested in a large quantity?
A. Loratadine
B. Diphenhydramine
C. Hydroxyzine
D. Meclizine

Based on this study, which of the following statements is most correct?
A. Diphenhydramine was associated with higher rates of mechanical ventilation than hydroxyzine.
B. Loratadine was associated with higher rates of mechanical ventilation than hydroxyzine.
C. Hydroxyzine was associated with the lowest rates of mechanical ventilation for all drugs analyzed.
D. Hydroxyzine was associated with higher rates of mechanical ventilation than diphenhydramine.

Q1 Answer: B Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-564-L01-P

Evaluation of Intravenous Heparin-Dosing Protocols in Obese Patients

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Purpose:
Weight-based dosing of intravenous unfractionated heparin (IVUH) is the standard of care. Although under-represented in literature, obese patients likely have increased volume of distribution and higher IVUH dosing requirements. Previous studies have demonstrated improved outcomes when therapeutic activated partial thromboplastin time (aPTT) is achieved within 24 hours of initiation in venous thromboembolism and 48 hours in acute coronary syndromes. Most IVUH nomograms have maximum starting rates, which may under-dose patients who are obese, delaying time to therapeutic goals. This study aims to evaluate existing heparin dosing protocols at the Detroit Medical Center and determine optimal dosing strategies in obesity.
Methods:
This will be a retrospective chart review conducted at four university-affiliated hospitals between January 2021 and January 2025. Patients will be included if they are 18-89 years of age, on IVUH for at least 24 hours, and being treated for venous thromboembolism, cardiac thrombus, valve replacement, acute coronary syndromes, atrial fibrillation/flutter, or peripheral arterial disease. Exclusion criteria will include IVUH dosed by physician or for any other indication, pregnancy/lactation, and prisoners. The study group of morbidly obese patients will include those with a body mass index (BMI) > 40 kg/m2 or a total body weight (TBW) > 150 kg. The primary outcome will be dose required to achieve first target aPTT or anti-factor Xa (aXa) in all patients based on TBW, adjusted body weight, and BMI. Secondary endpoints will include time to first and second therapeutic aPTT/aXa level, percent of patients reaching target within 24 hours of initiation, achievement of therapeutic aPTT/aXa while on IVUH, number of dose adjustments and boluses, bleeding events, and thrombotic events.
Results/Conclusions:
Results and conclusions will be presented at the 2025 Great Lake Pharmacy Residents Conference.

Learning Objectives:
Describe the effects of obesity on the pharmacokinetics and pharmacodynamics of IV unfractionated heparin
Recognize the potential risks of delayed achievement of therapeutic activated partial thromboplastin time (aPTT) or anti-factor Xa level (aXa)
Self Assessment Questions:
What effect does obesity have on the volume of distribution of IV unfractionated heparin?
A. Increases volume of distribution due to increased blood volume
B. Does not change volume of distribution
C. Decreases volume of distribution due to decreased blood volume
D. Increases volume of distribution due to decreased blood volume

Which of the following outcomes have been reported when therapeutic aPTT/anti-factor Xa level is achieved quicker?
A. Decrease in recurrent venous thromboembolism when achieved within 24 hours in venous thromboembolism
B. Decrease in recurrent cardiovascular events when achieved within 48 hours in acute coronary syndrome
C. Decreased bleeding events when achieved within 24 hours in venous thromboembolism
D. All of the above
Q1 Answer: A Q2 Answer: D
APCE Universal Activity Number 0121-9999-25-654-L01-P

T2Bacteria Versus Standard of Care Impact on Antimicrobial Prescribing
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Purpose: In recent years, there has been an increase in rapid diagnostic technology within microbiology laboratory departments across the United States. These rapid diagnostic tools allow laboratories, in partnership with antimicrobial stewardship teams, to optimize therapy sooner via quicker pathogen identification, susceptibility testing, and/or screening for specific resistance genes. T2BacteriaÂ® is currently the only culture independent, whole blood, rapid diagnostic tool approved by the Food and Drug Administration (FDA). The objective of this study was to assess if T2BacteriaÂ® had an impact on antimicrobial prescribing practices compared to microbiology laboratory standard of care in a real-world setting.

Methods: This was a multi-site, retrospective, observational cohort study of adult patients with positive blood cultures admitted to a study facility between July 1, 2021, through July 31, 2024. Patients were excluded if they were pregnant or incarcerated, grew a pathogen deemed a contaminant by the microbiology laboratory, had a viral or fungal co-infection, or had a polymicrobial infection. The primary outcome of this study was time to antimicrobial change from index culture, and whether that change was an escalation or de-escalation. Secondary outcomes included hospital length of stay, intensive care unit length of stay, and all-cause hospital mortality.

Results/Conclusion: Final results and conclusions to be shared at the 2025 Great Lakes Pharmacy Resident Conference.

Conflict of Interest Statement: Madison N Milby, Ashley L Ross, and Audry M Hawkins have received financial compensation from T2Biosystems in exchange for presenting at their panel during ID Week. Carlee S Berry has no conflicts of interest to disclose.

Learning Objectives:

Describe the role of rapid diagnostic tests in microbiology laboratories.

Identify potential benefits of culture independent rapid diagnostics for antimicrobial stewardship practices.

Self Assessment Questions:

All of the following, except _____, are roles that rapid diagnostic tests can serve in a microbiology laboratory blood culture processing.

A. Rapid pathogen identification

B. Identification of resistance genes

C. Automated susceptibility testing

D. Provide optimal antimicrobial selection

Which of the following is a potential benefit of culture independent rapid diagnostic tests?

A. Rapid pathogen identification following culture growth

B. Shorter time to an optimized antimicrobial regimen

C. Increase in hospital length of stay

D. Decrease the number of blood cultures ordered

Q1 Answer: D Q2 Answer: B

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Risk Factors for Infection with T-cell Directed Therapies for Lymphoma

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Purpose: The use of T-cell directed therapies, including chimeric antigen receptor (CAR) T-cell therapy and bispecific antibodies (BsAbs), have transformed the treatment landscape of relapsed/refractory non-Hodgkinâ€™s lymphoma. With the growing use of T-cell directed therapies in the relapsed setting and the potential use of these agents earlier in the treatment paradigm, it is important to consider toxicities such as infection risk. The purpose of this study is to describe the risk factors for infection in patients receiving T-cell directed therapies.

Study Design: This is a single center, retrospective, case-case-control study. The primary endpoint is to determine risk factors for infection in patients receiving T-cell directed therapies. The secondary endpoints include time to infection, type of infection, and outcomes of infection.

Methods: Adult patients aged 18 years or older who received treatment with either CAR T-cell therapy or at least one dose of a bispecific antibody at the University of Michigan will be included in this study. Patients must have a diagnosis of non-Hodgkinâ€™s lymphoma with at least 30 days follow up after receiving a T-cell directed therapy. Exclusion criteria include patients receiving immunosuppressive therapy for solid organ transplant and patients with HIV or AIDS. The case-case-control design will qualitatively analyze two separate case-control analyses, which will compare patients with severe infection (case 1) and those with mild to moderate infection (case 2) to those without infection (control). Infection will be graded using CTCAE version 5. Descriptive statistics will be used to describe patient demographics and disease characteristics. A chi-square test or Fisher's exact test will be used to evaluate dichotomous variables, and continuous variables will be analyzed using Student's t-test or Mann-Whitney U test. A multivariable logistic regression analysis will be performed to evaluate risk factors for infection.

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

Learning Objectives:

Describe T-cell directed therapies in non-Hodgkin lymphoma (NHL)

Discuss the limitations of T-cell directed therapies

Self Assessment Questions:

Which of the following best describes the function of T-cell engager therapy in the treatment of non-Hodgkin lymphoma?

A. It acts by directly inducing apoptosis in lymphoma cells through DNA damage

B. It directly targets and kills lymphoma cells by binding to CD30

C. It facilitates the interaction between T-cells and lymphoma cells by simultaneously binding to CD3 on T-cells and CD20 on lymphoma cells

D. It uses antibody-drug conjugates to deliver cytotoxic agents to lymphoma cells

Which of the following are limitations associated with both CAR T-cell therapy and bispecific T-cell engagers?

A. Increased risk of infection

B. Risk of cytokine release syndrome

C. Development of Immune Effector Cell-Associated Neurotoxicity Syndrome

D. All of the above

Q1 Answer: C Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-571-L01-P

Safety and Efficacy of a Subcutaneous Insulin Protocol for Management of Diabetic Ketoacidosis (DKA) at Detroit Medical Center (DMC)

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Purpose: Diabetic ketoacidosis (DKA) is a severe and potentially fatal complication of diabetes which remains a tremendous healthcare burden in the United States. In comparison to intravenous insulin, recent studies have demonstrated the non-inferiority of a subcutaneous insulin protocol in managing mild-to-moderate DKA. Advantages of this approach include ease of administration, less frequent monitoring, and less potential for titration errors. An evidence-based subcutaneous insulin protocol was subsequently implemented across three DMC facilities in June 2023. This study aims to evaluate the safety and efficacy of the DMC-implemented subcutaneous insulin protocol compared to the traditional intravenous insulin infusion regimen for mild or moderate DKA patients.

Methods: This is a retrospective, multi-center chart review of patients aged 18 years or older who presented to any of three DMC hospitals with mild or moderate DKA between June 6, 2022 and September 6, 2024. All patients received either the subcutaneous insulin protocol or traditional insulin infusion protocol. Patients who were under 18 years old, pregnant, incarcerated, taking sodium-glucose co-transporter-2 (SGLT2) inhibitors, diagnosed with hyperosmolar hyperglycemic state (HHS), admitted to the intensive care unit (ICU), admitted less than 24 hours, or missing medical records will be excluded. DKA severity will be assessed. Patient demographics, pertinent lab values, time to DKA resolution (hours) and length of stay (days) will be collected from the electronic medical record system. The primary endpoint will be the difference in median time to DKA resolution defined as any two of the following: venous pH >7.3, anion gap < 12 or serum bicarbonate > 15. Secondary outcomes will include number of hypoglycemic events, number of ICU transfers, and hospital length of stay.

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

Learning Objectives:

Discuss safety and efficacy of traditional and non-traditional treatment approaches to DKA.

Review clinical monitoring parameters associated with the resolution of DKA.

Self Assessment Questions:

NM is a 75yo, 110 lb male presenting to the ED with moderate DKA. What is the initial subcutaneous insulin regimen NM should receive?

A. Insulin lispro 15 units SUBQ x1, followed by sliding scale insulin

B. Insulin lispro 30 units SUBQ x1, followed by sliding scale insulin

C. Insulin glargine 7.5 units SUBQ x1, followed by sliding scale insulin

D. Insulin levemir 6 units SUBQ BID, followed by sliding scale insulin

In which scenario would NM meet criteria to de-intensify therapy?

A. Blood glucose decreasing and CO2 20 mEq/L, venous pH 7.35, AG 10 mEq/L

B. Blood glucose decreasing and CO2 18 mEq/L, venous pH 7.22, AG 20 mEq/L

C. Blood glucose decreasing and CO2 22 mEq/L, venous pH 7.35, AG 8 mEq/L

D. A and C

Q1 Answer: A Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-538-L01-P

Comparison of cefoxitin versus cephalosporin plus metronidazole for surgical site infection rates in colon surgery

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Purpose:

Colon surgeries are common procedures which many individuals undergo in the United States. Unfortunately, in some cases, surgical site infections develop shortly after the surgery is complete leading to increased complications such as higher rates of intensive care unit admissions, morbidity, and mortality. Thus, antibiotic prophylaxis is utilized to prevent an infection from occurring. Currently, at the IU Health Academic Health Center, the antibiotic regimens include cefoxitin alone, ceftriaxone plus metronidazole, or cefazolin plus metronidazole. The purpose of this research study is to evaluate which antibiotic regimen is superior in preventing surgical infections from occurring after colon surgery, with the hope that it may further lead to standardization of perioperative antibiotic therapy.

Methods:

This research project is a retrospective, cohort study which will include patients who underwent colon surgery from July 2019 â€“ July 2024 at academic hospitals. This trial will compare outcomes in patients receiving cefoxitin versus those receiving a cephalosporin (cefazolin or ceftriaxone) plus metronidazole for prophylaxis. The inclusion criteria for this study will be individuals who are 18 years of age or older and have undergone colon surgery. The primary endpoint for this study will be the incidence of surgical site infections within 30 days post-colon surgery. The secondary endpoints will include occurrence of clostridium difficile infections, bacteremia, re-operation rates during admission, and the overall length of stay.

Results & Conclusion:

Currently, the data collection is in process. Once the data is fully collected, a conclusion will be determined. All appropriate findings will be presented at the Great Lake Pharmacy Residency Conference in April 2025.

Learning Objectives:

Describe the importance of managing surgical site infection prevention to lower overall healthcare complicationsÂ

Identify the different antibiotic regimens utilized for surgical site infection prophylaxis in colon surgery to determine the most effective and safe antibiotic(s)

Self Assessment Questions:

Per CDC, within what time frame will surgical site infections occur?

A. 10 days after surgery

B. 15 days after surgery

C. 30 days after surgery

D. 60 days after surgery

Approximately, what percentage of all surgical procedures in the U.S. result in the development of a surgical site infection?

A. 0.1

B. 15-20%

C. 2-4%

D. 0.3

Q1 Answer: C Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-577-L01-P

The Transition from Adalimumab to a Biosimilar for the Treatment of Crohn's Disease, Ulcerative Colitis, Rheumatoid Arthritis, and Plaque Psoriasis

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Purpose: Adalimumab is a biologic that is FDA approved for the treatment of a variety of autoimmune conditions due to its efficacy and safety. As a result of its patent protection expiring, several biosimilars have since launched on the market, bringing more cost-effective treatment options to patients. Pharmacy Advantage is the Henry Ford Health mail-order specialty pharmacy that focuses on providing patient care for complex disease states. At Pharmacy Advantage, the biologic prescription process is a demanding workflow that requires several steps and proper documentation from providers, pharmacists, technicians, and patients in order to grant approval from the insurance company. These findings will be used to determine intervention opportunities for the Pharmacy Advantage biologic prescription process. The purpose of this study is to identify the time it takes for clinically stable patients on adalimumab to get established on biosimilar therapy. Methods: This is an IRB-approved retrospective cohort study; patients who achieved clinical stability for a minimum of 6 months between January 1st, 2023 to December 31st, 2024 and were prescribed adalimumab therapy for the treatment of Crohnâ€™s Disease, Ulcerative Colitis, Rheumatoid Arthritis, or Plaque Psoriasis were screened for the study. Patients included will be patients aged > 18 years, switched to a biosimilar for a minimum of 6 months, prescribed by a Henry Ford Health provider, and medication dispensed through Pharmacy Advantage. The primary outcome will be the duration from the time Pharmacy Advantage receives the biosimilar prescription to the time the medication is ready for delivery. Secondary outcomes include the time required for a prior authorization approval, financial assistance, medication-in-hand, percentage of patients with worsening disease and discontinuation of their biosimilar. Categorical variables will be analyzed using Chi-square or Fishers Exact Test. Descriptive data will be determined by mean, median, mode, and percent. Results/Conclusions: To be Presented.

Learning Objectives:

Identify the current adalimumab biosimilars on the market.

Review the current guidelines regarding the treatment of Crohn's Disease, Ulcerative Colitis, Rheumatoid Arthritis, and Plaque Psoriasis.

Self Assessment Questions:

T/F: Currently, there are only two adalimumab biosimilars on the market

A. TRUE

B. FALSE

C. N/A

D. N/A

T/F: According to the current clinical guidelines, adalimumab is recommended as first-line therapy for the treatment of Crohnâ€™s Disease, Ulcerative Colitis, Rheumatoid Arthritis, and Plaque Psoriasis

A. TRUE

B. FALSE

C. N/A

D. N/A

Q1 Answer: B Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-736-L01-P

Use of Inhaled Corticosteroid (ICS) and Formoterol Combination Inhalers as Asthma Reliever Medication at a Safety Net Health System

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Purpose: The Global Initiative for Asthma (GINA) guidelines now recommend using low-dose inhaled corticosteroid (ICS)-formoterol as the preferred reliever medication over short-acting beta agonists (SABA). ICS-formoterol has been shown to reduce the risk of severe asthma exacerbations. However, factors such as lack of education, insurance restrictions, and financial barriers may hinder providers from adopting this new regimen. This study aims to evaluate the prescribing practices of ICS-formoterol as a reliever medication in a safety-net health system.

Methods: This single-center, retrospective study will be conducted at John H. Stroger Jr. Hospital of Cook County. Patients will be identified through outpatient pharmacy records from July 1, 2023, to December 31, 2023. Data will be gathered via chart review. Inclusion criteria are patients aged 12 or older with a diagnosis of asthma, while patients with a diagnosis of Chronic Obstructive Pulmonary Disease (COPD) will be excluded. The primary objective is to quantify the number of ICS-formoterol prescriptions written as reliever therapy, defined as a prescription with PRN or as-needed instructions, or a progress note indicating reliever use. Secondary outcomes include the frequency of GINA guideline-preferred maintenance regimens, the rate of co-prescribing of SABA, and the proportion of days covered by SABA and ICS-formoterol over the 6-month study period. Additional data collected will include patient demographics (age, sex, race), asthma severity, comorbid conditions, therapy regimens, ICS-formoterol prescription details, insurance type, prescribing service, and external fill history. Descriptive statistics will be used for data analysis. Data collection and analysis is ongoing.

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

Learning Objectives:

Discuss the role of ICS-formoterol inhalers in asthma management as both maintenance and reliever therapy

Explain factors preventing ICS-formoterol from being prescribed as reliever therapy

Self Assessment Questions:

What is the primary benefit of using ICS-formoterol as a reliever medication for asthma?

A. It provides immediate relief of symptoms while also reducing airway inflammation

B. It is only effective in treating exercise-induced asthma

C. It works as a long-term control medication with no acute symptom relief

D. It is a steroid-free medication, making it a safer option for long-term use

Which of the following might discourage healthcare providers from prescribing ICS-formoterol as reliever therapy?

A. Concerns about patient misuse due to confusion between maintenance and rescue roles

B. The need for frequent dosing

C. Its effectiveness in only severe asthma cases

D. Availability of other equally effective, lower-cost alternatives

Q1 Answer: A Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-629-L01-P

Impact of Initial Parenteral Anticoagulation on DOAC Loading Dose for Acute VTE: Multicenter Study - Whitney Anderson

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Purpose: Venous thromboembolism (VTE), including both deep vein thrombosis (DVT) and pulmonary embolism (PE) impacts 900,000 patients annually, and accounts for 100,000 deaths each year. The preferred treatments indicated for VTE are Direct Oral Anticoagulants (DOACs), including apixaban and rivaroxaban. Manufacturer labeling states apixaban requires an initial lead-in dose of 7 days while rivaroxaban requires that of 21 days due to heavy recurrence of VTE within the first six months. When patients receive therapeutic parenteral anticoagulation prior to starting either DOAC, prescribers may alternatively decide to waive or reduce these lead-in doses. Some literature shows there being no difference in recurrent ischaemic events in patients receiving therapeutic heparin plus DOAC lead-in overlap versus those patients receiving no lead-in dose at all. However, current literature is underpowered, not generalizable, and lacks sufficient evidence. The purpose of this study is to evaluate the safety and efficacy of subtracting the number of days of parenteral anticoagulation from the lead-in dosing of DOACs compared to administering the full lead-in dose regardless of a prior duration of parenteral anticoagulation. Methods: This multi-center, retrospective cohort studied adult patients (>18 years old) admitted to the hospital with a newly diagnosed VTE and a receipt of both parenteral anticoagulation for at least 24 hours and either apixaban or rivaroxaban from January 1, 2017 to March 31, 2024. Patients were excluded due to receipt of therapeutic anticoagulation prior to admission as well as bleeding on admission. The primary composite outcome was time to recurrence of VTE within 6 months from index admission. Secondary outcomes included major bleed, clinically relevant nonmajor bleed, re-hospitalization for a VTE event, hospital length of stay and mortality within 6 months. Results/ Conclusions: Data analysis is currently in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Define the current manufacturer labeling for VTE dosing of apixaban and rivaroxaban.

Recall the distinction in recurrent ischaemic events in patients with and without DOAC lead-in dosing.

Self Assessment Questions:

According to the manufacturer labeling, what is the optimal lead-in dosing regimen of apixaban and rivaroxaban for new onset VTE?

A. Apixaban 20mg PO BID x7 days; Rivaroxaban 5mg PO daily x21 days

B. Apixaban 10mg PO BID x7 days; Rivaroxaban 15mg PO BID x21 days

C. Apixaban 5mg PO BID x7 days; Rivaroxaban 20mg PO BID x21 days

D. Apixaban 10mg PO BID x21 days; Rivaroxaban 15mg PO BID x7 days

Based on current literature, what is the expected risk of recurrent ischaemic events in patients receiving DOAC lead-in therapy compared to receiving no lead-in therapy?

A. Increased risk of recurrent VTE in those receiving lead-in doses.

B. Increased risk of recurrent VTE in those receiving no lead-in doses

C. No difference between the two groups.

D. Decreased risk of recurrent VTE in those receiving lead-in doses.

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-804-L01-P

Implementation of a Pharmacist-Lead Warfarin Management Guideline in Pediatric Patients

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Purpose: The utilization of anticoagulation in pediatric patients is rising due to the expansion of cardiac procedures and interventions for patients with congenital heart disease. While use of direct oral anticoagulants (DOAC) is climbing, they are not recommended or proven effective for all indications. Warfarin remains a reliable anticoagulant for the treatment and prevention of thromboembolic events in children unable to receive a DOAC. American Family Childrenâ€™s Hospital (AFCH) has recently implemented ventricular assist device program; therefore, it is predicted that the inpatient use of warfarin will rise. Although historically prevalent, management of warfarin presents many challenges in the pediatric setting. The primary objectives of this research project are to evaluate the current safety and efficacy of warfarin in the inpatient pediatric population, assess pharmacist satisfaction and comfortability dosing warfarin, create a pediatric guideline and pharmacist delegation protocol for warfarin management, and assess outcomes of the implemented protocol. Methods: Data was collected on all admitted pediatric patients receiving warfarin between January 1, 2018, and August 31, 2024. Data collection has evaluated the percentage of international normalized ratios (INR) within range, incidence of bleeding and clotting events, need for anticoagulation reversal, and relevant drug and food interactions. A survey was sent out via email to pediatric pharmacists at the institution. A guideline and delegation protocol were created with the assistance of cardiology providers. Preliminary results to support conclusion: Currently only 25.3% of inpatient INRs are within target range at AFCH between January 1, 2018, and August 31, 2024, with two patients requiring anticoagulation reversal. In the current state, pediatric pharmacists feel somewhat comfortable with warfarin management but face some barriers. Conclusions: Dosing and managing warfarin continue to present challenges in the pediatric setting, highlighting the need for pharmacist-driven management which may increase safe and successful use of anticoagulation with warfarin.

Learning Objectives:

Identify key factors in the pediatric setting that may complicate the dosing and management of warfarin.

Recognize the benefits of implementing a pharmacist driven pediatric warfarin guideline and delegation protocol.

Self Assessment Questions:

Which of the following are factors that may affect the sensitivity and variability of stable anticoagulation with warfarin in a pediatric patient?

A. Age 6 months or less

B. Continuous Enteral Tube Feeds

C. Transitioning from breast feeding to a solid food diet

D. All of the above

What benefits could be observed following the implementation of a pharmacist-led warfarin delegation protocol?

A. Increased percentage of INRs with the target range

B. Decreased safety with pharmacists dosing warfarin

C. Consistent documentation leading to improved pharmacist and provider satisfaction

D. A & C

Q1 Answer: D Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-647-L01-P

Evaluation of Erythropoiesis-Stimulating Agents as a Blood Transfusion-Sparing Measure in Acutely Injured Jehovah's Witness Trauma Patients

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Purpose:
Trauma patients often require blood transfusions for acute blood loss anemia; however, Jehovah's Witness (JW) patients may refuse blood transfusions due to religious beliefs. Clinical guidelines emphasize blood conservation strategies, including intraoperative cell salvage and synthetic blood substitutes. Erythropoiesis-stimulating agents (ESA), including epoetin alfa and darbepoetin alfa, stimulate red blood cell production and may be used as salvage therapy to manage acute bleeding. A paucity of data exists for ESA use in acute anemia from trauma. The purpose of this study is to evaluate treatment with ESA versus no ESA in acutely injured JW patients.

Methods:
This retrospective cohort study includes adult JW patients admitted to an academic medical center (level 1 trauma center) or affiliated community hospital (level 3 trauma center) with acute traumatic injury between January 2013 to July 2024. Patients receiving at least one dose of ESA during admission will be classified in the ESA group. The primary outcome will compare hemoglobin nadir from baseline between the ESA versus no ESA groups. Secondary outcomes will compare mortality, time to hemoglobin nadir, hemoglobin recovery from nadir, clinical anemia symptoms, and cardiovascular events between groups. A subgroup analysis will investigate optimal ESA dose and duration. A multivariate logistic regression analysis will be performed to identify independent factors associated with hemoglobin recovery.

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

Conclusions:
Findings from this study will provide insight into the role of ESAs in JW patients with acute traumatic injuries. This research may inform clinical decision-making and optimize transfusion-sparing protocols for this patient population.

Learning Objectives:

Describe the role of ESAs in managing acute anemia.

Discuss current literature regarding erythropoietin stimulating agents in acute anemia and trauma for Jehovah's Witness patients

Self Assessment Questions:

Which of the following is the mechanism of action of ESAs?

A. Induces erythropoiesis by stimulating the division and differentiation of committed erythroid progenitor cells

B. Inhibits the release of reticulocytes from the bone marrow into the bloodstream, where they mature to erythrocytes

C. Decrease in reticulocyte counts followed by a rise in hematocrit and hemoglobin levels

D. Exerts a destructive effect against hypoxia through its apoptotic action

What would an appropriate treatment plan be for an acutely injured patient with acute anemia who practices JW?

A. Transfusion with RBCs and platelets followed by EPO 300 units/kg/day

B. Erythropoietin 10,000 units SQ every other day

C. Albumin 25 g/day followed by folate 1 mg PO daily

D. Epoetin alfa 300 units/kg/day with iron sucrose 100 mg IV daily

Q1 Answer: A Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-816-L01-P

Evaluation of a Pharmacist Led Urinary Culture Follow-Up After Discharge from the Emergency Department

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Prior to assigning a pharmacist to a decentralized role in the Emergency Department (ED), it had typically been the responsibility of the ED nursing staff and physicians to manage the care of the patient following reported culture results after discharge from the ED. McLaren Greater Lansing decentralized the emergency department pharmacist in January 2024 and noticed the large workload of nursing staff and physicians that led to a gap of care for these patients. This failure to analyze cultures for patients after discharge from the ED in a timely manner led to a delay in patient care. In June 2024, our ED pharmacist had officially taken on the task of culture callback to provide a more standardized approach and timely care for these patients.
Purpose: Identify the specific interventions performed by the ED pharmacist in managing urinary culture follow-up and determine how these interventions address gaps in patient care.
Methods: A sample of patients will be collected from McLaren Greater Lansing from 07/01/2024 to 10/01/2024. Patients will be included if they were discharged from the ED and had a urinary culture performed. Patient data including age, comorbid conditions, culture results including organism and date of collection, and 30-day readmission will be collected. Detailed information about the pharmacist intervention will also be evaluated. Patients were excluded if they were under 18 years old.
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:
Discuss the impact of pharmacist-led interventions on quality of care for patients discharged from the emergency department.
Identify and interpret key components of urinalysis results.
Self Assessment Questions:

In a patientâ€™s urinalysis results, which test indicates whether or not contamination with the skin flora has occurred?
A. White blood cell (WBC) count
B. Nitrites
C. Bacteria
D. Epithelial cells
Which of the following urine culture results would be an appropriate trigger for pharmacist intervention?
A. No growth reported after 48 hours
B. Escherichia coli was identified with resistance to the prescribed antibiotic in a patient with urinary symptoms
C. Cephalexin prescribed on a patient with a history of ESBL UTIs
D. B and C
Q1 Answer: D Q2 Answer: D
APCE Universal Activity Number 0121-9999-25-815-L99-P

Efficacy Of DoxyPEP in A Real-World Clinic Setting: A Retrospective Analysis of STI Prevention Among PLWH and PrEP Users at LifeCare Clinic

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Title: Efficacy Of DoxyPEP in A Real-World Clinic Setting: A Retrospective Analysis of STI Prevention Among PLWH and PrEP Users at LifeCare Clinic

Purpose: The rising incidence of bacterial sexually transmitted infections (STIs) represents a significant public health challenge, particularly among men who have sex with men (MSM) and transgender women. While recent clinical trials have demonstrated the efficacy of Doxycycline Post-Exposure Prophylaxis (DoxyPEP) in controlled settings, real-world effectiveness data remains limited. This study aims to evaluate the implementation and effectiveness of DoxyPEP in reducing bacterial STI incidence among a diverse patient population at LifeCare Clinic, specifically focusing on people living with HIV (PLWH) and those on Pre-Exposure Prophylaxis (PrEP). The findings will provide crucial insights into the practical application of DoxyPEP in routine clinical care.

Methods: This retrospective, single-center chart review will analyze data from approximately 1,600 patients at LifeCare Clinic across two distinct periods: pre-DoxyPEP implementation (11/1/2022 - 9/1/2023) and post-DoxyPEP implementation (11/1/2023 - 9/1/2024). The study population includes both PLWH and individuals on PrEP. The primary endpoint is the comparison of bacterial STI (chlamydia, syphilis, and gonorrhea) incidence between pre- and post-implementation periods. Secondary endpoints include the comparison of STI incidence between DoxyPEP recipients from Methodist Retail Pharmacy and non-recipients in the post-implementation period. Statistical analysis will employ Chi-Square/McNemar tests for categorical variables, and Wilcoxon test for continuous variables. All analyses will be conducted using XLSTAT with a significance level of 0.05 and 95% confidence intervals.

Results: [Pending data collection]

Conclusion: [To be determined based on results]

Learning Objectives:

Describe the demonstrated effectiveness of DoxyPEP in reducing bacterial STIs based on clinical trials among MSM and transgender women

Discuss how bacterial STI incidence rates changed among LifeCare Clinic patients when comparing the pre-implementation period (November 2022 - September 2023) to the post-implementation period (November 2023 - September 2024)

Self Assessment Questions:

What reduction in bacterial STI rates did the DoxyPEP clinical trials demonstrate among individuals who received doxycycline for post-exposure prophylaxis?

A. Greater than 70% reduction in chlamydia, syphilis, and gonorrhea

B. Greater than 50% reduction in chlamydia only

C. Greater than 30% reduction in syphilis only

D. Greater than 20% reduction in gonorrhea only

What is the prescribed DoxyPEP regimen implemented at LifeCare Clinic for bacterial STI prevention?

A. 200 mg doxycycline taken daily for 72 hours

B. 200 mg doxycycline taken within 72 hours of condomless sex

C. 200 mg doxycycline taken weekly as prophylaxis

D. 100 mg doxycycline taken immediately after exposure

Q1 Answer: A Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-668-L01-P

Put a CAP on the Antibiotics: Impact of Transitions of Care Antimicrobial Stewardship Interventions on Discharge Prescriptions for Uncomplicated CAP

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Purpose: The Infectious Disease Society of America (IDSA) guidelines support the use of short course duration (< 6 days) of antibiotics for community acquired pneumonia (CAP). Despite this, patients are commonly prescribed an excessive duration of antibiotics at discharge. The purpose of this study is to evaluate the impact of electronic medical record (EMR) transitions of care (TOC) tools on duration of therapy for uncomplicated CAP.

Methods: This is an IRB approved, quasi-experimental study, being conducted to evaluate adult patients treated for uncomplicated CAP at 5 acute care hospitals. Patients who are discharged on antibiotic therapy between Julyâ€“November 2023 (pre-intervention) and Julyâ€“November 2024 (post-intervention) are included. From Marchâ€“May 2024, the EMR was altered to include total duration of antibiotic therapy when antibiotics are continued at discharge and a feature that permits stop dates entered inpatient to appear in discharge orders if the same antibiotic is prescribed. Patients meeting complicated CAP criteria are excluded. The primary outcome is to compare the proportion of patients who received < 6 days of antibiotic therapy for uncomplicated CAP. Secondary outcomes include comparing 30-day CAP-related readmissions, incidence of Clostridioides difficile infections 30 days after discharge, multidrug-resistant organisms (MDRO) isolated within 90 days of discharge, and days of antibiotic therapy prescribed at discharge. A non-equivalent dependent variable of fluoroquinolone prescribed during the CAP treatment course will be used to assess the standard of care provided. A sample size of 270 patients was calculated using a two-sided Î± of 0.05, Î² of 0.8, and an anticipated effect size of 15% increase in the primary outcome. Chi-square or Fisherâ€™s exact test will be used for categorical variables, as appropriate. Continuous variables will be compared using the Mann-Whitney U test. Statistical significance will be considered if the P-value is <0.05.

Results and Conclusion: To be presented.

Learning Objectives:

Define uncomplicated CAP

Describe the concerns associated with extended durations of antibiotic therapy for uncomplicated CAP

Self Assessment Questions:

According to Michigan Hospital Medication Safety (HMS) Consortium, what type of patients are excluded from being considered uncomplicated CAP?

A. Patients with structural lung disease

B. Patients with mild chronic obstructive pulmonary disease (COPD)

C. Patients with human immunodeficiency virus with a CD4 > 200

D. Patients with a respiratory isolate of MDRO > 5 years ago

What is an adverse event associated with prolonged durations of antibiotic therapy for CAP?

A. Development of COPD exacerbations

B. Clostridioides difficile infection

C. Decreased lung function

D. Enhanced bacterial colonization

Q1 Answer: A Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-578-L01-P

Evaluation of Post-Operative Antibiotic Use in Lower Limb Amputation

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Over 150,000 patients undergo lower extremity amputation in the United States each year, with peripheral arterial occlusive disease, diabetes mellitus, neuropathy, and trauma being common contributing conditions. Amputations have also been used as a source control procedure for infection management. Once these amputations are completed and if no residual infected tissue remains, then it is reasonable to discontinue antibiotics post-operatively. The IDSA/ASHP/SIS/SHEA guidelines for antimicrobial prophylaxis in surgery recommend against using post-operative antibiotics for longer than 24 hours for any surgical procedure. However, these guidelines do not make any recommendations specific to amputations. Currently, there are few studies comparing the need for antibiotics post-amputation, with even fewer focusing on amputations due to infectious causes. The literature evaluating the duration of antibiotic therapy in lower extremity amputations varies and outcomes are inconclusive. The goal of this project is to determine the risk of surgical site infections after lower limb amputation to guide the need for antibiotic use post-operatively at Froedtert Hospital.

This retrospective cohort analysis will include patients at Froedtert Hospital who have undergone lower limb amputation due to infection between June 2019 to June 2024. Patients will be separated into cohorts based on their duration of post-operative antibiotics including a short course of â‰¤ 48 hours or an extended course of > 48 hours. Inclusion criteria will include any patient â‰¥ 18 years old who received an above knee amputation (AKA), below knee amputation (BKA), or above ankle amputation (AAA). Only the index infection will be included in this study. Patients will be excluded if they have a concurrent infection requiring antibiotics, such as bacteremia, or if the presence of prosthetic material/hardware is suspected to be involved in the infection. Data will be collected from electronic medical records and manual chart reviews.

Results in process

Learning Objectives:

Recall the management of disease states that can lead to a lower limb amputation, including diabetic foot infection, peripheral arterial occlusive disease, and neuropathy.

Describe the body of evidence for post-operative duration of antibiotic therapy in lower limb amputations.

Self Assessment Questions:

Which of the following is the recommended duration of therapy per IDSA diabetic foot infection guidelines after amputation if there is no concern for residual osteomyelitis?

A. 3 weeks

B. 7 to 10 days

C. 2 weeks

D. 2 to 5 days

Which of the following most accurately describes the body of evidence surrounding post-operative duration of antibiotic therapy in lower limb amputations?

A. All available literature suggests that there is no benefit in continuing antibiotic therapy following amputation completion.

B. The current literature evaluating the duration of post-operative antibiotic therapy varies and outcomes are inconclusive.

C. There isnâ€™t any available literature evaluating post-operative antibiotic duration following lower limb amputation.

D. The IDSA guidelines recommend that antibiotics should be continued for at least 48 hours post-amputation.

Q1 Answer: D Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-533-L01-P

Antibiotic Prescribing Rate for Viral Respiratory Infections Before and After the Implementation of a Viral Care Package in the Urgent Care Setting

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Antibiotics are often inappropriately prescribed to patients who are diagnosed with a Tier 3 viral respiratory infection such as acute bronchitis, unspecified upper respiratory infections and serous otitis media; diagnoses that never require antibiotics for treatment. The aim of this study was to evaluate antibiotic prescription rates after the implementation a viral care package for patients with Tier 3 respiratory diagnoses at one urgent care in Traverse City, MI.

Approximately 400 viral care packages were made for one Munson urgent care. The viral care packages include common over-the-counter products and were developed into four age-appropriate packages: pediatrics 2-11, pediatrics 12-17, adults 18-64 (safe in pregnancy and lactation), and adults 65+. Viral care packages were dispensed from November 1st, 2024, through approximately January 31st, 2025. The primary outcome of this study is the rate of antibiotic prescriptions in patients diagnosed with a tier 3 viral respiratory infection. The 2023-2024 cold and flu season will be used as the control group. Secondary outcomes will assess the rate of antibiotic prescriptions in all patient encounters and the rate of antibiotic prescriptions within 7 days of receiving a viral care package. Lastly, patient and provider satisfaction of the viral care package will be assessed through a survey.

The rate of antibiotic prescriptions in patients with a Tier 3 respiratory infection during the 2023-24 cold and flu season (October 1st, 2023-April 30th, 2024) compared to the first two months of the 2024-25 cold and flu season (November 1st, 2024 â€“ December 31st, 2024) was 22.1% (272/1,232) vs.17.2% (52/302). As of January 15th, 2025, 317 viral care packages were dispensed. In patients that received a viral care package, 7.7% received an antibiotic prescription within 7-days. Patient and provider surveys will be evaluated at the conclusion of the study. No statistical analysis performed yet.

Learning Objectives:

Identify the factors that may contribute to antibiotic over-prescribing for viral respiratory infections in the outpatient setting

Explain how the implementation of a viral care package at Munson Healthcare is associated with antibiotic prescribing rates for tier 3 viral respiratory infections

Self Assessment Questions:

Which of the following diagnoses is a Tier 3 respiratory infection and never requires treatment with antibiotics?

A. Acute otitis media

B. Acute bronchitis

C. Acute sinusitis

D. Acute mastoiditis

Which of the following factors may contribute to inappropriate antibiotic prescribing for viral respiratory infections?

A. The provider believes the patient is expecting an antibiotic

B. Provider satisfaction

C. Patient satisfaction of their visit to urgent care/primary care

D. Both A and C

Q1 Answer: D Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-845-L99-P

Evaluation of rebound hypotension following discontinuation of norepinephrine or vasopressin in septic shock in a medical intensive care unit

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Purpose: Vasoactive medications are initiated in patients with septic shock that is non-responsive to fluid resuscitation to target a mean arterial pressure (MAP) of 65 mmHg. Current guidelines recommend norepinephrine as the first-line vasopressor with the addition of vasopressin for patients not meeting MAP goals; however, no guidance is provided on the order of vasopressor discontinuation. Previous studies have failed to reach a consensus as to the optimal order of discontinuation. This study evaluated the outcomes of medical intensive care unit (MICU) patients with septic shock on norepinephrine and vasopressin and the incidence of rebound hypotension following the discontinuation of either agent to determine which agent should be discontinued first.

Methods: This was a single-center, multi-site retrospective cohort study of patients with septic shock admitted to the MICU between June 1, 2021, to June 30, 2024. Adult patients with suspected septic shock (ICD-10 R6521) who received norepinephrine and vasopressin for at least 24 hours were included. Patients were excluded if they had concurrent cardiogenic shock receiving dobutamine or milrinone, if norepinephrine and vasopressin were discontinued at the same time, or if they were on additional vasopressors when either norepinephrine or vasopressin were discontinued. Patients were divided into two groups: norepinephrine discontinued first and vasopressin discontinued first. The primary outcome of the study was clinically significant hypotension within 24 hours after discontinuation of the first vasopressor defined as MAP less than 65 mmHg, re-initiation or up-titration of vasopressors, and/or fluid bolus of 500 mL or greater. Secondary outcomes included 28-day mortality and intensive care unit length of stay.

Results: Data collection is ongoing. Results will be presented at the 2025 Great Lakes Pharmacy Resident Conference.

Conclusion: Data collection is ongoing. Conclusions will be presented at the 2025 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review current literature for the discontinuation order of vasopressors in patients with septic shock.

Identify current practice trends within the UofL Health System to determine which agent causes higher rates of rebound hypotension.

Self Assessment Questions:

Which of the following is false about management of patients with septic shock?

A. Norepinephrine is a first-line vasopressor

B. Mean arterial pressure should be at least 65 mmHg to provide adequate tissue perfusion

C. Vasopressin is recommended by Surviving Sepsis Guidelines to be the first vasopressor discontinued

D. Hydrocortisone is recommended by Surviving Sepsis Guidelines if there is an ongoing requirement for vasopressors

Which of the following about vasopressin is true?

A. Vasopressin has vasodilatory effects by acting on V1 receptors in vascular smooth muscle

B. Vasopressin has a half-life of around 15 minutes

C. In patients with hypotension, vasopressin levels would normally be low to compensate

D. Vasopressin deficiency occurs as physiologic levels drop around 24-48 hours as shock continues

Q1 Answer: C Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-657-L01-P

Optimizing Continuous Albuterol Dosing Amid Shortage

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Statement of Purpose

To evaluate the impact of a reduced-dose continuous albuterol nebulization protocol on patients under 2 years of age diagnosed with bronchiolitis in the Pediatric Intensive Care Unit (PICU) during the nationwide albuterol shortage.

Statement of Methods Used

A single-center, retrospective chart review was conducted, including admissions from January 2021 through June 2023. The study focused on patients under 2 years of age admitted to the PICU with a diagnosis of respiratory failure or bronchiolitis who received continuous albuterol nebulization as part of their treatment plan. Data collection included demographics, duration of albuterol nebulization, hospital and ICU stay, and adverse events.

Summary of (Preliminary) Results to Support Conclusion

A total of 20 patients were included in the preliminary study, with 15% started on a reduced dose of continuous albuterol nebulization. Only one patient required escalation to the standard dose of 1 mg/mL after initially starting at 0.5 mg/mL. All patients experienced tachycardia, a known side effect of albuterol. Preliminary data suggest that the reduced-dose protocol did not result in a significant increase in adverse events compared to standard dosing. The average duration of continuous albuterol nebulization was 28.9 hours, with a hospital stay averaging 5 days and ICU stay averaging 3 days.

Conclusions Reached

The implementation of a reduced-dose continuous albuterol nebulization protocol for patients under 2 years of age diagnosed with respiratory failure does not result in a significant increase in adverse events compared to standard dosing. This approach may improve resource allocation and minimize potential side effects while maintaining high standards of care in critically ill pediatric patients.

Learning Objectives:

Recognize the clinical implications of reduced-dose continuous albuterol nebulization in pediatric patients with bronchiolitis.

Identify the safety and efficacy of reduced-dose albuterol nebulization compared to standard dosing in a PICU setting.

Self Assessment Questions:

What was the primary side effect experienced by all patients in the study?

A. Hypotension

B. Tachycardia

C. Bradycardia

D. Hypertension

Which of the following outcomes would be most important in evaluating the efficacy of reduced-dose albuterol nebulization in the PICU for infants with bronchiolitis?

A. Decreased need for sedation

B. Improvement in respiratory distress and oxygen saturation

C. Increased frequency of nebulizer treatments

D. Faster recovery from viral infections

Q1 Answer: B Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-521-L01-P

Neostigmine and Glycopyrrolate versus Sugammadex for Neuromuscular Blocking Agent reversal: A single center retrospective comparison of efficacy

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Purpose:
Neostigmineâ€™s onset of action is roughly 10-30 minutes, used parenterally for neuromuscular blockade reversal. Sugammadex is a selective agent designed for rapid reversal of rocuronium or vecuronium with an onset of about three minutes. Neostigmine has fallen out of favor for routine reversal due to the reported efficacy, safety profile and ease of use of sugammadex. Sugammadex potentially has increased predictability, faster reversal, lower risk of bradycardia, bowel evacuation, residual paralysis or respiratory failure requiring reintubation, but is more costly. The aim of this study is to determine post-operative outcome differences between neostigmine and sugammadex used for NMBA reversal.
Methods:
A retrospective cohort study was conducted at a 433-bed community hospital in Lexington, Kentucky. Included patients were admitted between January 01, 2023 to October 01, 2024, have received rocuronium or vecuronium for intraoperative neuromuscular blockade, and have been administered neostigmine with glycopyrrolate or sugammadex for steroidal non-depolarizing neuromuscular blockade reversal. Exclusion criteria included age less than 18 years old, intubation prior to surgery, undergoing procedures with expected continuation of mechanical ventilation post-operatively, pregnancy, patients undergoing renal replacement therapy, requiring rocuronium or vecuronium for rapid sequence intubation or in the treatment of acute respiratory distress syndrome, or receiving neuromuscular blockade with agents other than rocuronium or vecuronium. The study was composed of two groups, patients who received neostigmine and glycopyrrolate for neuromuscular blockade reversal and patients who received sugammadex for the same indication. Data collection was collected using Epic electronic health record. The primary outcome was time from neuromuscular blockade reversal to post-anesthesia care unit discharge. Secondary outcomes were airway status and adverse events including hypotension or bradycardia at PACU discharge, and time from anesthesia end to bowel movement.
Results/Conclusion:
Data analysis is currently in progress and will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify potential side effects of both Sugammadex and Neostigmine.

State the method of action of both Sugammadex and Neostigmine.

Self Assessment Questions:

Which of the following is the reason Neostigmine is used with glycopyrrolate?

A. Because neostigmine is a selective relaxant binding agent and can cause hypotension and bradycardia, which glycopyrrolate combats.

B. Because neostigmine is a selective relaxant binding agent and can cause hypertension and tachycardia, which glycopyrrolate combats.

C. Because neostigmine is an acetylcholinesterase inhibitor and can cause hypotension and bradycardia, which glycopyrrolate combats.

D. Because neostigmine is an acetylcholinesterase inhibitor and can cause hypertension and tachycardia, which glycopyrrolate combats.

Which of the following describes how sugammadex works to reverse anesthesia?

A. It is a modified gamma cyclodextrin that forms a complex with any non-depolarizing NMBA to reduce the amount of agent available to bind to nicotinic receptors in the neuromuscular junction.

B. It is a modified gamma cyclodextrin that forms a complex with rocuronium or vecuronium to reduce the amount of agent available to bind to nicotinic receptors in the neuromuscular junction.

C. It inhibits acetylcholine destruction facilitating transmission of impulses across the myoneural junction.

D. It inhibits acetylcholine destruction facilitating transmission of impulses across the myoneural junction.

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-551-L01-P

Optimizing Awareness: Effective Strategies for Educating Reproductive-Aged Individuals on Pharmacist-Prescribed Contraception in Indiana

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Purpose: Unintended pregnancy rates in the United States have been declining, yet remain high, particularly in Indiana. Over the past decade, more than half of U.S. states have passed laws allowing pharmacists to prescribe hormonal contraception to help overcome access barriers for individuals who can become pregnant. Despite recent legislation allowing pharmacists to prescribe self-administered hormonal contraception in Indiana, many pregnancy-capable individuals remain unaware of this service. The purpose of this project is to explore the most desirable strategies for educating pregnancy-capable people in Indiana about the availability of pharmacist-prescribed birth control, with the aim of enhancing education, awareness, and accessibility of these contraceptive options. By increasing access to these services, this project seeks to help prevent unwanted or mistimed pregnancies and improve reproductive health outcomes.
Methods: Up to eight virtual focus group sessions will be conducted with a total of up to 40 participants aged 18-44 years of age who can read and speak either English or Spanish and are capable of becoming pregnant. A focus group guide will be used to facilitate discussions and ensure consistency. The Social Marketing Theory will serve as the framework for developing questions and analyzing data. This theory emphasizes how to best present important information and incorporates the 4 Pâ€™s (Product, Price, Place, and Promotion). The focus group guide items will seek to identify themes related to the most effective ways to inform and educate pregnancy-capable individuals about the services and types of birth control that pharmacists in Indiana can prescribe. All focus groups will be transcribed, deidentified, and translated by InfraWare. The transcripts will be analyzed using inductive thematic analysis via Dedoose.
Results/Conclusions: Data collection and analyses are currently in progress. Initial results and conclusions will be shared at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

List the types of hormonal contraceptives pharmacists in Indiana can prescribe.

Identify the challenges or barriers that individuals who can become pregnant might encounter when trying to access reproductive health care.

Self Assessment Questions:

According to the standing order implemented in September 2023, pharmacists in Indiana can prescribe all of the following types of hormonal contraceptives except:

A. Pills

B. Patches

C. Intrauterine Device (IUD)

D. Rings

Which of the following is a common challenge pregnancy-capable individuals may face when accessing reproductive health care?

A. Available providers

B. Lack of access of health insurance

C. Low cost

D. Education on the various types of birth control

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-851-L99-P

Perioperative Pharmacist Intervention in Surgical Pain Management: Total Knee Arthroplasty and Total Hip Arthroplasty

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Amid the ongoing opioid epidemic, it is essential to implement risk mitigation strategies. Previous studies have indicated that pre-operative education leads to reduction in opioid use post-operatively, however there are not studies that evaluate the effectiveness of pharmacist involvement in risk mitigation. The purpose of this quality improvement project was to evaluate whether pharmacist involvement in post-operative surgical pain management can lead to improved patient understanding of opioids and increase proper disposal of unused opioids.

Methods: Identified patients were contacted by pharmacy within 1 week prior to surgery to provide education regarding opioid safety and review the pain management handout. Pharmacist counseling, patient understanding of opioid use post-surgery and interest in naloxone and opioid disposal envelopes were documented electronic health records Pharmacists contacted patients 10 - 14 days after surgery to collect the following data: quantity of opioids remaining, , pain rating , method of disposal, incidence of opioid induced constipation, and overall patient satisfaction with pharmacist involvement in their care.

Results: Forty two patients were identified with an upcoming total knee arthroplasty or total hip arthroplasty. Of those 42 patients, 27 met the inclusion requirements. Seven patients were excluded due to chronic opioid use, 4 patients were excluded due to surgery being postponed/cancelled, and 4 patients were unable to be reached. During the pre-op call, 20 patients were interested in a prescription for naloxone and 13 patients were interested in a medication disposal envelope. At the post-op call, 22 patients (81.4%) reported being â€œhighly satisfiedâ€ with pharmacist involvement. Four patients (14.8%) reported proper disposal of remaining opioids, 5 patients (18.5%) had no opioids remaining, and 18 patients (66.7%) had not yet disposed of their opioids.

Conclusion: Perioperative pharmacist involvement in surgical pain management can increase use of risk mitigation strategies and proper disposal of unused opioids and increase patient satisfaction.

Learning Objectives:

Describe strategies pharmacists can implement for opioid risk mitigation.

Identify common methods by which individuals obtain opioids for non-medical use.

Self Assessment Questions:

Patient is status post total knee arthroplasty without complications. How can we reduce opioid risk at discharge?

A. Give the patient no more than a 3 day supply of opioids.

B. Advise the patient to try taking as little opioid medication as possible.

C. Counsel the patient on proper disposal of opioids and provide examples of DEA approved methods.

D. Tell the patient to seek over the counter naloxone if needed.

What percent of people who misuse opioids get them from friends or family members?

A. 0.23

B. 0.56

C. 0.12

D. 0.41

Q1 Answer: C Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-795-L08-P

The Impact of Glucose Control Order Set Use in the Emergency Department

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Purpose: Majority of diabetic patients who develop hyperglycemia in the emergency department (ED) are often associated with non-hyperglycemic medical emergencies. Underlying conditions may include infectious processes, cardiovascular events, or acute abdominal conditions. Fast-paced environment of the ED, clinicians often focus on immediate or life-threatening issues, which may lead to deprioritizing glucose management. Delays in patient disposition and lack of consistent blood glucose (BG) monitoring may contribute to the development of hyperglycemic crisis, which has been associated with increased length of stay, Intensive Care Unit (ICU) admission rates, and in-hospital mortality. The purpose of this study is to evaluate the impact of a nursing-driven glucose control order set implemented in the Henry Ford Macomb Hospital ED.

Methods: This is an IRB-approved retrospective case-control study that will assess patients admitted to the Henry Ford Macomb Hospital ED. Intervention involved ED staff education conducted in October 2024. The study will evaluate the impact of the glucose control order set in diabetic patients during their ED stay. Adult patients with type 1 or 2 diabetes, insulin use, ED stayâ‰¥6 hours, and hospital admission between October and November 2024 will be included. Patients who meet the defined criteria for insulin pump, Diabetic Ketoacidosis (DKA), or Hyperglycemic Hyperosmolar State (HHS) will be excluded. The primary outcome is the proportion of time insulin is administered for BG levels>200 mg/dL. Secondary outcomes include number of BG checks, time to insulin administration for BG levels>200 mg/dL, change in BG level from ED presentation to inpatient transfer, and ICU admission for hospital-onset DKA. Safety outcomes will include monitoring for hypoglycemia. This study will include 192 patients, calculated using an anticipated effect size of 20% post-intervention. Statistical analysis will be performed using Studentâ€™s t-test or Mann-Whitney U test for continuous variables and Chi-square test or Fisherâ€™s exact test for categorical variables.

Learning Objectives:
Explain the factors involved in the development of hyperglycemia in the emergency department.
Discuss the impact of glucose control order set utilization in the emergency department.
Self Assessment Questions:
Which of the following factors will prevent hyperglycemia from developing in the emergency department?
A. Treat elevated blood glucose levels
B. Only treat immediate or life-threatening conditions
C. Lack of consistent blood glucose monitoring
D. Delays in patient disposition

What is the preferred antihyperglycemic therapy for treating elevated blood glucose levels in the emergency department?
A. Metformin
B. SGLT2 inhibitors
C. Insulin
D. GLP-1 receptor agonists
Q1 Answer: A Q2 Answer: C
APCE Universal Activity Number 0121-9999-25-598-L01-P

Safety and Efficacy of DOACs vs Warfarin in Patients with Morbid Obesity

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Obesity among American adults was 41.9% during 2017 â€“ March 2020. â€‹The prevalence of morbid obesity, body mass index (BMI) â‰¥ 40, was 9.2%. Obesity is a risk factor for venous thromboembolism (VTE) and atrial fibrillation (AF).â€‹ AF in America is projected to grow to 12.1 million individuals by 2030 due to the aging population. Non-valvular atrial fibrillation (NVAF) accounts for 95% of AF diagnoses.â€‹ VTE is developed at a 6.2-fold increased risk with obesity.â€‹ Historically, there were concerns for decreased efficacy with â€‹direct oral anticoagulant (DOAC) use in obesity. Warfarin has been the typical treatment due to INR monitoring. This study will compare the safety and efficacy of DOACs and warfarin in NVAF and VTE in morbidly obese patients.

This study is a single-center, observational, retrospective chart review. Adults with morbid obesity taking a DOAC or warfarin for NVAF or VTE from January 1, 2019 â€“ September 30, 2024 are included. Patients will be matched by age, indication, and sex. The primary outcome is a composite thrombotic event (recurrent DVT, PE, orâ€¯ischemic stroke occurrence) and composite bleeding event (clinically relevant non-major and major bleed). The secondary outcome is assessment of predictors for thrombotic or bleeding events.

Demographic and clinical data will be collected, including CHA2DS2-VASc scoreâ€‹, comorbidities, anticoagulation regimen, and concomitant antiplatelet use. EPIC STATA will be used to conduct survival time-to-event analysis utilizing a Cox proportional hazards model plotted on a Kaplan-Meier curveâ€‹. Person-years and event rate for each outcome will be calculated to determine outcome frequency between groups.

This study will provide additional data for anticoagulation selection for patients with BMI â‰¥ 40â€‹ and will investigate if DOAC utilization has been as safe and efficacious as warfarin in a real-world settingâ€‹.

Learning Objectives:

Describe the challenges in anticoagulation management in patients with morbid obesity (BMI = or above 40)

Explain the safety and efficacy outcomes relevant to anticoagulation optimization

Self Assessment Questions:

Which of the following has NOT been observed in studies looking at DOAC pharmacokinetics in people with obesity?

A. Increased AUC

B. Lower AUC

C. Lower peak

D. No change in AUC or no data available

Per International Society on Thrombosis and Haemostasis (ISTH), which of the following would be classified as a clinically relevant non-major bleed?

A. Bleeding that led to a transfusion of > 2 packed red blood cells (PRBCs)â€‹

B. Leading to hospitalization or increased careâ€‹

C. Fatal bleedingâ€‹

D. Bleeding that decreased hemoglobin (Hgb) > 2 g/dLâ€‹

Q1 Answer: A Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-681-L01-P

Assessing the Influence of an Electronic Health Record Decision Support Panel on Inpatient Antibiotic Duration for Sepsis

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The overutilization and inappropriate duration of antibiotic therapy in healthcare contributes to increased costs, adverse drug events, and antibiotic resistance. Prior to the adoption of an empiric antibiotic decision support panel in Epic, providers often relied on clinical decision making, personal experience, or external sources when selecting antimicrobial regimens and durations. In turn, this could lead to potential mistakes and high variability in empiric antibiotic prescribing. The addition of a decision support panel to the Epic electronic health record that provides real-time, evidence-based recommendations for empiric antibiotic treatment regimens could improve and standardize antibiotic use, thereby optimizing patient outcomes and shortening chosen durations of therapy. After collection and assessment of the data, the study results will be used to help identify areas of improvement for empiric antibiotic selection for sepsis at each level of care in our facility. The data results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize the importance of data-driven decision making in improving healthcare quality and safety.

Review the impact of an antibiotic decision support panel on empiric antibiotic prescribing patterns.

Self Assessment Questions:

How can data-driven decision making, such as the implementation of an antibiotic decision support panel, improve healthcare quality and safety in the treatment of sepsis?

A. By increasing the number of antibiotics prescribed to patients

B. By reducing variability in antibiotic prescribing and ensuring adherence to evidence-based guidelines

C. By allowing physicians to choose antibiotics based solely on personal experience

D. By extending the duration of antibiotic treatment for better patient outcomes

What is the expected benefit of comparing antibiotic duration and guideline adherence between the pre- and post-implementation groups in this study?

A. To assess the economic impact of antibiotics on hospital budgets

B. To determine if the decision support panel leads to reduced antibiotic use overall and adherence to best practices

C. To evaluate patient satisfaction with their antibiotic treatment

D. To analyze which antibiotics are the most commonly prescribed in the hospital system

Q1 Answer: B Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-593-L01-P

Pharmacist Impact on Optimization of Guideline-Directed Medical Therapy in Hospitalized Patients with Heart Failure: A Retrospective Cohort Study

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Purpose: Heart failure is a prevalent condition worldwide with negative impacts on patient outcomes and quality of life. Optimally dosed guideline-directed medical therapy (composed of beta blockers, mineralocorticoid receptor antagonists, sodium-glucose cotransporter-2 inhibitors, and ACE inhibitors/angiotensin-receptor blockers/angiotensin receptor-neprilysin inhibitors) has been proven to reduce morbidity and mortality in heart failure. As medication experts, pharmacists have great potential for impact in this setting. This study aims to determine the impact of early pharmacist-driven guideline-directed medical therapy (GDMT) interventions on hospitalized patients.
Methods: A retrospective cohort study was conducted at a 433-bed community hospital in Lexington, Kentucky. Included patients were admitted between May 1, 2024 and January 31, 2025, had a heart failure diagnosis, and were reviewed by a pharmacist within 48 hours of admission. Exclusion criteria include: pregnancy, incarceration, age <18 years, intubation, inpatient mortality/discharge to hospice, dialysis, and vasopressor use. The study consists of two groups. The control group includes patients admitted between May 1, 2024 and September 29, 2024 meeting the inclusion criteria who did not receive early pharmacist intervention. Chart review was conducted utilizing EPIC to identify eligible patients for the control group. For the intervention group (beginning on September 30, 2024), a pharmacist began making recommendations to providers within 48 hours to optimize GDMT regimens as indicated for patients meeting the inclusion criteria. These interventions included both dose optimization and/or the initiation of agents. The primary outcome of the study was the percentage of patients able to achieve 3+ GDMT agents at hospital discharge. Secondary outcomes include length of stay, pharmacist dose titration, readmission within 30 days, diuretic requirements, number of total interventions, time to intervention, and utilization of meds to beds services.
Results/Conclusions: Data analysis is currently in progress and will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify the pillars of guideline-directed medical therapy.
Identify barriers to guideline-directed medical therapy optimization.

Self Assessment Questions:

Which of the following regimens consists of all 4 pillars of guideline-directed medical therapy?
A. Hydralazine 50 mg PO TID, sacubitril/valsartan 24-26 mg PO BID, isosorbide dinitrate 20 mg PO TID, carvedilol 25 mg PO BID
B. Lisinopril 20 mg PO QD, metoprolol succinate 50 mg PO QD, sacubitril/valsartan 49-51 mg PO BID, spironolactone 25 mg PO QD
C. Bisoprolol 10 mg PO QD, spironolactone 25 mg PO QD, sacubitril/valsartan 49-51 mg PO BID, empagliflozin 10 mg PO QD
D. Dapagliflozin 10 mg PO QD, digoxin 0.25 mg PO QD, valsartan 80 mg PO BID, atenolol 25 mg PO QD
Which of the following is a potential barrier to guideline-directed medical therapy optimization?
A. Hyperkalemia
B. Tachycardia
C. Hypertension
D. Normal renal function
Q1 Answer: C Q2 Answer: A
APCE Universal Activity Number 0121-9999-25-693-L01-P

Evaluation of succinylcholine dosing for rapid sequence intubation procedures within different weight groups

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Purpose: Rapid sequence intubation (RSI) is a procedure often performed in the emergency department (ED) to secure the airway in patients in respiratory failure due to poor oxygenation or ventilation. It is a process done by administering sedative and neuromuscular blocking agents or paralytic agents, in rapid succession to allow for endotracheal intubation. Studies show that these medications help with first pass success and decreased aspiration. Rocuronium and succinylcholine are the most common paralytic agents used in RSI, but they are pharmacokinetically different, which leads to differences in onset, duration, dosing, and adverse effect profiles. Common dosing for succinylcholine ranges from 1-1.5 mg/kg based on total body weight with a maximum of 150 mg, but larger doses have been evaluated in pediatric populations and patients with specific comorbidities such as myasthenia gravis amongst others. Many studies suggest that optimal dosing is not achieved in obesity due to dosing maximums and may lead to suboptimal intubation conditions. The objective of this study was to evaluate appropriate succinylcholine dosing for RSI within different weight groups. Methods: Adult patients that were intubated by an ED physician with succinylcholine in the ED from January 2023 to December 2024 at Franciscan Health Indianapolis were evaluated for inclusion within this study and accounted for once. Subjects were divided by body mass index (BMI) scores into those >30kg/m2 or <30kg/m2. The primary outcome of this study was to measure the number of patients that received appropriate succinylcholine dosing based on TBW in RSI (1-2mg/kg). A retrospective chart review was conducted to obtain additional data including patient BMI, succinylcholine dose in mg/kg, hypotension and/or bradycardia seen after administration of succinylcholine, and number of intubation attempts performed. Results/Conclusions: Data analysis is in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Discuss the sequence of steps that take place during a rapid sequence intubation

Describe different clinical pearls between paralytic agents for rapid sequence intubation

Self Assessment Questions:

What are two common paralytic agents utilized in rapid sequence intubation?

A. Etomidate and Ketamine

B. Succinylcholine and Rocuronium

C. Propofol and Etomidate

D. Ketamine and Propofol

What is the correct order of events in rapid sequence intubation?

A. Pre-intubation optimization; Paralysis; Induction; Post-intubation analgesia and sedation

B. Induction; Pre-intubation optimization; Paralysis; Post-intubation analgesia and sedation

C. Pre-intubation optimization; Induction; Paralysis; Post-intubation analgesia and sedation

D. Pre-intubation optimization; Induction; Post-intubation analgesia and sedation; Paralysis

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-705-L01-P

Clinical Decision Support System Implementation: Clinical Pharmacy Practitioner Perspectives and Changes in Practice

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Purpose: Clinical decision support systems (CDSSs) have been used since the 1950s to aid clinicians and improve the quality of healthcare. Contemporary CDSSs have illustrated benefits in reducing time to optimal antimicrobial therapy, reducing inpatient length of stay, and increasing the number of interventions that clinicians make by improving workflow efficiency. However, the effective implementation of a CDSS may be hindered by inappropriate and excessive clinical alerts, fatigue, and provider burnout. This study aims to evaluate the implementation of a pharmacy oriented CDSS at a level 1A tertiary care Veterans Affairs facility.

Methods: A series of voluntary and anonymous surveys of pharmacists practicing at Veteran Health Indiana was conducted via an internet-based questionnaire throughout the implementation process of a CDSS (1 month post-implementation, 3 months post-implementation, and 6 months post-implementation). Pharmacistsâ€™ medication interventions were reviewed across the 3 months prior to implementation, the initial 3 months post-implementation, and the subsequent 3 months post-implementation of the CDSS. The primary outcome is pharmacistsâ€™ perspectives toward the CDSS throughout the implementation. Secondary outcomes include differences in pharmacistsâ€™ perspectives by role, change in number of pharmacist medication interventions, and differences in pharmacistsâ€™ perspectives toward CDSS throughout the implementation process by size of patient load. Exploratory outcomes include cost savings and patient safety events identified through pharmacist utilization of the CDSS.

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

Learning Objectives:

Describe the mechanisms used by knowledge-based and non-knowledge-based clinical decisions support systems to identify clinical interventions

Discuss changes in clinical pharmacist practitioners' perspectives toward a clinical decision support system over time

Self Assessment Questions:

Which statement best characterizes knowledge-based clinical decisions support systems?

A. Use of supervised learning to predict future results

B. Use of machine learning, statistical patterns, and/or artificial intelligence

C. Use of logic rules composed of â€œIf-then-â€statements

D. Use of unsupervised learning to detect patterns and classification of outcomes

Which domain of change behavior was most favorable among pharmacists practicing at Veteran Health Indiana following implementation of a clinical decisions support system?

A. Reactions (Attitudes/Beliefs)

B. Learning (Knowledge)

C. Perceived Behaviors (Utilization)

D. Actual Behaviors (Utilization)

Q1 Answer: C Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-767-L04-P

Review of Compliance and Patient Satisfaction in Patients Utilizing Home Infusion Delivery Services at a Regional Health Center

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Despite the growing interest in home delivery services for medications, there is a lack of comprehensive studies exploring their impact, particularly in terms of patient compliance, cost, and satisfaction. This research project aims to evaluate the patient cost and satisfaction associated with medications filled at Saint Joseph Regional Medical Center Infusion Pharmacy. The goal is to assess the potential benefits of developing a protocol to expand the current home infusion pharmacy services to include specialty medications. The study will focus on ten high-volume medications identified through insurance claim data. Patients prescribed these medications will be contacted via phone to gauge their interest in enrolling in the Home Infusion delivery service. Historical fill dates will be used to assess patients' current adherence with specialty medications. Additionally, patient satisfaction data will be reviewed from previous users of the home infusion delivery service. Alongside these efforts, the financial implications of expanding this service will also be examined through analysis of patientâ€™s copay, delivery cost, and profit margins for the Home Infusion pharmacy. Data analysis is currently in progress, results and conclusions will be presented at the Great Lakes Pharmacy.

Learning Objectives:

Review literature related to the benefit of use of home infusion pharmacies for patient care.

Define a pharmacist's role in home infusion pharmacy.

Self Assessment Questions:

What is the primary role of a pharmacist in a home infusion pharmacy setting?

A. Delivering medications to patients' homes

B. Monitoring and ensuring the safe preparation and administration of medications

C. Scheduling patient appointments with healthcare providers

D. Handling insurance claims exclusively

What is one potential benefit of home infusion pharmacies for patient care, as identified in the literature?

A. Increased patient compliance

B. Improved hospital infrastructure

C. Closer patient follow up

D. Greater physician availability

Q1 Answer: B Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-803-L99-P

Optimization of Outpatient Infusion Services: Trends and Insights

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Purpose: The outpatient infusion service market is a rapidly growing clinical service. The UW Health SwedishAmerican Hospital outpatient infusion population was primarily established to accommodate cancer-related treatments and associated supportive care. Services have expanded to include a population with increased diversity regarding disease state and necessary treatments. Analyzing patient population and medication trend data in the expanding service best supports optimization of outpatient infusion services and positive patient outcomes. The purpose of the study is to obtain baseline data regarding UW Health SwedishAmerican Hospital outpatient infusion services.

Methods: This study is a single institution, descriptive study assessing the patients and medications utilized at UW Health SwedishAmerican Hospital outpatient infusion services via retrospective chart review. The primary objective of this study is to evaluate current infusion services to gather baseline data and identify trends for optimization of current infusion services. The secondary objectives of this study are to assess patient encounter time, medication usage, and distance from infusion center. Electronic health records will be used to identify patients who completed an ambulatory infusion appointment at outpatient infusion from July 1, 2023, to December 31, 2024. Patients will be excluded if they are pregnant or breastfeeding, incarcerated at time of appointment, age greater than ninety years, and patients receiving concomitant cancer treatment at time of appointment. The data collected will include age, sex, patient zip code, encounter duration, and medications administered during infusion encounter. Results of this study will be utilized to identify outpatient infusion service populations and trends within completed encounters for service optimization at UW Health SwedishAmerican Hospital.

Preliminary Results: Approximately 2,500 patients fit within the criteria and will be assessed for analysis.

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

Learning Objectives:

Discuss the prevalence of outpatient infusion in disease management and expected growth trends.

Outline areas of focus to optimize outpatient infusion workflow.

Self Assessment Questions:

What specialties utilize outpatient infusions for patient management?

A. Infectious disease

B. Rheumatology

C. Hematology/Oncology

D. All of the above specialties utilize outpatient infusion services to provide safe and effective care for patients outside the hospital.

Which of the following is fundamental component for outpatient infusion service assessment throughout service development?

A. Number of healthcare specialties not requiring infusion services

B. Oral and intramuscular medication administration

C. Inventory requirements of outpatient infusion service locations

D. Environmental services supplied by larger health systems

Q1 Answer: D Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-756-L04-P

Development of a Pharmacist Workflow for Evaluation and Verification of Outpatient Oral Cancer Treatment During Hospitalization

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Purpose: Our health system does not currently have a unified workflow for the management of outpatient oral cancer treatments during patient admissions, which could contribute to possible missed, delayed or improperly administered treatments. With numerous oral cancer treatments and variable regimens, orders placed during a patientâ€™s admission have been linked to treatment deviations that could compromise patient safety. Therefore, establishment of a standardized workflow for pharmacists is crucial. The purpose of this project is to develop a workflow for evaluation and verification of outpatient oral cancer treatment during hospitalization.
Methods: A work group, including inpatient and oncology-focused pharmacists, was formed to identify expected practices related to outpatient oral cancer treatment. Relevant articles were reviewed, and a gap analysis was performed. A pre-implementation survey was administered to evaluate pharmacistsâ€™ current processes and knowledge, and data on patient safety events related to oral cancer treatments was collected. A standardized workflow, including electronic medical record tools, was then developed for pharmacists. Educational sessions will be conducted to train pharmacists on the new workflow, ensuring confidence in its application. Success of this project will be measured by tracking the number of patient-related safety events associated with oral cancer treatments, the number of pharmacist interventions, and follow-up survey results to evaluate the impact of the educational sessions. This project was submitted to the Institutional Review Board prior to initiation and classified as quality improvement.
Results/Conclusion: Pre-implementation survey results identified over half of pharmacists did not feel confident in the workflow for verifying the appropriateness of oral cancer treatments during admissions. Final results and conclusion to be presented at 2025 Great Lakes Pharmacy Resident Conference.
Learning Objectives:
Identify the risks of a non-standardized process for verifying oral cancer treatment orders
Recognize the pharmacist's role in identifying the appropriateness of oral cancer treatment during hospitalization
Self Assessment Questions:

Outpatient oral cancer treatments reordered within 24 hours of admission were associated with higher risks of what?
A. Drug interactions
B. Adverse effects
C. Dosing errors
D. All of the above
Pharmacist evaluation and intervention prior to the resumption of home oral cancer treatments during hospital admissions can ___ the possibility of patient safety events.
A. Increase
B. Decrease
C. Have no impact on
D. Double
Q1 Answer: D Q2 Answer: B
APCE Universal Activity Number 0121-9999-25-777-L05-P

Evaluating the risk of euglycemic Diabetic Ketoacidosis (eDKA) with SGLT2 (sodium-glucose cotransporter-2) inhibitor use during critical care or post-surgical hospitalization
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PURPOSE: SGLT2i are prescribed for chronic kidney disease (CKD), heart failure (HF), and type 2 diabetes mellitus (T2DM). FDA warnings have linked them to euglycemic diabetic ketoacidosis (eDKA). Hospitalization heightens eDKA risk, prompting recommendations against SGLT2i use during acute stays. Conflicting evidence regarding their safety and benefits during hospitalization highlights the need for further research to identify populations at risk, with key factors including poor carbohydrate intake, alcohol use, critically-ill, surgery, infection, and insulin non-compliance. The purpose of this study was to assess the incidence of eDKA in hospitalized patients who required intensive critical unit care or underwent surgery.
METHODS: This multicenter, retrospective chart review assessed adult patients who received at least one dose of a SGLT2i for diabetes and required ICU stay or surgery to evaluate provider-diagnosed and laboratory-defined eDKA. Exclusion criteria included patients under 18, pregnant, or incarcerated. Secondary outcomes included identification of risk factors for eDKA in ICU/surgical patients, examined early versus late SGLT2i initiation, and rates of undiagnosed laboratory-defined eDKA.
RESULTS: The primary outcome showed no provider diagnosed eDKA cases but identified two laboratory defined cases (0.02%). However, suspected eDKA was noted to be 88% in the sample. Secondary outcomes found poor carbohydrate intake and continued home insulin increased eDKA odds, though not statistically significant. However, infection, the day SGTL2i was initiated, and number of days receiving was statistically significant. Backward elimination, multivariate regression identified infection (OR 8.27; p=0.007) and SGLT2i duration (OR 1.33; p=0.041) as significant predictors for eDKA development.
CONCLUSION: For hospitalized patients that are prescribed SGLT2i for diabetes, infection and the number of days SGLT2i is received was associated with increased risks for the development of eDKA. These findings support the importance of ongoing education and individualized care plans to mitigate risks associated with SGLT2i therapy.

Learning Objectives:
Recognize the risk factors that contribute to the development of euglycemic diabetic ketoacidosis (eDKA).
Identify the laboratory markers that confirm the diagnosis of eDKA

Self Assessment Questions:
Which of the following risk factors places the patient at risk for developing eDKA?
A. Infection
B. Poor intake
C. Poor insulin compliance
D. All the above
Which combination of laboratory findings is used to confirm a diagnosis of eDKA?
A. Blood glucose > 250 mg/dL, normal bicarbonate, positive serum ketones
B. Normal blood glucose, normal bicarbonate, low arterial pH
C. Blood glucose < 250 mg/dL, low bicarbonate, low arterial pH, positive serum ketones
D. Low blood glucose (< 70 mg/dL), normal bicarbonate, positive serum ketones
Q1 Answer: D Q2 Answer: C
APCE Universal Activity Number 0121-9999-25-706-L01-P

Comparing Vancomycin Dosing Requirements between Obese and Non-Obese Patients in Achieving AUC Targets
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Background: Vancomycin is a glycopeptide antibiotic commonly used for various infectious indications. To achieve Area Under the Curve (AUC) goals of 400-600mcg*H/mL, the Infectious Diseases Society of America (IDSA) vancomycin guidelines recommend an initial maintenance dose of 15-20 milligrams per kilograms (mg/kg) using actual body weight (ABW) in most patients. With the non-linear relationship between vancomycin volume of distribution and drug clearance in obese patients, there is concern for overdosing vancomycin, leading to toxicity. Purpose: This study aims to evaluate the difference in vancomycin doses expressed in mg/kg of ABW in obese patients compared to non-obese patients. Methods: The institutional review board approved this retrospective, cohort study that includes patients at least 18 years old from July 1st, 2023, to June 30th, 2024, who received an initial maintenance dose of vancomycin 15 mg/kg during admission and had vancomycin random levels drawn within the same encounter. Patients will be excluded if they weighed > 133 kg, received conventional or pulse dosing of vancomycin, received vancomycin only for surgical prophylaxis, had > 10% change in body weight during the encounter, had malignant or cystic fibrosis, or had incorrectly obtained vancomycin levels. The primary endpoint is vancomycin dose expressed in mg/kg of ABW required at steady state to achieve an AUC target of 400-500mcg*H/mL. Secondary outcomes include incidence of patientâ€™s initial vancomycin steady state levels above AUC target of 400 mcg*H/mL and 500 mcg*H/mL and the rate of acute kidney injury. Primary and secondary outcomes will be analyzed using studentâ€™s t-test, Mann-Whitney U test, or Chi-square as appropriate based on the type of outcome data. Results and conclusions to be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe Vancomycin dosing based on the 2020 IDSA guidelines and how the pharmacokinetics relate to patients who are obese compared to patients that are not obese.

Review current published literature for the different avenues of how to dose vancomycin in the obese patient population.

Self Assessment Questions:

What is the recommended for initial maintenance dosing of vancomycin according to the 2020 IDSA vancomycin guidelines?

A. 20-25 mg/kg based on ABW
B. 15-20 mg/kg based on IBW
C. 15-20 mg/kg based on ABW
D. 20-25 mg/kg based on IBW

Which of the following vancomycin dosing schemes have been studied in the obese patient population?

A. Adjusted body weight
B. Allometric dosing
C. Reduced initial maintenance
D. All the above

Q1 Answer: C Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-611-L01-P

aPlase in Therapy: Comparing Tenecteplase to Alteplase for Acute Ischemic Stroke Following Health System-Wide Conversion

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This study aimed to assess the safety and efficacy of tenecteplase versus alteplase for treatment of acute ischemic stroke (aIS) following a system-wide transition to tenecteplase as standard of care. Following publication of several randomized, controlled non-inferiority trials, tenecteplase has replaced alteplase as first-line standard of care for aIS at many institutions, despite lacking FDA approval for this indication. Previous retrospective studies have shown conflicting results in symptomatic intracranial hemorrhage and change in NIH stroke score (NIHSS). Additional real-world clinical data is needed to validate this off-label use, particularly in low incidence safety outcomes including angioedema and extracranial hemorrhage.

This observational, multi-site study used retrospective data from patients treated at Trinity Health Michigan Hospitals for aIS from January 2020 to September 2024. Our population was divided into two groups: patients who received alteplase 0.9 mg/kg (max 90 mg) and patients who received tenecteplase 0.25 mg/kg (max 25 mg) for treatment of aIS. The primary outcome was incidence of symptomatic intracranial hemorrhage (sICH). Additional safety outcomes included incidence of angioedema and incidence of major extracranial bleeding event. Secondary outcomes included 90-day all-cause mortality, successful reperfusion (TICI 2b-3), change in NIHSS at discharge, and ICU length of stay. The primary outcome was analyzed using Welchâ€™s equivalence test and multivariable logistic regression models. Covariates included in the analysis were age, sex, NIHSS score, thrombectomy, occlusion site/site of vessel (large vessel occlusion or not), last known well to intravenous thrombolysis, history of stroke/TIA, and anti-platelet use pre-stroke. Secondary outcomes were analyzed using logistic regression models, Cox proportional hazard models and ANCOVA as appropriate. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review current literature regarding intravenous thrombolytics used for acute ischemic stroke

Discuss differences in safety and efficacy outcomes of alteplase versus tenecteplase for treatment of acute ischemic stroke across seven Trinity Health Michigan hospitals

Self Assessment Questions:

Which of the following is an advantage of tenecteplase over alteplase in the treatment of acute ischemic stroke?

A. Tenecteplase has a shorter half-life, requiring more frequent dosing

B. Tenecteplase has a standard, set dose for all patients

C. Tenecteplase can be administered as a single intravenous bolus dose

D. Tenecteplase is more effective in patients with minor strokes

According to the 2019 AHA/ASA guidelines, which of the following is recommended for the use of tenecteplase in treatment of acute ischemic stroke?

A. Tenecteplase is not recommended for any patients with acute ischemic stroke

B. Tenecteplase may be an alternative to alteplase, within 4.5 hours of symptom onset

C. Tenecteplase is only recommended for patients with NIHSS >20

D. Tenecteplase is preferred over alteplase for all patients

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-691-L01-P

Evaluation of the Efficacy, Safety, and Compliance with a Pediatric Diabetic Ketoacidosis Protocol in Critically Ill Patients

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Purpose: Recent data shows improved time to diabetic ketoacidosis (DKA) resolution and lower incidence of hypoglycemia when a two-bag protocol compared to a traditional one-bag protocol is utilized in pediatric DKA management. The primary aim of this study is to evaluate the efficacy and safety of, and compliance with, an institutional pediatric two-bag DKA protocol in critically ill patients. This will subsequently permit a comparison of its performance to literature-reported outcomes for similar two-bag DKA protocols.
Methods: Retrospective chart review with data obtained from Carle Foundation Hospital electronic medical record for patients less than 18 years old with utilization of the internal pediatric DKA protocol from 10/31/2021 to 09/30/2024. The primary efficacy outcome will be time to resolution of DKA, defined as serum bicarbonate > 18 mmol/L, beta-hydroxybutyrate < 1 mg/dL, and cessation of insulin infusion. The primary safety outcome evaluated will be incidence of hypoglycemia (blood glucose < 70 mg/dL) or administration of glucose/dextrose boluses. Additional secondary outcomes to be evaluated include adherence to appropriate maintenance fluid calculation, time to transition to subcutaneous insulin, and incidence of hypokalemia, hypophosphatemia, and hypomagnesemia.
Results: In process
Conclusions: In process

Learning Objectives:

Review pathophysiology and diagnosis of diabetic ketoacidosis
Discuss and compare one-bag vs two-bag DKA protocol logistics

Self Assessment Questions:

Per International Society for Pediatric and Adolescent Diabetes (ISPAD) guidelines, what are the criteria that make up the diagnostic triad of DKA?
A. Serum bicarbonate < 18 mmol/L, blood glucose > 200 mg/dL, and venous pH < 7.3
B. Serum bicarbonate > 18 mmol/L, blood glucose > 200 mg/dL, and moderate quantity of ketones in urine
C. pH < 7.3, blood glucose > 200 mg/dL, and anion gap â‰¥ 12
D. pH < 7.3, blood glucose > 200 mg/dL, and beta-hydroxybutyrate â‰¥ 3 mg/dL
What is the primary difference between a traditional one-bag vs. two-bag regimen for the treatment of DKA?
A. No difference, they are the same
B. Goal serum bicarbonate > 18 mmol/L vs > 20 mmol/L
C. Titratable vs fixed-dose insulin infusion
D. No addition of dextrose to intravenous fluids within the two-bag protocol
Q1 Answer: D Q2 Answer: C
APCE Universal Activity Number 0121-9999-25-548-L01-P

Time to First Administration of Anticoagulation Post-Fibrinolytic Therapy for Acute Pulmonary Embolism: Quality Improvement Project

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Purpose: Guideline review from the American College of Cardiology suggested that high-risk individuals on diagnosis of pulmonary embolism (PE) required intervention with a fibrinolytic agent followed by anticoagulation. Recent evidence suggested the use of anticoagulation decreased recurrent PE. The aim of this review was to determine the current prescribing practice of providers across Ascension St. Vincent institutions in Indiana.

Methods: A retrospective quality improvement review was completed with the primary objective to assess the time to first administration of anticoagulation in adult patients who received alteplase or tenecteplase for the treatment of acute PE across several sites within the Ascension Indiana markets from December 1, 2022 to April 18, 2024. Secondary efficacy endpoints and safety outcomes of this study included in-hospital mortality, length of ICU stay, length of hospital stay, incidence of bleeds and new thrombosis. Patients were identified through electronic records based on tenecteplase or alteplase administration. ICD10 codes were utilized to exclude patients who received fibrinolytic for a non PE indication.

Results: Eleven patients met inclusion criteria and received anticoagulation after fibrinolytic administration, the mean time between the fibrinolytic administration and anticoagulant administration was 479 minutes (~8 hours). Enoxaparin and heparin were the two anticoagulation agents in this review that were chosen to be initiated in patients post fibrinolytic administration. The average time to administration between these two agents was shorter with heparin.

Conclusions: The findings from this review suggest that providers at the Ascension St. Vincent institutions administered anticoagulation within the first 24 hours after use of a fibrinolytic. These results align with previous studies suggesting improved mortality and no difference in major bleeding with anticoagulation administration within 24 hours of receiving fibrinolytic therapy for management of acute PE.

Learning Objectives:

Recall current guideline recommendations for the use of fibrinolytics for pulmonary embolism treatment.

Discuss the practice trends discovered through this review on initiation of anticoagulation post fibrinolytic administration in pulmonary embolism.

Self Assessment Questions:

In the treatment of pulmonary embolism, fibrinolytic therapy is most commonly indicated for which of the following patient groups?

A. Patients with low-risk pulmonary embolism who are stable

B. Patients with massive (high-risk) pulmonary embolism and hemodynamic instability

C. Patients with chronic pulmonary embolism and without symptoms

D. Patients with subsegmental pulmonary embolism and mild symptoms

What is the primary goal when initiating anticoagulation therapy after fibrinolysis for pulmonary embolism?

A. Preventing recurrence of the pulmonary embolism

B. Reducing the risk of bleeding complications

C. Improving the patientâ€™s long-term survival rate

D. Normalizing the patientâ€™s coagulation profile

Q1 Answer: B Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-612-L01-P

Development of Ambulatory Care Pharmacy Dashboard for Performance Metrics

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Purpose: Ambulatory care pharmacists (ACPs) have the capability to improve clinical outcomes for patients and reduce costs for health systems. ACPs commonly generate indirect revenue through cost avoidance, making it difficult to justify expansion of ACP services. Expansion of ACP services can be especially beneficial when considering pharmacists can positively impact quality measures within the Star Rating Program for Medicare Advantage plans. A proposal to expand pharmacy services should include institution-specific analyses of expected benefits of ACP services. This can be accomplished with performance metric dashboards specific to ACP services. Performance metric dashboards can be useful to demonstrate the quality and value of pharmacist services. This quality improvement initiative aims to develop a dashboard to quantify ACP productivity and cost savings associated with ACP-led interventions. ACP-led interventions will be tracked within the electronic health record (EHR) at Trinity Health Medical Group primary care clinics in Muskegon, Michigan and surrounding areas.
Methods: The performance metric dashboard will be developed to track select productivity metrics and pharmacist-led interventions. Pharmacist-led interventions will be documented through the EHRâ€™s integrated intervention tracking system. The dashboard will initially be used to retrospectively collect data on the select metrics over a four-month period (Jul â€˜24 â€“ Dec â€˜24) to determine feasibility of implementation. Following this, the dashboard will be further developed to track an expanded list of pharmacist-led interventions, along with the productivity metrics. Following development of the dashboard, a two-month period (Jan â€“ Feb â€˜25) will be used for pharmacists at select clinics to document interventions within the EHR. Following this intervention phase, data will be collected to quantify the cost savings associated with pharmacist-led interventions and summarize pharmacist productivity. Conclusion: Data analysis is currently in progress and results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe how utilization of a performance metric dashboard can show the value of ambulatory care pharmacists.
Recognize the utility of tracking pharmacist-led interventions via EHR integration in the ambulatory care setting

Self Assessment Questions:

What intervention(s) can be displayed on a performance metric dashboard to quantify the value of ambulatory care pharmacists through association with cost avoidance?

A. Medication reconciliation
B. Avoid adverse drug reaction/drug interaction
C. More cost-effective drug available
D. All the above

Which of the following is a benefit of tracking pharmacist-led interventions via EHR integration in the ambulatory care setting?

A. Data is easily extractable, and it can be used to quantify positive impacts on patient care
B. This practice is cost-prohibitive
C. Pharmacist-led intervention tracking is only beneficial in the inpatient setting
D. None of the above

Q1 Answer: D Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-760-L04-P

Evaluation of Guideline-Directed Medication Therapy for Patients with Diabetes and Chronic Kidney Disease at a Veteran Affairs Medical Center

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Purpose: The publication of new chronic kidney disease (CKD) guidelines creates opportunities for identifying gaps in current clinical practices and improving patient outcomes. Making medication selections in accordance with Kidney Disease: Improving Global Outcomes (KDIGO) is essential for slowing CKD progression and preventing serious complications. The aim of this study is to assess if current prescribing practices within primary care for patients with CKD and diabetes at Veteran Health Indiana (VHI) align with the 2024 KDIGO guidelines.
Methods: A random sampling of Veterans with CKD and type 2 diabetes who were seen in VHI Primary Care between July 1, 2022 and July 1, 2024 were selected for retrospective chart review. Patients were excluded if they followed with renal or nephrology clinic, expired during the study period, or had type 1 diabetes. The primary outcome was percentage of patients on guideline-directed medication therapy (GDMT). Secondary outcomes included most common barrier(s) to GDMT, percentage of patients who had labs monitored appropriately, mean difference in albumin-to-creatinine ratio (ACR) and eGFR, and percentage of patients followed by a pharmacist for diabetes management.
Results: Of the 125 patients that were included in this study, 117 (93.6%) were on a renin-angiotensin-system inhibitor (RASi), 85 (68.0%) were on a sodium-glucose cotransporter-2 inhibitor (SGLT2i), and 5 (4.0%) were on a nonsteroidal mineralocorticoid receptor antagonist (ns-MRA). The number of patients who were not prescribed GDMT due to an unknown reason was 5 for RASi therapy, 32 for SGLT2i therapy, and 37 for ns-MRA therapy.
Conclusion: There is room to improve prescribing practices for patients with CKD and diabetes at VHI. Closing medication gaps and recommending GDMT in all eligible patients may improve clinical outcomes by slowing disease progression to kidney failure and decreasing the risk of CKD-associated morbidity and mortality.

Learning Objectives:
Recognize the three mainstays of medications therapy for patients with chronic kidney disease and diabetes.
Identify contraindications and adverse effects associated with non-steroidal mineralocorticoid receptor antagonist therapy.
Self Assessment Questions:

Which of the following is a guideline-directed medication therapy for patients with chronic kidney disease and diabetes?
A. Beta blockers
B. Sodium-glucose cotransporter-2 inhibitors
C. Calcium channel blockers
D. Thiazide diuretics
Which of the following is a contraindication to initiating finerenone therapy?
A. Serum potassium 4.7 mEq/L
B. eGFR 37 mL/min/1.73m2
C. History of genitourinary infections
D. Active carbamazepine order for epilepsy
Q1 Answer: B Q2 Answer: D
APCE Universal Activity Number 0121-9999-25-727-L01-P

Comparative Diuretic Efficacy of Intravenous Versus Oral Acetazolamide with Loop Diuretic Administration
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Purpose: Acetazolamide is an effective adjunctive agent for augmentation of diuresis in patients on loop diuretics. Most studies assessing acetazolamide for enhancement of loop diuretic diuresis were conducted with intravenous (IV) acetazolamide. However, in practice, oral (PO) acetazolamide is often used despite a lack of data supporting non-inferiority compared to IV administration. This study aims to evaluate if the addition of PO acetazolamide results in similar diuretic efficacy compared to the addition of IV acetazolamide in patients on loop diuretic therapy.
Methods: This is a retrospective chart review study evaluating the efficacy of the addition of PO compared to IV acetazolamide to loop diuretic therapy in adult patients between January 1st, 2011, and December 31st, 2023. Patients admitted to telemetry and intensive care unit (ICU) floors were included for receipt of acetazolamide in addition to at least one dose of loop diuretic within a 12-hour period. The primary outcome evaluates 24-hour net change in urine output (UOP). Secondary outcomes include 24-hour cumulative UOP, length of hospital stay, change in serum electrolytes, receipt of sodium-glucose cotransporter 2 inhibitors, receipt of adjunctive diuretic therapy, and cost analysis between IV and PO acetazolamide.
Conclusions Reached: Finalized results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the mechanisms of acetazolamide for diuretic-induced alkalosis and diuresis.

Describe acetazolamide's place in diuretic therapy and how this has been influenced by recent literature.

Self Assessment Questions:

The diuretic mechanism of acetazolamide is most closely associated with which of the following statements?

A. increased renal excretion of bicarbonate

B. prevents reabsorption of bicarbonate in the proximal renal tubule

C. prevention of the breakdown of carbonic acid

D. mild acidosis results in increased ventilation and increased oxygenation

RM is a 78-year-old male with history of heart failure with reduced ejection fraction, currently admitted for volume overload. RM remains edematous following administration of furosemide 80 mg IV twice daily for three days. Which of the following medications would be the best option for additional diuretic effect?

A. add empagliflozin 25 mg once daily

B. transition patient to torsemide 80 mg daily

C. acetazolamide 500 mg once daily

D. add sotagliflozin 200 mg once daily

Q1 Answer: B Q2 Answer: C

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HCAP: Are We Still Using This 5 Years Later?

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Purpose: The 2019 Infectious Diseases Society of America (IDSA) guidelines for community-acquired pneumonia (CAP) no longer recommends a healthcare-associated pneumonia (HCAP) diagnosis category. Since 2005, when HCAP was introduced, there has been a rise in the use of broad-spectrum antibiotics for Pseudomonas aeruginosa (PsA) and methicillin-resistant Staphylococcus aureus (MRSA), despite studies indicating that most HCAP risk factors have a weak association with these pathogens. This study provides an opportunity to assess prescribing practices at our institution. The objective of this study is to assess the appropriateness of antimicrobial prescribing for community-acquired pneumonia in adult patients.

Methods: This single-center, retrospective cohort study includes adult patients admitted to UI Health with antibiotic orders for CAP. Exclusions include pediatric patients, pneumonia onset after 48 hours of hospital admission, ventilation prior to pneumonia onset, and those transferred from another facility with a current pneumonia diagnosis. The primary outcome is the incidence of initial inappropriate antimicrobial prescribing of anti-PsA or anti-MRSA agents in adult patients admitted with CAP. Secondary outcomes include the incidence of MRSA or PsA, or other multidrug-resistant gram-negative CAP, risk factors for inappropriate treatment, incidence of prescriber diagnosis of HCAP, length of hospital stay, and duration of therapy. A subgroup analysis for the inappropriate treatment group will look at incidence of inappropriate antibiotic choice in the Emergency Department (ED), incidence of inappropriate prescribing after admission when antimicrobials were started in the ED, and incidence of inappropriate antimicrobial prescribing occurring more than 48 hours after initiation.

Results: Data collection is currently ongoing and results will be presented at the time of the conference.

Conclusion: The results of this study will assist with limiting the inappropriate use of broad-spectrum antibiotics for PsA and MRSA.

Learning Objectives:

Discuss why the HCAP diagnosis category was removed from the 2019 ATS/IDSA guidelines.

Identify key risk factors for antibiotic-resistant pathogens in hospitalized adult patients presenting with CAP.

Self Assessment Questions:

Why was the healthcare-associated pneumonia (HCAP) diagnosis category removed from the 2019 ATS/IDSA guidelines for the management of community-acquired pneumonia?

A. HCAP risk factors were found to be weakly associated with P. aeruginosa and MRSA infections.

B. The risk factors for HCAP overlapped significantly with those for HAP and VAP, leading to confusion in treatment decisions.

C. HCAP was determined to have no impact on antibiotic prescribing practices.

D. The diagnosis was not applicable to patients with chronic comorbid conditions.

According to the 2019 IDSA community acquired pneumonia guidelines, which two risk factors are the most strongly associated with respiratory infections caused by MRSA or P. aeruginosa?

A. immunocompromised patient and prior isolation of these organisms

B. resident of a nursing home and hypoxia

C. prior isolation of these organisms and recent hospitalization with exposure to parenteral antibiotics

D. advanced structural lung disease and chronic dialysis

Q1 Answer: A Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-703-L01-P

Effect of Proton Pump Inhibitor Therapy on Incidence of Immune-Mediated Diarrhea and Colitis in Patients on Immune Checkpoint Inhibitors

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Immune-mediated diarrhea and colitis (IMDC) is a well-documented adverse event of immune checkpoint inhibitor (ICI) therapy. IMDC can have a significant negative impact on a patientâ€™s quality of life and their ability to receive ICI therapy in the future. Proton pump inhibitors (PPIs) are known to alter the intestinal microbiome, leading researchers to theorize that PPIs could affect the risk of IMDC. Prior published research has shown mixed results regarding association of PPI use and incidence of IMDC and demonstrates the need for further investigation regarding the effect of PPIs on IMDC.

The purpose of the study is to evaluate the effect of PPIs on the incidence of IMDC in patients receiving ICI therapy. The secondary purpose of the study is to evaluate the effect of PPIs on mortality in patients receiving ICI therapy.

This single-health system, retrospective, observational cohort study will include adults seen at a UC Health outpatient facility with any solid tumor cancer diagnosis who received or are receiving ICI therapy between 2013 and 2023. Notable exclusion criteria include diagnosis of ulcerative colitis or Crohnâ€™s disease and concomitant therapy with any of the following during ICI therapy: immunomodulatory drugs, greater than 10 mg of prednisone or other equivalent steroid per day, and concomitant anti-cancer therapy (other than ICIs). Patients on concomitant PPI therapy will be compared to patients not on concomitant PPI therapy. The primary endpoint is the incidence of IMDC at any time during or up to 3 months after ICI therapy in patients on PPIs compared to those not on PPIs. Secondary endpoints include grade of IMDC (if developed), time to onset of IMDC (if developed), progression-free survival, and overall survival.

Results are pending. Results, discussion, and conclusions will be presented at the 2025 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Define immune-mediated diarrhea and colitis, and the impact that proton pump inhibitors may have on this important side effect of immune checkpoint inhibitor therapy.

Discuss a PGY2 research project examining the association between proton pump inhibitor therapy and incidence of immune-mediated diarrhea and colitis.

Self Assessment Questions:

Which of the following is a potential explanation for the impact of PPIs on the incidence of IMDC?â€‹

A. PPIs alter the intestinal microbiomeâ€‹

B. PPIs block the renal elimination of ICIs â€‹

C. PPIs inhibit CYP metabolism of ICIsâ€‹

D. PPIs work synergistically with ICIs to increase their effectsâ€‹

What is the primary outcome of the PGY2 research project discussed?â€‹

A. Time to development of IMDC

B. Overall survivalâ€‹

C. Incidence of IMDC

D. Progression free survivalâ€‹

Q1 Answer: A Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-545-L01-P

Evaluation of Time to Administration of IV Push versus IV Piggyback Lacosamide

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Historically, lacosamide was administered via intravenous piggyback (IVPB) to mitigate adverse effects associated with intravenous push (IVP) administration. In April 2022, Baptist Health Louisville transitioned from IVPB to IVP for lacosamide. Given the limited evidence on IVPâ€™s impact on administration time, this study evaluated the time from order verification to administration for IVP versus IVPB lacosamide. As a controlled substance, lacosamide required additional preparation, with IVPB compounding potentially delaying administration. The study also assessed whether IVP administration increased the risk of adverse effects, including cardiovascular or central nervous system effects and infusion reactions.

This single-center, retrospective, pre-post intervention cohort study included patients â‰¥ 18 years old who received at least one dose of IVP or IVPB lacosamide at Baptist Health Louisville. The pre-intervention cohort spanned January 1, 2021, to December 31, 2021, and the post-intervention cohort covered June 1, 2023, to June 1, 2024. Patients were excluded if they experienced systolic blood pressure < 90 mmHg, heart rate < 50 beats per minute, or developed new-onset atrial fibrillation, atrial flutter, or ventricular tachycardia within 6 hours prior to lacosamide administration. Palliative care patients were also excluded.

Planned data collection included: age, sex, race, unit location, time of pharmacist verification, time of administration, incidence of bradycardia, hypotension, atrial fibrillation/flutter, ventricular tachycardia, central nervous system side effects, infusion reactions, lacosamide dose and receipt of benzodiazepines.

The primary outcome was the time from order verification to administration of IVP compared to IVPB lacosamide. Secondary outcomes included the incidence of cardiovascular and CNS adverse effects and infusion reactions within 6 hours of administration. A target sample size of 100 patients per group was estimated to achieve >90% power with a pre-specified alpha of 0.05.

Learning Objectives:

Explain the impact of IV push lacosamide administration method on efficiency

Discuss adverse effects associated with lacosamide administration

Self Assessment Questions:

Which is not a potential reason for delay in administration for IV piggyback lacosamide?

A. Need for additional compounding steps

B. Increased monitoring requirements compared to IV push

C. Lacosamide is a controlled substance, potentially requiring additional documentation

D. Stability of IV lacosamide sterile products

Which of the following was not a concern associated with the use of IV push administration of lacosamide?

A. Increased risk of cardiovascular adverse events

B. Increased risk of central nervous system adverse events

C. Increased risk of infusion reactions

D. Increased risk of acute kidney injury

Q1 Answer: B Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-785-L05-P

Evaluating Anticholinergic Burden Score as a Predictor of Inpatient Falls

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Purpose: Inpatient falls are one of the most frequently reported safety incidents in the hospital. Beyond immediate physical harm, falls can significantly impede recovery, reduce patient independence, escalate healthcare costs, and adversely impact hospital quality metrics. Medications, particularly anticholinergic agents, are among the primary contributors to fall risk. Currently, the Henry Ford Health System does not use anticholinergic burden scores to assess fall risk, potentially overlooking an important opportunity for risk assessment. Instead, the Hester Davis Fall Assessment tool is used to determine fall risk upon admission. This study seeks to evaluate the effectiveness of anticholinergic burden score as a predictive tool for inpatient falls. By exploring this relationship, we aim to improve prescribing practices, refine preventive strategies, and raise awareness about the risks associated with anticholinergic medications. Methods: This study was an IRB-approved, observational, retrospective cohort study that included adult patients at Henry Ford Jackson Hospital who experienced a documented inpatient fall between November 30, 2023, and November 30, 2024. All falls, regardless of whether they resulted in physical harm, were included in the analysis. Patients were excluded if they belonged to a vulnerable population or if the fall occurred post-discharge. Medications administered 24 hours prior to the fall were assessed to calculate the patient's anticholinergic burden score using both the Anticholinergic Cognitive Burden Score and the German Anticholinergic Burden Score. This score was then compared to the patient's Hester Davis Risk Assessment score. Logistic regression analysis was conducted to estimate the odds ratio of falls per unit increase in anticholinergic burden and to evaluate the predictive accuracy of each scoring tool. Results and Conclusion: The results and conclusion of this study will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the relationship between anticholinergic medications and inpatient falls

Recognize medications that contribute to high anticholinergic burden and their potential clinical implications

Self Assessment Questions:

Which of the following statements regarding anticholinergic burden scales is correct?

A. A score of 3 or higher is associated with an increased incidence of confusion, dizziness and falls

B. Anticholinergic burden scales are applicable only to patients over 65 years of age

C. Anticholinergic burden scales do not take medication dosage into consideration

D. Both A and C are correct

Which of the following medications would you expect to have the highest anticholinergic burden score?

A. Donepezil

B. Olanzapine

C. Oxycodone

D. Carbamazepine

Q1 Answer: D Q2 Answer: B

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Hyperkalemia Treatment Improvement to Decrease Incidence of Hypoglycemia

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The clinical practice guidelines for the treatment of hyperkalemia were last updated in October 2023 by the UK Kidney Association, and they recommend insulin regular 10 units IV with dextrose 50% 25 g. While insulin and glucose administration remain the most effective treatment for hyperkalemia, hypoglycemia remains a concern. Multiple clinical trials have been conducted to determine if different insulin dosing strategies should be used for hyperkalemia treatment to decrease the incidence of hypoglycemia. Incidence of hyperkalemia treatment induced hypoglycemia at our institution will be evaluated and modifications to the hyperkalemia order panel will be implemented to efficiently treat patients with hyperkalemia without causing hypoglycemia.

A retrospective data analysis will be performed for patients admitted from January 2024 to March 2024 who received insulin regular 10 units intravenously, were 18 years or older, and had a serum potassium greater than 5.5 mEq/L. The data collected from this analysis will be used to determine what modifications are needed to our institutionâ€™s hyperkalemia order panel. The primary outcome will be the incidence of hypoglycemia (defined as a blood glucose less than 70 mg/dL) within 12 hours of IV insulin administration used for hyperkalemia treatment. Patients will also be evaluated for incidence of severe hypoglycemia (defined as a blood glucose less than 54 mg/dL), change in serum potassium after treatment, the incidence of hyperglycemia based on the first glucose check after insulin and dextrose administration, and the use of other potassium-lowering agents (sodium zirconium cyclosilicate or sodium polystyrene sulfonate) during treatment. Data after a revision of the order panel will be analyzed and compared to data before the revision.

All results and conclusions will be presented at the 2025 Great Lakes Pharmacy Resident Conference. Further education and modifications to the order panel are needed to decrease the incidence of hypoglycemia with hyperkalemia treatment.

Learning Objectives:

Identify treatment that should be used for hyperkalemia and the order in which it should be administered.

Describe what patient population is at a higher risk of developing hypoglycemia from hyperkalemia treatment.

Self Assessment Questions:

The standard treatment for hyperkalemia is insulin, dextrose, and calcium gluconate. In what order should these medications be administered?

A. Calcium, insulin, dextrose

B. Insulin, dextrose, calcium

C. Dextrose, calcium, insulin

D. Calcium, dextrose, insulin

In which population should you consider using a lower insulin dose for hyperkalemia treatment?

A. Liver failure

B. Renal dysfunction

C. Obesity

D. Diabetes

Q1 Answer: D Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-628-L01-P

The Impact of Hypertensive Treatment on patients receiving Tenecteplase for Acute Ischemic Stroke

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Statement of Purpose
The purpose of this study is to compare the outcomes of patients who were treated with antihypertensive therapy prior to receiving tenecteplase to those who did not receive antihypertensive therapy.

Background
Fibrinolytic therapy is the primary treatment for acute ischemic stroke, with alteplase being FDA-approved and tenecteplase being shown to be an equally effective alternative. Tenecteplase has advantages, such as a longer half-life and stronger fibrin affinity, which may make it more efficient in clot dissolution. For fibrinolytic therapy, blood pressure must be below 185/110 mmHg before administering tenecteplase and maintained below 180/105 mmHg for 24 hours after. This control is vital to prevent bleeding, brain injury, and death. At Community Hospital, tenecteplase is the preferred treatment for acute ischemic stroke. Patients must have their blood pressure stabilized before administration and are closely monitored to ensure it remains within the target range, particularly if they were hypertensive upon admission. Antihypertensive medications are given as needed to maintain stability and prevent complications.

Methods
This is a retrospective analysis examining a subset of patients who received tenecteplase in the Emergency Department for acute ischemic stroke, from January 1, 2021, to August 1, 2024. The primary objective is to assess the change in the National Institutes of Health Stroke Scale (NIHSS) from initial assessment to discharge. NIHSS scores were assessed at numerous times from 0-24 hours following tenecteplase administration. Information regarding blood pressure and use of antihypertensive agents was collected for additional analysis. Safety endpoints include the incidence and types of bleeding and mortality.

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

Learning Objectives:
Recognize the differences in outcomes between patients who receive antihypertensive treatment prior to Tenecteplase to those who did not.
Discuss if and how elevated blood pressure was adequately controlled in this patient population.
Self Assessment Questions:
What should the blood pressure be maintained at for 24 hours following tenecteplase administration for acute ischemic stroke?
A. < 185/110 mmHg
B. <180/110 mmHg
C. <180/105 mmHg
D. <185/105 mmHg
What is the recommended dose of tenecteplase currently supported by clinical trials and used in this study for an acute ischemic stroke?
A. 0.25 mg/kg
B. 0.5 mg/kg
C. 0.4 mg/kg
D. 0.1 mg/kg
Q1 Answer: C Q2 Answer: A
APCE Universal Activity Number 0121-9999-25-558-L01-P

Daratumumab Monotherapy: Reconsidering Relapsed and Refractory Multiple Myeloma Maintenance Therapy
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Multiple myeloma is a cancer that affects the plasma cells in the bone marrow, leading to complications like bone damage and kidney issues. Emerging treatments, such as daratumumab monotherapy, offer potential benefits for maintaining remission in these patients. The purpose of this study is to evaluate the effectiveness of daratumumab monotherapy in sustaining remission for multiple myeloma patients, aiming to provide physicians with real-world evidence to guide treatment decisions and improve patient outcomes.

In this single-center retrospective cohort study, data will be collected from patients aged 18 or older with relapsed or refractory multiple myeloma who received daratumumab monotherapy for maintenance treatment. Exclusion criteria include patients with any other concurrent malignancies, as well as those who have received concomitant therapies (other than daratumumab) for more than 6 months during the proposed study period. Data will be queried and extracted from medical records, with additional manual collection and review of patient information to assess outcomes. Data validation will be conducted to ensure the accuracy and completeness of the information, including cross-checking entries for consistency and addressing any discrepancies. The data collected will include patient demographics, treatment history, progression details, and survival data. The primary outcome is progression-free survival, including incidence and time to progression. Secondary outcomes include overall survival.

Seventy-seven adult patients receiving subcutaneous daratumumab for refractory or relapsed multiple myeloma were initially screened for trial entry. Of these, 48 were excluded for not having received daratumumab as monotherapy, leaving 29 patients eligible for analysis.

Full results and conclusions will be presented at the Great Lakes Pharmacy Residents Conference.

Learning Objectives:

Identify key clinical guidelines recommendations and indications for the use of daratumumab in relapsed or refractory multiple myeloma

Discuss findings related to the efficacy, safety and clinical outcomes of daratumumab monotherapy for relapsed or refractory multiple myeloma

Self Assessment Questions:

Which of the following clinical guideline recommendations for the use of daratumumab in relapsed or refractory multiple myeloma is most appropriate for this patient?

A. Daratumumab is recommended as a monotherapy or in combination with other agents after the failure of one or more lines of therapy.

B. Daratumumab is primarily indicated for newly diagnosed multiple myeloma when used in combination with other therapies.

C. The recommended starting dose of daratumumab is 16 mg/kg once a week for the first two cycles.

D. Daratumumab should not be used in patients with a history of hypersensitivity to monoclonal antibodies.

Which of the following statements accurately describes the efficacy, safety, and clinical outcomes of daratumumab monotherapy for relapsed or refractory multiple myeloma based on previous trials?

A. Daratumumab monotherapy has demonstrated a significant improvement in PFS compared to other standard therapies

B. Daratumumab monotherapy has shown modest clinical outcomes, with patients experiencing prolonged remissions and durable responses

C. Daratumumab monotherapy results in a high incidence of severe adverse events including neutropenia and anemia

D. Daratumumab monotherapy has not been shown to provide a survival advantage over combination therapie

Q1 Answer: A Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-718-L01-P

Alvimopan versus Naloxegol for Post-Operative Ileus Prevention

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Purpose: Ileus is a common complication of surgical procedures, especially those involving the abdomen. Patients at highest risk have undergone procedures with intestinal manipulation or larger incisions. As ileus can increase length of stay, overall cost of care, and post-op morbidity, prevention remains crucial. Naloxegol and alvimopan are both peripherally acting mu-opioid receptor antagonists (PAMORAs) used prophylactically to promote bowel motility post-operatively. Previous studies comparing alvimopan and naloxegol have found no statistically significant difference between post-operative length of stay, return of bowel function, hospital readmission, and incidence of post-operative ileus (POI). However, they are limited in their application due to the specific procedure types studied.

Methods: This study is a retrospective chart review from January 1, 2020, to June 30, 2024. A patient list was generated utilizing the Indiana University Health electronic medical record system of patients who received alvimopam or naloxegol. Exclusion criteria include use of buprenorphine inpatient or outpatient, use of both PAMORAs during the indexing admission, or initial PAMORA dose >36 hours after surgery. Outcomes will be compared between patients receiving prophylactic naloxegol versus alvimopan. An estimated sample size of 750 patients is required to achieve 80% power with an alpha set at 0.05. The primary outcome is the difference in POI. Key secondary outcomes include differences in the administration of additional laxatives, bowel perforation, time to return of bowel function, length of stay, and average morphine milliequivalents per day during hospitalization between PAMORA agents. This study aims to evaluate the efficacy and safety of these agents in preventing POI for a wide surgical population and help clarify if cost saving initiatives are feasible.

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

Learning Objectives:

Recall the most common causes of post-operative ileus.
Identify post-operative ileus prevention strategies.

Self Assessment Questions:

Which of the following are common causes of post-operative ileus?
A. Electrolyte imbalance, history of diabetes mellitus, manipulation of the bowel
B. Nausea, vomiting, dehydration
C. Early mobilization, gender, cirrhosis
D. Decreased urine output, history of STEMI, age
Which of the following is a common post-operative ileus prevention strategy?
A. Centrally acting kappa-opioid receptor agonists (CAKORAs)
B. Peripherally acting kappa-opioid receptor antagonists (PAKORAs)
C. Centrally acting mu-opioid receptor antagonists (CAMORAs)
D. Peripherally acting mu-opioid receptor antagonists (PAMORAs)
Q1 Answer: A Q2 Answer: D
APCE Universal Activity Number 0121-9999-25-684-L01-P

Utilization of Illinois Drug Reuse Opportunity Program (I-DROP) Medications at a Single Community Hospital

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Purpose: In 2021, U.S. adults spent $63 billion out-of-pocket on prescriptions, with 8% incorrectly taking medications due to cost. Additionally, over 2.5 million tons of medical waste are produced annually. To address these challenges, the Illinois Drug Reuse Opportunity Program (I-DROP), passed in 2022, allowing pharmacies to redistribute unused, unopened medications for new prescription orders. This program improves medication affordability and reduces waste. At the University of Wisconsin Northern Illinois (UWNI) outpatient pharmacy, medications are redistributed for a $4 fee. However, utilization has been limited. This study evaluated baseline I-DROP utilization, identified missed opportunities, and assessed the impact of an educational intervention for prescribers, case management, and operations staff to increase adoption.

Methods: This study was conducted in two phases: pre-intervention (December 2023 to February 2024) and post-intervention (December 2024 to February 2025). Retrospective data from QS1 pharmacy software assessed eligible prescriptions, I-DROP medications dispensed, and missed opportunities. In November 2024, an educational intervention was implemented, consisting of informational sessions and a list of available I-DROP medications, aimed at prescribers, case management, and operations managers. Utilization rates were compared pre- and post-intervention, stratified by departments with and without pharmacist involvement.

Summary of Preliminary Results: The educational intervention led to greater I-DROP utilization at UWNI. Enhanced awareness among prescribers and pharmacists helped reduce missed opportunities, while resources like medication lists supported more efficient use of donated medications.

Conclusion: Targeted educational interventions increased I-DROP utilization at UWNI, improving awareness and reducing missed opportunities. Providing resources such as a list of available medications facilitated efficient use of donated medications. This study underscores the role of pharmacists in enhancing medication access and reducing waste, demonstrating the potential of similar strategies to promote drug reuse programs. Continued research is needed to evaluate the long-term impact on medication affordability, adherence, and environmental sustainability.

Learning Objectives:

Describe the purpose and implementation of the Illinois Drug Reuse Opportunity Program (I-DROP) in addressing medication affordability and waste reduction.

Identify the key components of the educational intervention designed to increase I-DROP utilization at the University of Wisconsin Northern Illinois outpatient pharmacy.

Self Assessment Questions:

What is the primary purpose of the Illinois Drug Reuse Opportunity Program (I-DROP)?

A. To reduce the number of prescriptions written by physicians

B. To allow redistribution of unused, unopened medications for new prescription orders

C. To fund research on pharmaceutical waste management

D. To eliminate the need for insurance coverage for prescription medications

Which of the following was a component of the educational intervention to increase I-DROP utilization at the UWNI outpatient pharmacy?

A. Offering free consultations to all patients

B. Introducing automated reminders for refills

C. Creating a list of available I-DROP medications

D. Reducing the dispensing fee for I-DROP medications to $2

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-832-L99-P

Administration of Alteplase versus Mechanical Thrombectomy in Patients Presenting with Acute Pulmonary Embolism

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The Purpose of this Research:
Pulmonary embolisms that are considered to be unstable high-risk with hemodynamic compromise can have in-hospital mortality rates over 25%. This research project aims to assess the in-hospital mortality, major bleeding events, and intensive care unit length of stays in patients that received systemic thrombolytic, catheter directed thrombolytic (CDT), or mechanical thrombectomy. Currently there is limited research regarding direct comparisons of the treatments that will be reviewed in this study. By evaluating these treatment modalities, the study aims to identify the most effective approach for improving clinical outcomes in patients with intermediate or high-risk pulmonary embolisms.

Scientific Rationale:
Pulmonary embolism is a life-threatening condition characterized by the obstruction of pulmonary arteries, often resulting in impaired gas exchange, right ventricular dysfunction, and shock. While anticoagulation therapy is standard for non-severe pulmonary embolisms, more aggressive approaches are considered in patients with severe manifestations. Each treatment option has its own mechanisms and potential risk. Understanding the differences in efficacy and complication rates between systemic thrombolytics, CDT, and mechanical thrombectomy can be crucial to optimizing patient outcomes. This research project aims to fill the gap by comparing these three treatment approaches in acute high risk pulmonary embolism.

The Risk and Potential Benefits of this Research:
Minimal risk for this study exists due to retrospective nature. The data will be deidentified to minimize the risk of patient information becoming compromised.
Potential benefits include improving guidance for the treatment of high-risk acute pulmonary embolism.

Inclusion/Exclusion Criteria:
Inclusion criteria: Age >18 years old, high risk pulmonary embolism, intermediate to severely ill pulmonary embolism, received one of the treatment modalities
Exclusion criteria: Low risk pulmonary embolism, initial use of anticoagulation for the treatment of pulmonary embolism, received alteplase for other indication.

Learning Objectives:
Identify indicators that increase the risk for early mortality in acute pulmonary embolism
Indicate absolute contraindications to systemic thrombolysis in acute pulmonary embolism

Self Assessment Questions:

Identify the appropriate indicators below that put patients at high risk for early mortality with acute pulmonary embolism.
A. Hemodynamic instability
B. Hemodynamic instability + PESI class I-II
C. PESI class I-II + Right Ventricular dysfunction
D. Hemodynamic instability + PESI class III-IV + Right Ventricular dysfunction + Positive troponin levels
Indicate below the appropriate absolute contraindication to systemic thrombolysis in acute pulmonary embolism.
A. Refractory hypertension (systolic BP >180 mmHg)
B. Central nervous system neoplasm
C. Traumatic resuscitation
D. Previous transient ischemic attack
Q1 Answer: D Q2 Answer: B
APCE Universal Activity Number 0121-9999-25-623-L01-P

Retrospective Review of Supratherapeutic Gentamicin Levels in Neonates Following Maternal and Neonatal Gentamicin Infusion

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Chorioamnionitis is an intraamniotic bacterial infection with resultant inflammation of amniotic fluid, placenta and/or the fetus treated with antibiotics prior to delivery with gentamicin and ampicillin. Existing literature demonstrates that a random gentamicin concentration in neonates may be supratherapeutic with maternal gentamicin administration 1-12 hours prior to delivery. The aim of this study is to identify a relationship between maternal antepartum gentamicin administration and its potential to cause supratherapeutic gentamicin concentrations in their neonates who also received gentamicin following delivery.

This retrospective chart review will include neonates who acquired a trough and their respective mothers who had gentamicin administered prior to birth. Patients will be excluded if they do not meet inclusion criteria, are transferred to an outside hospital during antibiotic duration, or if the mother did not receive gentamicin prior to birth. The resulting data will be compiled to assess the primary outcome of the number of patients who had supratherapeutic following neonatal and maternal gentamicin administration. The secondary outcomes include positive blood culture in the first 48 hours of life, any change to the antibiotic regimen due to a supratherapeutic trough, and the association of maternal and neonatal doses with antenatal and postnatal administration times. 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:

Review current literature for the use of gentamicin in patients with chorioamnionitis and their implementation in clinical guidelines

Describe the initial treatment options for the management of chorioamnionitis

Self Assessment Questions:

The 2010 study by Lyell and colleagues found daily gentamicin to be as effective as every 8-hour gentamicin. Which outcome was the primary measurement in this study?

A. Compare umbilical cord and maternal serum peak gentamicin concentrations

B. Treatment success after 16 hours of treatment without endometritis development

C. Composite of neonatal death, chronic lung disease, or major cerebral abnormality

D. Composite of neonatal morbidity and mortality

What is the optimal antibiotic regimen for a patient with suspected chorioamnionitis?

A. gentamicin + clindamycin

B. metronidazole + clindamycin

C. gentamicin + ampicillin

D. gentamicin monotherapy

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-680-L01-P

Nimodipine Dosing Frequency in Subarachnoid Hemorrhage (SAH)

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Purpose: Current guideline dosing for nimodipine in SAH is 60mg every 4 hours, but this is often changed to 30mg every 2 hours if there is hypotension; however, there is no current evidence demonstrating this alternative dosing strategy has any impact on blood pressure. The purpose of this study is to assess if there is a change in MAP between the two nimodipine dosing strategies: nimodipine 30 mg every 2 hours vs. nimodipine 60 mg every 4 hours

Methods: This is a retrospective chart review of patients admitted to Detroit Medical Center(DMC) between January 1st, 2014 and July 31st, 2024. Patients included were 18 years old or older, admitted for SAH from ruptured aneurysm, and started on nimodipine within 96 hours of SAH onset. Patients were excluded for hypersensitivity to nimodipine, pregnancy, and nimodipine discontinuation prior to 24 hours of therapy. Primary outcome is a change in blood pressure defined as a change of 5 mmHg or more in the average MAP 24 hours after switching from nimodipine 60 mg every 4 hours to nimodipine 30 mg every 2 hours. Secondary outcomes include incidence of MAP â‰¤65 mmHg events recorded within 24 hours of nimodipine dosage change, discontinuation due to hypotension, vasopressor use, vasospasm occurrence, number of fluid boluses within 24 and 48 hours of nimodipine administration, total input and output within 24 and 48 hours of nimodipine administration, and differences in hypotension and discontinuation between dosage forms. Statistical analysis includes paired t-test, Mann-Whitney U test, chi-squared test, Fisherâ€™s exact test, and inverse probability of treatment weighting (IPTW).

Results: Results and conclusion will be presented at the GLPRC.

Learning Objectives:

Identify the current role of nimodipine in the management of SAH patients

Discuss guideline recommended dosing of nimodipine in SAH patients

Self Assessment Questions:

What is the main function of nimodipine in SAH patients?

A. Decrease rates of vasospasm

B. Improves patient outcomes following SAH

C. Reduces cerebral blood pressure

D. Increases cerebral perfusion pressure

What is the guideline recommended dosing and duration of nimodipine in SAH?

A. 60mg q4h for 21 days

B. 30mg q2h for 21 days

C. 60mg q4h for 30 days

D. 30mg q2h for 30 days

Q1 Answer: B Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-528-L01-P

Myelosuppression risk of chemotherapy in ovarian cancer patients who previously received a PARP inhibitor

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Purpose: Myelosuppression, including neutropenia, anemia, and thrombocytopenia, are known and concerning adverse effects of many chemotherapy medications. All of these factors affect the clinical outcomes of patients and may result in chemotherapy dose delays or modifications. One treatment utilized in the management of ovarian cancer, as well as multiple other types of cancers, are PARP inhibitors (PARPi). This class of drugs works by inhibiting poly ADP-ribose polymerase, a protein responsible for repairing DNA. Myelosuppression is a common adverse effect in PARPi and due to the mechanism of action, there is a concern for increased future risk of myelosuppression with this class of medications. The objective of this study is to describe the hematologic effects of subsequent chemotherapy among patients who received PARPi maintenance therapy compared to those who did not receive PARPi maintenance therapy. Methods: This study is a single-system retrospective chart review of patients receiving second-line chemotherapy for ovarian cancer between the dates of January 1, 2017 and June 30, 2024. Patients will be grouped according to usage of maintenance PARPi prior to second-line chemotherapy. The data collected includes baseline characteristics, neutropenic risk factors, incidence of myelosuppression, incidence of dose delays due to myelosuppression, chemotherapy received, and supportive care received. The primary outcome is the incidence of neutropenia. Results and conclusion will be reported at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize the factors that would put patients at a higher risk of experiencing neutropenia.

Describe the role of PARP inhibitor therapy in the treatment of ovarian cancer.

Self Assessment Questions:

What is considered a significant risk factor for neutropenia?

A. Younger age (< 50 years old)

B. Prior chemotherapy or radiation therapy

C. Brain involvement by tumor

D. Smoking history

Which of the following is considered severe neutropenia?

A. ANC > 2000 cells/mm3

B. ANC < 1500 cells/mm3

C. ANC < 1000 cells/mm3

D. ANC < 500 cells/mm3

Q1 Answer: B Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-546-L01-P

Comparative Effectiveness of Intravenous Labetalol Versus Nicardipine on Blood Pressure Variability in Hypertensive Emergencies

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Purpose: Hypertensive emergencies are characterized by severely elevated blood pressure with acute end-organ damage, and blood pressure variability (BPV) has emerged as a potential predictor of adverse outcomes in these conditions. While nicardipine continuous intravenous (IV) infusion and labetalol IV boluses are commonly used for BP management, limited evidence directly compares their effects on BPV across all hypertensive emergencies. Existing studies, primarily in ischemic stroke populations, suggest that nicardipine infusion may provide less blood pressure variability, and achieve goal BP faster than intermittent labetalol boluses. However, their effect on BPV in other types of hypertensive emergencies remains unclear. The purpose of this study is to compare the effects of nicardipine and labetalol on BPV in patients with hypertensive emergencies, with the hypothesis that nicardipine continuous infusion will result in lower BPV compared to labetalol boluses.
Methods: This is a retrospective cohort study conducted across five acute care hospitals in Michigan. Adult patients treated with either intravenous nicardipine continuous infusion or labetalol boluses between January 2021 and December 2024 will be included. A total of 118 patients who received either study drug within six hours of admission will be analyzed. Patients who received metoprolol, hydralazine, or other antihypertensives or both study drugs will be excluded. The primary endpoint, BPV, will be measured as the difference between maximum and minimum MAP values, recorded hourly and grouped into 2-hour intervals during the first six hours of treatment. Secondary endpoints include BPV over the first 24 hours of treatment. Clinical outcomes assessed include length of stay, in-hospital mortality, and intracerebral hemorrhage. Safety outcomes include bradycardia, tachycardia, and hypotension.
Results/Conclusion: To be presented.

Learning Objectives:

Describe the role of BPV in hypertensive emergencies based on current evidence.

Explain the effects of continuous nicardipine infusion and labetalol boluses on BPV in hypertensive emergencies based on current evidence.

Self Assessment Questions:

What effect does high BPV have on outcomes in patients with acute ischemic stroke?

A. No impact on clinical outcomes

B. Increased risk of hemorrhagic transformation and poor functional recovery

C. Reduced risk of intracerebral hemorrhage

D. Improved 3-month functional outcomes

Which statement accurately reflects the effects of nicardipine and labetalol on BPV in hypertensive emergencies based on current evidence?

A. Nicardipine and labetalol have no significant differences in BPV control

B. Labetalol boluses result in lower BPV than nicardipine infusion

C. Continuous infusion of nicardipine is associated with lower BPV compared to labetalol boluses

D. Nicardipine is associated with increased BPV due to its rapid titration requirements

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-620-L01-P

Pharmacist Impact on Glycemic Control when Transitioning from Intravenous Insulin Infusion to Subcutaneous Insulin

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Background: Diabetes is one of the largest and fastest growing chronic diseases in the United States with 7.86 million hospitalizations in 2021. Management of blood glucose (BG) is difficult in the hospital setting; blood glucose values <70mg/dL may result in life-threatening hypoglycemia while values >180mg/dL increase risk for nosocomial infections, medical complications, mortality, longer hospital stays, and greater likelihood of transitional care needs after hospital discharge. Blood glucose values for critical care patients on an electronic glucose monitoring system (eGMS) at this institution were found to be above the recommended American Diabetes Association goal of 140-180 mg/dL 25.7% of the time compared to 14.1% for other hospitals utilizing the same eGMS.

Purpose: To assess the impact of pharmacist interventions on glycemic control in a community hospital setting for patients transitioning from intravenous (IV) insulin infusion to subcutaneous insulin

Methods: This single-center, retrospective, cohort study evaluated glycemic control of critical care patients who received IV insulin infusion utilizing an eGMS and then transitioned to subcutaneous insulin. Inclusion criteria included any adult patient on an IV insulin infusion for a diagnosis of hyperglycemia, diabetic ketoacidosis (DKA), or hyperosmolar hyperglycemic state (HHS) and subsequently transitioned to subcutaneous insulin therapy. Interventions to improve glycemic control made by pharmacists included shifting of the eGMS BG target, staff education, and creation of a protocol to establish parameters for transition from IV insulin infusion to subcutaneous insulin. The primary outcome was glycemic control (defined as percentage of time in goal BG range of 140-180 mg/dL) within the first 24 hours after transitioning from IV insulin infusion to subcutaneous insulin and secondary outcomes included glycemic control during insulin infusion and within 48 hours after transition.

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

Learning Objectives:

Recognize the importance of glycemic control for patients in the hospital setting

Identify a pharmacist's role in improving glycemic control in hospitals

Self Assessment Questions:

Which of the following is a possible complication related to blood glucose values >180mg/dL?

A. Infection

B. Longer hospital stays

C. Increased mortality

D. All the above

Pharmacists can make an impact on glycemic control within their institution by which of the following methods?

A. Establishing an institution target blood glucose

B. Healthcare staff education

C. Creating protocols to improve glycemic control

D. All the above

Q1 Answer: D Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-672-L01-P

Effects of a Surgical Opioid Avoidance Protocol in Pancreas Transplant Recipients

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Pancreas transplant is an extensive surgery that requires a large incision across the abdomen. The surgical opioid avoidance protocol (SOAP) was developed as a post-surgical initiative to encourage scheduling a multi-modal pain regimen over using primarily opioids. The purpose of this study is to analyze the outcomes in opioid use and patient reported pain scores after initiating this protocol.

This study is designed as a single-center, retrospective, cohort study using adult pancreas transplant recipients at the University of Illinois in Chicago Hospital from January 1, 2018 to July 26, 2020. Patients in vulnerable populations and those who experienced failed transplant or death during index admission were excluded. Those deemed qualified for the study were separated into pre-SOAP and post-SOAP groups and chart review on electronic medical records was conducted on either Cerner or EPIC systems.

The primary outcome of this study looked at total opioid use recorded in morphine milligram equivalents and various secondary outcomes. These data points were collected and stored using Research Electronic Data Capture. Nominal data was compared using Chi square or Fisherâ€™s exact test and continuous data was compared using Studentâ€™s T-test or Mann Whitney U test. A mixed effects logistic regression curve will be used to analyze pain scores over time.

Basic demographics showed that a majority of the patients reviewed were African-American, males who received simultaneous pancreas kidney transplants. The average age was 43.6 +/- 9.8 years with an average BMI of 30.0 +/- 7.9 kg/mÂ². Preliminary data demonstrated that the average length of stay (10.2 +/- 6.3, 9.4 +/- 3.4, [p value = 0.503]) and return to bowel function in days (2.9 +/- 1.4, 2.6 +/- 1.6, [p value = 0.339]) was not affected with the initiation of the protocol. The finalized data will be presented during the conference.

Learning Objectives:

Identify essential components in a multi-modal pain regimen

Describe trends in the total amount of opioids used in MME during admission and various secondary outcomes

Self Assessment Questions:

Which component does not belong in a multi-modal pain regimen?

A. Scheduled IV/PO acetaminophen

B. Scheduled lidocaine patch

C. Scheduled IV hydromorphone

D. PRN PO tramadol

Which of the following statement is correct?

A. Hospital length of stay increased after initiating SOAP

B. Hospital length of stay decreased after initiating SOAP

C. Return of bowel function decreased after initiating SOAP

D. Hospital length of stay and return of bowel function remained unchanged after initiating SOAP

Q1 Answer: C Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-791-L08-P

Pharmacist driven metabolic monitoring of second-generation antipsychotics in an outpatient behavioral setting

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Purpose: The prevalence of metabolic syndrome in patients treated with atypical antipsychotics is 25-50% greater than those in the general population. Psychiatrist time is divided amongst high risk patients often in a mental health crisis making it difficult to stay on top of and routinely complete these physical and laboratory assessments. The objective is to determine if pharmacist can make impactful interventions screening and treating for metabolic syndrome. Adding ambulatory pharmacist to the care team, provides another resource for medical management. The addition of another professional will allow for less patients lost for follow-up, more frequent follow-ups, and enhance the support for treatment of chronic conditions.

Methods: This is a retrospective chart review of 1118 atypical antipsychotic prescriptions written from May 27th, 2024 to November 26th, 2024 from MyMichigans behavioral health outpatient clinic. Patients were included if they were over the age of 18, patients of MyMichigan Psychiatry, and has an active atypical antipsychotic prescription. Those who were prescribed an atypical antipsychotic within the six months were excluded if the prescription was only prescribed during their stay at the partial hospitalization program or if the prescription had been discontinued. The primary analysis will evaluate the demand for a pharmacist in this setting based on the amount of potential interventions recorded based on the need for updated lipid panels, fasting glucose, and body mass index, additional or titration of medications, switching to atypical antipsychotics with less metabolic properties, and those lost at follow-up. The results and interventions recorded from this study has been discussed with the perspective providers. Epic messages will be sent to the providers with interventions recorded prior to patientâ€™s follow-up appointments. The recorded interventions will be used to determine if a pharmacist is warranted in the MyMichigan Psychiatry clinic.

Learning Objectives:

Define what metabolic syndrome is and how it is diagnosed.

Identify medication classes that increase the risk of developing metabolic syndrome.

Self Assessment Questions:

Which of the following medications carries the highest risk of developing metabolic syndrome?

A. Fluoxetine

B. Olanzapine

C. Bupropion

D. Trazodone

In which scenario does a patient meet criteria for management of metabolic syndrome?

A. a.An 18-year-old male with a waist circumference of 43, fasting blood sugar of 126, HDL of 50, blood pressure of 122/82, and triglycerides of 180.

B. b.A 36-year-old female with a waist circumference of 30, fasting blood sugar of 88, HDL of 55, blood pressure of 126/78, and triglycerides of 100.

C. c.A 40-year-old female with a waist circumference of 38, fasting blood sugar of 90, HDL of 62, blood pressure of 118/76, and triglycerides of 180.

D. d.A 60-year-old male with a waist circumference of 24, fasting blood sugar of 70, HDL of 38, blood pressure of 124/80, and triglycerides of 130.

Q1 Answer: B Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-639-L01-P

Early Enteral Antihypertensive Initiation for Intracerebral Hemorrhage

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Purpose: Elevated blood pressure is a critical concern in acute intracerebral hemorrhage (ICH), often managed with intravenous (IV) antihypertensive infusions, favored for ease of titration and stable blood pressure control. Current guidelines from the American Heart Association/American Stroke Association and European Stroke Initiative recommend maintaining systolic blood pressure below 180 mmHg and transitioning to enteral therapy within a week. However, optimal timing and specific agents for transitioning to enteral therapy remain unclear. This study evaluates the impact of transitioning to enteral antihypertensives within 48 hours of admission, aiming to fill existing gaps in the literature by determining if this approach can stabilize blood pressure variability, reduce intensive care unit (ICU) length of stay, and improve both short- and long-term clinical outcomes.
Methods: This retrospective cohort study at Bronson Methodist Hospital included patients admitted for acute ICH between January 01, 2023, and December 01, 2024. Eligibility criteria included adults 18 years and older admitted to the neuro critical care unit who received at least one dose of enteral antihypertensives during their ICU stay. Patients with do not resuscitate or do not intubate orders within 72 hours of admission, minors, pregnant patients, and incarcerated patients were excluded. The primary endpoint was ICU length of stay. Secondary safety endpoints included incidence of hypotension, vasopressor use, and increase of four or more points from the lowest National Institutes of Health Stroke Scale score during ICU admission. Efficacy outcomes included the number of as-needed IV antihypertensive boluses administered per patient, duration of IV nicardipine, and incidence and duration of arterial lines. Additionally, long-term outcomes were assessed through the Modified Rankin Scale scores 4-8 months post-discharge.
Results + Conclusion: Data collection and analysis is in progress. Results and conclusions will be presented at the 2025 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Explain the clinical rationale and importance of blood pressure management in acute ICH.

Describe the current guidelines and therapeutic approaches for the use of antihypertensive therapy in the acute phase of ICH

Self Assessment Questions:

Which of the following best describes the rationale for tight blood pressure control in patients with acute intracerebral hemorrhage?

A. To increase cerebral perfusion and prevent secondary ischemic injury.

B. To prevent vasospasm and subsequent cerebral edema.

C. To reduce the risk of hematoma expansion and improve functional outcomes.

D. To enhance the clearance of blood breakdown products in the subarachnoid space.

How does effective blood pressure control impact the management and recurrence of intracerebral hemorrhage (ICH)?

A. It increases the risk of recurrent ICH by causing fluctuations in cerebral perfusion pressure.

B. It reduces the risk of recurrent ICH by lowering the stress on small blood vessels in the brain.

C. It improves short-term survival without affecting long term recurrence.

D. It delays recovery from the initial ICH episode by reducing necessary perfusion pressure to damaged areas of the brain.

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-615-L01-P

Effect of Multidisciplinary Antimicrobial Stewardship Team Intervention on Days of Therapy for Meropenem in an Adult Medical Intensive Care Unit

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Purpose: Broad-spectrum antibiotic use tends to be higher in medical intensive care units (ICU) compared to non-ICU units, driven by disease complexity and severity. Given the association of high antibiotic use with increased antibiotic resistance, improving antimicrobial stewardship practices is crucial. Emphasizing multidisciplinary collaboration and implementing antibiotic use audits have been shown to enhance antibiotic prescribing practices. To promote appropriate use of meropenem, weekly multidisciplinary meropenem audits were initiated in November 2022. The purpose of this study is to assess whether the intervention effectively reduced meropenem usage at our institution.

Methods: This is a single-center, retrospective, pre-post study, conducted at John H. Stroger Jr. Hospital of Cook County in the medical ICU. The intervention was the implementation of the multidisciplinary antimicrobial stewardship team who conducted weekly reviews of all patients receiving meropenem in the medical ICU to promote appropriate use. Adult patients in the medical ICU, receiving meropenem, and not under the care of the infectious diseases (ID) consult team were included. The data was collected from the electronic medical record from November 1, 2021, to October 31, 2023. The primary outcome is the days of therapy per 1,000 patient days for meropenem. Secondary outcomes include days of therapy per 1,000 patient days for piperacillin-tazobactam and cefepime, ICU length of stay, and mechanical ventilation days. Acceptance rate of recommendations will be assessed and evaluated by category: de-escalate, discontinue, continue, or request infectious diseases consult. Statistical analysis will be conducted as follows: continuous data will be analyzed using the Mann-Whitney U test, and categorical data will be analyzed using Fisherâ€™s exact test.

Results and conclusions will be presented at the 2022 Great Lakes Pharmacy Resident Conference

Learning Objectives:

List the advantages and limitations of monitoring antimicrobial use through the metric of days of therapy per patient days

Identify the stewardship recommendations that were most accepted by the primary care team and those that were least frequently implemented

Self Assessment Questions:

Which of the following is a limitation of using days of therapy per 1,000 patient days as a metric for tracking antimicrobial use?

A. It helps identify areas of overuse

B. Days of therapy data is usually readily available from pharmacy or infection control records

C. It does not differentiate between appropriate and inappropriate antimicrobial use

D. It is an accepted metric by the Infectious Disease Society of America

Which type of stewardship recommendation was accepted the most by the primary team?

A. Continue

B. Discontinue

C. De-escalateÂ

D. Infectious disease consult

Q1 Answer: C Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-824-L99-P

Evaluation of Catabolic Response in Neurologically Injured Patients with Augmented Renal Clearance

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Introduction: Augmented renal clearance (ARC), defined as a creatinine clearance > 130 ml/min, is present in many neurocritical care patients. Detection of ARC is important to ensure appropriate dosing of renally-cleared medications. The gold standard for identifying ARC is an 8-hour urine creatinine clearance measurement. Patients with neurologic critical illness also often exhibit hyper-catabolism due to the inflammatory response to injury. The gold standard for evaluating metabolic needs for critically ill patients is a metabolic cart study. This calculates a measured energy expenditure (MEE) based on oxygen consumption and expiration of carbon dioxide. This study aims to begin to explain potential etiologies for ARC related to catabolism and identify biomarkers which may in identifying the presence and extent of ARC.
Methods: Adults ages 18-65 years old who were within seven days of admission to an intensive care unit with a primary diagnosis related to neurological critical illness were screened for inclusion. After obtaining informed consent, the subject underwent an 8-hour urine collection for measured creatinine clearance (mClCr) and urine urea nitrogen (UUN) on the study day. A metabolic cart study was obtained within 24 hours of the urine collection to document MEE. Residual blood samples that were already obtained for daily monitoring were used for measurement of biomarkers. Biomarkers of interest include prealbumin, procalcitonin, c-reactive protein, transferrin, and 3-methylhistidine. The desired sample size is 20 patients.
Results: Seven patients have currently been enrolled and completed the study procedures. The mean age of enrolled patients is 47 years old. Three of the enrolled patients had traumatic brain injuries, three had ischemic strokes, and one had a subarachnoid hemorrhage. The mean MEE is 2695 kcal and the mean mCrCl is 245 ml/min.

Learning Objectives:

Recognize the potential relationship of augmented renal clearance (ARC) and hyper-catabolism in neurologically injured critically ill patients.

Identify the methods of determining if a patient has augmented renal clearance (ARC) and the degree of hyper-catabolism they are experiencing.

Self Assessment Questions:

Augmented renal clearance is most commonly defined as a creatine clearance > ___ ml/min.

A. 130

B. 100

C. 90

D. 60

This study is using a(n) __, for detection of ARC and a(n) __ for evaluation of metabolic needs.

A. 8-hour creatinine clearance measurement; metabolic cart study

B. Metabolic cart study; 8-hour creatinine clearance measurement

C. 4-hour creatinine clearance measurement; dietitian consult

D. 24-hour creatinine clearance measurement; metabolic cart study

Q1 Answer: A Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-661-L01-P

Evaluating the Potential Financial and Clinical Impact of CCM Billing Involving Pharmacists in Primary Care

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Purpose:
Chronic Care Management (CCM) is an essential primary care service that supports Medicare beneficiaries with multiple chronic conditions. It involves non-face-to-face coordination, including health tracking, personalized care plans, and medication management. Although pharmacists are not recognized as billing providers for CCM services, they may play a significant role, offering opportunities to generate additional revenue. This study aims to evaluate missed billing opportunities for CCM services involving pharmacists in primary care clinics and identify potential financial impacts and areas for improvement in workflow, implementation, and delivery of patient care.

Methods:
This retrospective chart review will analyze patients with at least one audio-only encounter with a pharmacist within the Community Health Networkâ€™s outpatient clinics between January 1, 2024, and January 31, 2024. Data will be collected from the electronic health record system, Epic., including patient demographics, number of chronic conditions, encounter time, insurance type, and change in clinical outcomes (e.g., hemoglobin A1c, blood pressure, body weight). The analysis will quantify missed revenue opportunities and evaluate the number of CCM visits performed, aiming to improve workflow and demonstrate the value of pharmacists in chronic care management.

Results:
Preliminary data includes 510 individuals with a pharmacist during the study period. Of those who have been reviewed, 49% were Medicare, Medicaid, and or dual-eligible beneficiaries potentially meeting CCM- inclusion criteria per Centers for Medicaid and Medicare Services (CMS) guidelines. Estimated missed revenue for January 2023 exceeds $8,121.36, excluding commercial. This approximation does not include commercial and or private payers. This data suggests a significant opportunity for implementation of CCM services in primary care settings throughout the network.

Conclusion:
Results will be discussed at the Great Lakes Pharmacy Resident Conference, with a focus on optimizing CCM service delivery, improving financial outcomes, and expanding the role of pharmacists in primary care.

Learning Objectives:

Discuss the role of Chronic Care Management (CCM) in enhancing the quality of care for patients with chronic conditions and the potential impact of pharmacists in this model.

Identify the potential financial benefits and missed revenue opportunities for pharmacists with providing CCM services within a primary care setting.

Self Assessment Questions:

According to the CDC, approximately percentage of adults in the U.S. have been diagnosed with two or more chronic conditions, a population that may potentially benefit from Chronic Care Management (CCM) services?

A. 0.1

B. 0.25

C. 0.35

D. 0.4

Why is it important to quantify potential missed revenue opportunities for Chronic Care Management services?

A. To understand how much time pharmacists are spending on patient interactions

B. To identify potential revenue streams and improve care delivery by integrating pharmacists into CCM workflow

C. To decrease the amount of time of pharmacists spend on patient care

D. To track the number of patients who do not successfully meet treatment goals identified by providers

Q1 Answer: D Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-801-L99-P

Effect of Vitamin K Supplementation on Elevated INR in Hospitalized Patients with Cirrhosis

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Purpose

Patients with cirrhosis cannot efficiently produce many prothrombotic and antithrombic factors, resulting in hemostatic imbalances that increase the patientâ€™s risk of both bleeding and inappropriate clotting. These imbalances can manifest through an elevated international normalized ratio (INR). Some prescribers administer vitamin K to correct elevated INR and decrease risk of bleeding. Strong evidence supporting this practice is lacking and the degree to which vitamin K decreases INR in patients with cirrhosis not on anticoagulation remains unclear. The purpose of this study is to determine the effect vitamin K has on INR in hospitalized patients with cirrhosis and elevated INR.

Methods

This was approved by the Institutional Review Board. This study was a retrospective cohort study of patients 18 years of age and older diagnosed with cirrhosis with an INR greater than or equal to 1.5. Patients who were admitted to Baptist Health Floyd during the study timeframe were randomly selected to be screened for eligibility until 202 patients were included. Patients were excluded if they took warfarin outpatient and/or during admission, received prothrombin complex concentrate prior to the first INR being drawn, were pregnant or incarcerated, or were missing INR data. The primary outcome was absolute decrease in INR in patients treated with vitamin K compared to those who were not. Secondary outcomes include incidence of in-hospital bleeding events, incidence of in-hospital thrombotic events, and length of hospital admission.

Results and Conclusion

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:

Describe the pathophysiology of elevated INR in cirrhosis

Recall current evidence that reports on vitamin K's effect on bleeding in cirrhosis

Self Assessment Questions:

Which of the following options contribute to elevated INR in cirrhosis?

A. Fluid retention

B. Decreased production of vitamin K dependent coagulation factors

C. Formation of varices

D. Increased production of factor VIII

How many published studies have shown that vitamin K causes a statistically significant reduction in major bleeding events in patients with elevated INR secondary to cirrhosis?

A. 0 studies

B. 1 study

C. 2 studies

D. 3 studies

Q1 Answer: B Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-507-L01-P

Terlipressin Outcomes in Hepatorenal Syndrome Versus Hepatorenal Syndrome-Acute Tubular Necrosis

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Purpose: Terlipressin is a vasopressor receptor agonist that has been used in Europe for more than 30 years for hepatorenal syndrome (HRS) but was recently approved by the FDA in 2022. The CONFIRM trial evaluated the efficacy and safety of terlipressin plus albumin in adults with HRS-type 1, now known as HRS-AKI. The study resulted in verified HRS reversal, defined as two consecutive serum creatinine (SCr) measurements of 1.5 mg/dL or less at least 2 hours apart and survival without renal-replacement therapy for at least 10 days, in 32% of patients treated with terlipressin compared to 17% of patients treated with placebo.â€¯Acute tubular necrosis (ATN) is commonly found in patients with cirrhosis leading to difficulty in differentiating HRS. A current lack of available objective testing leads to difficulty diagnosing HRS especially in the setting of acute tubular necrosis (ATN). Often in practice, providers who have concern for HRS, despite evidence of ATN, have utilized terlipressin for treatment. The outcomes of terlipressin use in ATN are unknown. This project aims to evaluate outcomes of terlipressin use in patients with HRS compared to HRS with ATN (HRS-ATN).â€¯â€¯

Methods: This study was a retrospective chart review that evaluated terlipressin outcomes in HRS versus HRS-ATN in adult hospitalized patients at Indiana University Health from June 2023 to December 2024. Patients included had cirrhosis with ascites and received at least 4 doses of terlipressin. Theâ€¯primary outcome evaluated was HRS reversal, defined as SCr less than 1.5mg/dL or within 0.3 mg/dL of baselineâ€¯during hospitalization. Secondary endpoints evaluated were transplant free survival at 90 days, avoidance of continuous renal replacement or intermittent hemodialysis within hospitalization, and mortality in hospital, at 30, and 90 days.

Learning Objectives:

Define the diagnostic criteria for HRS-AKI

Discuss the clinical outcomes of terlipressin for management of HRS-AKI

Self Assessment Questions:

What criteria would be diagnostic of HRS-AKI?

A. Presence of cirrhosis and ascites

B. SCr of at least 1.5 mg/dL or 0.3 mg/dL greater than baseline value within 48 hours

C. SCr that did not improve more than 20% after albumin administration for 2 days

D. All the above

Which of the following is a significant outcome that has been found with the use of terlipressin in HRS-AKI?

A. Reversal of HRS (any SCr of 1.5 mg/dL or less)

B. Verified reversal of HRS with no recurrence through 30 days

C. Transplant free survival at 90 days

D. Mortality at 90 days

Q1 Answer: D Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-722-L01-P

Comparison of Cytokine Release Syndrome Management Algorithms In T-cell Engager Therapies

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Statement of Purpose: Cytokine release syndrome (CRS) is a common immune-mediated adverse effect of T-cell engager therapies, such as bispecific T-cell engager (BiTE) and chimeric antigen receptor T-cell (CAR-T). The pathophysiology of CRS is theorized to be similar in BiTE and CAR-T as studies showed similar cytokine activity between both therapies. Management of CRS involves tocilizumab, an IL-6 receptor antagonist, and corticosteroids. Both the American Society for Clinical Oncology and European Myeloma Network recommend the use of tocilizumab for initial management of CAR-T-associated CRS with corticosteroids reserved for Grades 2-4. Currently, scarce data exists supporting the optimal management of CRS with BiTE therapies. University of Cincinnati Medical Center (UCMC) adopted an institution-specific protocol utilizing corticosteroids for initial management of BiTE-associated CRS and tocilizumab for Grades 2-4. The primary objective is to compare time to resolution of CRS between BiTE CRS management and CAR-T CRS management. Secondary objectives include comparison of tocilizumab usage for CRS management, steroid usage for CRS management, time to onset of immune effector cell-associated neurotoxicity syndrome, time to onset of CRS, incidence of CRS, incidence of immune effector cell-associated neurotoxicity syndrome, incidence of ICU transfers, length of stay, use of refractory agents for CRS management.

Statement of Methods Used: This single-center, retrospective, double arm, observational study will be conducted at UCMC. Participants included must be at least 18 years of age diagnosed with non-Hodgkin's Lymphoma, multiple myeloma, B-cell acute lymphoblastic leukemia, or chronic lymphocytic leukemia/small lymphocytic lymphoma treated with BiTE or CAR-T therapy. Exclusion criteria include vulnerable patient populations, patients enrolled in clinical trials, and patients that received blinatumomab.

Summary of (preliminary) results to support conclusion: Data collection and analysis are on-going. Results will be presented at Great Lakes Pharmacy Residents Conference in April 2024.

Conclusions Reached: Conclusion will be based on results.

Learning Objectives:

Review the management of cytokine release syndrome associated with T-cell therapies.

Describe the clinical impact that these results will have on CRS management in T-cell therapies.

Self Assessment Questions:

On the Bone Marrow Transplant unit, you are reviewing patients prior to rounds. A patient that was admitted earlier in the week to receive glofitamab (BiTE therapy) is newly febrile with Tmax of 102Â°F. You check the patientâ€™s chart and find no active treatment for CRS. What do you recommend for the treatment of CRS in this patient?

A. Acetaminophen

B. Tocilizumab

C. Dexamethasone

D. Siltuximab

What is the primary endpoint of this research project?

A. Time to resolution of CRS

B. Serum IL-6

C. CARTOX score

D. Number of dexamethasone doses used

Q1 Answer: C Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-556-L01-P

Evaluation of Systemic Corticosteroid Duration of Therapy in Ventilated Critically Ill Patients with Pulmonary Indications

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Purpose: Systemic corticosteroids are regularly used in the critically ill population to promote anti-inflammatory cytokines, mediate stress responses, and promote organ recovery. Corticosteroids use also comes with the risk of dangerous adverse effects, introducing a need for best practice to ensure responsible and appropriate dosing of corticosteroids. Guidelines surrounding optimal corticosteroid dosing and duration of therapy in critically ill patients are ambiguous and overall lacking. The purpose of this study was to assess differences in corticosteroids prescribing and its effect on clinical outcomes in patients with respiratory indications admitted to the intensive care unit.

Methods: This was a retrospective, single-center, cohort study in a 433-bed community hospital in Lexington, Kentucky with four critical care patient units and 50 critical care beds. Patients with a respiratory indication for corticosteroid use, including acute respiratory distress syndrome, bacterial pneumonia, and chronic obstructive pulmonary disease exacerbation, were identified through an electronic health record database based on medication orders for intravenous (IV) methylprednisolone, IV hydrocortisone, or IV dexamethasone. The following patients were excluded: COVID-19 diagnosis (present or within 14 days), presence of tracheostomy (no extubation), systemic corticosteroid use prior to admission, death/hospice during admission, and non-pulmonary related indications. Patients were cohorted into two groups, short-term duration (â‰¤ 5 days to taper) vs. long-term duration (> 5 days to taper). The primary outcome was ventilator-free days. Selected secondary outcomes include incidence of ventilator-associated pneumonia and incidence of re-intubation. Selected data points collected for each patient include cumulative corticosteroid dose (in prednisone equivalents), total ventilator days, duration of ICU stay (days), post-ventilator ICU length of stay (days), and time to/duration of corticosteroid taper. Appropriate statistical tests were used. All data used a 95 percent confidence interval and an alpha value of 0.05.

Results/conclusions: Data will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize the proven benefits and potential risks of systemic corticosteroid use in the critically ill population.

Discuss the pertinent guideline recommendations for systemic corticosteroid use in the critically ill population and the current gap in literature regarding corticosteroid dosing.

Self Assessment Questions:

Which of the following is true regarding the adverse effects of systemic corticosteroids?

A. Systemic corticosteroids are known to cause impaired glucose homeostasis and may increase the risk for hypoglycemia

B. Systemic corticosteroids carry the risk of electrolyte abnormalities, including hypernatremia, fluid retention, and hypokalemia

C. Administration of systemic corticosteroids to a critically ill patient may also benefit concurrent ICU-related delirium

D. Systemic corticosteroids may cause increased respiratory distress and should be avoided in respiratory-related conditions

Which of the following correctly describes guideline recommendations regarding tapering of systemic corticosteroids?

A. Guidelines recommend high doses and little-to-no taper strategy for all systemic corticosteroid medication regimens

B. Tapering must be prolonged (>30 days) for all patients who receive systemic corticosteroids in the ICU

C. Guidelines suggest that a prolonged taper may be beneficial in acute respiratory distress syndrome (ARDS), but make no stance regarding tapering in other indications

D. Guidelines provide a list of common corticosteroid regimens that were utilized in clinical trials, but make no stance regarding which agent/dose/tapering strategy is preferred

Q1 Answer: B Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-669-L01-P

Doxycycline vs Minocycline for the Treatment of Osteomyelitis

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Statement of Purpose:

The OVIA trial demonstrated oral antibiotics for the treatment of bone and joint infections were noninferior to intravenous antibiotics. However, there have been no published literature evaluating differences in efficacy between oral antibiotics. The purpose of this study is to compare doxycycline to minocycline in the treatment of osteomyelitis. With sixteen different hospitals and over three-hundred primary and specialty care hospitals, Indiana Health University has a broad range of infectious disease practices. Our studyâ€™s purpose is to investigate each tetracycline and compare which is more effective for the treatment of osteomyelitis.

Statement of Methods Used:

This will be a multi-center retrospective study of patients across Indiana University Health systems who were diagnosed with osteomyelitis and or bone/joint infection and were treated with doxycycline or minocycline for at least two weeks of their six-week treatment course from January 1st, 2021, to August 1st, 2024. Patients will be excluded if they have received other antibiotics for a non-osteomyelitis indication, pregnant, or incarcerated. The primary outcome will consist of data indicating treatment failure (revisit to the emergency department/readmission to the hospital for osteomyelitis, change of antibiotic prescription due to resistance or any of the following: draining sinus tract arising from bone or prosthesis or the presence of frank pus adjacent to bone or prosthesis, bacteria isolated from tissue samples or a repeat biopsy that showed characteristic inflammatory infiltrate or microorganisms). Secondary outcomes will include days of therapy, adverse effects, if additional days of therapy was required due to treatment failure, and appropriateness of therapy at discharge.

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 pharmacokinetic properties of doxycycline and minocycline and their impact on bone penetration.

Recall results to draw conclusions regarding the efficacy of doxycycline and minocycline for the treatment of osteomyelitis and or bone/joint infections.

Self Assessment Questions:

Which statement best explains the differences in activity between doxycycline and minocycline?

A. Doxycycline exhibits increased bioavailability and protein binding compared to minocycline.

B. Minocycline exhibits increased cellular concentrations causing tighter binding to the 30S ribosomal unit reducing emergence of resistance.

C. Minocycline has been observed to induce resistance to community acquired methicillin resistant staphylococcus aureus.

D. Doxycyclineâ€™s MIC breakpoints for common causative organisms in osteomyelitis and bone/joint infections are lower than that of minocycline.

Which of the following is an adverse effect associated ONLY with minocycline?

A. Esophagitis

B. Nausea/vomiting

C. Hyperpigmentation

D. Photosensitivity

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-562-L01-P

Steroid Discontinuation Practices in Distributive Shock

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Distributive shock is a state of relative hypovolemia resulting from pathological distribution of intravascular volume and includes septic, anaphylactic, and neurogenic shock. The Surviving Sepsis Campaign guidelines recommend adults with septic shock and an ongoing requirement for vasopressor therapy be treated with intravenous corticosteroids. While guidance is provided regarding daily dosing and duration, the optimal strategy for steroid discontinuation after resolution of septic shock remains undefined. At University Hospitals Cleveland Medical Center (UHCMC), there are no established guidelines for the corticosteroid discontinuation in distributive shock. This study aims to evaluate the impact of tapering in comparison to abrupt discontinuation of corticosteroids on recovery, adverse effects, and vasopressor reinitiation to determine the optimal approach for improving patient outcomes.

This single-center, retrospective chart review examines corticosteroid discontinuation practices in patients with distributive shock. Patients initiated on 150 to 300 mg daily intravenous hydrocortisone, requiring at least one vasopressor, and receiving antibiotics for â‰¥48 hours during an encounter at UHCMC, a tertiary academic medical center, between October 2023 and October 2024 will be included. Patients diagnosed with shock from other causes, admitted to the Cardiothoracic Intensive Care Unit (CTICU), were administered hydrocortisone for <48 hours, had vasopressor use at the time of corticosteroid discontinuation, or had withdrawal of care or death prior to cessation of corticosteroids will be excluded.

The primary outcome assesses the incidence of hemodynamic instability, defined as MAP â‰¤ 65 mmHg requiring vasopressor reinitiation post-steroid discontinuation. Secondary outcomes include assessment of hypertension (systolic blood pressure â‰¥180 mmHg or diastolic blood pressure â‰¥120 mmHg) requiring intervention, number of patients with two or more episodes of hyperglycemia (i.e., blood glucose levels â‰¥200 mg/dL) during and 24 hours post hydrocortisone, intensive care unit length of stay, and steroid initiation timing relative to vasopressors. Statistical analysis is ongoing; results and conclusions will be presented.

Learning Objectives:

Describe the Surviving Sepsis Campaign guidelines recommendation for the use of intravenous corticosteroids in adults with septic shock requiring ongoing vasopressor therapy.

Discuss how the results of this study could inform future guidelines for corticosteroid discontinuation in patients after the resolution of septic shock.

Self Assessment Questions:

According to the Surviving Sepsis Campaign guidelines, which therapy is recommended for adults with septic shock if adequate fluid resuscitation and vasopressor therapy are unable to restore hemodynamic stability?

A. Immediate cessation of vasopressors

B. IV hydrocortisone at a dose of 200 mg/day

C. Administration of broad-spectrum antibiotics only

D. Oral hydrocortisone at a dose of 200 mg/day

For adults with septic shock on norepinephrine with inadequate mean arterial pressure (MAP) levels, what is the recommended next step?

A. Increase the dose of norepinephrine

B. Initiate dopamine

C. Add vasopressin

D. Discontinue norepinephrine and initiate epinephrine

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-513-L01-P

Evaluating methadone as treatment for refractory cancer induced bone pain

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Purpose:â€¯
Cancer induced bone pain (CIBP) is common for patients with metastases. Current treatments for CIBP vary, but commonly include opioids such as oxycodone IR, morphine, and/or fentanyl patches. Sometimes these opioids are not sufficient in adequately managing metastatic bone pain and other agents are required. There is data to suggest that methadoneâ€”besides being a mu opioid agonistâ€”also has antagonist activity against N-methyl-D-aspartate (NMDA) receptor. This NMDA antagonist mechanism of methadone reduces the risk hyperalgesia and may aid in reducing pain in patients who have failed prior opioid therapies. Current literature addressing methadone as treatment for CIBP is limited in populations that have received other concurrent cancer treatments. The purpose of this study was to evaluate the change in numeric rating scale pain score (NRS) of patients receiving 28 days of methadone therapy for CIBP. Authors aim to identify opportunities to utilize methadone as treatment sooner in patients with CIBP.

Methods:â€¯
This retrospective cohort study assessed change in NRS while on methadone as compared to other opioids trialed for treatment of CIBP. The primary objective of this study was to analyze the change in patientsâ€™ numeric rating scale (NRS) after 28 days of receiving methadone therapy. Secondary objectives included assessing the daily total morphine milliequivalent (MME) of breakthrough opioid medications required and change in ECOG scores before and after the initiation of methadone. Adult patients with CIBP were eligible for inclusion if they had received at least 28 days methadone therapy and failed therapy with at least one other opioid between February 1st 2020 and August 31st 2024. Patients were excluded if they have complicated bone metastases

Results/Conclusion:â€¯
Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.â€¯

Learning Objectives:

Define the mechanism of action of methadone and how it can treat chronic pain.
Identify the gaps in literature regarding the use of methadone for refractory cancer induced bone pain (CIBP).

Self Assessment Questions:

Which of the following best describes methadoneâ€™s mechanism of action for chronic pain?
A. Agonist at the Î¼ opioid receptor
B. Partial agonist at the Î¼ opioid receptor
C. Noncompetitive antagonist to NMDA receptor
D. Competitive antagonist to NMDA receptor

What patient population does current literature study regarding the use of methadone in cancer related bone pain?
A. Patients in the United States
B. Patients in the outpatient setting
C. Patients receiving radiation and enteral pain therapy
D. Patients receiving bisphosphonates
Q1 Answer: A Q2 Answer: B
APCE Universal Activity Number 0121-9999-25-797-L08-P

Exploring the Safety and Efficacy of Nurse-Directed aPTT Monitoring: A Pilot Trial

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Purpose:

Unfractionated heparin (UFH) is a parenteral anticoagulant often used inpatient for treatment or prevention of thromboembolism. Heparin monitoring differs based on institutions protocols and is typically monitored by physicians, pharmacy consult services, or nurses. Dose titrations of heparin are made based upon activated partial thromboplastin time (aPTT) measurements. Institutions have their own specific aPTT goals which are typically about 1.5 â€“ 2 times control. At Parkview Health, heparin is dosed and monitored by pharmacy consult services based on an anticoagulation protocol. However, nurse driven protocols titrating heparin based on aPTT are commonly used at other institutions and cited in current medical literature as being safe and effective.â€¯In an effort to streamline care, we evaluated if a new nurse-managed heparin protocol maintained the quality and safety of parenteral heparin use and if there is improved patient care workflow with the utilization of this new protocol.

Methods:

A retrospective, quasi-experimental, interrupted time series study was conducted at Parkview Heart Institute. Patients 18 years or older admitted to the coronary procedure intensive care unit or comprehensive heart treatment units who received a heparin continuous infusion were included. Those patients with only one aPTT value, those with only one adjustment to their heparin infusion, patients switched to anti-Xa monitoring, and those transferring from other units were excluded. The primary outcome of this study is time to achieve therapeutic range, defined as the duration from heparin initiation to the first aPTT value within the target therapeutic range. Secondary endpoints include titration errors, medication-related incidents documented in the institution's error reporting system, time to infusion rate adjustment, and percentage of patients with aPTT values outside the therapeutic range.

Results/Conclusions:

Data analysis is currently in progress and results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify strategies for enhancing safety and efficacy of a parenteral heparin monitoring workflow
Explain the nurse's role in heparin management to improve interprofessional collaboration and patient care

Self Assessment Questions:

Which of the following is the most effective way to identify safety gaps in parenteral heparin monitoring workflow?
A. Limiting the documentation of medication errors during the pilot phase to reduce bias
B. Analyzing medication error reports from all clinical staff, including nursing and pharmacy
C. Conducting retrospective reviews of medication errors post-implementation
D. Monitoring medication errors in real-time during the pilot and offering ongoing staff education
What are potential benefits to nurse managed heparin protocols?
A. Decreased time to heparin titration based on aPTTs
B. Increased time in therapeutic range
C. Streamlined workflow for nursing
D. All of the above
Q1 Answer: D Q2 Answer: D
APCE Universal Activity Number 0121-9999-25-733-L01-P

Comparison of Exposure to and Treatment of Venlafaxine vs Duloxetine Reported to American Poison Centers

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Purpose

Depression is a prevalent mental health disorder in the United States, with serotonin-norepinephrine reuptake inhibitors (SNRIs) being a first-line treatment. However, individual agents have varying receptor affinities and thus, different toxicity profiles. Venlafaxine, with a 30 times higher affinity for serotonin re-uptake inhibition compared to its effects on norepinephrine, is associated with more severe cardiovascular effects and a higher risk of serotonin toxicity. In contrast, duloxetine has only a 10 times higher affinity to serotonin and is linked to more neurological side effects. These differences underscore the need for potential individualized treatment approaches for SNRI poisoning. This study compares the toxicological profiles of two SNRIs, venlafaxine and duloxetine, using data from Americaâ€™s Poison Centers. The purpose is to bridge gaps in knowledge to improve poison center triage and management guidelines for these two substances.

Methods:

This was a retrospective observational study analyzing single-substance exposures to venlafaxine or duloxetine reported between January 1, 2018, and December 31, 2023. The primary endpoint was a composite measure of cardiac dysfunction, including QT prolongation, dysrhythmia, EKG changes, and tachycardia. Secondary endpoints included various cardiovascular, neurological, and mortality outcomes. Statistical analyses were completed to compare the incidence of these outcomes.

Results:

Results and conclusions will be presented at the 2025 Great Lakes Pharmacy Residency Conference

Learning Objectives:

Explain the difference in clinical effects and management of duloxetine and venlafaxine in potentially toxic exposures

Indicate where triage guidance should differ dependent on which drug within the class is ingested in a toxic exposure

Self Assessment Questions:

Which of the following is more likely to occur in a patient exposed to venlafaxine compared to duloxetine

A. Drowsiness
B. Irritability
C. Dysrhythmias
D. Nausea

What would be the appropriate immediate treatment level of care to recommend for a patient who has ingested an amount of venlafaxine equal to 1 gram?

A. Observation
B. Psychiatric Admission
C. Medical Surgical Unit
D. Critical Care Unit

Q1 Answer: C Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-854-L01-P

Guideline Implementation to Standardize Post-Thrombolytic Anticoagulation Initiation for Pulmonary Embolism

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Currently at Froedtert & the Medical College of Wisconsin, there is limited guidance regarding the initiation of therapeutic anticoagulation following the administration of thrombolytic therapy for pulmonary embolism. This project aims to develop and release an institutional guideline to standardize post-thrombolytic therapeutic anticoagulation in the setting of acute pulmonary embolism treatment.

This quality improvement project will develop a guideline to standardize the initiation and monitoring of therapeutic anticoagulation in the treatment of pulmonary embolism in patients who have received systemic thrombolytic therapy. Electronic health records were analyzed for patients treated with tenecteplase for pulmonary embolism between October 1, 2022 and June 1, 2024. Patients treated between October 2022 and January 2025 will be assigned to the â€œPre-Implementationâ€group (n=41), while patients treated between February 2025 and June 1, 2025 will be assigned to the â€œPost-Implementationâ€group. Primary outcome measured will be a composite average percentage of cases post-implementation that utilize guide-recommended options for therapeutic anticoagulation, monitoring parameters, and criteria for initiation of therapeutic anticoagulation. Secondary outcomes will include each component of the composite primary outcome and clinician satisfaction as extrapolated via survey. Safety outcomes will be assessed via percentage of critical bleeding events up to 48 hours post therapeutic anticoagulation initiation.

Learning Objectives:

Review the role of tenecteplase in acute management of massive pulmonary embolism

Recognize an appropriate activated partial thromboplastin time (aPTT) for initiation of anticoagulation post thrombolytic administration

Self Assessment Questions:

Which of the following laboratory values is recommended to monitor per this projectâ€™s guideline?

A. Serum creatinine

B. White blood cell count

C. Activated partial thromboplastin time

D. Red blood cell count

Per this project guideline, which of the following is the recommended activated partial thromboplastin time threshold for the initiation of therapeutic anticoagulation post thrombolytic administration for the treatment of pulmonary embolism?

A. Greater than 1x ULN

B. Less than or equal to 2x ULN

C. Between 1.5-2x ULN

D. Greater than 2x ULN

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-520-L01-P

Association of Low-Dose Ketamine Infusion with Acute Pain Management Outcomes After Traumatic Injury in Adult Intensive Care Unit Patients

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Purpose:
To evaluate the implementation of a low dose ketamine continuous infusion protocol for acute pain management after traumatic injury in adult intensive care unit (ICU) patients. The study will explore how low-dose ketamine continuous infusion correlates with patients' pain scores, opioid consumption, related adverse effects, and overall patient outcomes.

Methods:
This single-center retrospective study will include adult traumatic injury patients within the intensive care unit of Munson Medical Center receiving intravenous low-dose ketamine. The primary endpoint of this study is to evaluate the association of a low-dose ketamine infusion on acute pain management outcomes by assessing pain scores and opioid consumption. Secondary endpoints of this study include evaluating the safety including ketamine related adverse events and patient outcomes. Patients treated with the low-dose ketamine infusion protocol from October 11th, 2024, to February 29th, 2025, will be identified and reviewed utilizing the electronic medical record (EMR) for inclusion. Each patient will serve as their own quasi-control as outcomes will be compared before and after ketamine administration.

Conclusion:
In conclusion, patients with traumatic injuries have a critical need for effective and sustained pain relief in the ICU. It is anticipated that the integration of the low-dose ketamine continuous infusion protocol into standard of care pain management treatment will result in a reduction in patient reported pain scores and opioid consumption.

Learning Objectives:

State the dose range of ketamine considered to be subanesthetic.

Explain the hemodynamic parameters that should be monitored in patients receiving ketamine infusions.

Self Assessment Questions:

Which of the following factors is primarily used to titrate ketamine for acute pain management in critically ill patients?

A. Drug concentration in blood

B. Patient-reported pain scores

C. Sedation levels

D. Hemodynamic stability

In the context of managing acute pain in critically ill patients, which of the following statements about the use of low-dose ketamine infusions is accurate?

A. Ketamine primarily acts by inhibiting the release of the inhibitory neurotransmitter GABA

B. Low-dose ketamine infusions are associated with significant respiratory depression and hypotension

C. Ketamine provides analgesic effects through noncompetitive inhibition of the NMDA receptor and activation of opioid receptors

D. The use of ketamine as an adjunct to opioid therapy has been shown to increase overall opioid consumption

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-630-L01-P

Impact Of GLP-1 Receptor Agonists on Body Weight in Persons with HIV Compared to Persons Without HIV

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Purpose:â€¯â€¯
According to the U.S. Department of Health and Human Services, weight gain in persons with HIV (PWH) has been associated with integrase strand transfer inhibitors (INSTIs) and return to health following treatment initiation. Previously studied interventions, such as transitioning to a non-INSTI regimen, have yielded insignificant results. Glucagon-like peptide-1 receptor agonists (GLP-1 RAs) are effective anti-obesity medications. Previous data suggests PWH have altered GLP-1 expression, however, data is limited on the impact of GLP-1 RA on metabolic outcomes in PWH.â€¯ This study aims to evaluate the incidence of weight loss with GLP-1 RA in PWH compared to persons without HIV.â€¯

Methods:â€¯â€¯
This study is a retrospective cohort analysis of weight changes in PWH compared to persons without HIV receiving GLP-1 RAs at UC Health outpatient clinics between January 1, 2017 and January 1, 2024. The primary objective is to compare the rate of patients achieving â‰¥5% weight loss in PWH compared to persons without HIV at 6 months (Â±2 months). Secondary objectives include the rate of â‰¥5% weight loss at 1 year (Â±2 months), mean change in body weight (kg), and mean change in blood pressure (mmHg). Safety outcomes including the incidence of adverse events will also be collected.â€¯ Patients will be included if they are â‰¥18 years of age and receiving a GLP-1 RA for â‰¥6 months. Patients will be excluded with a disruption of GLP-1 RA use prior to 6 months or if they do not have pre- and post- GLP-1 RA weight documented. Baseline characteristics such as age, sex, gender identity, race/ethnicity, and relevant comorbidities and medications will be collected. Patients will be matched (2:1) based on GLP-1 RA medication, GLP-1 RA dose, age, sex, and race. The Institutional Review Board has approved this study. Data collection and analysis are currently ongoing.

Learning Objectives:

Describe the pathophysiology of weight gain in persons with HIV

Identify potential strategies for the mitigation of weight gain in persons with HIV

Self Assessment Questions:

Which of the following is a risk factor for weight gain in PWH? â€‹

A. Decreased viral loadâ€‹

B. Black raceâ€‹

C. Higher socioeconomic statusâ€‹

D. Assigned Male Sex At Birthâ€‹

According to study data, which of the following agents may be associated with weight loss?

A. Lamivudine (3TC)

B. Abacavir (ABC)Â Â

C. Tenofovir alafenamide (TAF)

D. Tenofovir disoproxil fumarate (TDF)

Q1 Answer: B Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-744-L02-P

Cisplatin and Carboplatin Shortage Management: Evaluating Regimen Changes and Clinical Outcomes

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During 2023, a significant shortage of cisplatin and carboplatin occurred causing issues with obtaining and keeping these medications in stock for several months. This study aims to assess the changes in clinical outcomes that might have occurred in association with regimen adjustments made in response to this shortage. This is a retrospective, multi-center cohort review study. Patients were evaluated across multiple healthcare sites within a single institution from March 2023 to September 2023. Patients eligible for inclusion in this study were those aged 18 years or older, planned to receive carboplatin or cisplatin as part of their treatment regimen during the defined shortage period. Exclusion criteria included patients who were switched from carboplatin or cisplatin to alternative chemotherapy agents secondary to platinum-induced toxicity or adverse effects. Patients assessed were compiled from a master list of requests for platinum agents during the shortage period. Subsequently, patient charts were manually reviewed to identify any regimen changes, as well as to capture details of any toxicities or side effects reported in clinical notes from scheduled follow-up visits. The study protocol was approved by the regional institutional review board to ensure compliance with ethical standards and patient confidentiality. The primary outcome of this study was the proportion of patients who experienced changes in their chemotherapy regimen, specifically from platinum-based therapy to alternative treatment options. Alternative options included the use of non-platinum agents, holding the platinum agent, or delaying the administration of platinum-based drugs. Secondary outcomes focused on clinical outcomes related to these regimen changes including thrombocytopenia, neutropenia and patient-reported toxicities. Statistical analysis was completed using Microsoft Excel 365 v.2410, utilizing descriptive statistics to evaluate the proportion of patients requiring a change in regimen due to platinum shortage. Results will be finalized and presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Outline regimen changes that occurred during the carboplatin and cisplatin shortage throughout a health care system.

Identify toxicity trends associated with patients in which regimen changes occurred during the carboplatin and cisplatin shortage.

Self Assessment Questions:

Which of the following has been found to be a concern for patients during drug shortages?

A. Increased cost

B. Increased drug adverse effects

C. Increased mortality

D. All of the above

What option has been identified as the most common cause of drug shortages?

A. Increased demand for specific medications

B. Transportation and supply chain disruptions

C. Quality and manufacturing issues

D. Regulatory changes

Q1 Answer: D Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-823-L99-P

Retrospective Evaluation of Duration of Antibiotic Therapy in Adults Hospitalized for Bacteremic Pneumococcal Pneumonia

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Purpose: To compare rates of clinical failure in patients receiving short vs. long durations of antibiotic therapy for bacteremic pneumococcal pneumonia.
Methods: Retrospective, multicenter cohort study comparing adult patients with bacteremic pneumococcal pneumonia receiving short (â‰¤10 days) and long (>10 days) durations of antibiotics. Inclusion criteria were admission to Norton Healthcare, pneumonia diagnosis, blood culture growing S. pneumoniae, and receipt of antibiotic therapy within 48 hours of growth from blood culture. Exclusion criteria were pregnancy, incarceration, polymicrobial or persistent bacteremia, any non-pneumonia infection, or death prior to completion of therapy. The primary outcome was rate of clinical failure at 30 days from the end of therapy defined as a composite of all-cause mortality, clinical worsening in the intensive care unit, and relapsed bacteremia or pneumonia. Secondary outcomes were individual components of clinical failure, length of hospital stay, and adverse effects associated with antibiotics. Data were analyzed using descriptive statistics with Chi-square or Fisherâ€™s exact test for categorical data and Mann-Whitney U and student t-test for continuous data, as appropriate.
Results: The primary outcome of clinical failure occurred in 24.5% of patients with shorter courses of antibiotics being non-inferior to longer ones (17.2% vs. 25.7%, p=0.45). There was no statistically significant difference between groups in 30-day mortality, transfer to or worsening in the ICU, relapse of S. pneumonia bacteremia, or relapse of pneumonia. Length of stay was significantly reduced in patients receiving shorter courses compared to longer ones (3 days vs. 5 days, p<0.001). Rates of Clostridioides difficile infection and other adverse events associated with antibiotics were similar for short and long durations of therapy.
Conclusions: Short courses of antibiotics were non-inferior to longer courses in terms of clinical failure and were associated with a significant reduction in the length of stay.

Learning Objectives:

Review data on the duration of treatment for bacteremic pneumococcal pneumonia.

Discuss the impact that duration of therapy may have on clinical and microbiological outcomes.

Self Assessment Questions:

What is the most common cause of bacterial CAP globally?

A. Haemophilus influenzae

B. Staphylococcus aureus

C. Streptococcus pneumoniae

D. Moraxella catarrhalis

What duration of beta-lactam therapy has been associated with a risk of emergence of penicillin non-susceptible S. pneumoniae?

A. 8 days

B. 15 days

C. 12 days

D. 10 days

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-607-L01-P

High-dose daptomycin vs. best alternative therapy for invasive infections caused by Enterococcus faecalis with MIC = 4 mcg/mL

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Daptomycin is a cyclic lipopeptide antibiotic with concentration-dependent bactericidal activity against gram-positive organisms, and it remains an essential treatment option for enterococcal infections resistant to vancomycin or ampicillin. Daptomycin minimum inhibitory concentration (MIC) breakpoints for Enterococcus faecalis isolates were recently revised with 4 mcg/mL classified as intermediate. These revisions were established based on a 6 mg/kg/day daptomycin dosing regimen, and while high-dose regimens (8-10 mg/kg/day) are common in practice for treating invasive infections, it is unknown whether these can overcome MIC=4 mcg/mL for E. faecalis. This is a single-center, retrospective, observational, cohort study conducted at The Ohio State University Wexner Medical Center inpatient facilities assessing rates of clinical failure in patients with invasive E. faecalis infections with a daptomycin MIC = 4 mcg/mL. Patients were treated with either daptomycin or best alternative therapy (BAT) from 7/19/2019 through 5/31/2024 and matched 3:1 based on isolate source. Patients treated with doses <8 mg/kg/day; patients deceased within 72 hours of therapy initiation; patients who received two agents with in vitro E. faecalis susceptibility for >25% of their treatment course; patients treated for pneumonia, primary central nervous system infections, or urinary tract infections; patients who left against medical advice; and patients <18 or >89 years old were excluded. The primary composite outcome was clinical failure, defined as a switch from definitive therapy to an alternative agent secondary to clinical decline, infection-related hospital readmission while on definitive treatment, and/or infection-related mortality within 30 days of therapy completion. The secondary outcome was all-cause mortality within 30 days of therapy completion. Fisher's exact or chi-square was used for comparison of categorical data while student's t-test or Mann-Whitney U was used for continuous data based on number of events and distribution. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Discuss current therapy regimens for E. faecalis invasive infections used in clinical practice

Describe rates of clinical failure in E. faecalis invasive infections with a daptomycin MIC = 4 mcg/mL when treated with daptomycin vs. best alternative therapy

Self Assessment Questions:

Which of the following antibiotics represents a common treatment option for Enterococcus faecalis invasive infections?

A. Ceftaroline

B. Daptomycin

C. Levofloxacin

D. Ertapenem

Which of the following dosing regimens represents high-dose daptomycin therapy?

A. Daptomycin 700 mg every 24 hours (BMI = 48.7 kg/m2, adjusted body weight = 109 kg)

B. Daptomycin 400 mg every 24 hours (BMI = 25.9 kg/m2, actual body weight = 75 kg)

C. Daptomycin 600 mg every 24 hours (BMI = 38.3 kg/m2, adjusted body weight = 92 kg)

D. Daptomycin 400 mg every 24 hours (BMI = 17.2 kg/m2, actual body weight = 40 kg)

Q1 Answer: B Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-641-L01-P

Evaluation of Safety Events in Patients Who fill Autoinjectors at the University of Kentucky Specialty Pharmacy

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Auto-injector medications are a cornerstone of medical management in multiple chronic disease states, including inflammatory bowel disease, hypercholesterolemia, migraines, and rheumatoid arthritis among others. In these disease states, successful medication administration is crucial to prevent exacerbations or disease progression. Despite prior studies showing that specialty pharmacy interventions improve patient outcomes and medication adherence, at the University of Kentucky Specialty Pharmacy (UKSP) there are still areas of opportunity to help decrease the risk of auto-injector medication misfires. This study aimed to identify trends in self-injectable medication misfire events in order to develop a targeted education intervention to reduce avoidable misfire events.

This is a retrospective, observational study including patients who received a prescription dispense for a self-injectable medication between 01/01/2022-12/31/2022 at UKSP. Auto-injector dispensing history as well as patient demographics (age, ethnicity, gender, payor, preferred language, and race) were collected. The primary outcome was incidence of misfire events per 1,000 fills. Secondary outcomes include odds of misfire in comparison to other auto-injector medications, demographic factors associated with misfires, and whether the misfire resulted in a delay in care.

In 2022, there were 1,911 prescription dispenses of auto-injectable medications with 19 patient-reported misfires. Evolocumab [6.56 incidents per 1,000 fills; OR 6.31, 95%CI 2.45-16.26] and fremanezumab [5.64 incidents per 1,000 fills; OR 4.04, 95%CI 1.15-14.12] were identified as having significantly higher risk of misfire as compared to other auto-injector medications. 42.1% of misfires resulted in a delay in therapy. No demographic factors were significantly associated with misfire events.

These findings highlight the need for proactive patient education on auto-injector medications, particularly in patients receiving evolocumab and fremanezumab in our patient population. As these agents are considered non-specialty at our institution, applying specialty care model proactive medication counseling and management may improve patient outcomes.

Learning Objectives:

Identify common trends in auto-injector misfires among various chronic disease states

Discuss the benefits of applying the specialty care model to address educational gaps in complex medication administration

Self Assessment Questions:

Based on the study, which auto injector medication was identified as having the highest risk of misfire compared to others?

A. Adalimumb

B. Evolocumab

C. Alicroumab

D. Fremanezumab

Which of the following is not a potential benefit of applying a specialty care model to patients using non-specialty auto-injector medications?

A. Increased cost in medication

B. Increased patient adherence

C. Decreased in delay of therapy

D. Decrease in number of safety events

Q1 Answer: B Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-780-L05-P

Impact of Emergency Medicine Pharmacists on Door-to-Needle Times with Use of Tenecteplase for Acute Ischemic Stroke

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Strokes are a major cause of long-term disability. Current guidelines emphasize early treatment as crucial for restoring blood flow in acute ischemic stroke patients. Reperfusion can be achieved through thrombolytics such as tenecteplase and alteplase. The purpose of this study is to determine if the presence of an emergency medicine pharmacist decreases the door-to-needle time of tenecteplase in acute ischemic stroke. This study has been reviewed by the Institutional Review Board and will be a retrospective chart review of patients who received tenecteplase for acute ischemic stroke in the emergency department from July 1, 2022, to July 31, 2024. Excluded patients who received tenecteplase of indication other than stroke, on anticoagulation, admitted to the hospital prior to tenecteplase administration, and where stroke protocol was initiated prior to the start of the emergency medicine pharmacistâ€™s shift but still aided upon arrival. The primary outcome compared the door-to-needle time for tenecteplase administration when an emergency medicine pharmacist is present to when they are not in the emergency department. Secondary outcomes compared the proportion of patients when the door-to-needle time was â‰¤ 30 minutes, â‰¤ 45 minutes, and â‰¤ 60 minutes of arrival when an emergency medicine pharmacist is present to when they are not. Preliminary results show an average door-to-needle time of 42.9 minutes when an emergency medicine pharmacist is present versus an average of 71.1 minutes when they are not. With this the precent of patients with a door-to-needle time of â‰¤ 30 minutes was 31.2% versus 3.9%, for â‰¤ 45 minutes it was 63.1% versus 19.6%, and for â‰¤ 60 minutes it was 86% versus 47.1%. In conclusion this study has shown that the presence of an emergency medicine pharmacist decreases the door-to-needle time of tenecteplase for acute ischemic stroke.

Learning Objectives:

Review current inclusion and exclusion criteria for thrombolytic administration in acute ischemic stroke.

Recognize how the presence on an emergency medicine pharmacist can decrease door-to-needle time for tenecteplase administration in acute ischemic stroke.

Self Assessment Questions:

Which of the following is would be an exclusion to the administration of tenecteplase for acute ischemic stroke?

A. Symptoms suggestive of ischemic stroke that are deemed to be disabling

B. Symptom onset < 3 hours

C. Intracranial hemorrhage on CT

D. SBP < 185 mmHg and DBP < 110 mmHg

Which of the following are ways emergency medicine pharmacists can expedite the administration of tenecteplase

A. Assessing patients for potential contraindications

B. Assisting in compounding at the bedside

C. Providing dosing recommendations

D. All of the above

Q1 Answer: C Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-617-L01-P

What a Pain: Impact of Outpatient Total Knee Arthroplasty on Opioid Prescribing

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Total knee arthroplasty (TKA) is a common elective procedure in the United States. Historically, TKAs have been inpatient (IP) procedures. Recent changes by the Centers for Medicaid and Medicare Services now allow for outpatient (OP) billing. Postoperative pain management for TKA is essential, with reduction in opioid use being a primary focus. Currently, TKAâ€™s have one of the highest postoperative opioid requirements, which could lead to persistent opioid use. This study aims to compare the differences in opioid prescribing at discharge and assess if OP TKAs require more opioid refills compared to IP TKAs.

This retrospective, single-center observational study analyzes patients who underwent an elective TKA either in an IP or OP setting from November 1, 2022, through August 31, 2024. Electronic medical records and the Michigan Automated Prescription System will be utilized to obtain all study data. Data collection will include baseline characteristics, comorbidities, pertinent home medications, surgical variables, medications prescribed at discharge, and Schedule II opioid refill history. Major inclusion criteria include opioid naÃ¯ve patients discharged directly to home with a prescription for a Schedule II opioid. Primary outcomes include the total amount of Schedule II opioids prescribed at discharge. Secondary outcomes include 30-day readmission secondary to pain, whether patients were provided with an opioid taper on discharge, and opioid refills within 30 and 90 days post-TKA. Statistical analysis will involve Poisson regression and Logistic regression models to analyze outcomes.

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

Learning Objectives:

Discuss the risks associated with persistent opioid use disorder after surgery.

Review how to appropriately apply OPEN guidelines to postoperative opioid prescribing.

Self Assessment Questions:

Which of the following is a risk associated with persistent opioid use disorder?

A. Diarrhea

B. Falls

C. Gastrointestinal Ulcers

D. Hepatotoxicity

Which of the following would be an appropriate patient that OPEN guidelines could apply to?

A. Patient with substance use disorder

B. Patient undergoing medication-assisted treatment for opioid use disorder

C. Patient that is opioid naive

D. Patient with persistent opioid use

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-796-L08-P

Re-Gap or Not? Predicting the Likelihood of Anion Gap Re-opening in Diabetic Ketoacidosis Patients

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Purpose: Diabetic Ketoacidosis (DKA) is a life-threatening complication of diabetes mellitus characterized by uncontrolled hyperglycemia, metabolic acidosis, and increased ketone concentration which leads to an elevated anion gap. Anecdotally, anion gap re-opening (AGRO) after transition from continuous insulin infusion to a subcutaneous insulin regimen is associated with increased hospital resources and potentially worse outcomes. There is currently scant literature that has looked at specific variables associated with AGRO. The purpose of this study is to identify factors that contribute to AGRO in DKA patients to aid in predicting the likelihood of AGRO and further guide treatment decisions in this patient population. Methods: This is a retrospective, multi center, cohort study comparing patients with DKA whose anion gap reopened within 24 hours after successfully closing compared to those that did not. Patients were eligible for this study if they were admitted to a Trinity Health Michigan hospital with a primary diagnosis of DKA utilizing ICD-10 codes and were initiated on a continuous insulin infusion using a 2-bag method during the time periods of May 1st, 2022, to September 30th, 2024. Primary outcome is incidence of anion gap re-opening, defined as anion gap of >12 within 24hrs after having previously achieved an anion gap of â‰¤ 12. Secondary outcome is to identify factors leading to anion gap re-opening that will include time to initial anion gap closing, hospital length of stay, time to initial serum bicarbonate correction, insulin infusion duration, admission to ICU and ICU length of stay, subcutaneous insulin overlap, baseline labs, home medications prior to arrival and demographic variables. Results/Conclusions: Data analysis is currently in progress and Results and Conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Discuss the pathophysiology of DKA and clinical significance of AGRO in DKA management.

Review available AGRO and DKA management literature.

Self Assessment Questions:

Which of the following medications can precipitate DKA?

A. Clozapine

B. Glucocorticoids

C. SGLT2 inhibitors

D. All the above

Which maintenance fluids are utilized in the 2-bag method?

A. Lactated Ringers

B. 0.45 NaCl

C. D10/0.45 NaCl

D. B and C

Q1 Answer: D Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-670-L01-P

Maribavir vs. Valganciclovir in the Solid Organ Transplant population: How are we managing?

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Cytomegalovirus (CMV) infection is a major setback for solid organ transplant (SOT) recipients as it influences many short and long-term outcomes that collectively contribute to reduced graft function and patient survival. Current treatment recommendations include the use of valganciclovir as a first line agent, and managing its associated toxicities places a considerable strain on both patients and the healthcare system. The SOLSTICE trial for refractory CMV infections demonstrated maribavirâ€™s superiority to investigator-assigned treatments (including valganciclovir) in clearing CMV viremia by week 8. Yet, the pharmacokinetic impact of maribavir on calcineurin inhibitor-based immunosuppression regimens has yet to be thoroughly evaluated. The purpose of this study was to assess the efficacy of maribavir for viremia clearance in a variety of SOT recipients, as well as the real-world impact of maribavir on calcineurin-inhibitor levels, in comparison to standard of care agent valganciclovir. This was a retrospective, single-center, cohort study. Patient cohorts were defined as (i) SOT patients receiving maribavir OR (ii) SOT patients receiving valganciclovir for CMV treatment between 11/1/2021 through 8/30/2024. Patients who received a stem cell transplant or received any other antiviral agent for CMV treatment were excluded. The primary outcome was CMV viremia clearance by week 8 leading to treatment discontinuation. Other pertinent secondary outcomes included impact of antiviral on calcineurin inhibitors trough levels, adjustment of immunosuppression during treatment, and development of CMV end-organ disease. Safety outcomes included adverse events attributed to CMV treatment and rate of discontinuation of CMV treatment. To achieve a power of 80 and alpha of 0.05, a sample size of approximately 60 patients was calculated based on an expected difference of 30% between groups. Statistical analysis will be completed using Mann Whitney U-test for continuous data. Categorical data will be analyzed using Chi-square or Fisherâ€™s exact test. Results and conclusion will be reported at GLPRC.

Learning Objectives:

Discuss the safety and efficacy of valganciclovir for treatment of CMV

Review current evidence for the use of maribavir as an alternative agent for CMV treatment and its impact on calcineurin inhibitors

Self Assessment Questions:

What is a primary safety concern associated with the use of valganciclovir in solid organ transplant recipients?

A. Increased risk of graft rejection

B. Myelosuppression, including neutropenia and thrombocytopenia

C. Development of CMV resistance due to underdosing

D. Hepatic toxicity requiring frequent liver function monitoring

Based on the SOLSTICE trial, which of the following was concluded?

A. Maribavir was superior to investigator assigned therapy (IAT) for CMV viremia clearance

B. Maribavir was non-inferior to IAT for CMV viremia clearance

C. Maribavir had more treatment discontinuations due to adverse effects compared to IAT

D. Maribavir was associated with more neutropenia compared to valganciclovir

Q1 Answer: B Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-701-L01-P

What factors are associated with receipt of over-the-counter pharmacy services among patients at a Midwest Federally Qualified Health Center?

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Purpose: Over-the-counter (OTC) medications provide an affordable and convenient way for patients to manage their health, with community pharmacists playing a crucial role as accessible sources of medication information. They are particularly valuable in guiding patients to make informed decisions about OTC products. However, there is limited research on the factors that influence the accessibility of OTC pharmacy services. This study aims to fill this gap by exploring the predictors and barriers to accessing OTC pharmacy services at Federally Qualified Health Centers (FQHCs).
Methods: A cross-sectional, web-based survey (hosted on Qualtrics) was conducted at HealthLinc pharmacies within FQHCs in Northern Indiana. Prospective participants were invited to participate in the study via fliers distributed at the pharmacy. Eligible participants included individuals aged 18 and older. The survey consisted of 15 items, primarily using Likert-type scales and select-choice questions, to assess patients' comfort with independently selecting OTC medications and their willingness to seek pharmacist assistance. Guided by Andersenâ€™s Behavioral Model, the study considered several factors that may influence these outcomes, including demographic characteristics (predisposing factors), insurance status and income (enabling factors), and patients perceived and evaluated need for OTC medications (need characteristics).
Results/Conclusions: Data collection and analysis are ongoing. Preliminary findings and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:
Identify barriers that influence the accessibility of OTC pharmacy services.
Discuss the pharmacist's role in supporting patients with care gaps related to OTC medications.
Self Assessment Questions:
Which of the following patients is most at risk for barriers to access OTC?
A. Race
B. Insurance
C. Need Characteristics
D. All of the above
How can a pharmacist help patients overcome care gaps related to OTC medications?
A. By recommending specific OTC medications regardless of the patient's individual health needs
B. By providing guidance on the appropriate use of OTC products and addressing potential concerns
C. Informing the patient to read the package insert when looking for guidance regarding an OTC medication
D. By recommending OTC medications for long-term conditions.
Q1 Answer: D Q2 Answer: B
APCE Universal Activity Number 0121-9999-25-806-L99-P

Evaluating the effects on symptom control of adjunctive phenobarbital in moderate-to-severe alcohol withdrawal patients

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Alcohol withdrawal syndrome (AWS) represents a significant global health challenge, impacting millions of individuals annually and carrying the potential for life-threatening complications, such as alcohol withdrawal delirium. While the majority of cases are characterized by mild symptoms, severe AWS has the capacity to escalate rapidly, particularly among individuals with a history of recurrent withdrawal episodes. Benzodiazepines are the standard treatment for AWS though some patients experience reduced response, escalating dose requirements, or require additional agents for symptom control. Phenobarbital is increasingly used as an adjunctive agent, yet data on its safety, dosing, and effectiveness remain limited. The purpose of this study is to evaluate the use of adjunctive phenobarbital for symptom control in moderate-to-severe AWS.

This is a single-center, retrospective cohort study conducted at John H. Stroger, Jr. Hospital of Cook County. Adult patients admitted between January 1, 2018, and December 31, 2023, with moderate-to-severe AWS defined as having a score of more than 8 based on the Clinical Institute Withdrawal Assessment for Alcohol â€“ Revised (CIWA-Ar) will be included in this study. Exclusion criteria include patients who received benzodiazepines or phenobarbital for an indication other than alcohol withdrawal syndrome, those with delirium from causes other than alcohol withdrawal, those with non-alcohol-related seizures, and pregnant or breastfeeding patients. The primary outcome is the percentage of time at goal symptom control, defined as a CIWA-Ar score of <8. Secondary outcomes include hospital length of stay and Richmond Agitation Sedation Scale (RASS) score. Safety outcomes include need for mechanical ventilation, hypotension defined as a blood pressure <90/60 mmHg, and seizures. Additional data collected include patient age, sex, and race. The primary outcome will be analyzed using the Mann-Whitney U test. Secondary outcomes, baseline characteristics, and safety outcomes will be analyzed using the Mann-Whitney U test and Fisher's exact test.

Learning Objectives:

Identify common symptoms of severe alcohol withdrawal syndrome and the potential benefits of phenobarbital as an adjunctive treatment.

Explain the role of adjunctive phenobarbital in managing severe alcohol withdrawal syndrome and its impact on symptom control.

Self Assessment Questions:

Which of the following is a common symptom of severe alcohol withdrawal syndrome?

A. Bradycardia and hypotension

B. Severe agitation, tremors, and delirium

C. Hypertension and bradycardia

D. Acute myocardial infarction

Which of the following best describes the primary benefit of using adjunctive phenobarbital in the management of severe alcohol withdrawal syndrome?

A. It reduces the rate of mortality in patients experiencing severe alcohol withdrawal syndrome.

B. It potentiates GABAergic activity by prolonging the opening of chloride channels whereas benzodiazepines increase the frequency of channel opening, helping to correct dysregulated GABAergic activity.

C. It accelerates the detoxification process and eliminates the need for long-term medications.

D. It is used to manage mild withdrawal symptoms in outpatient settings.

Q1 Answer: B Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-536-L01-P

IVIG Supplementation in Patients Treated with Bispecific Antibodies, Help or HoGGwash?

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Background:
Chimeric antigen receptor T-cell (CAR-T) and bispecific monoclonal antibodies (BsAb) provide effective treatment for refractory multiple myeloma and certain lymphomas, achieving response rates of 60-80%. However, these therapies are associated with significant adverse effects, including cytokine release syndrome (CRS) (72%), immune effector cell-associated neurotoxicity syndrome (ICANS) (>50%), and hypogammaglobulinemia (HoGG) (76%), which may increase infection risk. BsAbs target BCMA, CD19, and CD20, depleting both malignant and healthy plasma cells, thereby impairing humoral immunity.
A retrospective study at Mount Sinai Hospital observed a 10-fold reduction in serious infections among BsAb-treated patients who received intravenous immunoglobulin (IVIG). Despite these promising findings, IVIG has associated risks, including hypersensitivity reactions, thrombosis, and renal failure, as well as high costs. Given the infection risk in BsAb therapy, this study aims to assess the impact of IVIG prophylaxis on infection rates.
Methods:
This IRB-exempt, retrospective study reviewed patients treated with BsAb therapy from 01/01/2023 to 09/30/2024. A chart review of adults with relapsed/refractory multiple myeloma and lymphoma was conducted, comparing infection outcomes between those who received IVIG prophylaxis and those who did not. The primary outcome measured was the incidence of Grade 3 and 4 infections requiring hospitalization. Secondary outcomes included infection classification and malignancy-specific trends. Descriptive statistics were used to compare groups.
Results:
Data collection and analysis are in progress with results and conclusions to be presented at the conference.
Conclusion:
This study evaluates whether IVIG prophylaxis reduces serious infections in BsAb-treated patients with hematologic malignancies, potentially guiding future infection prevention strategies in immunocompromised populations.

Learning Objectives:

Recognize the incidence and impact of infections in patients with hematologic malignancies receiving bispecific antibody (BsAB) therapy.

Review the role of intravenous immunoglobulin (IVIG) supplementation in mitigating infection risk among BsAB-treated patients with hypogammaglobulinemia (HoGG)

Self Assessment Questions:

Which of the following is a primary reason why patients receiving BsAB therapy are at increased risk of infections?
A. BsAb therapy directly suppresses bone marrow function
B. BsAb therapy induces hypogammaglobulinemia by depleting antibody-producing cells
C. BsAb therapy only targets malignant cells, leaving immune function intact
D. BsAb therapy reduces the need for antimicrobial prophylaxis
What is a potential limitation of IVIG supplementation in BsAB-treated patients?
A. IVIG has no known side effects
B. IVIG is universally recommended for all patients receiving BsAB therapy
C. IVIG may cause hypersensitivity reactions, thrombosis, and/or hemolytic anemia
D. IVIG permanently restores humoral immunity in immunocompromised patients
Q1 Answer: B Q2 Answer: C
APCE Universal Activity Number 0121-9999-25-523-L01-P

Gabapentin Order Set Optimization For Acute Post-Operative Pain

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Evidence for perioperative pain-control efficacy with gabapentin is controversial. Multiple meta-analyses and systematic reviews examining perioperative efficacy and tolerability showed that gabapentin provided negligible benefit beyond the first 24 hours post-operative and resulted in increased sedation and respiratory depression risk. The American Pain Society recommends a multimodal analgesia regimen including gabapentin; however, this recommendation lacks convincing evidence. The Enhanced Recovery After Surgery guidelines yield contradictory recommendations for perioperative gabapentin depending on specialty and procedure. Despite variable practice guideline recommendations, inconsistent outcome data, and safety concerns, perioperative gabapentin utilization remains a common practice at Froedtert & the Medical College of Wisconsin.

In effort in limit routine use, the Pain Stewardship Committee reviewed perioperative order sets for neurosurgery, transplant surgery, orthopedic surgery, and cardiovascular surgery and recommended the removal of gabapentin to order set owners. Consequently, gabapentin has been deselected from auto-select in transplant surgery order sets, updated with renal dosing in orthopedic surgery order sets, and removed from neurosurgery and cardiovascular order sets.

This project intends to track the changes in gabapentin utilization resulting from order set revisions through retrospective review of the electronic health records of all postoperative patients 18 years and older within neurosurgery, transplant surgery, orthopedic surgery, and cardiovascular surgery over three months before and after revised order set implementation within a single health system enterprise.

The primary outcome of this project is the rate of new-start gabapentin utilization by neurosurgery specialties in the perioperative setting for the management of acute pain. Secondary outcomes include the rate of gabapentin utilization by the other surgical specialties and the rate of new-start gabapentin discharge prescriptions for acute post-operative pain. Chi squared testing will be used to analyze data.

Data collection and analysis are ongoing. Preliminary results and conclusions will be presented at the 2025 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review safety concerns that accompany guideline recommendations for gabapentin for post-operative pain.

Describe order set revision strategies that discourage the routine use of gabapentin in the post-operative setting.

Self Assessment Questions:

The American Pain Societyâ€™s Guidelines on the Management of Postoperative Pain identifies which of the following side effects associated with gabapentin?

A. Dizziness

B. Neuralgia

C. Insomnia

D. Weight loss

Which of the following are order set revision strategies that may impact post-operative gabapentin utilization?

A. Removal of the medication from the order set

B. Inclusion of dosage selections driven by renal function in the order set

C. De-selection of the medication from auto-select in the order set

D. All of the above

Q1 Answer: A Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-798-L08-P

Sexual Transmitted Infections Expedited Partner Therapy from the Emergency Department

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The CDC has identified the spread of STIs as a concern, with nearly 1.6 million cases of chlamydia reported since 2018. For many, especially those who experience socioeconomic disadvantages, access to healthcare is often a concern. For these individuals, a trip to the emergency department is the most accessible place for care for low acuity illnesses, even the treatment of STIs. Patients with STIs cannot only receive treatment for themselves, but they can expedite the treatment for their partner. Expedited partner therapy (EPT) allows for exposed partners to receive treatment, in the form of a take home script, without having to seek care. Deaconess Health does not currently have a protocol for EPT and STI visits have accounted for >600 visits to our ED in the last 6 months. Our objective is to increase access to timely care and remove-barriers for the partners of patients who are STI-positive. At the start of the project, state-specific legal requirements were reviewed, along with our current ED process and data from other sites. In collaboration with ED providers, the IT team, and the outpatient pharmacy we developed a process for our EPT workflow with methods based on information found during our review. Currently, our inpatient pharmacy team oversees follow-up of cultures from the emergency department, including STIs. We plan to integrate EPT processes into this workflow. In Indiana, EPT is approved for chlamydia and gonorrhea; however gonorrhea requires ceftriaxone, so it was decided to focus on chlamydia. Our EPT process just recently went live, we will begin the data collection for a 3-month period soon, which will include number of positive tests, the number of patients treated, and the number of EPT scripts sent out, to assess the impact of expanding the EPT process in the ED.

Learning Objectives:

Review the impact of expanding our EPT process

Recall EPT information

Self Assessment Questions:

How old must a patient be to recieve EPT?

A. 18

B. 16

C. 13

D. 21

Why is the focus only on chlamydia?

A. Both is too much work

B. Gonorrhea preferred treatment is an injection

C. It is the most common

D. Gonorrhea cannot be spread

Q1 Answer: A Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-833-L99-P

Expanding Evaluation of Initial and On-going Inpatient Pharmacist Competency

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Purpose:
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. Over this past year, a peer review process to assess pharmacist competence managing vancomycin pharmacokinetics was introduced within the inpatient setting at Froedtert Health and the Medical College of Wisconsin. While vancomycin dosing is the most common pharmacokinetic service offered by inpatient pharmacists at Froedtert, there are several other services managed by pharmacists. The purpose of this study is to expand the peer review process to validate pharmacist competence managing vancomycin, aminoglycoside, antifungal, and bivalirudin pharmacokinetic services.
Methods:
Peer reviewers will retrospectively review clinical notes filed by their acute care pharmacist colleagues from August 2023-September 2024 at Froedtert Hospital and Froedtert Menomonee Falls Hospital. Pharmacists will be eligible for review if they have filed one pharmacokinetic note for any of the included pharmacy-to-dose services, with a limit of four notes being reviewed, one from each service. Two peer reviewers will independently review each note, utilizing a rubric to evaluate pharmacist competence based on the content of the notes. Peer review rubrics will be designed for each evaluated service and contain two different domains, documentation criteria and therapeutic decision making, to assess if the filed note meets criteria rating. The primary outcome is the percentage of pharmacists that achieve the â€œmeets criteriaâ€ rating for all their reviewed notes.
Results:
Of 200 pharmacists eligible for peer review, it is estimated 46 will be reviewed this cycle. Of the pharmacists to be reviewed, 18 are PGY1 residents and 3 are pharmacists onboarded within the last 12 months. 25 of the 46-pharmacist filed at least one note in each of the pharmacokinetic services to be reviewed.
Conclusion:
Conclusions are pending.

Learning Objectives:

Describe the rationale for developing and implementing a peer review process to ensure pharmacist competency in providing pharmacy consult services.

Explain the selected process to review and ensure Froedtert's inpatient pharmacists' competency managing pharmacokinetic services at Froedtert Health.

Self Assessment Questions:

Which of the following are reasons for implementing a peer review process?
A. To meet the standards for postgraduate residency programs provided by ASHP
B. To identify gaps in pharmacists' knowledge
C. To assess the competence of inpatient pharmacists managing pharmacokinetic services
D. Both A and C
Which of the following is true about Froedtert's peer review process?
A. Each note is reviewed by 3 reviewers
B. A standardized rubric was developed for use by peer reviewers
C. Residents were not included in the review process
D. Only Vancomycin notes were included
Q1 Answer: D Q2 Answer: B
APCE Universal Activity Number 0121-9999-25-750-L04-P

Impact of Clinical Decision Support on New-Start Oral Anticoagulant Prescribing

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Purpose: In 2019, The Joint Commission revised its National Patient Safety Goals to address a rise in adverse drug events associated with oral anticoagulants (OACs). In 2020-2022, Norton Healthcare (NHC) implemented clinical decision support (CDS) intended to reduce adverse events and drive best practice prescribing of oral anticoagulants. The primary aim of this study was to assess prescribing compliance with guideline recommended oral anticoagulant selection and dosing pre- and post- implementation of clinical decision support within an order set.
Methods: This retrospective chart review included patients initiated on oral anticoagulant therapy for the indications of atrial fibrillation, venous thromboembolism, and mechanical valves while admitted to one of four adult hospitals. Included patients received at least one dose prior to discharge and were discharged home on the same anticoagulant. The pre-implementation group consisted of 100 patients during the period of 03/2018 to 03/2020. The post-implementation group consisted of 100 patients during the period of 06/2022 to 06/2024. The primary objective was to compare providersâ€™ prescribing compliance with best practice as determined by societal guidelines (American College of Chest Physicians, American Society of Hematology) pre- and post- implementation of NHCâ€™s anticoagulant CDS within an order set. Secondary outcomes included a comparison of major adverse cardiovascular and cerebrovascular events at 90 days, major bleeding within 90 days, and incidence of severe stroke.
Results: Of the 100 patientâ€™s pre-implementation of the CDS, 96 had compliant anticoagulant selection and dosing compared to 89 in the post-implementation group. This resulted in no statistical difference between the two arms. The results provided no difference in secondary endpoints with CDS.
Conclusion: The study found that oral anticoagulant CDS did not result in a statistical improvement in provider compliant prescribing. Given high provider compliance pre-CDS, the impact of the CDS cannot be determined with current sample size.

Learning Objectives:

Discuss common prescribing errors among DOACs
Recognize benefits of clinical decision support systems

Self Assessment Questions:

What is the most common prescribing error among DOACs?
A. Over dosing
B. Under dosing
C. Selection of wrong drug
D. Contraindication
Clinical decision support systems have the ability to improve what area?
A. Patient safety
B. Financial challenges
C. Less documentation
D. Increase provider workload
Q1 Answer: B Q2 Answer: A
APCE Universal Activity Number 0121-9999-25-790-L05-P

Patent ductus arteriosus: A retrospective comparison of medication therapies

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Purpose: The ductus arteriosus (DA) is an open blood vessel in unborn infants that allows blood to bypass the lungs and flow directly to the body. Typically, the DA will spontaneously close within 24h after birth in healthy term infants. When it does not close, this is considered patent ductus arteriosus (PDA) which can result in heart failure and pulmonary edema/hypertension. Traditional pharmacologic managements include NSAIDs (Ibuprofen or Indomethacin) for one-two courses. A 3â€“7-day course of acetaminophen may be similarly efficacious to NSAIDs, with less incidence of gastrointestinal bleeding, intraventricular hemorrhage, necrotizing enterocolitis and renal dysfunction. However, long term follow-up regarding the comparison of these two medication classes is lacking. The objective of this review is to compare intravenous indomethacin to oral and intravenous acetaminophen for the treatment of PDA.
Methods: A retrospective cohort chart review evaluating preterm infants < 37 weeks gestational age with a postnatal age of < 60 days with confirmed diagnosis of PDA, admitted from June 30, 2014, to June 30, 2024, at the Detroit Medical Center. The data collected includes medication type, route, frequency and dose, duration of treatment, treatment failure, need for second course therapies, surgical intervention, incidence of PDA re-opening, oxygen support requirements, concomitant drug therapies resulting in prolonged ductus patency and laboratory values relative to safety outcomes. The primary outcome is successful PDA closure. Following data analysis, we aim to utilize the results to create a standardized treatment approach and improve patient outcomes by providing a more definitive answer regarding the most appropriate pharmacological option and timing of intervention for PDA closure.
Results/Conclusion: Data collection and analysis are on-going. Preliminary results show similar efficacy between indomethacin and acetaminophen with minimally higher rates of treatment failure with acetaminophen. Final results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize the health issues/conditions that can occur as a result of PDA
Identify the variance between the adverse drug effect profiles of indomethacin and acetaminophen

Self Assessment Questions:

Which of the following conditions are not associated directly with PDA?
A. Heart failure
B. Pulmonary edema
C. Aortic stenosis
D. Pulmonary hypertension
Which of the following side effects are associated with indomethacin?
A. Gastrointestinal bleed
B. Necrotizing enterocolitis
C. Renal dysfunction
D. All of the above
Q1 Answer: C Q2 Answer: D
APCE Universal Activity Number 0121-9999-25-543-L01-P

Assessment of Education Regarding the Evaluation of Beta Blocker Initiation/Continuation Timing in Heart Failure Diagnosis and Exacerbation

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Purpose: Many patients with heart failure fail to receive beta blockers despite the clinical trial data. The objective of the study is to see the effects of continuous education and assess any shifts in understanding. The education will focus on the comparison of initiation/maintenance compared to failure to initiate beta blocker.
Methods: The project includes Indiana University Ball Memorial Hospital medical residents in internal medicine, transitional medicine, and family medicine who complete the pre- and post-continuing education questionnaires. The education will focus on presenting data from major clinical trials such as MERIT-HF, CIBIS-II, COPERNICUS, IMPACT-HF, and more highlighting the benefits of quick initiation or continuation of beta blocker use in heart failure whether that be new diagnosis, decompensation, and exacerbation. The background and data gathered to present will exclude HFpEF and any study explaining the benefits of beta blockers that is not a randomized control trial. Information presented during presentation contains both symptomatic and asymptomatic patients and the results of beta blocker initiation. The education will also present results of the OPTIMIZE-HF trial that evaluates the risk of post-discharge death for patients receiving beta-blockers before admission and continued on therapy, newly started, treatment was withdrawn, and eligible but not treated. Before and after the education, a questionnaire will be distributed amongst the residents to assess any shifts in understanding of initiating/re-initiating beta blockers and if they plan to implement the education into clinical practice. The questionnaires will produce data showing if the information was retained and the shift in thinking in clinical mindset after education presented. The continuing education will be presented to the medical residents in person at the Medicine Grand Rounds.
Results/Conclusions: Data analysis is currently in progress and Results and Conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Explain the role of beta-blockers in heart failure treatment.
Discuss how landmark heart failure clinical trials contribute to beta-blocker treatment guidelines.

Self Assessment Questions:

During hospital admission for ADHF, when is the proper time to initiate a beta-blocker?
A. Immediately, once hemodynamically stable and euvolemic.
B. Outside hospital at the discretion of patient's primary care provider (PCP).
C. One week after the hospital encounter.
D. Continue throughout hospital stay even if patient requires inotropic support.
How quickly can a beta-blocker be safely titrated for a heart failure patient?
A. Initiate beta-blocker at target dose for quicker benefits.
B. Titrate every 1-2 weeks.
C. Titrate every 3-4 weeks.
D. Titrate every 3-5 days.
Q1 Answer: A Q2 Answer: B
APCE Universal Activity Number 0121-9999-25-626-L01-P

Tobramycin Pharmacokinetics in Pediatric Patients with Cystic Fibrosis on Maintenance Azithromycin

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Purpose: Many people with cystic fibrosis (CF) are colonized with Pseudomonas aeruginosa; this colonization is associated with increased morbidity and mortality in pediatric patients, so effective and appropriate treatment for a pulmonary exacerbation (PEx) is crucial. The CF Foundationâ€™s PEx Guidelines recommend that treatment include an intravenous (IV) aminoglycoside, like tobramycin, in addition to continuing maintenance medications, like oral azithromycin, to reduce pulmonary inflammation. However, several studies have shown that patients who use both medications during PEx treatment have worse clinical outcomes compared to those that do not; this could suggest a potential interaction between these two medications, but there are currently no studies evaluating the impact of azithromycin on the pharmacokinetics of tobramycin. The objective of this study was to compare the tobramycin elimination rate constant (Ke) between pediatric people with CF on maintenance azithromycin versus those not on maintenance azithromycin when treated with IV tobramycin for a PEx.

Methods: This was a retrospective cohort study of pediatric patients with CF who received IV tobramycin for the treatment of a PEx at Riley Hospital for Children between January 1, 2019 and June 1, 2024. Exclusion criteria were a history of lung transplant or underlying renal issues, admission to an intensive care unit, receiving daily azithromycin within 3 weeks of admission, and receiving maintenance azithromycin outpatient that was not continued while admitted. The primary outcome was tobramycinâ€™s elimination rate. Secondary outcomes included tobramycinâ€™s volume of distribution, area under the curve, half-life, serum peak and trough concentrations, drug-free interval, daily dose, duration of therapy, incidence of acute kidney injury, recovery of forced expiratory volume (FEV1) within 5% of baseline, and time to next admission for a PEx.

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

Learning Objectives:

Select guideline-recommended therapy for a pediatric patient with cystic fibrosis experiencing a pulmonary exacerbation.

Review current literature pertaining to the clinical outcomes of patients with cystic fibrosis who receive IV tobramycin and concomitant azithromycin during pulmonary exacerbation treatment.

Self Assessment Questions:

Which of the following is recommended by current guidelines as an appropriate treatment strategy for a pediatric patient with cystic fibrosis (CF) who is colonized with Pseudomonas aeruginosa?

A. Start IV tobramycin + cefepime, hold chronic CF medication

B. Start IV tobramycin + cefepime, continue chronic CF medications

C. Start IV tobramycin monotherapy, hold chronic CF medications

D. Start IV tobramycin monotherapy, continue chronic CF medications

Which of the following accurately represents clinical outcomes for people with cystic fibrosis who use IV tobramycin and oral azithromycin concomitantly during pulmonary exacerbation treatment?

A. Better clinical outcomes

B. Similar clinical outcomes

C. Worse clinical outcomes

D. Available studies have not evaluated this endpoint

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-650-L01-P

Using Employer Data to Identify Potential Health Inequities Relating to Pharmaceutical Access and Utilization in a Self-Insured Population

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PURPOSE: To determine if there are measurable health inequities relating to pharmacy access with the University of Michiganâ€™s current health plan benefit structure.
OBJECTIVES: The primary objective of this study is to assess and evaluate the real-world utilization of prescription products covered under a pharmacy benefit in an employerâ€™s population stratified by premium banding to identify potential health inequities.
METHODS: This study is a retrospective cohort study conducted by clinical and administrative staff within the University of Michiganâ€™s Benefit Administration Office and MHealthy. De-identified pharmacy claims will be collected from the Universityâ€™s pharmacy claims database for all members who meet the eligibility criteria between July 1, 2022 through December 31, 2023. The study will be utilizing two separate data sets, one data set including drugs used to treat type II diabetes (T2DM) and mental health conditions and another data set including all University of Michigan Prescription Drug Plan (UM PDP) formulary covered drugs. These datasets will be utilized depending on the specific co-primary outcomes of interest.
PRELIMINARY RESULTS: Between July 1, 2022 and December 31, 2023, 33,100 members were eligible for the study. Members with an annual salary of $49,300 or below have the lowest employee contribution and highest employer contribution towards premiums (Band 1). For an annual salary of greater than $49,300 and up to $69,800 (Band 2), employee contribution towards premiums increases gradually over the spectrum of the Band 2 salaries. For an annual salary of greater than $69,800 (Band 3), employees have the highest contribution and lowest employer contribution towards premiums. At UM PDP, there are 7,160 members, 7,381 members, and 18,559 members in Band 1, Band 2, and Band 3, respectively. Interim results of this study will be presented at GLRPC.

Learning Objectives:

Describe how salary-based premium contributions can be used as a strategy to address health equity in employer-sponsored prescription drug benefits

Identify some commonly used pharmacy claim metrics when assessing pharmacy access and use.

Self Assessment Questions:

Which of the following best describes how the University of Michigan structures their health insurance premium contributions?

A. All employees pay the same premium amount

B. Premiums are based on years of service

C. Premium contributions are determined by salary bands, with lower-paid employees paying less

D. Premium amounts are negotiated individually with each department

Which of the following metrics will be used to assess medication adherence using pharmacy claims in this study?

A. Proportion of days covered (PDC)

B. Patient survey responses

C. Emergency department visits

D. Drug discontinuation due to adverse events

Q1 Answer: C Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-826-L99-P

Evaluation of CKD-EPI creatinine-cystatin versus Cockcroft-Gault Estimations

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Background: The Cockcroft-Gault (CG) equation has known limitations, including its use of creatinine as a renal biomarker. Creatinine (SCr) is influenced by various factors that may lead to inaccurate renal clearance estimations. The CKD-EPI Creatinine-Cystatin (eGFRcr-cys) equation incorporates a second biomarker, cystatin c (CysC), in an attempt to provide more accurate estimations of renal function. KDIGO Guidelines recommend utilizing eGFRcr-cys in various outpatient scenarios, but no guidance exists on its use in the inpatient setting. A previous University of Kentucky (UK) HealthCare study identified four characteristics that were predictive of a >25 mL/min difference between renal function estimated by CG and eGFRcr-cys. These characteristics included age <58 years old, weight >105 kg, ICU admission within 24 hours, and history of quadriplegia or paraplegia. This study aims to use pharmacokinetic evaluation to validate these predictors.

Methods: This retrospective review included patients admitted to UK HealthCare between June 5, 2021, and June 15, 2024. Included patients were â‰¥18 years, had a >25 mL/min difference between CG and eGFRcr-cys, â‰¥1 predictor, CysC and Scr levels collected within 24 hours of each other, and vancomycin or aminoglycoside levels. Patients who were pregnant or received renal replacement therapy were excluded. The primary endpoint was to compare differences between clearance estimated by each equation and actual clearance determined through pharmacokinetic evaluation.

Results: Out of 49 eligible encounters, 71% (35/49) of actual clearance aligned more closely with eGFRcr-cys clearance estimations. The median difference between actual clearance and eGFRcr-cys was 31 mL/min and the median difference between actual clearance and CG was 49 mL/min (p=0.004).

Conclusion: Through pharmacokinetic evaluation, this study validates the preference for eGFRcr-cys for inpatient renal clearance estimation in patients who are <58 years old, >105 kg, admitted to the ICU within 24 hours of presentation, or have a diagnosis of quadriplegia or paraplegia.

Learning Objectives:

Discuss the limitations of the Cockcroft-Gault equation for the estimation of renal clearance.

Identify clinical scenarios in which eGFRcr-cys renal estimation may be preferred over CG renal estimation.

Self Assessment Questions:

Which of the following is not a factor that can influence serum creatinine?

A. Muscle mass

B. Heart failure

C. Steroid use

D. Hyperglycemia

In which patient may eGFRcr-cys provide the most accurate renal clearance estimation?

A. A 59-year-old male with lung cancer who is admitted to a general medicine unit

B. A 71-year-old female with chronic kidney disease and an above knee amputation admitted to a general medicine unit

C. A 48-year-old male with a history of paraplegia secondary to stroke admitted directly to the ICU

D. A 91-year-old female with diabetic ketoacidosis admitted to a progressive care unit

Q1 Answer: D Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-519-L01-P

Evaluation of Ketamine's Impact on Vasopressor Requirements in Critically Ill Patients: A Retrospective Cohort Study

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Purpose: Ketamine is a commonly used sedative agent for procedural sedation and rapid sequence intubation. Ketamine can also be administered as an adjunct agent for sedation and analgesia in mechanically ventilated patients requiring high levels of sedation. Ketamine induces the release of norepinephrine, epinephrine, and dopamine, leading to transient increases in cardiovascular function in non-catecholamine depleted patients. The existing literature on continuous infusion ketamineâ€™s effect on vasopressor requirements is conflicting, with some studies reporting potential benefit and others showing no clinical difference. The purpose of this research is to contribute to this body of literature by investigating whether the use of ketamine as an adjunct sedative and analgesic agent can decrease vasopressor requirements in critically ill patients.

Methods: This retrospective cohort study was conducted at Saint Joseph Hospital, a 433 bed community hospital located in Lexington, KY. The study included mechanically ventilated patients admitted between August 7, 2018, and December 31, 2024 who received at least one vasopressor agent for at least 3 hours prior to the initiation of continuous infusion ketamine, and received both ketamine and vasopressors concomitantly for at least 3 hours. To be included, patients must have also been receiving vasopressors at a dose â‰¥ 0.1 mcg/kg/min of norepinephrine or norepinephrine equivalents. The primary outcome is change in vasopressor requirement, measured by the dose of norepinephrine (or norepinephrine equivalents) in mcg/kg/min at 6, 12, 24, and 48 hours after the initiation of continuous infusion ketamine. Secondary outcomes included the change in continuous infusion opioid requirements, ICU length of stay, and duration of mechanical ventilation. A paired samples t-test or Wilcoxon signed-rank test was used for continuous variables as appropriate.

Results/Conclusion: Results and conclusions on this project are still in process and will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the effect ketamine has on the cardiovascular system

Identify the potential risks and benefits of using ketamine as an adjunct sedative in mechanically ventilated patients

Self Assessment Questions:

Which of the following best describes how ketamine impacts the cardiovascular system?

A. Ketamine is a direct antagonist of beta receptors leading to decreased cardiac output

B. In catecholamine depleted patients ketamine causes release of serotonin and glutamate leading to an increase in mean arterial pressure

C. Ketamine is a direct agonist on beta receptors leading to increased chronotropy

D. In non-catecholamine depleted patients ketamine causes release of norepinephrine, epinephrine and dopamine leading to an increase in systemic vascular resistance

Which of the following is a potential benefit of using ketamine as an adjunct sedative in mechanically ventilated patients?

A. Ketamine provides sedation without inhibiting respiratory drive

B. Ketamine can increase intracranial pressure

C. Ketamine has a delayed onset of action

D. Ketamine significantly increases airway resistance

Q1 Answer: D Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-599-L01-P

Aspirin and Clopidogrel Duration of Therapy for Secondary Stroke Prevention

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Purpose: The American Heart Association and American Stroke Association recommend dual antiplatelet therapy (DAPT) for 21-90 days for secondary stroke prevention in patients with non-cardioembolic minor strokes or transient ischemic attacks (TIA). With the recommended durationâ€™s wide range, the purpose of this study was to determine the optimal DAPT treatment duration for secondary stroke prevention in patients with a high-risk TIA or minor stroke.
Methods: This retrospective cohort study evaluated patients admitted to UofL Hospital and Jewish Hospital between July 1, 2022 and July 31, 2023. Patients with an ICD-10 code of acute ischemic stroke (NIHSS â‰¤ 3) or high-risk TIA and discharged on aspirin and clopidogrel were included. These patients were divided into two groups â€“ those that receive DAPT for 21-60 days compared to 61-90 days. Those with TIA symptoms limited to isolated numbness, visual changes, or dizziness were excluded. Discontinuation of the study drug for more than five days, receipt of therapeutic anticoagulation or non-steroidal anti-inflammatory drug during the treatment period, or are pregnant or incarcerated were also excluded. The efficacy outcome included a composite rate of ischemic events within 90 days of DAPT initiation. The safety outcome included a composite rate of moderate to severe hemorrhages. This study was approved by the University of Louisville Institutional Review Board.
Results: There was no difference in the efficacy outcome of recurrent stroke within 90 days of DAPT initiation between groups (2.30% vs 2.99%, p=1.00), as well as no difference in the safety outcome of moderate to severe hemorrhage (0% vs. 1.49%, p=0.428).
Conclusion: Among patients with a minor stroke or TIA, there was no difference between groups for risk of a recurrent ischemic event or moderate to severe hemorrhage within 90 days of DAPT initiation. Patient specific factors should be considered when determining duration of therapy.

Learning Objectives:

Review guideline recommendations and existing literature for dual antiplatelet therapy (DAPT) duration for secondary stroke prevention

Discuss the results of a study conducted at a comprehensive stroke center evaluating efficacy and safety of DAPT for 21 to 60 days compared to 61 to 90 days for secondary stroke prevention

Self Assessment Questions:

Which of the following is the recommended duration for dual antiplatelet therapy (DAPT) for secondary stroke prevention?
A. 30-60 days
B. 30-90 days
C. 21-60 days
D. 21-90 days
Which of the following is a potential risk of prolonged use of DAPT?
A. Recurrent ischemic stroke
B. Moderate to severe hemorrhage
C. Cardioembolic stroke
D. Hypertension
Q1 Answer: D Q2 Answer: B
APCE Universal Activity Number 0121-9999-25-724-L01-P

Comparison of Critical Care Pharmacist Workload and Clinical Outcomes at an Academic Safety Net Hospital

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Statement of purpose: Critical care pharmacists (CCPs) play an essential role within the multidisciplinary team and their value continues to evolve. An ideal CCP-to-patient ratio has not been established, and the existing literature has aimed to explore the relationship between pharmacist workload and its impact on patient-centered outcomes in the ICU. It is still unclear which institution-specific considerations further define an ideal pharmacist workload. Additional studies are needed to better understand CCP practice models and their relationship with patient-centered outcomes. This study aims to characterize the association between CCP workload and patient-centered outcomes following practice model changes at an academic safety-net hospital.
Methods: A single-center, observational cohort study was conducted at an academic safety-net hospital in Indianapolis, Indiana. The pre-group occurred from August 2023 to January 2024 and the post-group occurred from October to December 2024. The pre-group was part of a multicenter study, Optimizing Pharmacist Team-Integration for ICU Patient Management (OPTIM), which is pending publication. CCP-to patient ratios and interventions were collected prospectively, and patient demographics and outcomes were collected retrospectively. Patients were included if they were admitted to an ICU service during the study periods. Patient-specific data within 24 hours of admission included sequential organ failure assessment (SOFA), ICU clinical score, and medication regimen complexity- ICU (MRC-ICU) score. The primary outcome was in-hospital mortality. Patient-specific secondary outcomes included ICU and hospital length of stay (LOS), ICU readmissions, duration of mechanical ventilation, ventilator-free days, and incidence of ICU delirium. Pharmacist outcomes were CCP-to-patient ratios, new ICU patients per shift, and the presence of pharmacy students or residents. Intervention quantity and type were collected in the post-group analysis as a descriptive outcome.
Results: Results and conclusions will be presented at the Great Lakes Pharmacy Residents Conference in April 2025.

Learning Objectives:

Identify methods for quantifying critical care pharmacist (CCP) workload
Review the clinical implications of pharmacist workload on mortality and ICU length of stay (LOS)

Self Assessment Questions:

Which of the following is true regarding CCP-to-patient ratios?
A. Ratios have no clinical significance or impact on patient outcomes
B. An ideal ratio of 1:40 has been demonstrated in current literature
C. All organizations have recommended the same ratio
D. Higher ratios have been associated with worse patient outcomes in literature
Which of the following is considered true regarding the MRC-ICU Score?
A. There is a maximum of 50 points available
B. The score consists of only yes and no questions
C. The score has been validated to correlate with mortality, ICU length of stay, and pharmacist workload
D. A higher score is correlated with improved patient outcomes
Q1 Answer: D Q2 Answer: C
APCE Universal Activity Number 0121-9999-25-759-L04-P

Clopidogrel versus potent P2Y12 inhibitors in patients with acute coronary syndrome and atrial fibrillation on oral anticoagulation

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Atrial fibrillation and acute coronary syndromes (ACS) frequently coexist, presenting a significant clinical challenge due to the need for both anticoagulation and antiplatelet therapy. The combination of oral anticoagulants (OAC) with dual antiplatelet therapy (DAPT) leads to a heightened risk of bleeding, prompting guidelines to recommend using an OAC plus a P2Y12 inhibitor, preferably clopidogrel, to minimize this risk. However, limited data exist on the safety and efficacy of potent P2Y12 inhibitors, such as ticagrelor and prasugrel, when combined with OAC in this population. This study aims to evaluate

and compare the outcomes of clopidogrel versus potent P2Y12 inhibitors in patients with ACS and atrial fibrillation who are on concomitant OAC.

This retrospective cohort study includes adult patients with ACS and atrial fibrillation who received either clopidogrel or a potent P2Y12 inhibitor in combination with an OAC upon discharge. The primary endpoint is the incidence of bleeding events leading to readmission or unplanned discontinuation of therapy of OAC, P2Y12 inhibitor, or both. The secondary endpoint is major adverse cardiovascular events defined as non-fatal myocardial infarction or stroke, or all-cause mortality. Data analysis is ongoing. Final results and conclusions will be presented at the conference.

Learning Objectives:

Discuss the current evidence on anticoagulation and antiplatelet therapy in patients with acute coronary syndrome and atrial fibrillation.

Identify the potential differences in bleeding and ischemic outcomes between clopidogrel and potent P2Y12 inhibitors when used with oral anticoagulants.

Self Assessment Questions:

Which statement is most correct regarding dual antiplatelet therapy (DAPT) and oral anticoagulation in patients with ACS and atrial fibrillation?

A. Ticagrelor is superior to clopidogrel in reducing ischemic events in ACS patients on oral anticoagulation.

B. Clopidogrel is the preferred P2Y12 inhibitor for most patients on oral anticoagulation due to a lower bleeding risk.

C. Triple therapy (DAPT + oral anticoagulation) is recommended indefinitely to minimize thrombotic risk.

D. Prasugrel is preferred over ticagrelor in patients with ACS and atrial fibrillation receiving oral anticoagulation.

In patients with ACS and atrial fibrillation on oral anticoagulation, what is the primary benefit of using dual therapy (a P2Y12 inhibitor + an oral anticoagulant) over triple therapy (DAPT + an oral anticoagulant)?

A. Reduced bleeding risk

B. Lower rate of thrombotic events

C. Improved medication adherence

D. Increased inhibition of platelet aggregation

Q1 Answer: B Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-677-L01-P

Assessment of Housing as a Barrier to Pharmacy Students Selecting Rotations in Rural Healthcare Settings

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Purpose: Pharmacy students may be reluctant to pursue clinical rotations in rural areas due to a variety of barriers, which limit clinical experiences and may contribute to the shortage of healthcare professionals in underserved rural communities. Identifying and addressing these potential barriers may help improve access to rural rotations. The goal of this project is to identify whether housing is a barrier and to develop strategies that enhance recruitment and engagement within the Aspirus Health System.

Methods: An online survey was developed and distributed to pharmacy students in collaboration with the colleges of pharmacy in Wisconsin from November 20th, 2024 to December 31st, 2024. The survey focused on identifying barriers to pursuing rural rotations, housing challenges, decision-making factors, and ways to make these rotations more appealing. Descriptive statistics will be used to analyze responses and identify key trends. In addition, outreach efforts were made to local universities and community organizations to assess potential resources and support systems for housing assistance to students. This project was submitted to the Institutional Review Board prior to initiation and classified as quality improvement.

Results/Conclusion: To be presented at the 2025 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

List potential resources or strategies that could help pharmacy students secure housing during rural healthcare rotations

Describe factors that would make clinical rotations in rural pharmacy settings more appealing to students

Self Assessment Questions:

Which of the following are potential resources that could help pharmacy students secure housing for rural healthcare rotations?

A. Grants or stipends

B. Local host programs

C. Facility sponsored housing

D. All the above

Which of the following factors could make clinical rotations in rural healthcare settings more appealing to pharmacy students?

A. Accessible housing

B. Opportunities for unique patient care experiences

C. Financial incentives

D. All the above

Q1 Answer: D Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-758-L04-P

Osimertinib in Advanced or Metastatic Uncommon EGFR-mutated Non-Small Cell Lung Cancer

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Background:
Osimertinib is a targeted, irreversible epidermal growth factor receptor (EGFR) tyrosine kinase inhibitor (TKI) that binds to mutant forms of EGFR. Osimertinib has demonstrated improved efficacy when compared to traditional chemotherapy as a first-line treatment in EGFR-mutated non-small cell lung cancer (NSCLC). Clinical studies support the use of osimertinib in common EGFR mutations (exon 19 deletions, exon 21 L858R substitutions, and T790M), but outcomes data is limited for the use of EGFR TKIs in uncommon EGFR mutations. The purpose of this study is to evaluate the outcomes of osimertinib treatment in advanced or metastatic NSCLC patients with uncommon EGFR mutations.
Methods:
This is a single-center, retrospective cohort study of locally advanced or metastatic NSCLC patients with an uncommon EGFR mutation who received osimertinib between May 1, 2018, and September 30, 2024. Patients were included if the following criteria were met: age â‰¥ 18 years, diagnosis of locally advanced or metastatic NSCLC, confirmed uncommon EGFR mutation (compound mutations allowed), and received at least one dose of osimertinib. Patients were excluded if they were incarcerated, pregnant, had unstable brain metastases, an EGFR exon 20 insertion mutation, and/or received osimertinib as adjuvant therapy. The primary endpoint is progression free survival. Secondary endpoints include overall response rate, overall survival, and duration of response. Safety endpoints include the incidence of rash, diarrhea, nausea and vomiting, and cardiomyopathy, dose delays due to adverse events, and dose reductions. Descriptive statistics will be performed according to the type of data contained within each particular data set. Kaplan Meier methods will be used to determine median PFS and median OS. The study was approved by the Institutional Review Board at Norton Cancer Institute.
Results:
To be presented at Great Lakes Pharmacy Resident Conference, 2025.
Discussion:
To be presented at Great Lakes Pharmacy Resident Conference, 2025.

Learning Objectives:
Recognize common and uncommon epidermal growth factor receptor (EGFR) mutations
Describe the mechanism of action of osimertinib
Self Assessment Questions:
Which of the following is a common EGFR mutation?
A. Exon 19 S7681
B. Exon 19 L861Q
C. Exon 19 deletion
D. Exon 19 G719X
Which of the following statements describes the mechanism of action of osimertinib?
A. Inhibition of programmed cell death-1 (PD-1) activity
B. Inhibition of intracellular tyrosine kinase
C. Inhibition of KRAS G12C
D. Upregulation of EGFR signaling pathways
Q1 Answer: C Q2 Answer: B
APCE Universal Activity Number 0121-9999-25-690-L01-P

Predictive Value of Methicillin-Resistant Staphylococcus aureus (MRSA) Nasal Swab PCR Assay for MRSA Pneumonia in Critically Ill Stroke Patients

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Purpose:
Ischemic and hemorrhagic strokes are associated with significant morbidity and mortality, with secondary complications such as stroke-associated pneumonia (SAP) contributing to increased mortality rates. Methicillin-resistant Staphylococcus aureus (MRSA) is a key pathogen associated with poor outcomes in this patient population. While MRSA PCR nasal swabs have demonstrated high negative predictive value (NPV) in other critically ill populations, their diagnostic utility in stroke patients remains uncharacterized. This study evaluates the diagnostic performance of MRSA PCR nasal swabs in predicting culture-confirmed MRSA pneumonia in critically ill hemorrhagic and ischemic stroke patients.
Methods:
This IRB-approved, single-center, retrospective study included adult patients admitted to the neuroscience critical care unit at an academic medical center between January 1, 2018, and July 31, 2024, who had confirmed ischemic or hemorrhagic stroke and underwent both MRSA PCR nasal swab and lower respiratory culture testing (bronchoalveolar lavage, tracheal aspirate, or sputum). Exclusion criteria included age less than 18 years, pregnancy, incarceration, outpatient MRSA PCR testing, prior mupirocin decontamination, or a time lapse of greater than 7 days between MRSA PCR and respiratory culture.
The primary outcome was the diagnostic characteristics (NPV, positive predictive value [PPV], sensitivity, specificity) of MRSA PCR nasal swabs in predicting culture-confirmed MRSA pneumonia.
Data were extracted from electronic medical records and analyzed using descriptive statistics. A target sample size of at least 200 patients was established.
Results, Conclusions:
Data analysis is ongoing. Preliminary findings suggest trends in diagnostic performance that could impact clinical decision-making and antimicrobial stewardship in critically ill stroke populations. Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the clinical significance of stroke-associated pneumonia (SAP) and its impact on morbidity and mortality in critically ill ischemic and hemorrhagic stroke patients.
Discuss the diagnostic utility of MRSA PCR nasal swabs in predicting culture-confirmed MRSA pneumonia.

Self Assessment Questions:

What are the primary factors contributing to the increased morbidity and mortality associated with stroke-associated pneumonia (SAP) in critically ill stroke patients?
A. Early rehabilitation delays
B. Methicillin-resistant Staphylococcus aureus (MRSA) infections
C. Gastrointestinal complications
D. Risk of recurrent stroke
Which of the following best describes the diagnostic characteristic of MRSA PCR nasal swabs that supports their potential utility in critically ill stroke populations?
A. High sensitivity for detecting all bacterial pathogens causing pneumonia
B. High specificity for distinguishing MRSA from all other pathogens
C. High positive predictive value (PPV) for identifying MRSA pneumonia
D. High negative predictive value (NPV) for ruling out MRSA pneumonia
Q1 Answer: B Q2 Answer: D
APCE Universal Activity Number 0121-9999-25-844-L01-P

Comparative Efficacy of Three-Factor to Four-Factor Prothrombin Complex Concentrate for Reversal of DOAC-Related Intracranial Hemorrhage

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Anticoagulation has been identified as a predictor for hematoma expansion in intracranial hemorrhage (ICH) and prompt reversal of anticoagulation is recommended to decrease morbidity and mortality. Four-factor prothrombin concentrate (4F-PCC) for direct oral anticoagulation (DOAC) reversal is supported by the American Stroke Association & American Heart Association guidelines for the Management of Patients With Spontaneous Intracerebral Hemorrhage. Conversely, three-factor prothrombin concentrate (3F-PCC) has limited evidence of efficacy and is not supported by guidelines for this indication. At the health-system being studied, the current reversal algorithm for emergent DOAC related bleeding includes either 3F-PCC or 4F-PCC, since 3F-PCC is less cost prohibitive, easier to administer, and has the same amount of factor X as 4F-PCC.

This is a multicenter, retrospective, cohort study to compare 3F-PCC to 4F-PCC for the reversal of apixaban or rivaroxaban in ICH. Patients were included in the study if they received 3F-PCC or 4F-PCC within 6 hours of presentation for apixaban or rivaroxaban reversal. Patients were excluded if noted to be a non-survivable event, a repeat head CT within 48 hours of initial was not obtained, arteriovenous malformation, penetrating head trauma, or aneurysmal subarachnoid hemorrhage was identified. The primary outcome is hematoma expansion. Secondary endpoints include length of hospital stay, 30-day mortality, 30-day thromboembolic events post reversal, and 30-day readmission. Cohorts will be matched using GCS, neurosurgical intervention within 24 hours, type of bleed, time from potential bleed <3 hours, 3-6 hours, or greater than 6 hours through propensity scoring.

The current status of the project is refined data collection and statistical analysis. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference in 2025.

Learning Objectives:

Discuss the appropriateness of interchanging the prothrombin complex concentrates in the event of reversal specific to DOAC-related ICH.

Identify the differences between the prothrombin complex concentrates in regard to dosing, administration and components.

Self Assessment Questions:

Which prothrombin complex concentrate is supported by guidelines for DOAC reversal in intracranial hemorrhages?

A. Three Factor

B. Four Factor

C. Neither, guidelines do not recommend use of either factor

D. Either, guidelines do not recommend against use of either factor

Which of the following is matched correctly with prothrombin complex concentrate dosing and administration?

A. Three Factor PCC is given at 25 units/kg over 3 hours

B. Four Factor PCC is given at 25-50 units/kg at 3 units/kg/min

C. Three Factor PCC is given as 2000 units at 5 units/kg/hour

D. Four Factor PCC is given as 50 units/kg over 5 minutes

Q1 Answer: B Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-594-L01-P

Impact of AUC-Based Vancomycin Monitoring on Pharmacist Workload

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Purpose: The 2020 ASHP/PIDS/SIDP/IDSA vancomycin guidelines state that AUC-monitoring using Bayesian software is the preferred method of vancomycin therapeutic drug monitoring (TDM). Historically, trough monitoring with a goal of 10-20 mcg/mL has been used as a surrogate marker for a target AUC/MIC of 400-600 mcg/mL*hr. This AUC goal has been associated with optimizing efficacy and limiting toxicity in adults, however, there is limited data in pediatrics. In March 2021, University of Michigan Health updated the vancomycin TDM protocol to recommend two-level AUC-based monitoring. This study will add to the limited body of literature to evaluate the impact of AUC-based vancomycin monitoring on pharmacist workload compared to single-level monitoring at a pediatric hospital.

Methods: This pre-post quasi experimental study will review patients less than 18 years old admitted to C.S. Mott Childrenâ€™s Hospital between November 1, 2020 and December 31, 2020, and between May 1, 2021 and June 30, 2021, who received at least one dose of intravenous vancomycin during their hospital stay. Patients who received vancomycin for surgical prophylaxis will be excluded. The primary objective is to quantify the impact of switching from single-level to AUC-based monitoring on pharmacist workload by assessing pharmacist-reported time spent on vancomycin monitoring and documentation. Secondary outcomes include percent target attainment with initial dosing, vancomycin usage, duration of vancomycin therapy, number of vancomycin levels collected, percent of patients receiving vancomycin TDM, acute kidney injury, mortality, and time to clearance of blood cultures for MRSA bacteremia. For statistical analysis, a Mann-Whitney U test will be used to analyze our continuous data and a chi-squared or Fisher's exact test will be used to analyze our discrete data.

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

Learning Objectives:

Describe the updated 2020 ASHP/PIDS/SIDP/IDSA vancomycin guidelines and current literature supporting the use of AUC monitoring as the preferred method of vancomycin dosing in pediatric patients.

Recognize how the change from single-level to AUC monitoring at UMH has impacted pharmacist workload based on study results.

Self Assessment Questions:

Fill in the blanks. The updated 2020 ASHP/PIDS/SIDP/IDSA vancomycin guidelines recommend a safety and efficacy target of _____ for patients with severe MRSA infections using _____.

A. AUC 400-600 mcg/mL*hr; Bayesian software

B. AUC 400-600 mcg/mL*hr; two-level kinetics

C. Trough 10-15 mcg/mL; Bayesian software

D. Trough 15-20 mcg/mL; single-level kinetics

Which of the following is true regarding the limitations of single-level monitoring for pediatric patients?

A. Many pediatric patients require lower doses of vancomycin to achieve a therapeutic trough level

B. While a trough goal of 10-15 mcg/mL has been validated in several adult studies, there is significant variability in trough levels with pediatric patients

C. In pediatric patients, an AUC of 400-600 mcg/mL*hr generally correlates with a trough level >20 mcg/mL given decreased renal function

D. Trough monitoring measures total drug exposure over an interval, whereas AUC monitoring measures a single drug concentration at the end of a dosing interval

Q1 Answer: A Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-825-L99-P

Sickle Cell Pain Trends and Medication Management in the Emergency Department at a Safety-Net Academic Medical Center

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Sickle cell disease (SCD) is a genetic disorder characterized by the production of abnormal hemoglobin leading to severe pain. Current literature lacks comprehensive data on opioid and multimodal pain management in the acute care space, especially in the setting of a safety-net hospital. Additionally, Eskenazi Health is a part of The Emergency Department Alternatives to Opioids Program (ED-ALT) grant program, which aims to reduce the likelihood of future opioid misuse by developing and implementing alternatives to the use of opioids for pain management in hospitals and emergency department (ED) settings. Baseline data from this project will be utilized to target efforts with the ED-ALT grant to best serve our specific population of patients with SCD. The purpose of this research is to assess medications used to treat pain in patients who presented to the Eskenazi Health ED for a vaso-occlusive crisis (VOC) and patient disposition after their ED encounter. This study was a single-center, retrospective, observational chart review study conducted at a safety net hospital. Patients were included if they were at least 15 years old with a SCD diagnosis and presented to the ED for a VOC between July 1st, 2023 and June 30th, 2024. Exclusion criteria included incarcerated patients and patients diagnosed with SCD presenting for any reason other than a VOC. The primary outcome was total morphine milliequivalents (MME) for each ED encounter. Secondary outcomes included MME (per hour and per day) and MME based on patient disposition (discharge, observation, or admission). Additional information collected included the total number of opioid and multimodal pain medications used over the course of their encounter. Results and conclusions will be presented at the Great Lakes Pharmacy Residents Conference in April 2025.

Learning Objectives:

Identify current gaps in literature regarding non-opioid pain control in patients with sickle cell disease (SCD)

Define the ideal time to initiation of analgesia for patients presenting with a vaso-occlusive crisis (VOC) to the emergency department (ED)

Self Assessment Questions:

Which of the following is NOT a gap in the existing literature regarding multimodal pain treatment in sickle cell disease (SCD):

A. Limited emergency department specific data

B. Lack of data for efficacy of opioid alternatives

C. Often low or very low certainty in evidence

D. Low financial impact on health systems

What is the recommended administration time of analgesia after emergency department arrival during a vaso-occlusive crisis (VOC)?

A. Less than 10 minutes

B. Less than 30 minutes

C. Less than 1 hour

D. Less than 2 hours

Q1 Answer: D Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-794-L08-P

Influence of anti-PJP agent on UTI incidence and pathogens following kidney transplantation

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Purpose: Urinary tract infections (UTIs) are the most prevalent infectious complication in renal transplant recipients and are a major cause of morbidity, mortality, and recurrent hospitalizations, particularly in the first six months post-transplant. It has been estimated that up to 70% of patients will develop a UTI in the first six months after renal transplant. While primarily used in the prevention of pneumocystis jirovecii (PJP) infection, trimethoprim/sulfamethoxazole (TMP/SMX) also confers some protection against UTIs. Alternative agents for PJP prophylaxis including dapsone, pentamidine and atovaquone likely do not provide the same protection, but few data describe this gap in coverage and provide evidence to assist in determining if additional prophylaxis is warranted.
Methods: To better address this question, we evaluated early UTI-related outcomes in kidney transplant recipients based on PJP prophylaxis agent in a retrospective, single-center, observational study. Risk factors for infection were analyzed in order to assist in identifying patients who might benefit from targeted UTI prophylaxis. Adult kidney transplant patients that received at least thirty consecutive days of a single anti-PJP agent and have been followed by our institution for six months post-transplant were included. Notable exclusionary criteria include genitourinary abnormalities, history of recurrent UTIs, and receipt of additional organs during the same admission. Outcomes will be compared per thirty consecutive days on a single anti-PJP agent. The primary outcome of this study is to compare the incidence of UTIs among patients receiving PJP prophylaxis with TMP/SMX versus alternative agents in the first six months post kidney transplantation. Secondary outcomes include pathogen prevalence in urine culture results, prevalence of multi drug resistant organisms, and risk factors for occurrence of UTI.
Results/Conclusions: Data collection is in progress and final results will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recall the impacts of PJP prophylaxis agents in terms of efficacy, safety, and need for additional antibiotic coverage
Discuss the role of trimethoprim/sulfamethoxazole in dual prophylaxis of PJP and UTIs

Self Assessment Questions:

Which of the following anti-PJP agents also may provide coverage for UTIs?
A. Dapsone
B. Trimethoprim/sulfamethoxazole
C. Atovaquone
D. Pentamidine
Which of the following is NOT an additional risk factor for development of UTI post-kidney transplant?
A. History of recurrent UTIs prior to transplant
B. Type 2 diabetes mellitus
C. Presence of ureteral stent
D. Male sex
Q1 Answer: B Q2 Answer: D
APCE Universal Activity Number 0121-9999-25-656-L01-P

Implementation of a Care Coordination Application Specialty Pharmacy Patient Management Program

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Froedtert Specialty Pharmacy previously utilized individual smart documentation phrases within an electronic health record (EHR), EpicÂ® Hyperspaceâ„¢, to document medication details and monitor treatment parameters. However, the previous process for documenting specialty medications was time-intensive, manual, and lacked standardization across pharmacists and disease states. Additionally, inefficiency extended to data extraction, which was a heavily manual process. As a result, the ability to analyze and report treatment effectiveness from patient clinical outcomes data was limited. Streamlining documentation and monitoring practices is essential to enhance efficiency and improve the reportability of patient outcomes.

In September 2024, Froedtert Specialty Pharmacy transitioned to the Compass Roseâ„¢ Specialty Patient Management Program, integrated into EpicÂ®. Compass Roseâ„¢ facilitates specialty medication management by integrating smart, data-reportable patient information into pharmacy workflows. The program also has the capability to extract patient outcomes through automated reporting functions. This project aims to evaluate the implementation of the Compass Roseâ„¢ Specialty Patient Management Program at Froedtert Specialty Pharmacy.

Analysis will compare data from August 2024 (pre-intervention) and November 2024 (post-intervention). The variability of pharmacist documentation will be evaluated by comparing the total number of dot phrases utilized by pharmacists. The change in pharmacist efficiency will be evaluated by the number of manual steps and time required to complete various tasks. Finally, the availability of patient care outcomes and ability to electronically validate required elements to meet accreditation standards will be evaluated.

There was a 98% reduction in non-standardized smart phrases, decreasing from 750 to 10 standardized templates. Research is ongoing to further evaluate the impact of the Compass Roseâ„¢ Specialty Management Program on documentation efficiency and clinical outcomes.

Implementing the Compass Roseâ„¢ Specialty Patient Management Program has streamlined documentation processes, notably reducing non-standardized smart phrases. Research is ongoing to evaluate the full impact of Compass Roseâ„¢ at Froedtert Specialty Pharmacy.

Learning Objectives:

Describe the impact of a care coordination platform specialty patient management program on standardizing clinical documentation and improving compliance with specialty accreditation standards in specialty pharmacy workflows.

Describe the characteristics of a care coordination platform that enhance workflow efficiency and improve the reporting of patient care outcomes.

Self Assessment Questions:

How did the implementation of Compass Roseâ„¢ impact non-standardized smart phrases?

A. The implementation of Compass Roseâ„¢ resulted in a 98% reduction in non-standardized smart phrases, decreasing from 750 to 10 standardized templates.

B. The implementation of Compass Roseâ„¢ increased non-standardized smart phrases by 50%, making it harder to track templates.

C. Compass Roseâ„¢ had no impact on non-standardized smart phrases, leaving them unchanged.

D. The implementation of Compass Roseâ„¢ led to the creation of 500 new non-standardized smart phrases.

What types of data can the Compass Rose Specialty Management Programâ„¢ automatically extract?

A. Compass Roseâ„¢ does not have the ability to extract data.

B. Compass Roseâ„¢ can automatically extract only demographic data, such as age and address.

C. Extracting patient outcome data in Compass Roseâ„¢ is a highly manual, time-intensive process.

D. Compass Roseâ„¢ can automatically extract patient outcomes data, enabling more efficient capture and analysis of treatment effectiveness through its advanced reporting capabilities.

Q1 Answer: A Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-757-L04-P

Assessment of Empiric Treatment for Extended-Spectrum Beta-Lactamase-Producing Enterobacterales (ESBL-E) Urinary Tract Infection and Local ESBL-E Rate Based on Presence of Risk Factors

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Purpose: To compare the percentage of empiric ESBL-E urinary tract infection (UTI) treatment between patients with known ESBL-E risk factors and no known ESBLE-E risk factors groups, then determine the incidence rate of ESBL-E based on patientsâ€™ risk factors.

Methods: A retrospective chart review was conducted at a hospital from March 1st to May 31st of 2024 to determine the rate of local ESBL-E prevalence that dictates patientsâ€™ empiric ESBL-E treatment. The primary outcome was the percentage of empiric treatment (empiric use of carbapenems) for ESBL-E UTI between patients with known risk factors and no known risk factors. ESBL-E risk factors were defined as a history of ESBL-E infection in the past 12 months and/or intravenous antibiotics use in the past three months. The secondary outcome was the percentage of urine cultures positive for ESBL-E between the two comparison groups. Both outcomes were assessed using a Chi-square test through IBMÂ® SPSS Statistics.

Results: 25 patients were reviewed in each group. 44% (n=11) of patients in the known risk factors group were treated empirically for ESBL-E UTI compared to 8% (n=2) of patients in the no known risk factors group ($p = 0.004$). In the known risk factors and no known risk factors groups respectively, 76% (n=19) versus 20% (n=5) of patientsâ€™ urine culture were positive for ESBL-E ($p < 0.001$).

Conclusions: Our patients with these risk factors have a significantly higher likelihood of having a urine culture positive for ESBL-E. It is reasonable to use the presence of these risk factors as a determinant factor when selecting ESBL-E UTI empiric treatment. Although these results confirm a consistent practice of antimicrobial stewardship by minimizing empiric carbapenem use in our patients with no known ESBL-E risk factors, there is room to optimize usage in our patients with known ESBL-E risk factors.

Learning Objectives:

Select appropriate empiric treatment for UTI when risk factors for ESBL-E are present
Identify antimicrobial stewardship opportunities when treating UTI by evaluating patients for ESBL-E risk factors

Self Assessment Questions:

GL is a 57-year-old male who was admitted to the hospital with symptoms of frequent urination and burning sensation during urination caused by urinary tract infection (UTI) which led to sepsis. Their past medical history includes type 2 diabetes, hypertension, and chronic obstructive pulmonary disease (COPD). Upon reviewing their chart, you found out that GL was admitted one month ago and completed a 5 day course of intravenous ceftriaxone for community acquired pneumonia treatment. Current admissionâ€™ urine culture preliminary result: E. coli (susceptibility pending) Which of the following is the most appropriate antibiotic to empirically treat GLâ€™s urinary tract infection while waiting for final urine culture results?

A. Ceftriaxone
B. Piperacillin/tazobactam
C. Moxifloxacin
D. Ertapenem

Which of the following statement (s) represents recommended antimicrobial stewardship practices for patients with UTI symptoms and a positive urine culture for Klebsiella pneumoniae?

A. Patients with known ESBL-E risk factors should be prescribed empiric ESBL-E treatment
B. Patients must have at least two known ESBL-E risk factors to receive ESBL-E empiric treatment
C. Empiric ESBL-E treatment should be avoided in clinically stable patients with no known ESBL-E risk factors
D. A and C

Q1 Answer: D Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-559-L01-P

Impact of Initial Parenteral Anticoagulation on DOAC Loading Dose for Acute VTE: Multicenter Study - Sarah Grazia

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Venous thromboembolism (VTE) impacts up to 900,000 patients annually. Direct oral anticoagulants (DOACs), such as apixaban and rivaroxaban, are preferred for VTE treatment when indicated. These DOACs require initial lead-in dosing of 7 and 21 days, respectively. Prescribers may elect to forgo lead-in doses when patients receive multiple days of therapeutic parenteral anticoagulation prior to DOAC therapy initiation. Current literature lacks sufficient evidence to support this practice. This study aims to evaluate the efficacy of subtracting the number of days of parenteral anticoagulation from the lead-in dosing compared to administering the full lead-in dose regardless of prior parenteral anticoagulation duration. Data will be collected on patients who meet the following inclusion criteria: adult patients admitted to the hospital with newly diagnosed VTE who received treatment with apixaban or rivaroxaban for VTE and had received therapeutic parenteral anticoagulation for at least 24 hours prior to starting oral anticoagulation. Exclusion criteria includes receipt of therapeutic anticoagulation prior to admission, greater than 1 hour overlap between parenteral anticoagulation and DOAC, patients that did not receive a lead-in dose reduction directly corresponding to the number of days of parenteral anticoagulation, moderate to severe mitral valve stenosis, bleeding on admission or prior to initiation of treatment, pregnancy, mechanical valve replacement, history of coagulopathy, history of severe liver disease, and contraindicated medications. The primary outcome will be time to first recurrent venous thromboembolism event. In order to detect a 3% difference in the time to recurrent VTE with a power of 80%, a sample size of 1,392 will be required. The primary endpoint will be analyzed using the Cox proportional hazards model. Subgroup analysis will be conducted to evaluate the duration of parenteral anticoagulation and the duration of DOAC lead-in therapy separately for patient subgroups based on whether they transitioned to either apixaban or rivaroxaban.

Learning Objectives:

Identify Identify the American Society of Hematology 2020 guidelines recommended lead in durations for apixaban and rivaroxaban in the treatment of acute venous thromboembolism.

Review available literature on using alternative direct oral anticoagulant dosing strategies for acute venous thromboembolism treatment in patients already receiving parenteral anticoagulation.

Self Assessment Questions:

Which of these is a standard lead-in dose and duration for apixaban in the treatment of acute venous thromboembolism

A. apixaban 10 mg twice daily for 10 days

B. apixaban 10 mg twice daily for 7 days

C. apixaban 10 mg twice daily for 21 days

D. apixaban 5 mg twice daily for 7 days

In the Williams et. al (2022) trial, what was the finding of the primary outcome, recurrence of venous thromboembolism at 6 months?

A. No difference of recurrence of venous thromboembolism between experimental (reduced lead-in) and control (full lead-in) groups

B. Statistically significant higher recurrence of venous thromboembolism in those receiving reduced lead-in durations

C. Statistically significant higher recurrence of venous thromboembolism in those receiving full lead-in durations

D. Study concluded before results were analyzed

Q1 Answer: B Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-676-L01-P

Impact of Analgesia and Sedation Protocol Compliance on Patient Outcomes in the Intensive Care Unit

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Purpose: Sedation is used in critically ill patients to prevent and treat anxiety and agitation and increase tolerance to mechanical ventilation. Light sedation is preferred to reduce the time to extubation and intensive care unit (ICU) length of stay. It is achieved through modalities like daily sedative interruption and nursing-protocolized sedation as per the 2018 Prevention and Management of Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption in Adult Patients in the ICU guideline recommendations. Hospital policy outlines nursing-protocolized sedation dosing adjustments. Non-adherence to the protocol may result in over- or under-sedation resulting in adverse patient outcomes, although this has not been evaluated. The purpose of this study was to evaluate sedative and analgesic dosing compliance to hospital policy on duration of mechanical ventilation in ICU patients compared with non-compliance. Methods: This retrospective cohort assessed adult ICU patients from 2/16/2024 through 11/30/2024 who were on mechanical ventilation â‰¥ 24 hours and administered fentanyl intermittent boluses or continuous infusions with a light sedation goal. Notable exclusions included those with suspected or proven acute primary brain injury, active status epilepticus, or active alcohol withdrawal. Critical Care Pain Observation Tool and/or Richmond Agitation Sedation Scale scores and overall compliance were reviewed by stratifying for adherence (â‰¥ 66%) and non-adherence (<66%) to each expected dose adjustment until extubation. The primary endpoint was median duration of mechanical ventilation. Secondary endpoints included median ICU and hospital lengths of stay, in-hospital mortality, incidences of self-extubation and tracheostomy, and mean daily dosage of sedative and analgesic use. Results/Conclusions: Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

State the recommended modalities described in the 2018 Prevention and Management of Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption in Adult Patients in the intensive care unit (ICU) guidelines to achieve and maintain a light level of sedation

Recognize notable properties and adverse effects of fentanyl that can impact patient outcomes with oversedation

Self Assessment Questions:

Which of the following modalities are recommended by the 2018 Prevention and Management of Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption in Adult Patients in the ICU guideline recommendations to achieve and maintain a light level of sedation in critically ill, mechanically ventilated adults?

A. Protocol-based utilization of neuromuscular blocking agents

B. Daily sedative interruptions

C. Nursing-protocolized targeted sedation

D. Both B and C

Which notable property of fentanyl must be considered in instances of oversedation?

A. Tissue accumulation

B. Decreased analgesia

C. Respiratory hyperventilation

D. Diarrhea

Q1 Answer: D Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-671-L01-P

Impact of 72 Hour Hang Time on Central Line Associated Bloodstream Infections in Neonatal Intensive Care Unit

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Purpose: Revisions to nursing policies in the NICU at Dupont Hospital were implemented in August 2024, which allowed for select, continuously infused products and their associated administration sets, to be changed every 72 hours. The purpose of this project is to determine the impact that extended hang time, with select, continuously infused products and their associated administration sets, will have on the CLABSI rate in the NICU. Methods: This will be a retrospective, cohort study. A chart review will be conducted to compare CLABSI rates in patients admitted in the NICU during the pre-intervention (2/1/2024-7/31/2024) and post-intervention (8/1/2024-1/31/2025) time periods. A list of patients for inclusion will be utilized by querying electronic medical records to gather patients admitted in the NICU with positive blood culture results. This list will be further filtered to include only patients who had a central line in place. A chart review will then be conducted to collect baseline data and necessary clinical information. Information collected will include positive blood culture results, number of central line days, number of patient days spent in the NICU and number of patient admissions to the NICU. Patients will meet criteria for inclusion if they have a positive blood culture result associated with use of a central line. Additionally, sterility of compounded products after 72-hours will be verified via local sterility testing. Data six months before, and after, the revised policies implementation will be included to ensure adequate amount of data is available for analysis. The primary objective is an evaluation of CLABSI rates between the pre- and post-intervention groups. Results/Conclusions: This study is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the difference between hang-time and beyond-use-date

Recognize the appropriate beyond-use-date for compounded sterile products

Self Assessment Questions:

Current guidance allows which beyond-use-date for category 2 compounded sterile products (aseptically processed, no sterility testing, only sterile starting components) stored at controlled room temperature?

A. 10 days

B. 24-hours

C. 4 days

D. 2 weeks

Current guidance from the Centers for Disease Control and Prevention recommends in patients not receiving blood products or fat emulsions; replacing administration sets that are continuously used no more frequently than at which interval?

A. 7 days

B. 24-hours

C. 72-hours

D. 96-hours

Q1 Answer: C Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-834-L99-P

Impact of a locally infiltrated incisional cocktail on opioid utilization post cesarean delivery

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Purpose:
The current approaches to analgesia for a cesarean delivery include neuraxial analgesia, general anesthesia, local anesthetics, and enhanced recovery after cesarean (ERAC) protocols. Various surgical procedures have utilized locally infiltrated incisional cocktails to provide additional pain control postoperatively. These include total knee arthroplasty, total hip arthroplasty, and lumbar surgery. However, incisional cocktails have not been studied in obstetrics. In April 2022, incisional cocktails were introduced as an option for cesarean deliveries at Baptist Health Louisville. The objective of this study is to compare morphine milligram equivalents (MMEs) utilized post cesarean delivery in patients who received an incisional cocktail of ropivacaine, clonidine, and epinephrine to the standard of care.
Methods:
This was a single center, retrospective, cohort study, which included patients who had a cesarean delivery at Baptist Health Louisville and excluded patients if less than 18 years of age, did not receive ERAC protocol, past medical history of substance use disorder, chronic opioid use, received topical bupivacaine/meloxicam, experienced hemorrhage, or required reoperation. Patients were divided into two study groups of either receipt of incisional cocktail or standard of care. The primary endpoint was total MMEs utilized at 24 hours post cesarean delivery. The secondary endpoints were MMEs utilized at 48 and 72 hours post cesarean delivery, escalation in level of care, and post-delivery length of stay. A sample size of 60 patients per group was required to achieve 80% power and detect a difference in the primary endpoint with a pre-specified alpha set at 0.05. An independent T-test will be performed for continuous parametric data and a chi-squared analysis for discrete data.
Results/Conclusions:
Results and conclusions will be presented at the Great Lakes Pharmacy Residents Conference.
Learning Objectives:
Identify surgical procedures that have utilized incisional cocktails based on published literature.
Describe the components of the incisional cocktail used in this study.
Self Assessment Questions:
Which of the following surgical procedures were NOT represented in the literature discussed for utilization of incisional cocktails to manage post-operative pain?
A. Total Hip Arthroplasty
B. Total Knee Arthroplasty
C. Obstetric procedures
D. Lumbar Surgery
What medication components are used in the obstetric incisional cocktail at Baptist Health Louisville?
A. Ropivacaine, epinephrine, and clonidine
B. Bupivacaine, epinephrine, and clonidine
C. Ropivacaine, epinephrine, and ketorolac
D. Bupivacaine, epinephrine, and ketorolac
Q1 Answer: C Q2 Answer: A
APCE Universal Activity Number 0121-9999-25-799-L08-P

Shorter Vs Longer Duration of Therapy for Pediatric Ventilator Associated Pneumonia
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Purpose

Ventilator-associated pneumonia (VAP) is defined as pneumonia that develops more than 48 hours after endotracheal intubation. It is a prevalent healthcare-associated infection in pediatric intensive care units (PICUs) and is linked to a significant mortality rate. While the Infectious Diseases Society of America (IDSA) recommends a 7-day antibiotic regimen for adult VAP, there is a lack of data comparing shorter duration to longer duration of therapy for the pediatric population.

Methods

This is a retrospective study comparing the effectiveness of seven days or less of antibiotic therapy compared to eight days or more of antibiotic therapy in the treatment of pediatric ventilator-associated pneumonia. This study was conducted at a university-affiliated pediatric hospital. Patients were included if they met the following criteria: eighteen years old or younger, met the US Centers for Disease Controlâ€™s diagnostic criteria for ventilator associated pneumonia, and were mechanically ventilated for 48 hours or more before diagnosis of pneumonia. Key exclusion criteria were patients who received > 24 hours of inactive empiric therapy, receipt of antibiotics for extra-pulmonary infection, complicated pneumonia, cystic fibrosis, chronic endotracheal tube placement and immunosuppressed status. The primary outcome of this study is 30-day mortality. Secondary outcomes include recurrence of VAP within 90 days, mechanical ventilation duration after VAP diagnosis, mechanical ventilation free days and ICU length of stay. Study outcomes between patients who received short-course vs. longer antibiotic therapy will be compared using the chi-square test or studentâ€™s t-test as appropriate.

Results

Results will be presented at the 2025 Great Lake Pharmacy Residents Conference.

Conclusions

Conclusions will be presented at the 2025 Great Lake Pharmacy Residents Conference.

Learning Objectives:

Describe the impact of antibiotic therapy duration on the clinical outcomes of pediatric ventilator-associated pneumonia (VAP).

Discuss the potential consequences of prolonged antibiotic therapy on pediatric VAP management.

Self Assessment Questions:

Based on the 2016 IDSA HAP/VAP guidelines, the recommended duration of therapy for most adult patients with ventilator-associated pneumonia is:

A. 7 days

B. 8 days

C. 14 days

D. 15 days

What are the potential consequences of prolonged antibiotic therapy in pediatric VAP management?

A. Increased risk of antibiotic resistance and disruption of the microbiome.

B. Improved resolution of infection with fewer complications.

C. Decreased incidence of VAP recurrence due to extended antimicrobial coverage.

D. Reduction in ICU length of stay due to prolonged therapy.

Q1 Answer: A Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-646-L01-P

Assessing Antibiotic Administration in Patients Presenting with Febrile Neutropenia to a Tertiary Medical Center in West Virginia

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Infections are a significant cause of morbidity and mortality in neutropenic patients. Due to diminished host response, fever is often the sole indicator of an occult infection. Febrile neutropenia (FN) is an oncologic emergency and life-threatening complication that warrants urgent medical attention. In oncology patients, guidelines recommend administration of empiric antibiotics within 1 hour of presentation. Correspondingly, oncology centers have adopted time-to-antibiotics (TTA) as a quality-of-care measure and have successfully implemented quality improvement (QI) initiatives to improve limiting factors such as timely patient evaluation, lab results, and dose preparation. The objective of this study was to benchmark FN patients that receive TTA < 1 hour and identify opportunities for improvement at our facility. This single center retrospective cohort study was approved by the Marshall University Institutional Review Board. The inclusion criteria were as follows: patients that presented to Cabell Huntington Hospitalâ€™s emergency department (ED) or were directly admitted, had an established hematologic or oncologic diagnosis, and received IV antibiotics for new onset FN between September 1, 2019 and August 31, 2023. Patients with a new hematologic or oncologic diagnosis after admission, received IV antibiotics at an outside facility within 24 hours, and/or developed FN in the hospital were excluded. The primary outcome was the percentage of patients receiving antibiotics within 1 hour of presentation. Secondary outcomes compare antibiotic administration within 1 hour between pediatric and adult patients, appropriateness of empiric antibiotic use, and the association between TTA > 1 hour and impact on length of stay, time to FN resolution, duration of antibiotics, use of myeloid growth factors, and/or need for increased level of care. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review Infectious Diseases Society of America and American Society of Clinical Oncology guidelines relating to febrile neutropenia.

Identify antibiotics appropriate for empiric therapy.

Self Assessment Questions:

Per American Society of Clinical Oncology guidelines, when should pediatric patients presenting to the ED with febrile neutropenia receive antibiotics?

A. Within 60 minutes of arrival

B. Within 90 minutes of arrival

C. Within 120 minutes of arrival

D. Within 150 minutes of arrival

Which of the following would not be an appropriate empiric agent to initiate in a patient who presents with febrile neutropenia?

A. Cefepime

B. Meropenem

C. Piperacillin/tazobactam

D. Ertapenem

Q1 Answer: A Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-716-L01-P

Impact of Pharmacist Management of Continuous Glucose Monitors on Diabetes Outcomes

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Purpose: Continuous glucose monitors (CGMs) provide a plethora of information to optimize diabetes management; however, several barriers have slowed the integration of CGMs into clinical practice. Evidence shows that involving pharmacists in the management of diabetes in patients utilizing a CGM has positive impacts on diabetes control. There is limited evidence directly comparing diabetes outcomes of patients with CGMs managed by pharmacists versus non-pharmacist providers. The goal of this study is to assess the impact of pharmacist management of CGMs on diabetes outcomes, compared to non-pharmacist providers.

Methods: This is a retrospective study of patients ages 18 to 89 years old with diabetes and a baseline hemoglobin A1c (HbA1c) of 8% or higher. Patients must have their diabetes managed by a Community Health Network provider and have been initiated on a Freestyle Libre or Dexcom CGM between July 1, 2022 and June 30, 2023. The primary objective is to compare the change in HbA1c after 1 year of CGM use in patients with diabetes who are managed by a pharmacist versus patients who are managed by a non-pharmacist provider. The secondary objectives are to compare the time to HbA1c less than 8%, the percentage of patients with an HbA1c less than 8% after one year of CGM use, the number of diabetes medications, the number of diabetes medication changes, the types of diabetes medication changes, and the number of diabetes appointments in patients using a CGM who are managed by a pharmacist versus patients using a CGM who are managed by a non-pharmacist provider. Baseline demographics and study results will be evaluated using descriptive statistics. Parametric study results will be assessed using a t-test and nonparametric study results will be assessed using a Mann-Whitney U test.

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

Learning Objectives:

Identify potential barriers to incorporating continuous glucose monitors (CGMs) into clinical practice.

Describe the benefit of pharmacist involvement in managing patients' CGMs.

Self Assessment Questions:

Which of the following is NOT a potential barrier to the integration of continuous glucose monitors (CGMs) into clinical practice?

A. High patient demand for CGM technology

B. Insurance coverage of CGM technology

C. Lack of provider confidence with use of CGM technology

D. Time constraints to download and review CGM data

Which of the following is considered a benefit of pharmacist involvement in managing patientsâ€™ CGMs?

A. 24-hour availability for assessment of CGM data

B. Closer follow-up for medication adjustments based on CGM data

C. Eliminating the need for patients to see their PCP for diabetes management

D. Use of CGM data to diagnose diabetes complications

Q1 Answer: A Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-709-L01-P

Optimizing the Process for Turning Unused Oncology Medications into Second Chances

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In Michigan, YesRx, a nonprofit organization, was started to facilitate the donation of cancer medications to patients in need. The University of Michigan Healthâ€“Sparrow Herbert-Herman Cancer Center (UM Health-Sparrow HHCC) is licensed as a partial cancer drug repository (CDR) and has collaborated with YesRx, in the donation of oncology medications since November 2023. The purpose of this quality improvement initiative is to optimize the CDR donation process and awareness at UM Healthâ€“Sparrow HHCC and ultimately maximize engagement in the YesRx statewide CDR network.

The primary objective of this quality improvement project is to optimize the CDR process at the UM Healthâ€“Sparrow HHCC for donating unused oncology and supportive care medications.

The secondary objectives include raising patient awareness of UM Health-Sparrow HHCCâ€™s CDR through routine patient education, placement of flyers and posters throughout the clinic, and a one-month dedicated oncology medication take-back campaign at the clinic. Data will be collected retrospectively from medications donated since UM Health-Sparrow HHCC obtained its partial CDR license in November 2023, which includes date of donation, medication details (name, strength, dosage form, quantity, lot number, National Drug Code (NDC), expiration date), average wholesale price, and reason for excluding ineligible medications for donation. Prospectively, data will be collected from medications donated during a newly established take-back campaign at UM Healthâ€“Sparrow HHCC, and a survey to obtain donor feedback will be offered to assess their satisfaction with the donation process. This prospective data will include the same aforementioned medication details, with the addition of donor survey responses, patient demographics, cancer diagnosis, cancer stage, and reasons for donation. Data will be further analyzed to assess if there is any difference in donations received between patients with early vs. advanced-stage cancer.

Learning Objectives:

Describe the financial toxicities associated with cancer treatments and their impact on patient care

Explain the process for donating and receiving eligible, unused cancer medications through Cancer Drug Repositories

Self Assessment Questions:

Which of the following statements about CDRs is correct?

A. Any type of CDR license can accept, store, and dispense donated cancer and supportive care medications.

B. CDRs are federally operated programs that allow for nationwide donation and dispensing of cancer medications.

C. Only low-income patients are eligible to receive medications through CDRs.

D. CDRs aim to reduce waste and increase access to cancer and supportive care medications.

You are the pharmacist leading a Cancer Medication Take Back event at your facility. Several patients come up to the table to donate their unused cancer and supportive care medications. Which of the following would be acceptable for donation to a CDR?

A. An unopened and untampered bottle of controlled IV pain medication.

B. A partially used antiemetic blister pack with an intact label, expiration date of 12 months, and with the remaining tablets untampered.

C. An untampered and unused bottle of abiraterone previously dispensed by another CDR, with an intact label and within the expiration date.

D. A 16-year-old female donating several unused, untampered packages of venetoclax on behalf of her mother, who has just been placed in hospice care.

Q1 Answer: D Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-839-L99-P

Immunosuppressant Level Fluctuations: A Potential Surrogate Marker of Adherence

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Purpose: Tacrolimus has long been established as a cornerstone of maintenance immunosuppressive therapy for transplantation, significantly reducing 1-year acute rejection rates and improving long-term graft survival. Over the past decade, the measurement of intrapatient variability (IPV) in tacrolimus levels has been utilized as a predictive marker for the development of acute rejection, graft function, and graft loss. The purpose of this study is to assess if variation in immunosuppressant (IS) levels correlate with graft outcomes, as they could indicate noncompliance. This study would also aid in determining the threshold of fluctuation at which IPV becomes significant, which would enable the identification of high-risk patients.
Methods: This will be a retrospective cohort study of patients across Indiana University Health who underwent kidney alone transplants between January 1st, 2022, to September 30th, 2023, maintained on tacrolimus. Exclusion criteria included patients have been re-transplanted or who have received simultaneous pancreas kidney, pancreas after kidney transplant, liver, and kidney transplants, and inpatient tacrolimus levels. The primary outcome is to determine if there is a correlation between IS level fluctuations and graft outcomes - specifically graft loss, patient death, and development of de-novo DSAs which may imply noncompliance. If a correlation is identified, the degree of fluctuation that becomes significant for identifying high-risk patients will be determined. Secondary outcomes are incidence of rejection and change in GFR, based on degree of IS level fluctuation. 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 Fisherâ€™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:

Discuss a comprehensive understanding of the pharmacokinetic properties of tacrolimus and their relationship to intra-patient variability (IPV).

Explain the available data to draw conclusions on tacrolimus IPV and its implications for predicting acute rejection, graft function, and graft loss in solid organ transplants.

Self Assessment Questions:

Which statement best explains how tacrolimus pharmacokinetics contribute to intra-patient variability in transplant therapy?

A. Tacrolimus has a wide therapeutic window, with consistent absorption and metabolism, resulting in low intra-patient variability.

B. Tacrolimus is rapidly excreted by the kidneys, and its short half-life requires frequent dosing, leading to high intra-patient variability.

C. Tacrolimus is metabolized by CYP3A4 enzymes, and its variable absorption and narrow therapeutic window contribute to significant intra-patient variability, impacting graft outcomes.

D. Tacrolimus is primarily given intravenously, with stable plasma levels minimizing intra-patient variability and ensuring consistent graft function.

How does intra-patient variability (IPV) of tacrolimus impact the prediction of acute rejection, graft function, and graft loss in solid organ transplantation?

A. High IPV in tacrolimus levels is associated with increased risk of acute rejection and poor graft outcomes.

B. Low IPV in tacrolimus levels correlates with reduced risk of graft loss and stable graft function.

C. IPV in tacrolimus has minimal impact on predicting graft outcomes or rejection risk.

D. Tacrolimus IPV does not affect long-term graft survival but has no significant role in predicting acute rejection.

Q1 Answer: C Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-524-L01-P

3-Factor Prothrombin Complex Concentrate vs 4-Factor Prothrombin Complex Concentrate for the Reversal of Oral Factor Xa Inhibitors

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Purpose: The increasing use of oral factor Xa inhibitors has brought forth the need for an effective reversal strategy in the setting of life-threatening bleeding complications, like intracerebral hemorrhage (ICH). The efficacy of prothrombin complex concentrate (PCC) to reverse the effects of oral factor Xa inhibitor-associated ICH has been shown, but there is little clinical data comparing the efficacy of three factor (3F) and four factor (4F) PCC. The purpose of this study is to evaluate and compare the hemostatic efficacy and safety of 3F-PCC and 4F-PCC in the treatment of ICH.

Methods: This was a retrospective cohort study of all patients across Indiana University Health who presented with an oral factor Xa inhibitor-associated ICH between January 1, 2019, and January 1, 2024. Patients were included if they received 3F-PCC or 4F-PCC. Patients were excluded if they had a Glascow Coma Scale (GCS) score less than 7, underwent surgery within 12 hours of admission, or had a thrombotic event within two weeks prior to the index event. The primary outcome was hemostatic efficacy, which was defined by the composite of three factors: change in hematoma volume of 20% or less (excellent) or 35% or less (good), decrease in the GCS score of greater than 2 points at 12 hours, and the absence of additional rescue therapies (PCC or surgery) within 3 â€“ 12 hours after presentation. Secondary outcomes included hospital and ICU lengths of stay, hospital mortality, and thromboembolic events during admission.

Results and Conclusion: Data collection and analysis are currently in progress. Results and conclusions will be presented at the 2025 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify guideline-recommended and alternative reversal strategies for oral factor Xa inhibitors.

Discuss the existing data comparing the hemostatic efficacy of 3F-PCC and 4F-PCC in ICH associated with the use of oral factor Xa inhibitors.

Self Assessment Questions:

Which of the following are guideline-recommended reversal agents for oral factor Xa inhibitors?

A. Andexanet alfa

B. 3-factor prothrombin complex concentrate (3F-PCC)

C. 4-factor prothrombin complex concentrate (4F-PCC)

D. Both A and C

Based on past prospective and retrospective studies, which of the following statements accurately reflects the effectiveness of 3F-PCC in comparison to 4F-PCC for reversing the effects of oral factor Xa inhibitors?

A. 4F-PCC is more effective than 3F-PCC in reversing the effects of oral factor Xa inhibitors.

B. Neither 3F-PCC nor 4F-PCC was effective in reversing the effects of oral factor Xa inhibitors.

C. 3F-PCC demonstrated similar outcomes to 4F-PCC and should be considered a viable option to reversing oral factor Xa-associated bleeding.

D. Fresh frozen plasma (FFP) should be administered in place of 3F-PCC and 4F-PCC to reverse factor Xa-associated bleeding.

Q1 Answer: D Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-696-L01-P

Evaluating Efficacy of a Pharmacist-Driven 48-Hour Broad-Spectrum Antibiotic De-escalation Process

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Overuse of broad-spectrum antibiotics can lead to emergence of multi-drug resistant organisms. Pharmacists play a critical role in practicing antimicrobial stewardship by making recommendations for antibiotic de-escalations. In 2023, Columbus Regional Health (CRH) implemented a pharmacist-driven process to aid in reducing the usage of certain broad-spectrum antibiotics. This study will evaluate the extent that this process has decreased specific broad-spectrum antibiotic usage at Columbus Regional Health (CRH), and analyze specific factors that may be contributory for higher success rates when proposing de-escalation interventions in order to seek potential opportunities for improvement to strengthen the antimicrobial stewardship at this facility. The de-escalation process works by sending a notification for consult to the pharmacists whenever a patient has been on one of three antibiotics: cefepime, piperacillin/tazobactam, or meropenem, for 48 hours or more. Pharmacists then clinically evaluate the patient and determine if a de-escalation recommendation can be made based on the patientâ€™s diagnosis, clinical status, and culture results. To evaluate the efficacy of this protocol, this study will compare de-escalations from when the process was first implemented in November 2023 to de-escalations a year out from implementation. Patients that received an initial dose of one of the aforementioned antibiotics but not continued on it will be excluded from the study. This study compares initial and year post-implementation percentages of broad-spectrum antibiotic orders that were discontinued before 48 hours, discontinued after a pharmacist recommendation, and those that were continued past the 48-hour mark even with a pharmacist recommendation for de-escalation. When applicable, de-escalations are further categorized by why continuation of broad-spectrum antibiotics was warranted, why a recommendation for de-escalation was denied by the provider, and what specific type of intervention for de-escalation was completed. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the pharmacist's role in promoting antimicrobial stewardship.

Identify the benefits of reducing the usage of broad-spectrum antibiotics.

Self Assessment Questions:

Which of the following is a potential recommendation for antimicrobial stewardship that a pharmacist should make?

A. Choose the most narrow-spectrum agent that is sensitive on a culture and reasonable for source of infection

B. Always use IV antibiotics for the full duration of inpatient stays

C. Treat all infections for at least 7 days to ensure eradication of the pathogen

D. Recommend against de-escalation if we do not have culture results available

Which of the following can be a result of the usage of broad-spectrum antibiotics?

A. Lower incidences of C. difficile infections

B. Development of antimicrobial resistance

C. Duration of treatment can be shorter than with narrow-spectrum agents

D. Duration of treatment can be longer than with narrow-spectrum agents

Q1 Answer: A Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-698-L01-P

Evaluation of a Beta-Lactam Allergy on Antibiotic Selection at Bronson Methodist Hospital: A Three Step Intervention

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Purpose

Beta-lactam antibiotic allergies are reported in approximately 10% of people in the United States. However, the incidence of IgE-mediated reactions are predicted to be much lower. Documentation of medication allergies in the electronic medical record (EMR) has historically lacked specific details relating to the severity of the reaction. When vague documentation of antibiotic allergies occurs, it can lead to a suboptimal choice of antibiotics to treat infections. This is evident in the antibiotic choice for surgical site infections (SSI). SSI account for a significant number of healthcare-associated infections. Compared to first line antibiotics for SSI prophylaxis, second line antibiotics have been proven to have increased rates of post-surgical infections. The aim of this study is to analyze antibiotic prescribing of surgical prophylaxis antibiotics in those with a listed penicillin allergy after several interventions from this healthcare systemâ€™s antimicrobial stewardship program. These interventions include an enhanced EMR antibiotic reporting, implementation of a cefazolin graded challenge, and implementation of an R-group allergy chart for beta-lactams.

Methods

In this retrospective cohort, we evaluated patients at Bronson Healthcare Group who received antibiotics for surgical prophylaxis from January 1, 2015, to June 30, 2024. Eligible patients were adults who had an intravenous prophylactic antibiotic prescribed pre-surgery and had a beta-lactam allergy documented. Patients were excluded if they had a pre-existing infection requiring antibiotic treatment, no allergy listed, or no detailed intraoperative antibiotic data. The primary endpoint is the change in surgical antibiotic prescribing after two phases of antimicrobial stewardship interventions. Secondary endpoints include difference in prescribing after each intervention individually, National Healthcare Safety Network (NHSN) reported infection rates, prescribing differences based on the specific allergy listed, and prescribing differences based on surgery type.

Results/Conclusion

Data analysis is currently being performed. Results and conclusions will be presented at the 2025 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the recommended first- and second-line antibiotics for surgical prophylaxis.

Describe cefazolin's utility for surgical prophylaxis in patients with a documented beta-lactam allergy.

Self Assessment Questions:

MW is a 50-year-old male that presents for a total knee arthroplasty. MW has a listed allergy of â€œrashâ€ for both penicillin and ceftriaxone. The surgeon calls you and asks what surgical prophylactic antibiotic you would recommend. Based on the available information, which of the following is the best choice for surgical prophylaxis in this patient?

A. Clindamycin

B. Levofloxacin

C. Cefazolin

D. Vancomycin

What most determines cross reactivity amongst beta-lactam antibiotic allergies?

A. Core beta-lactam ring

B. R1-group side chain

C. Antibiotic generation

D. Antibiotic class

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-572-L01-P

Utilization of Long-Acting Inhalers in Patients Hospitalized with an Acute COPD Exacerbation

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Purpose: To determine the difference in hospital length of stay (LOS) between patients with Chronic Obstructive Lung Disease (COPD) who did or did not receive long-acting bronchodilators (LABD) while hospitalized.

Methods: This is a single-centered retrospective chart review of 126 patients from August 2022 to November 2024. Inclusion criteria are adults over 40 years old with an established diagnosis of COPD and primary admission diagnosis of COPD exacerbation confirmed with discharge diagnosis. Key exclusion criteria are patients with a LOS less than 1 day or requiring mechanical ventilation the first day of admission. The treatment group will consist of patients who received LABD and short-acting bronchodilator therapies (SABD) throughout their admission. The control group will consist of patients only given SABD. The primary outcome is the difference in LOS between groups. Key secondary outcomes are the amount of SABD doses, oral steroid therapy, re-admission 30 days from discharge, and 90-day dispense history to assess adherence. Statistical analyses of study endpoints will be assessed descriptive and inferential statistics using R software.

Results: Data from 126 patients, (n= 63 in each group), showed a mean LOS in days of 5.27 + 3.28 versus 4.19 + 2.33 (p-value: 0.035). Mean doses of SABD administered throughout the hospitalization were 10.83 + 12.34 versus 9.08 + 9.22, and oral steroids measured in days administered were 3.98 + 1.89 versus 3.52 + 1.48.

Conclusion: Patients who received LABD throughout their admission had a longer mean LOS. Additionally, patients who received LABD also received more SABD doses and oral steroid therapy. Initiating LABD in patients hospitalized for a COPD exacerbation did not decrease LOS.

Learning Objectives:

Discuss long-acting bronchodilators place in therapy for patients with COPD.

Classify medications used for inpatient versus outpatient management of COPD exacerbations.

Self Assessment Questions:

A COPD patient is being discharged from the hospital and never started on any inhaler therapy, which medication component should you recommend based on the 2024 GOLD Guidelines?

A. Short-acting beta agonist (SABA)

B. Short-acting muscarinic antagonist (SAMA)

C. Inhaled corticosteroid (ICS)

D. Long-acting beta agonist (LABA) and Long-acting muscarinic antagonist (LAMA)

After a hospitalization for a COPD exacerbation, which medication should be continued?

A. Oral corticosteroids

B. Long-acting bronchodilators

C. Antibiotic therapy

D. Short acting bronchodilators

Q1 Answer: D Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-574-L01-P

Evaluation of Phenobarbital Loading Dose Strategies for Moderate-Severe Alcohol Withdrawal Management

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Purpose: Each year, approximately 8 million people are affected by alcohol use disorder, with up to 50% experiencing alcohol withdrawal syndrome (AWS). AWS can cause severe symptoms, including potentially life-threatening seizures. Phenobarbital (PHB) is commonly used to treat AWS due to its ability to enhance GABA activity and decrease glutamate. The Detroit Medical Center implemented a PBH protocol for moderate-severe AWS, recommending 5-10 mg/kg ideal body weight front-load dosing. Some providers still utilize low intermittent dosing due to quick administration with fewer adversities. The purpose of this study is to evaluate appropriate PHB dosing strategies. Methods: This retrospective cohort study investigates adult patients admitted to the emergency department with moderate-severe alcohol withdrawal syndrome (defined as Richmond Agitation-Sedation Scale (RASS) of +2 to +4) who received PHB from January 1st, 2022 through August 1st, 2024. The primary outcome is symptom resolution (defined as RASS of -1 to +1 without additional rescue doses). Secondary outcomes included the need for rescue doses, intensive care unit (ICU) admission, hospital length of stay, time to order verification and administration and safety outcomes such as hypotension, hallucinations or respiratory depression.
Preliminary Results: 50 patients were included, 34 in the front-loading PBH group and 14 in the low-intermittent PBH group. The front-loading group demonstrated a higher rate of symptom resolution without need for rescue therapy (61% vs 25%). The average length of stay (6.1 days vs 6.7 days) and ICU admission (22% vs 17%) were similar among groups. The average time between PBH order and administration was longer in the front-loading PHB group (47 minutes vs 30 minutes). Safety outcomes were infrequent in both groups (16% vs 8%). Conclusion: The preliminary results demonstrate PHB front-load dosing strategy is a potential safe and effective strategy for patients with moderate-severe AWS. Final results will be presented at the GLPRC.

Learning Objectives:
Review the mechanism and literature regarding phenobarbital loading dose strategies
Identify the optimal phenobarbital dosing strategy to treat moderate-severe alcohol withdrawal syndrome
Self Assessment Questions:
Which of the following is considered a severe symptom of alcohol withdrawal syndrome?
A. Seizures
B. Thrombosis
C. Hypotension
D. Respiratory depression
What phenobarbital dose (mg/kg) is associated with toxicity?
A. 10 mg/kg
B. 5 mg/kg
C. 25 mg/kg
D. 40 mg/kg
Q1 Answer: A Q2 Answer: D
APCE Universal Activity Number 0121-9999-25-529-L01-P

Evaluation of Euglycemic Diabetic Ketoacidosis in Patients Using Sodium-glucose Cotransporter-2 Inhibitors
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Background: Euglycemic diabetic ketoacidosis (eDKA) is a serious and under-recognized complication of diabetes, characterized by ketoacidosis with near-normal glucose levels (<200 mg/dL). Known triggers of eDKA include fasting, illness, reduced carbohydrate intake, and certain medications including SGLT2 inhibitors. The increasing use of SGLT2i has contributed to a rise in eDKA cases, necessitating improved clinical awareness. This study aims to describe the clinical characteristics, treatment, and outcomes of eDKA in SGLT2i users at the University of Illinois Hospital (UIH).
Methods: A retrospective, descriptive case series analyzed patients with eDKA on SGLT2i from January 2021 to June 2024 at UIH. Data was collected from electronic medical records in EPIC. Patients â‰¥18 years old, prescribed an SGLT2i at diagnosis, and met laboratory criteria for a conservative definition of eDKA were included in the study. Laboratory evidence of eDKA was defined as beta-hydroxybutyrate â‰¥1.0 mmol/L or bicarbonate â‰¤23 mmol/L with blood glucose â‰¤300 mmol/L. Data collection includes patient demographics, past medical history, prior to admission medications, baseline labs, and treatment of eDKA. Patients were followed for six months post-diagnosis to evaluate recurrence, recovery, and medication changes.
Results: 28 patients were identified out of 304 who were screened. The mean bicarbonate level at presentation was 17.4 mmol/L (SD 4.3 mmol/L), mean beta-hydroxybutyrate level was 4.1 mmol/L (SD 2.5 mmol/L), and the mean blood glucose level was 175 mmol/L (SD 59 mmol/L). Urine ketones were positive in 75% (21) of patients. Following treatment, 11% (3) had SGLT2i listed as an allergy. Further results are upcoming.
Conclusions: The findings highlight the diagnostic and management challenges of eDKA in SGLT2i users. Most patients presented with significant ketosis and acidemia despite near-normal glucose levels, emphasizing the need for early recognition. Ongoing analysis will help clarify what management strategies that have been used to mitigate the risks associated with eDKA.

Learning Objectives:

Describe the clinical presentation of euglycemic diabetic ketoacidosis (eDKA)

List the common triggers and laboratory findings associated with eDKA

Self Assessment Questions:

Which of the following best describes the distinguishing feature of euglycemic diabetic ketoacidosis (eDKA) compared to typical diabetic ketoacidosis (DKA)?

A. eDKA presents with glucose levels >300 mg/dL

B. eDKA presents with near-normal glucose levels (<200 mg/dL)

C. eDKA does not involve ketosis

D. eDKA only occurs in type 1 diabetes

Which of the following are common triggers for euglycemic diabetic ketoacidosis (eDKA)?

A. Fasting, illness, reduced carbohydrate intake, and SGLT2 inhibitors

B. High-fat diet, exercise, and elevated glucose levels

C. Insulin overdose, infection, and carbohydrate loading

D. Alcohol use, insulin overdose, and hyperglycemia

Q1 Answer: B Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-634-L01-P

Navigating the GLP-1/GIP Shortage: Consequences for Insulin Management, Glycemic Control, and Adherence in Patients with Type 2 Diabetes

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Purpose: In recent years, glucagon-like peptide-1 agonists (GLP-1) and glucose-dependent insulinotropic polypeptides (GIP) medications have become highly utilized for indications such as Type 2 Diabetes Mellitus (T2DM) and weight loss. For patients with T2DM, these medications can significantly reduce hemoglobin A1c and insulin requirements. The recent popularity of GLP-1/GIPs has led to shortages and limited access, leading to frustration of patients and healthcare providers. It is unclear if these shortages have an impact on clinical outcomes over time. This study will evaluate if GLP-1/GIP shortages and patient adherence impact changes in A1c and insulin requirements over a 6-month period. Methods: This is a single-center, retrospective study that will be conducted among two outpatient clinics associated with Ascension Genesys Hospital. This study will include patients 18 years or older with insulin-dependent T2DM who filled a new prescription for VictozaÂ®, OzempicÂ®, RybelsusÂ®, TrulicityÂ®, or MounjaroÂ® between January 2024 through June 2024. Patients with unretrievable prescription fill data or Type 1 Diabetes Mellitus will be excluded. Patients will also be excluded if they are prescribed a GLP-1/GIP for less than 6 months or are deemed non-persistent (defined as a gap in fills greater than twice the prescription days-supply). The primary outcome will assess change in baseline A1c after 6 months. Secondary outcomes change in total daily dose (TDD) of insulin, the number of switches between different GLP-1/GIP agents, and if deprescribing of sulfonylureas occurred. Results/Conclusions: Data collection and analysis is currently in progress. Final results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review previous literature assessing the impact of GLP-1 medications on insulin deprescribing.

Define the proportion of days covered (PDC) adherence measure used in this study.

Self Assessment Questions:

Which of the following GLP-1/GIP medication(s) were not included in the George et al. study?

A. Dulaglutide

B. Semaglutide

C. Tirzepatide

D. Both B and C

What proportion of days covered (PDC) is widely accepted as a measure of adherence in previous literature?

A. 0.5

B. 0.95

C. 0.8

D. There is no standard

Q1 Answer: D Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-587-L01-P

Effect of inpatient medicated assisted recovery consult service on re-presentation rates for patients with opioid use disorder

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As of 2023, it is estimated that 8.9 million people in the United States have opioid use disorder (OUD). Despite the availability of effective therapies, only 1 in 5 adults with opioid use disorder receive medications for opioid use disorder (MOUD). In an effort or address barriers to treating patients with OUD, UI Health introduced the OUD medication-assisted recovery (MAR) consult service in July, 2022. This pharmacist-led service assists with OUD management, including MOUD initiation, rotation, titration, patient counseling, and coordination of care. This retrospective-cohort study aims to evaluate the impact of the OUD MAR consult service of the rate or re-presentation for patients with OUD by evaluating the primary outcome of percent of patients who re-present within 90 days of discharge (ED visit or hospitalization). Secondary outcomes will include 30, 60, and 180-day re-presentation rates, proportion of patients attending outpatient follow-up visits and remaining on MOUD, and analysis of outcomes by OUD treatment. Data will be collected retrospectively via review of electronic medical records dated from 7/1/2023 to 6/30/2024. Patients will be screened for eligibility based on presence of an active problem list including OUD and presence of at least one inpatient encounter during the study period. Demographic data will be analyzed using descriptive statistics. The primary and secondary endpoint of the two groups (MAR consult and non-MAR consult) will be compared. Categorical variables will be compared using a chi-squared test. Continuous variables will be compared using a student t-test or a Mann â€“ Whittney U test. 388 patients who received a MAR consult and 244 patients who did not receive a MAR consult were identified for inclusion. Preliminary data indicates 41.1% of patients who received a MAR consult and 57.7% of patients who did not receive a MAR consult re-presented within 90 days of discharge.

Learning Objectives:

Identify the role of the pharmacist in overcoming barriers to MOUD access and improving care outcomes for patients with opioid use disorder.

Review retrospective study data to evaluate the effectiveness of a pharmacist-led OUD MAR inpatient consult service on patient re-presentation rates and continuity of care.

Self Assessment Questions:

What are some of the barriers to treatment that patients with OUD face?

A. Social Stigma

B. Medication Access

C. Lack of provider familiarity with MOUD

D. All of the Above

After reviewing the results, do you think that the pharmacist â€“ lead OUD MAR inpatient consult service improves patient care?

A. Yes

B. Yes with reservations

C. No

D. More information needed

Q1 Answer: D Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-852-L08-P

Primed and Ready: Closing the Loop with Circle Priming

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Overview and background: At University Hospitals Rainbow Babies and Children's Hospital (UH RBC), NIOSH 1 antineoplastic intravenous (IV) infusion preparations are pre-primed with sodium chloride 0.9% unless stated otherwise. The sodium chloride 0.9% pre-primed in the line is administered to the patient at the time of chemotherapy administration which presents challenges to patients with fluid restrictions and requires extended infusion times. In the event of a spill or disconnect, the exact amount of antineoplastic medication administered is also unknown due to the varying amounts of fluid in the line. An alternative is to utilize circle priming for priming the IV line. Circle priming is a closed-system process where the antineoplastic medication is primed using the medication inside the bag during preparation and eliminates the need to use sodium chloride 0.9%. However, there is limited data to support the safety of circle priming. The purpose of this study is to assess nursing comfort and safety with circle priming.

Methods: A quasi-experimental, pre-post test, mixed methods study will be conducted from December 2024 to March 2025. The study will include nursing staff that receive circle priming training within the UH RBC Hematology and Oncology department. The study will exclude nursing staff directly involved in conducting circle priming education and training. It is estimated that 25 nurses will meet inclusion criteria.

The primary outcome of this study is nursing comfort level with antineoplastic administration. Data will be collected utilizing a voluntary and anonymous baseline survey. After circle priming go-live, a similar survey will be administered to reassess. The secondary outcome of this study is the level of antineoplastic exposure with circle priming utilizing hazardous drug surface testing to detect methotrexate pre and post circle priming go-live.

Results/Conclusion: Data analysis is ongoing, and results/conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Define circle priming

Identify areas that can be assessed to evaluate nurse comfort and safety with circle priming implementation

Self Assessment Questions:

Which of the following best defines the process of circle priming?

A. A method of priming medication tubing using only saline

B. A process of priming medication tubing by utilizing fluid from the IV bag in a closed system rather than using additional, pre-primed compatible fluid

C. A technique for flushing medication tubing with sterile water before administering medication

D. A method of preparing medication tubing that involves using an open system and additional fluid sources

Which of the following cannot be used to evaluate nurse comfort and safety with circle priming?

A. Safety Reports

B. Surveys

C. Antineoplastic Exposure

D. Patient Satisfaction Surveys

Q1 Answer: B Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-763-L04-P

Assessing Medication for Opioid Use Disorder Prescribing Barriers in an Urban, Safety-Net, Academic Medical Center Emergency Department

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Purpose: Patients with opioid use disorder (OUD) may face a wide range of barriers regarding medications for opioid use disorder (MOUD) and treatment engagement, such as language differences, medication costs and/or lack of insurance coverage, housing insecurity, health illiteracy, and stigma. The purpose of this research was to identify and assess MOUD prescribing barriers in the emergency department (ED). Methods: This study had a mixed-methods design, consisting of retrospective data collection and prospective survey administration. Retrospective data collection was designed to compare prescriber and patient characteristics for ED encounters that did and did not result in an MOUD prescription. Patients were included if they were at least 18 years old and had an OUD-related diagnosis code applied to an ED visit between January 1, 2024, and June 30, 2024. Patients were excluded if they were already prescribed MOUD, established in an opioid treatment program, hospitalized, or incarcerated. Prospective patient surveys were designed to assess patient attitudes towards treatment and identify actual and perceived barriers to treatment. Patients were eligible for survey participation if they were at least 18 years old, had OUD, and were in the ED during the time of data collection. Patients who were incarcerated were excluded. Prospective provider surveys were designed to assess provider knowledge and comfort with prescribing MOUD for ED patients and identify prescribing barriers. Providers were eligible for survey participation if they practiced in the ED and were able to prescribe controlled substances under a valid DEA number. Initial survey results were used to create formal pharmacist-led departmental education for all ED providers. An identical post-survey was distributed to the provider group to assess changes in knowledge and comfort following pharmacist-led education and to inform the need for further education. Results/Conclusions: Final results to be presented at the 2025 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify social determinants of health (SDOH) factors and how they can pose barriers to patients seeking treatment with MOUD.

Recognize the importance of ED-initiated buprenorphine and its impact on OUD treatment engagement and illicit opioid use.

Self Assessment Questions:

Which of the following is a SDOH barrier that may prevent patients from receiving MOUD?

A. Housing insecurity

B. Primary language other than English

C. Lack of insurance

D. All of the above

Patients with OUD who are started on buprenorphine in the ED have _ rates of treatment engagement and _ self-reported days of opioid use compared to those who are referred to outside treatment facilities for treatment.

A. Higher; more

B. Higher; fewer

C. Lower; more

D. Lower; fewer

Q1 Answer: D Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-510-L08-P

Enhancing Medication Reconciliation: Automating Profile Review with Language Models

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Medication reconciliation is crucial for patient safety, aiming to prevent medication errors that contribute to adverse events and increased healthcare utilization. However, this process is time-consuming and prone to inconsistencies due to factors like varying documentation practices and the lack of standardized workflows. The purpose of this research is to integrate large language models (LLMs) into the profile review process of medication reconciliation, automating a time-consuming part of the workflow that can improve patient care.â€¯â€¯

This study will utilize OpenAIâ€™s GPT-4o model to automate medication information extraction from EHRs. A model will access and process medication data from disparate sources within the EHR, including medication orders, dispense history, and physician notes. This automated extraction will be compared to a manual review of the same data, where a pharmacist compiles the medication list by reviewing the same sources of information. This is a retrospective chart review of 100 patients admitted to the adult Surgical Intensive Care Unit and adult general care unit between January 1st, 2024 and September 1st, 2024 will be conducted.â€¯

The primary outcome is to assess the accuracy of the LLM in extracting medication information compared to the manual process. Accuracy will be measured by precision, recall, and F1 score for the following medication attributes: medication name, dosage form, strength, frequency, and route of administration. Secondary outcomes include evaluating of the limitations of LLMs. Final results will be presented at GLPRC.

This study will provide valuable insights into the feasibility and potential benefits of using LLMs to enhance medication reconciliation. By automating the time-consuming task of profile review, LLMs could improve the efficiency and accuracy of this critical process, leading to better patient care and optimized pharmacy workflows.â€¯

Learning Objectives:

Recognize the need for a better system for medication reconciliations among health systems

Describe the use of OpenAI in automating the workup process of medication reconciliation

Self Assessment Questions:

What is true about medication reconciliations in the health system setting?

A. Medication reconciliation does not contribute to the safety of the patient

B. There is a lack of standardization with medication reconciliations across different health systems in the US

C. Medication reconciliations is often a very quick process

D. Medication reconciliation does not help prevent medication errors and adverse events

What process is essential for the pharmacists to conduct with the integration of automating patient profile review?

A. Going through all the patientâ€™s dispense history to match with current inpatient medications

B. Looking over notes from the physician at every outpatient care visit

C. Conducting the interview with the patient or caregiver

D. Pulling medication information from the patientâ€™s current orders

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-762-L04-P

Outcomes Following a Transitions of Care Pharmacy Program Expansion

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Statement of Purpose:

The purpose of this study is to evaluate the impact of an expansion of a transitions of care (TOC) pharmacy program on 30-day hospital readmissions, rates of discharge medication reviews, medication safety event reporting, patient satisfaction, prescription bedside delivery service enrollment, and outpatient prescription volume at a large community hospital. Overall, this study was conducted to evaluate the benefits of TOC pharmacist program expansion on potential reduction in hospital readmission rates.

Statement of methods used:

This was a single center, pre-post-intervention cohort study at a large community hospital. The pre-implementation period was August 15, 2022, to February 15, 2023, and post-implementation period from August 15, 2023, to February 15, 2024. Patients discharged from the fourth and fifth medical-surgical floors will be included during both inclusion windows. The primary outcome of this study was the difference in 30-day hospital readmission rates following expansion of TOC pharmacist services. Secondary outcomes included rates of discharge medication reviews, medication error reporting, and change in patient satisfaction scores. Additionally, a financial analysis was conducted relating to a prescription bedside delivery service, specifically with patient enrollment capture rates and prescription volume. Data collection occurred through electronic medication record event reporting for hospital readmission rates, pharmacist discharge medication review capture, medication error rates, patient satisfaction scoring and outpatient pharmacy prescription data.

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 transitions of care pharmacist as it relates to patient satisfaction scores and medication safety event reporting within a hospital system.

Discuss the measurable outcomes impacted by having a transitions of care pharmacist program within a hospital system.

Self Assessment Questions:

Transitions of Care pharmacists can help improve patient satisfaction scores for HCAHPS survey questions related to medications. Which of the following is not an HCAHPS survey question related to medication education?

A. â€œStaff told you what the medication was forâ€

B. â€œWere you given any medicine that you had not taken before?â€

C. â€œStaff described possible side effectsâ€

D. â€œUnderstood the purpose of taking medicationsâ€

Which of the following is a measurable outcome that could be impacted by having a transitions of care pharmacist?

A. Total length of stay

B. Patient disposition locationÂ

C. 30-day index readmission rates

D. 30-day mortality rates

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-788-L05-P

Extended-Interval Dosing vs Standard-Interval Dosing of Immune Checkpoint Inhibitors at a Community Outpatient Oncology Infusion Center

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Purpose: Due to the COVID-19 pandemic, clinical practice guidelines were updated to allow extended-interval dosing for immune checkpoint inhibitors (ICIs). While other studies have reviewed the effectiveness of switching dosing regimens of ICIs, the primary objective of this study was to assess safety of extended-interval dosing by comparing the rates of immune-related adverse events (irAEs) between standard and extended-interval dosing regimens of ICIs.
Methods: A single-center, retrospective cohort study was performed at a rural outpatient oncology infusion clinic in Kentucky. The study was divided into two arms: those receiving standard-interval ICI therapy and those receiving extended-interval ICI therapy. The standard-interval arm included patients who underwent treatment with nivolumab 240 mg every two weeks, pembrolizumab 200 mg every three weeks, or durvalumab 750 mg (approximately 10 mg/kg) every two weeks. The extended-interval arm included patients treated with nivolumab 480 mg every four weeks, pembrolizumab 400 mg every six weeks, or durvalumab 1500 mg every four weeks.
Results: The study included 185 patients: 121 receiving standard-interval dosing and 64 receiving extended-interval dosing. No differences in baseline patient demographics were found. Rates of irAEs were statistically higher in the standard-interval dosing arm vs the extended-interval dosing arm (30.6% vs 15.6%, p = 0.03). The standard-interval arm also had significantly more severe reactions compared to the extended-interval arm (Somersâ€™ D = -0.114, p = 0.025). Rates of irAEs were similar between dosing arms in the patients taking pembrolizumab and nivolumab (p = 0.42 and p = 0.39 respectively) but were significantly higher in those taking standard-interval dosing vs extended-interval dosing with durvalumab (p = 0.003).
Conclusion: Extended-interval dosing of ICIs resulted in significantly lower rates of irAEs and appears to be as safe as standard-interval dosing of ICIs at our rural outpatient oncology infusion center.

Learning Objectives:

Recognize immune-related adverse events (irAEs) caused by immune checkpoint inhibitor (ICI) therapy

Identify advantages of switching from standard-interval dosing to extended-interval dosing of immune checkpoint inhibitor (ICI) therapy

Self Assessment Questions:

Which of the following is an immune-related adverse effect associated with immune checkpoint inhibitor therapy?

A. Colitis

B. Nausea

C. Hyperhidrosis

D. Increased risk of infection

What is an advantage of switching a patientâ€™s immune checkpoint inhibitor (ICI) therapy from standard-interval dosing to extended-interval dosing?

A. Prevents the need for dual-ICI therapy

B. Decreases infusion chair time for patients

C. Allows for standardized dosing in lieu of AUC-based dosing

D. Decreases rates of inpatient admissions required for ICI therapy

Q1 Answer: A Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-542-L01-P

Evaluation of the Impact of Timing of Post-Operative Beta-Blocker Initiation in Cardiothoracic Surgery Patients

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Purpose: It is well documented in current literature that patients are at significantly increased risk of developing post-operative atrial fibrillation (POAF) following cardiothoracic surgery. POAF is associated with increased risk of stroke, cardiac arrest, thromboembolism, mortality, and increased hospital length of stay. To mitigate these risks, clinical practice guidelines recommend that patients, without a contraindication, receive a beta-blocker both pre- and post-operatively. There is little guidance or primary literature regarding the optimal timing of beta-blocker therapy initiation following cardiothoracic surgery. This study aims to assess if the timing of beta-blocker initiation post-operatively impacts the incidence of atrial fibrillation following cardiothoracic surgery. Methods: A retrospective cohort analysis will be performed to evaluate the impact of timing of post-operative beta-blocker initiation on POAF in cardiothoracic surgery patients. Adult patients admitted to the Bethesda North Hospital cardiovascular intensive care unit following cardiothoracic surgery requiring a full sternotomy who were started on beta-blocker therapy prior to discharge will be included. Patients with a known history of atrial fibrillation, those that underwent a Cox maze procedure, and those on antiarrhythmic therapy other than a beta-blocker prior to admission will be excluded. The primary outcome of this study is the incidence of POAF following cardiothoracic surgery. Secondary endpoints include POAF onset, length of hospital stay, cumulative beta-blocker dose, post-operative vasopressor requirement, mortality, and incidence of in-hospital stroke. Safety outcomes include hypotension requiring beta-blocker interruption or discontinuation as well as rates of bradycardia. Descriptive statistics will be used to describe the study population. Chi-square or Fisherâ€™s exact test will be utilized for nominal categorical data. Studentâ€™s t-test or Mann-Whitney U test will be utilized for continuous data depending on normality of the data. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the pathophysiology and risks associated with the development of post-operative atrial fibrillation.

Review current published literature and guidelines for the use of beta-blockers in the prevention of post-operative atrial fibrillation.

Self Assessment Questions:

The development of post-operative atrial fibrillation is associated with which of the following?

A. Stroke

B. Increased hospital length of stay

C. Mortality

D. All of the above

What is the current American Heart Association guideline recommendation on when to start beta-blocker therapy following coronary artery bypass graft surgery?

A. As soon as possible

B. Within 24 hours

C. Within 48 hours

D. Between 48 and 72 hours

Q1 Answer: D Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-678-L01-P

Assessing the Initiation, Maintenance, and Safety of Lorazepam Continuous Infusion for Alcohol Withdrawal Syndrome

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Purpose: Alcohol withdrawal syndrome (AWS) is a common occurrence in hospitalized patients who have alcohol use disorder (AUD). AWS can present as symptoms of anxiety, sleep disturbances, headache, hallucinations, and nausea/vomiting. More severe cases of AWS can result in seizures and alcohol withdrawal delirium, which can have potentially deadly consequences. Pharmacotherapy for AWS involves the use of symptom triggered dosing based on scoring determined by the Clinical Institute Withdrawal Assessment of Alcohol Scale, Revised (CIWA-Ar). Benzodiazepines are recommended as first-line therapy by the American Society of Addiction Medicine (ASAM) for AWS management in hospitalized patients. Resistant AWS can lead to high cumulative doses of lorazepam and/or other guideline recommended medications. Frequent dose triggering can lead to nursing burden and excessive need for administration of medication doses. To minimize nursing burden, lorazepam intravenous (IV) continuous infusion may be a viable treatment option and has shown efficacy for AWS. However, there is minimal guidance on initiation, titration, or incidence of adverse effects regarding lorazepam infusions. This research assessed current ordering practices and safety outcomes for lorazepam continuous infusion in the treatment of AWS at an academic medical center. Methods: A retrospective chart review was conducted to assess adult patients who received lorazepam via IV infusion for the indication of alcohol withdrawal syndrome from January, 2023 through July, 2024. Key outcomes included cumulative lorazepam-equivalent and phenobarbital doses prior to initiation of lorazepam infusion, CIWA-Ar and patient sedation scores at the start of infusion, starting rate of lorazepam infusion, recorded titration of infusion dose, and incidence of adverse events attributed to the use of lorazepam infusion. Results & Conclusions: A total of 29 lorazepam infusion initiations met inclusion criteria inclusion, with 8 (28%) infusions resulting in an adverse event. Additional results and conclusions will be presented at the 2025 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize American Society of Addiction Medicine (ASAM) guideline-recommended pharmacotherapy options for alcohol withdrawal management.

Identify the most common adverse event attributed to IV lorazepam infusion based on the results of this study.

Self Assessment Questions:

Which of the following medications/medication classes are considered â€œfirst lineâ€therapy by the ASAM Clinical Practice Guidelines on alcohol withdrawal management in hospitalized patients with no medication contraindications?

A. Carbamazepine

B. Gabapentin

C. Benzodiazepines

D. Phenobarbital

In patients who received IV lorazepam infusion and had a reported adverse event, which of the following adverse events was most commonly reported?

A. Confusion

B. Respiratory Depression

C. Propylene Glycol Toxicity

D. Paradoxical Reactions

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-600-L01-P

Risk Factors for Thromboembolic Complications after Factor Xa inhibitor Reversal

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Statement of purpose: The approval of factor Xa inhibitors (FXaI) has significantly improved the management of thromboembolic disorders due to their predictable pharmacokinetics and lack of required monitoring. Increasing use of these agents has heightened the need for effective and safe reversal strategies in cases of major bleeding or urgent surgery. Current guidelines recommend andexanet alfa (ADX) for targeted reversal of FXaI or prothrombin complex concentrate (PCC) as an alternative strategy for bleeding management. The intent of reversal to restore hemostasis in a bleeding patient must also be weighed against the risk of a thromboembolic event (TE). Reported rates of thromboembolism are approximately 10% for ADX and 6% for PCC, but data on specific risk factors for TE development remain limited. This study aimed to identify patient- and medication-related characteristics that are associated with the development of TE after FXaI reversal.

Methods: This was a retrospective, single health system cohort study using data from January 2018 to January 2024. Adult patients that received ADX or 4-factor PCC (4F-PCC) for intended FXaI reversal were included. Exclusion criteria included death or transition to comfort care within 12 hours of reversal administration. The primary outcome was to identify specific risk factors predictive of 30-day TE after FXaI reversal. Secondary outcomes included in-hospital mortality, 90-day mortality, hospital and ICU length of stay, discharge disposition, and 90-day modified Rankin scale (mRS) for patients reversed for an intracranial indication.

Summary of preliminary results:
Data collection and analysis are currently ongoing. Results will be presented at the Great Lakes Pharmacy Resident Conference in 2025.

Conclusions reached: Conclusions will be forthcoming based on results.

Learning Objectives:

Recognize risks associated with different reversal strategies

Describe the risk factors that contribute to thromboembolic events after FXaI reversal

Self Assessment Questions:

Which of the following describes the mechanism of action of andexanet alfa? (select all that apply).

A. Andexanet alfa is an exogenous factor replacement strategy that replaces factors II, VII, IX, X

B. Andexanet alfa directly binds and sequesters factor Xa inhibitors and inhibits the activity of Tissue Factor Pathway Inhibitor (TFPI), which increases tissue factor-initiated thrombin generation

C. Andexanet alfa is a factor replacement strategy that replaces factor Xa ONLY

D. Andexanet alfa is a recombinant factor VIIa, a vitamin K-dependent glycoprotein, that promotes hemostasis by activating the extrinsic pathway of the coagulation cascade

7.What is the proposed mechanism behind by which andexanet alfa may potentiate an higher thromboembolic risk?

A. Since andexanet alfa dosing is complex, patients commonly receive high doses of andexanet alfa when they are indicated for lower doses, which puts them at higher risk for thromboembolic events

B. Andexanet alfa replaces clotting factors, higher levels of these clotting factors leads to higher incidence of thromboembolic events

C. Andexanet alfa binds to tissue factor pathway inhibitor, an endogenous factor Xa inhibitor, which potentiates increased thrombin generation

D. Andexanet alfa promotes the activation of platelets leading to clot formation

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-772-L05-P

Frequency and Characteristics of Patient Information Requests Made by Community Pharmacists During the Delivery of Medication Therapy Management Services for a Self-Insured Employer.

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Medication therapy management (MTM) services aim to enhance patient safety, improve medication adherence, and support patient self-management through the identification and resolution of medication therapy problems (MTPs). However, pharmacists lack routine access to objective data (e.g., laboratory data, progress notes) to efficiently conduct MTM services. Currently, community pharmacists typically have to request patient information from a physicianâ€™s office or other medical facilities via telephone or fax. These methods are inefficient and increase workflow disruptions. Prior research has identified the need for health information exchange (HIE) (i.e., the facilitation of data sharing across multiple healthcare facilities and electronic health records (EHRs)) in community pharmacies. Integration of HIE would provide community pharmacists with objective data to streamline MTM services. In 2024, Purdue University expanded access to MTM services for all beneficiaries in collaboration with Clarest Health Network. The purpose of this project is to evaluate the frequency and characteristics of patient information requests made by community pharmacists during the delivery of MTM services for a self-insured employer.

Observational cross-sectional data will be collected using an electronic card study, in which. data collection forms take 60 seconds or less to complete. Data on patient information requests will be submitted by full-time pharmacists who are employed by an Indiana community pharmacy within the Clarest Health Network. Pharmacy managers or staff pharmacists will choose to participate in the study themselves or decline participation. Each participating pharmacy is limited to having one pharmacist submit data to prevent duplication of data submission. Pharmacists will complete 8 weeks of data collection and record characteristics of patient information requests during MTM services provided to Purdue beneficiaries. All data will be analyzed by computing descriptive statistics in SPSS.

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

Learning Objectives:

List the challenges associated with requesting patient information during medication therapy management services.

Identify the types of objective data commonly requested by community pharmacists during medication therapy management services.

Self Assessment Questions:

What is a limitation of requesting patient information by contacting a physicianâ€™s office via fax or phone during MTM services?

A. It is the most efficient method available

B. It can be time-consuming and may delay patient care

C. It ensures immediate access to patient records

D. It is the preferred method by all healthcare providers

What are common sources of objective patient information that can be used for delivering MTM services?

A. Patient self-reported symptoms and family history

B. Online health forums and patient blogs

C. Progress notes and medication lists from other healthcare facilities

D. Verbal reports from friends or caregivers

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-846-L99-P

CNS Penetration and Pharmacokinetics of Telavancin in Critically Ill Patients

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Background

Gram-positive pathogens are the primary cause of community-acquired meningitis and device-related central nervous system (CNS) infections. Telavancin, a vancomycin-derivative lipoglycopeptide, offers broad and potent coverage against Gram-positive organisms. There is a potential role for telavancin in treating Gram-positive CNS infections caused by resistant pathogens. While animal models suggest modest CNS penetration, there is a knowledge gap about telavancin's CNS penetration in humans. This study aims to evaluate the extent of CNS penetration of telavancin in critically ill patients with external ventricular drainage.

Methods

This is an on-going prospective, open-label, single cohort study to evaluate the CNS penetration and pharmacokinetics of telavancin in critically ill patients. The study targets 20 patients aged 16-85 years with placement of an external ventricular drain (EVD). Exclusion criteria included pregnancy, active or presumed infection, and baseline renal dysfunction defined by serum creatinine greater than 1.5 mg/dL. Participants received telavancin 10 mg/kg intravenously once daily for three consecutive days. Serum and cerebrospinal fluid (CSF) sampling via the EVD occurred before and after scheduled doses of telavancin to determine CNS penetration and serum pharmacokinetics. The primary endpoint was the extent of CNS penetration of telavancin defined by percent of the plasma concentration seen in the CSF based on area under the concentration-time curve.

Results

Subject screening and enrollment are on-going. Six patients have completed study procedures. Five patients presented with subarachnoid hemorrhage and one patient had a spontaneous intracranial hemorrhage. The mean age of the patients was 62 years (52-72) with the sex of the patients split evenly between male and female. Prior to the initial telavancin dose, the population's mean estimated creatinine clearance was 137 mL/minute. The median admission Glasgow Coma Scale of the population was 12 (3-14). The results of the study are pending.

Learning Objectives:

Explain pharmacokinetic properties of telavancin related to CNS penetration

Describe the safety profile of telavancin by identifying common adverse effects

Self Assessment Questions:

Which of the following properties of telavancin would be expected to increase blood brain barrier penetration?

A. Presence of a lipophilic side chain

B. Positive charge at physiologic pH

C. High molecular weight

D. 90% protein binding

Which of the following is a common adverse effect of telavancin?

A. Nephrotoxicity

B. Thrombocytopenia

C. Bradycardia

D. Hypoglycemia

Q1 Answer: A Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-829-L01-P

Evaluation of Therapeutic Enoxaparin Dosing based on Anti-Xa Drug Monitoring

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Purpose: Anti-Xa levels serve as a clinical surrogate to evaluate the efficacy and bleeding risk of enoxaparin in patients with venous thromboembolism (VTE) and atrial fibrillation. Despite the widespread use of the anti-Xa assay, guidelines regarding its routine measurement remain inconsistent, particularly for specific populations such as those with low body weight, obesity, renal dysfunction, or advanced age. The primary outcome was to describe the incidence of therapeutic, subtherapeutic, and supratherapeutic anti-Xa levels in non-critically ill adults. Secondary outcomes compared these levels amongst subgroups including low body weight (<45 kg), obese (BMI >40 kg/m2), presence of renal dysfunction (CrCl <30 ml/min), and older age (>65 years). Tertiary outcomes included incidence of bleeding, thrombosis, and in-hospital mortality.

Methods: This retrospective chart review, performed at a large community teaching hospital from January to December 2023, evaluated patients treated with therapeutic enoxaparin. Anti-Xa levels were considered therapeutic if within the range of 0.5-1.0 units/mL and drawn 4-6 hours following a steady state dose. Descriptive statistics were performed.

Results: A total of 227 patients were screened, of which 107 were included, with a mean age of 71 years, weight 90.2 kg, and CrCl 80.9 mL/min. Among 79 patients with appropriately timed initial anti-Xa levels, 3.8% were subtherapeutic, 40.5% therapeutic, and 55.7% supratherapeutic. No patients had low body weight, and 10.3% of obese patients had supratherapeutic levels. Most patients had normal renal function. The incidence of bleeding was 20.6%, with the highest rates in the therapeutic cohort (22.2%). Thrombosis occurred in both the therapeutic and supratherapeutic cohorts. In-hospital mortality was recorded solely within the therapeutic cohort (6.7%).

Conclusion: Supratherapeutic levels were most common with the 1 mg/kg dosing regimen, requiring dose adjustments to achieve target anti-Xa levels.

Learning Objectives:

Identify the therapeutic anti-Xa level range for patients with venous thromboembolism (VTE) and atrial fibrillation.

Recall the patient-specific factors that can influence anti-Xa levels in non-critically ill adults.

Self Assessment Questions:

What is the target range for therapeutic anti-Xa levels in patients treated with enoxaparin?

A. 0.2 - 0.5

B. 0.5 - 1

C. 0.75 - 1

D. 1 - 1.5

Which of the following patient subgroups may require empiric dose adjustments for enoxaparin based on the findings of the study above?

A. Patients with obesity

B. Middle aged patients

C. Patients with good renal function

D. Patients with normal body mass index

Q1 Answer: B Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-579-L01-P

Effectiveness of B52 versus Single Agent Interventions for Acute Agitation in Hospitalized Patients

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Purpose: Acute agitation in healthcare often requires pharmacologic interventions for symptom management and patient safety. Untreated agitation can lead to patient and practitioner harm, increased restraint use, and psychological trauma. The goal of management is to quickly calm the patient without causing excessive sedation. When non-pharmacologic interventions are ineffective, antipsychotic monotherapy is preferred. Another treatment option is the combination of haloperidol 5 mg, lorazepam 2 mg, and diphenhydramine 50 mg, known as B52. A literature gap exists comparing B52 to monotherapy antipsychotics for managing acute agitation in hospitalized patients. This study evaluated the effectiveness of B52 versus monotherapy and compared adverse events between the two study arms.
Methods: This is a multi-hospital retrospective cohort study of patients admitted to UK HealthCare between June 2021 and June 2024. Included patients were â‰¥ 18 years of age, received B52 OR at least 1 dose of a single antipsychotic. Patients were excluded if pregnant or administered a study medication within 24 hours of transfer from an ICU. Study arms were B52 versus monotherapy (either olanzapine, chlorpromazine, ziprasidone, or haloperidol). The primary outcome was the incidence of an additional anti-agitation agent within 4 hours of the initial medication administration. Secondary outcomes included length of stay and adverse effects.
Results: The incidence of an additional anti-agitation agent was lower in the B52 group compared to monotherapy (5%, n= 7/148 vs 18%, n=26/150; $p < 0.001$). Median length of stay was lower in the B52 group compared to monotherapy (4 vs 10 days; $p < 0.001$). Adverse effects were not statistically different.
Conclusion: B52 shows greater efficacy for the treatment of acute agitation within 4 hours without an increased incidence of adverse effects in hospitalized patients. Additional analyses are ongoing to assess factors within the study population that may have influenced these findings.

Learning Objectives:

Describe gaps in literature surrounding the comparison of B52 to monotherapy antipsychotics in hospitalized patients
Identify the effectiveness of B52 and monotherapy antipsychotics in medical-surgical patients

Self Assessment Questions:

How is untreated agitation potentially harmful to patients?
A. Less restraint use
B. Compromised care
C. Verbal de-escalation
D. Calming the patient quickly
What is the guideline recommendation for first line treatment for non-severe acute agitation?
A. Non-pharmacologic measures
B. Haloperidol, lorazepam, diphenhydramine
C. Olanzapine
D. Haloperidol alone
Q1 Answer: B Q2 Answer: A
APCE Universal Activity Number 0121-9999-25-635-L01-P

Multicenter Evaluation of Terlipressin Use in Hepatorenal Syndrome

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Hepatorenal syndrome (HRS) is a life-threatening complication of decompensated cirrhosis with ascites. Terlipressin, a synthetic vasopressin analogue, was approved for use in the United States in September 2022. Its mechanism involved splanchnic vasoconstriction, which increases effective arterial blood volume, elevates mean arterial pressure, and improves renal perfusion. The CONFIRM study demonstrated terlipressin combined with albumin effectively reverses HRS. This study aims to provide real-world evidence regarding the safety and efficacy of terlipressin, with the goal of identifying the optimal patient population and refining criteria for its use.

This retrospective, multicenter, observational study evaluates the safety, efficacy, and dosing of terlipressin in adult patients with cirrhosis and HRS. The data presented here reflect findings from a single center. All adult patients who received terlipressin between September 14, 2022 and July 15, 2024 were included. The primary outcome was efficacy of terlipressin in reversing HRS, defined as two consecutive serum creatinine measurements of 1.5mg/dL or a serum creatinine within 0.3mg/dL of baseline within 14 days of terlipressin initiation and survival without renal replacement therapy (RRT) for an additional 10 days. Secondary outcomes at 90 days included recurrence of HRS, intensive care unit days, number of terlipressin doses administered, interruptions to terlipressin administration, need for vasopressor therapy, need for RRT, liver transplantation, rehospitalization, death, adverse events, and adherence to institution-specific restrictions for use.

A total of 25 patients were included for analysis. The primary outcome, HRS reversal, was achieved in 4 patients (16%). Within 90 days, 10 patients (40%) died, 8 patients (32%) underwent liver transplantation, and 6 patients (24%) required rehospitalization. The most common reason for terlipressin discontinuation was hypoxia, which occurred in 15 patients (60%).

Single-center findings suggest terlipressin is less effective at reversing HRS in the real-world setting compared to the CONFIRM trial, and safety remains a concern.

Learning Objectives:

Review literature supporting use of terlipressin for the management of HRS.

Discuss the utility of terlipressin in a real-world setting based on single-center findings of this multicenter study.

Self Assessment Questions:

Which statement is true regarding terlipressin use for management of HRS?

A. Telipressin is the only guideline recommended treatment option for HRS.

B. The FDA approved terlipressin as a titratable continuous infusion for HRS.

C. The CONFIRM study showed that terlipressin was superior to placebo for treatment of HRS, but was associated with serious adverse events.

D. The CONFIRM study showed that terlipressin is non-inferior to standard of care for treatment of HRS.

Based on the single-center results of this study, which of the following adverse events was the most common cause of terlipressin discontinuation?

A. GI Bleed

B. Infection

C. Stroke

D. Hypoxia

Q1 Answer: C Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-675-L01-P

Impact of Direct Oral Anticoagulant (DOAC) Management Following Implementation of Pharmacist-Directed Monitoring Service

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Purpose: This study intends to evaluate the impact of pharmacist-directed anticoagulation monitoring services in patients receiving direct oral anticoagulants (DOACs). The use of DOACs has increased significantly in the United States over the past decade, contributing to substantial Medicare Part D expenditures and a rising number of attributable outpatient bleeding events. In response to a growing need, Community Health Network (CHNw) recently initiated a pharmacist-driven DOAC monitoring service. This service allows network providers to refer patients to the DOAC pharmacy team, who assist with facilitating cost-effective anticoagulation selection, appropriate dose optimization, timely laboratory monitoring, and active chart review.
Methods: This institutional review board-approved retrospective chart review analyzes patients receiving outpatient DOAC monitoring at CHNw from June 30, 2024 to August 30, 2024. Eligible patients were at least 18 years of age, prescribed a DOAC through CHNwâ€™s electronic health record, and received an ambulatory referral for DOAC monitoring services. Preliminary data suggest approximately 790 patients meet inclusion criteria, with pregnant and incarcerated patients excluded. Data collection is focused on the initial pharmacist-led DOAC monitoring encounter for each patient. The primary objective is to describe the category and number of pharmacist-directed therapeutic interventions following service implementation, including DOAC dose modification, detection of clinically significant drug interactions, and ordering of laboratory services. Secondary objectives include identifying the number of patients receiving cost assistance following pharmacist intervention and average pharmacist time spent per initial encounter. Additional secondary endpoints include identifying the number of patients with a history of major bleeding, determining the proportion of DOAC patients receiving appropriate DOAC dosing, laboratory monitoring, and modification of clinically significant drug interactions following implementation of pharmacist-led clinical services.
Results: Data collection is ongoing with findings to be presented at the Great Lakes Pharmacy Residency Conference (GLPRC) in April-May 2025.

Learning Objectives:

Review the clinical and financial impact of current DOAC prescribing practices in the United States
Outline the most common pharmacist-directed therapeutic interventions within the DOAC monitoring service

Self Assessment Questions:

During the past decade, the number of Medicare Part D enrollees receiving oral anticoagulation have nearly doubled to _____, resulting in increased Medicare Part D spending to $_____, which accounts for nearly 6% of total Part D expenditures.

A. 2.68 million; 0.44 billion
B. 3 million; 1.2 billion
C. 5.24 million; 7.38 billion
D. 7 million; 10.2 billion

Based on preliminary data, which was the most common intervention completed by pharmacists within the DOAC service?

A. Provider contacted to consider modifying antithrombotic or other therapy due to concerning drug interaction with DOAC
B. Indicated DOAC labs ordered
C. Pharmacist completed DOAC dose adjustment
D. Pharmacist placed orders for alternative DOAC selection

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-644-L01-P

Two versus Four Times Daily Dosing of Cephalexin Compared to Ciprofloxacin for the Treatment of Pyelonephritis

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Background: Best practice guidelines recommend ciprofloxacin 500 mg twice daily as the first-line oral treatment for acute pyelonephritis. Rising resistance and adverse effects have elicited concerns regarding use of fluoroquinolones as first-line treatment options. Oral beta-lactams have an improved safety profile and may be viable options for the treatment of urinary tract infections (UTI). Recent outcomes data have shown cephalexin to have a high rate of clinical cure and that twice daily dosing is effective for uncomplicated UTI. Given the absence of established dosing recommendations for cephalexin in the treatment of pyelonephritis, the purpose of this investigation is to compare treatment failure of cephalexin dosed 1000 mg twice daily vs. 500 mg four times daily to guideline-recommended therapy, ciprofloxacin 500 mg twice daily.

Methods: This retrospective cohort study includes adult patients treated for pyelonephritis with cephalexin 1000 mg twice daily, 500 mg four times daily, or ciprofloxacin 500 mg daily in outpatient settings across Michigan from January 1, 2020, to June 30, 2024. Patients were excluded if they had a creatinine clearance of < 30 mL/min, were pregnant, had negative or no urine culture, a culture resistant to cephalexin or ciprofloxacin, had a UTI or bacteremia in the past 30 days, or were on antibiotics for UTI prophylaxis. The primary outcome will compare treatment failure between groups, defined as continuation of symptoms while on therapy or symptom recurrence or bacteremia within 30 days of antibiotic completion. Secondary outcomes compared between groups include rate of adverse drug reactions while on therapy and Clostridioides difficile infections within 30 days of therapy completion.

Results: Data collection and analysis are currently in progress.â€¯â€¯

Conclusions: To be presented at the Great Lakes Pharmacy Residency Conference.â€¯

Learning Objectives:

Describe current oral antibiotic options for treatment of pyelonephritis per Infectious Disease Society of America (IDSA) guidelinesâ€‹

Identify the potential benefits of utilizing cephalexin over fluoroquinolones in treatment of pyelonephritis

Self Assessment Questions:

Based on the IDSA guideline recommendations for the treatment of pyelonephritis, which oral regimen is considered first-line?

A. Ciprofloxacin 500 mg twice daily for 7 days

B. Amoxicillin 500 mg twice daily for 7 days

C. TMP/SMX 160/800 mg twice daily for 7 days

D. Cephalexin 1000 mg twice daily for 7 days

Which of the following is a potential benefit for using cephalexin instead of ciprofloxacin for the treatment of pyelonephritis?

A. Shorter duration of therapy

B. Lower daily medication burden

C. Lower risk of serious adverse effects

D. Broader spectrum of coverage

Q1 Answer: A Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-715-L01-P

Effects of Bariatric Surgery on Allogeneic Stem Cell Transplant

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Allogeneic stem cell transplantation is a medical procedure used to treat certain cancers, hematologic disorders, and some genetic conditions. Graft-versus-host disease (GvHD) is a common complication after allogeneic stem cell transplantation (allo SCT) where the donorâ€™s immune cells attack the recipientâ€™s tissues. Other common morbidities after allo SCT include mucositis/diarrhea, weight loss, malnutrition, and severe malnutrition. There is limited data in literature on how bariatric surgery effects allogeneic stem cell transplantation. A retrospective case series showed higher rate of acute GVHD in the bariatric surgery group compared to the control group. Bariatric surgeryâ€™s effect on gut microbiome with increasing levels of E. coli and decreasing levels of beneficial bacteria may have contributed to increased incidence of acute GVHD. Median survival time was 199 days for bariatric surgery vs 628 days for control group.

The primary objectives of this study will be to compare incidence of overall acute GvHD, incidence of grades 2-4 acute GvHD, and morality between patients who had bariatric surgery at least 6 months prior to receiving allo SCT and patients who received allo SCT without a prior history of bariatric surgery.

This will be a single center, retrospective, matched cohort study that will compare adult patients with prior bariatric surgery before allo SCT and patients without prior bariatric surgery before allo SCT at University of Michigan Health (UMH) from 2004 â€“ 2024. Cohorts will be matched in a 1:2 ratio respectively using human leukocyte (HLA) matching, type of SCT (matched unrelated donor vs matched related donor), type of conditioning (full vs reduced intensity), GVHD prophylaxis, age, sex, race, year of transplant, and disease state. This will be the first study in literature to complete risk stratified outcome analysis.

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

Learning Objectives:

Identify common complications/comorbidities after allogeneic stem cell transplantation.

Describe the data in current literature on bariatric surgery and allogeneic stem cell transplantation.

Self Assessment Questions:

What is a common complication after allogeneic stem cell transplantation (allo SCT)?

A. Diabetic ketoacidosis (DKA)

B. Graft-versus-host disease (GvHD)

C. Myocardial infarction (MI)

D. Deep vein thrombosis (DVT)

What was the difference in number of days for median survival time between the bariatric surgery group and the control group in the retrospective case series on the effect bariatric surgery in patients undergoing allogeneic hematopoietic stem cell transplantation?

A. 97

B. 210

C. 429

D. 18

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-769-L05-P

Frequency and characteristics of prescription adaptations requested and made by chain community pharmacists.

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Purpose: Community pharmacists can make minor prescription adaptations according to Indiana law (e.g., changing tablets to capsules). There are also changes that only prescribers can make by writing a new prescription (e.g., changing between different high intensity statins). The purpose of this study is to determine the frequency and characteristics (e.g., type of adaptation, time required) of minor prescription adaptations requested and made by chain community pharmacists. Methods: The electronic card studyâ€™s purpose is to capture cross-sectional observational data on chain community pharmacists requesting and making minor prescription adaptations utilizing an electronic form that is designed to be completed in less than 60 seconds during routine practice. The data collection form was designed by applying the Relative Advantage construct within the Consolidated Framework of Implementation Research (CFIR) and will collect variables such as the type of adaptation made or requested, the time required, and the reason for the adaptation. Data characterizing the minor prescription adaptations will be submitted over a period of two weeks by full time pharmacists who work a minimum of 32 hours per week, maintain an active pharmacist license, and are employed by a non-specialty Walgreens Co. Pharmacy located in the greater Indianapolis, Indiana area. Approximately 60 pharmacists meet eligibility criteria and will be contacted for recruitment. Only one pharmacist in an eligible pharmacy can submit data. The data collection form will be pilot tested by four practicing community pharmacists to provide feedback for content and completion time. Training and check-ins between researchers and participating pharmacists will be provided to promote quality in data reporting. Data will be analyzed using descriptive statistics. All study procedures will be approved by the Purdue University Institutional Review Board. Results/Conclusion: IRB approval is pending. Results and conclusions will be presented at the 2025 Annual Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify types of minor prescription adaptations chain community pharmacists can request and make in Indiana.

Define potential therapeutic interchanges that a chain community pharmacist would have to request from a prescriber in Indiana.

Self Assessment Questions:

Which of the following is an example of a minor prescription adaptation in Indiana?

A. Changing tablets to capsules

B. Increasing the dosage of a medication

C. Decreasing the dosage of a medication

D. Adding a new medication to a prescription

Which of the following is true regarding atorvastatin 40mg and rosuvastatin 20mg?

A. Atorvastatin 40mg is therapeutically interchangeable with rosuvastatin 20mg, and does not require the pharmacist to request a new prescription from the prescriber

B. Atorvastatin 40mg is therapeutically interchangeable with rosuvastatin 20mg, but requires the pharmacist to request a new prescription from the prescriber

C. Atorvastatin 40mg is not therapeutically interchangeable with rosuvastatin 20mg

D. Atorvastatin 40mg is therapeutically interchangeable with rosuvastatin 40mg

Q1 Answer: A Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-814-L99-P

Retrospective Review of Hepatotoxicity: Comparing Isavuconazole and Posaconazole

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Background:
Isavuconazole and posaconazole are second-generation triazoles used for prophylaxis and treatment of invasive fungal infections. Clinical trials have indicated lower incidences of hepatotoxicity with these agents compared to voriconazole. Given their frequent use as alternatives to other azoles and to each other, a direct comparison of their hepatotoxicity profiles would provide invaluable insight to guide clinical decision making. To date, no published literature exists that directly compares the hepatotoxicity profiles of these two agents.

Purpose:
To compare the hepatotoxicity profiles of prophylactic posaconazole and isavuconazole in patients with hematologic malignancies or history of bone marrow transplantation.

Methods:
This is a retrospective, cohort study conducted at The Ohio State University Wexner Medical Center on patients with hematologic malignancies or a history of bone marrow transplantation who received posaconazole or isavuconazole for antifungal prophylaxis.

Patients were included if they were 18 to 89 years old, received at least 7 days of the study drug and had baseline liver function tests (LFTs) obtained within one year before azole initiation and at least one LFT panel obtained after azole initiation within the study period. Patients were excluded if they met any of the following criteria: prisoner status, pregnancy, receipt of an alternative azole therapy within the past two weeks, pre-existing liver disease, elevated baseline LFTs, or clinical conditions predisposing to abnormal LFTs and/or an increased risk of hepatotoxicity.

The primary outcome is the incidence of hepatotoxicity. Secondary outcomes include the severity of hepatotoxicity, time to hepatotoxicity, classification of adverse drug reaction probability with the Naranjo probability score, and classification of elevated LFTs according to CTCAE v 5.0 definitions for those with hepatotoxicity.

Results/Conclusion:
Data collection is ongoing. Results and conclusion will be presented at the Great Lakes Resident Conference.
Learning Objectives:

Describe the current literature regarding the incidence of hepatotoxicity associated with isavuconazole and posaconazole.
Outline the essential aspects of this study's design.
Self Assessment Questions:
1. Which statement best describes the existing literature on the comparative hepatotoxicity of isavuconazole and posaconazole?
A. Posaconazole has higher rates of hepatotoxicity
B. Isavuconazole has higher rates of hepatotoxicity
C. There have previously been no studies directly comparing the hepatotoxicity of isavuconazole and posaconazole
D. Posaconazole and isavuconazole have been shown to have similar rates of hepatotoxicity
Which of the following patients would have been excluded from this study?
A. Patients with a hematologic malignancy
B. Patients with underlying liver disease or conditions that can cause abnormal liver function tests
C. Patients indicated for prophylactic antifungal therapy
D. Patients with an autologous bone marrow transplant
Q1 Answer: C Q2 Answer: B
APCE Universal Activity Number 0121-9999-25-651-L01-P

Evaluation of Peri-Operative Antimicrobial Use in Urological Procedures

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Purpose: This study evaluated the frequency and appropriateness of antimicrobial prophylaxis in four common endoscopic urological procedures: ureteroscopy (URS), transurethral resection of the prostate (TURP), transurethral enucleation of the prostate with Holmium laser (HoLEP), and transurethral resection of bladder tumors (TURBT). According to the 2019 American Urological Association (AUA) guidelines, a single prophylactic antimicrobial dose is recommended before these procedures to prevent periprocedural infections with no continuation postoperatively. Prolonged antibiotic use before and after urological procedures persists in many institutions, including Froedtert Health, contributing to antibiotic resistance and Clostridioides difficile infections (CDI). By analyzing antimicrobial prophylaxis prescribing patterns in common urological procedures and comparing guideline adherence rates across various practice sites within our health system, this study aims to identify opportunities for antimicrobial stewardship interventions. Methods: A retrospective, multi-site chart review was conducted within the Froedtert Health System from September 2023 to September 2024. The study included 200 adult patients, with 50 randomly selected from each procedure category (URS, TURBT, HoLEP, and TURP). Patients were excluded if they had received antibiotics for a symptomatic urinary tract infection (UTI) within 14 days before their procedure, underwent emergency urological procedures, or were pregnant or incarcerated. The primary objective was to evaluate adherence to AUA guidelines for antimicrobial prophylaxis duration. Secondary objectives included assessing the appropriateness of antimicrobial selection for prophylaxis, determining post-procedural infection rates, and evaluating the incidence of CDI. Results/Conclusion: Data analysis is ongoing; findings will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the impact of guideline-concordant single-dose antimicrobial prophylaxis on post-procedural outcomes.

Identify factors contributing to the use of extended-duration antibiotic regimens in urological procedures.

Self Assessment Questions:

1. When surgical antimicrobial prophylaxis is recommended prior to a urological procedure, what duration of prophylaxis is recommended by the 2019 American Urological Association (AUA) guidelines?

A. A single dose of prophylactic antibiotics prior to the procedure, with no continuation post-operatively unless clinically indicated.

B. A three-day course of antibiotics starting one day before the procedure.

C. Antibiotics given only if the patient develops symptoms of infection after the procedure.

D. A seven-day antibiotic regimen regardless of patient infection risk

What is the definition of a symptomatic urinary tract infection (UTI)?

A. A UTI diagnosed solely based on positive urine culture results, regardless of symptoms

B. A UTI associated with signs and symptoms such as dysuria, urinary frequency, urgency, fever, or costovertebral angle tenderness

C. Any urinary tract infection in a patient with an indwelling catheter

D. A UTI including joint pain and no appetite.

Q1 Answer: A Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-584-L01-P

Impact of Pharmacist-led Medication Therapy Management (MTM) Visits on Medication Access, Adherence, and Clinical Outcomes for Patients Prescribed Glucagon-Like Peptide-1 (GLP-1) Receptor Agonists

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Glucagon-Like Peptide-1 (GLP-1) Receptor Agonists are a newer class of medications recommended as first-line treatment for adults with type 2 diabetes and mitigating cardiovascular risk. Pharmacist-led Medication Therapy Management (MTM) clinics provide patients with comprehensive visits to evaluate therapy goals and make therapy changes. The purpose of this study is to evaluate whether pharmacist-led MTM visits lead to reduced time to therapy initiation, increased medication adherence, and improved A1c compared to physician visits alone.

A report was generated from the Electronic Health Record (EHR) to identify patients either managed by MTM Pharmacists or Primary Care Physicians (PCP) alone, and prescribed starting doses of three GLP-1 Receptor Agonists (semaglutide, dulaglutide, and tirzepatide). Retrospective chart review was performed to include type 2 diabetes patients with a baseline A1c greater than 6.5%. Data was collected to identify dates of when GLP-1 therapy was first discussed and subsequently filled. Proportion of days covered (PDC) data was collected using EHR medication fill history. Baseline and 3-month A1c were documented. The primary objective of this study is to compare the time from medication discussion to therapy initiation between the two provider groups. Secondary outcomes compare PDC and percent change of A1c from baseline to 3 months.

The average time from discussion to initiation for MTM clinics was 4.25 days (n=55) compared to 11.93 days (n=46) for PCP clinics, a difference of 7.68 days. Average change in A1c at 3 months from baseline was 1.65% and 1.45% for MTM and PCP respectively, a difference of 0.2%. PDC was calculated at 98.47% and 95.08% for MTM and PCP respectively.

Patients managed by MTM clinics are able to fill GLP-1 receptor agonists sooner than PCP clinics alone. Change in A1c at 3 months was better when managed by MTM Clinics. PDC results were similar.

Learning Objectives:
Identify the role of pharmacist-driven MTM clinics in providing patient care
Recognize the barriers of starting glucagon-like-peptide-1 receptor agonists
Self Assessment Questions:
Which of the following best describes the role of a pharmacist-driven MTM clinic?
A. Dispense medications to patients and counsel them on new medications
B. Evaluate therapy goals and make guideline-directed therapy changes
C. Provide medications free of charge based on patientâ€™s income
D. Refer the patient to a specialist as pharmacists cannot make therapeutic changes
Which of the following are the biggest barriers to starting glucagon-like-peptide-1 receptor agonists?
A. Cost and Insurance coverage/Prior authorizations
B. Lack of guideline recommendation
C. Primary literature shows no benefit of this class over other antihyperglycemics
D. Providers are unaware of this medication class
Q1 Answer: B Q2 Answer: A
APCE Universal Activity Number 0121-9999-25-836-L99-P

A business case for medication reconciliation: evaluation of revenue generation power

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Purpose: Medication reconciliation (MR) is an essential step to decreasing medication errors related to inappropriate home medication ordering. Many institutions have implemented a pharmacy-led admission MR program, as they have shown increased medication history accuracy and identification of potential errors. Though the safety benefit is known, much of the literature surrounding the financial impact of MR is based on potential cost avoidance only. The overall aim of this study is to evaluate the ability of students on rotation and designated medication reconciliation pharmacy technicians (MRT) to increase capture of discharge prescriptions via the Meds to Beds (M2B) service, thereby increasing revenue for the institution.

Methods: This separate-sample pre-post implementation analysis was analyzed using retrospective data in the pre-implementation period (September 2023 - August 2024) and prospective data in the post-implementation period (September 2024 - March 2025). The primary objective of this analysis was to assess the cost-to-benefit ratio of utilizing students and MRTs to complete MR and enroll patients in M2B. The secondary objectives include â€‹quantifying the monthly change in percentage of patients enrolled in M2B, quantifying the number of new enrollees per number of MR and time spent performing MR per month, evaluating the monthly percent of total discharged patients that are interested in M2B, enrolled in M2B, and had M2B performed, and quantifying the total gross revenue generated per month from patients enrolled in M2B.

Results and Conclusions: Results are available for the pre-implementation phase only, as the post-implementation data collection is ongoing. At a pre-implementation baseline, of the patients discharged each month, 48% (Â±2.2%) were interested in M2B, 33% (Â±2.0%) enrolled, 27% (Â±2.8%) filled at the outpatient pharmacy, and 22% (Â±2.8%) received the M2B service. With the implementation of students and MRTs, these numbers will be reassessed, and cost will additionally be factored into the discussion.

Learning Objectives:

Explain how medication reconciliation programs have historically been justified and how this analysis adds to the discussion

Describe how the addition of students and medication reconciliation technicians have impacted Meds to Beds enrollment at a single center

Self Assessment Questions:

What element has been missing from historic justifications of medication reconciliation programs?

A. Safety benefit

B. Cost savings

C. Labor needs

D. Revenue potential

At baseline, what is the average percent of patients receiving the Meds to Beds service (out of all patients discharged with at least one prescription)

A. 0.14

B. 0.22

C. 0.43

D. 0.68

Q1 Answer: D Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-745-L04-P

Impact of Psychiatric Pharmacist Interventions on Medication Safety and Outcomes: A Retrospective Review in an Inpatient Behavioral Health Unit at a Community Hospital

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Medication errors and suboptimal psychotropic medication management are common challenges in inpatient psychiatric settings, often leading to prolonged hospitalization or readmissions. This study aimed to assess the potential impact of integrating psychiatric pharmacists directly into the care team by retrospectively identifying pharmacist interventions that could have improved medication safety and patient outcomes in a behavioral health unit.

A retrospective chart review was conducted for patients admitted to the behavioral health unit for December 2023. Data collected included: demographics, psychiatric diagnoses, psychotropic medication orders, dosing regimens, and reported adverse drug reactions (ADRs). Laboratory results (renal and hepatic function), vitals, and clinical monitoring parameters were reviewed to assess medication appropriateness. Provider documentation was analyzed to determine gaps in medication management and opportunities where a psychiatric pharmacist could have intervened. Identified potential pharmacist interventions that were categorized include: dose adjustments, therapeutic duplication, drug monitoring, drug interactions, and alternative medication recommendations.

A total of 634 psychotropic medication orders were reviewed, with 177 (28%) warranting pharmacist intervention. The most common intervention categories included inappropriate dosing (42%), alternative therapy recommendations (13%), duplicate therapy identification (12%), and drug monitoring needs (10%). Additionally, adverse drug events (7%), inappropriate therapy selection (7%), drug-drug interactions (3%), incorrectly ordered medications (5%), and drug-allergy mismatches (1%) were also identified. Among 49 unique patients, the mean length of stay (LOS) was 12.16 days (median: 9, range: 3â€“54), and the 30-day readmission rate was 18.37%. Patients were prescribed an average of 9 medications (range: 0â€“28).

The findings highlight the crucial role of psychiatric pharmacists in optimizing medication safety and therapeutic outcomes. A significant proportion of medication orders required pharmacist intervention, demonstrating the need for dedicated psychiatric pharmacy services. Future research should explore the impact of psychiatric pharmacist integration on long-term patient outcomes, cost-effectiveness, and quality of care in behavioral health settings.

Learning Objectives:

Describe the role of psychiatric pharmacists in identifying and preventing medication errors in inpatient behavioral health settings

Identify the most common pharmacist interventions required for optimizing psychotropic medication management in hospitalized psychiatric patients.

Self Assessment Questions:

Which of the following was the most frequently required pharmacist intervention in the study?

A. Alternative therapy recommendations

B. Drug interactions

C. Inappropriate dosing

D. Drug-allergy interactions

What percentage of psychotropic medication orders reviewed in this study warranted pharmacist intervention?

A. 15

B. 28

C. 42

D. 50

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-590-L05-P

Evaluation of Outcomes for Veterans with Opioid Use Disorder Managed by a Clinical Pharmacist Practitioner

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Purpose: Opioid use disorder (OUD) is a significant concern within the Veteran population. Approximately 10% of Veterans are affected by substance use disorders, and opioids account for around 70% of overdose deaths. Clinical Pharmacist Practitioners (CPPs) can play a crucial role in managing opioid use by providing increased availability of prescribers, medication management, risk mitigation, and harm reduction. The purpose of this project is to determine if there is difference in outcomes for Veterans with OUD who are managed by a CPP versus a physician or nurse practitioner in a Substance Abuse Treatment Clinic.

Methods: This single-center, retrospective cohort study will review patients with OUD who are managed within the Robley Rex Veterans Affairs Medical Center (RRVAMC) in Louisville, KY. Patients will be included in the study if they have a prescription for a medication for opioid use disorder (MOUD) between June 1, 2023, to June 1, 2024 and had at least three appointments following medication initiation. Patients managed by a CPP will be compared to patients managed by a physician or nurse practitioner and matched based on prescription for OUD. The primary outcome of this study will be a composite score of nonfatal overdose, hospitalization at RRVAMC related to OUD, and emergency department visits at RRVAMC related to OUD. Secondary endpoints will include individual components of the primary outcome, death from any cause, admission to the substance use residential recovery treatment program, clinic no show rates, medication possession ratio, active naloxone prescription, suicide risk screen completion, prescription drug monitoring completion, and positive urine drug screen results. The outcomes will be evaluated using descriptive statistics, T tests for continuous variables, and Chi-Square or Fisherâ€™s Exact tests for nominal data.

Results/Conclusion: Pending

Learning Objectives:
Describe the expanding role a CPP may have in treating patients with OUD.
List outcomes being measured for Veterans who are being treated with MOUD.
Self Assessment Questions:
As of January 2024, how many states allow pharmacists to obtain a DEA license?
A. 3
B. 10
C. 13
D. 25
Which of the following is an outcome being measured for Veterans who are being treated with MOUD?
A. Change in other mental health condition
B. Fatal overdose
C. Hospitalizations at RRVAMC related to OUD
D. Employment status
Q1 Answer: B Q2 Answer: C
APCE Universal Activity Number 0121-9999-25-660-L08-P

Evaluating Diuretic Optimization In Hospitalized Patients With Heart Failure Using Remote Dielectric Sensing (ReDS) Vest Analytics

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Purpose: Heart failure exacerbations are a leading cause of readmission and increased length of stay. Increased volume overload in patients leads to poor clinical outcomes. Despite this, patients do not receive optimized diuresis due to prescribing hesitancy related to renal function, physical presentation, and other factors. Remote Dielectric Sensing (ReDS) vests are often used in outpatient heart failure clinics to assess clinical progression. ReDS vests provide clinically accurate and relevant analyses of the lung fluid content that can enable more frequent and appropriate optimization of diuretic therapy based on the providers' clinical judgement.
Methods: This retrospective study assesses the diuretic prescribing trends for hospitalized patients with heart failure at Baptist Health Corbin who are enrolled in the Heart Failure Pathway. Participants must be hemodynamically stable to qualify for enrollment in the Baptist Health Corbin Heart Failure Pathway. The aim of the study is to compare average daily furosemide equivalents prescribed to patients in the hospital compared to their home daily furosemide equivalent. Qualified participants will be divided into two groups, those who received Remote Dielectric Sensing readings to assist with diuresis and those that did not.

Learning Objectives:

Discuss the influence of ReDS vest readings on diuretic prescribing patterns in heart failure patients.

Identify reasons for prescriber hesitancy in optimizing diuretic therapy in heart failure patients.

Self Assessment Questions:

Considering the potential risks of under-prescribing or over-prescribing diuretics in heart failure patients, how might ReDS assist in mitigating these risks?

A. The ReDS Vest provides real-time monitoring of lung fluid content, allowing for timely and precise adjustments in diuretic therapy based on a patient's current fluid status

B. The ReDS Vest helps identify the underlying cause of heart failure, which allows for more accurate prescribing of medications unrelated to diuretics

C. The ReDS Vest primarily measures heart rate and blood pressure, which helps identify the correct diuretic dosage, regardless of lung fluid status

D. The ReDS Vest reduces the need for clinical assessment by providing a one-time diagnostic reading, making diuretic adjustments unnecessary

Which patient condition would cause hesitancy in increasing a patient's home diuretic dose?

A. Hyperkalemia

B. Angina

C. Acute kidney injury

D. Hypertension

Q1 Answer: A Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-674-L01-P

Evaluation of a Biosimilar Switch at a Hospital-Based Outpatient Infusion Clinic

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Purpose: A biosimilar is a biological product that is similar to and has no clinically meaningful differences from an existing FDA-approved reference product. The FDA requires biosimilar and interchangeable biological products to meet their approval standards. Since the introduction of biosimilars non-medical switches have become common practice within health systems to help manage medication costs for both the patient and the institution. The biologic infliximab has several biosimilar formulations and is commonly used by outpatient infusion clinics for the treatment of inflammatory bowel disease (IBD). Multiple studies have been completed on infliximab biosimilars validating there is no clinically significant difference in the overall effectiveness or loss of response. In 2022, a system-wide formulary decision designated infliximab-abda as the preferred infliximab agent for the health system. To adhere to these formulary changes, the inpatient pharmacy initiated a review of all current patients receiving infliximab infusions for IBD at the outpatient infusion clinic. Medically stable patients were switched from a less preferred to a more preferred infliximab agent via a collaborative initiative. The purpose of this quality assessment is to determine the clinical and financial outcomes of this biosimilar switch.

Methods: Electronic records of adult patients who completed non-medical switch from a less preferred to a more preferred infliximab biologic as part of the formulary initiative will be reviewed. Clinical effectiveness will be defined as patients who continued on preferred infliximab biologic for at least 12 months after switch without documented disease progression. Financial impact for the health system and the individual patient will also be calculated by analyzing electronic claims data from August 2022 to January 2024. Additionally, any documented adverse events during the non-medical switch will be examined.

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

Learning Objectives:

List criteria for biosimilar designation.

Describe the rationale behind non-medical biosimilar switches.

Self Assessment Questions:

Which of the following medications would be considered a biosimilar?

A. A biologic with clinically significant differences in treatment outcomes

B. A generic of an already established biologic agent

C. A new biologic agent used to treat IBD

D. A biologic with no clinically meaningful differences from an existing FDA-approved reference product

For which of the following patients is a non-medical switch appropriate?

A. A patient experiencing an infusion reaction on current therapy

B. A patient with evidence of disease state worsening while on therapy

C. A clinically stable patient unable to afford current therapy

D. A patient with evidence of disease worsening due to poor adherence on current therapy

Q1 Answer: D Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-821-L99-P

Evaluating the Impact of Risk-Based vs. Universal Thromboembolic Prophylaxis in Low-Risk Cesarean Deliveries

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Pharmacologic prophylaxis for venous thromboembolism (VTE) in postpartum cesarean patients varies significantly across obstetric guidelines. Changes to these guidelines lead to the adoption of the Caprini risk tool at University Hospitals Health System for postpartum patients. A consequence of this was universal pharmacologic VTE prophylaxis for post-cesarean patients. Heparin products may reduce VTE risk in this population, however its use in otherwise healthy patients may increase bleeding complications such as wound hematomas and postpartum hemorrhage. This study aims to evaluate the clinical impact of this practice change on bleeding-related complications in low-risk post-cesarean patients at a large health system.

This multicenter, retrospective, observational study analyzed data from the University Hospitals Obstetrics Network via the TriNetX platform. Postpartum patients over 18 years of age who delivered via cesarean between January 1, 2017 and June 30, 2019 and January 1, 2021 to June 30, 2023 were included. Patients were excluded if they had a past medical history significant for bleeding or clotting disorders such as sickle-cell disease, thrombophilias, or prior VTE events. Patients were divided into risk-based or universal VTE prophylaxis groups which was determined by the VTE guideline in place during time of delivery. Patients were stratified into the risk-based group if delivery occurred between January 1, 2017 and June 30, 2019 or the universal prophylaxis group if delivery occurred between January 1, 2021 and June 30, 2023. The primary outcome is a composite of wound hematomas, wound dehiscence, blood transfusion, and postpartum hemorrhage. Secondary outcomes included a composite of: VTE events, disseminated intravascular coagulation, balloon tamponade, spinal hematomas, heparin-induced thrombocytopenia, and use of uterotonics. Outcomes were analyzed using logistic regression models to estimate odds ratios and 95% confidence intervals for risk of complications. Results and conclusions will be presented at the Great Lakes Pharmacy Residents Conference.

Learning Objectives:

Discuss the varying guideline recommendations (RCOG, ACOG, Chest) for VTE prophylaxis in postpartum cesarean patients and how that has influenced institutional practice.

Explain the risks and benefits associated with pharmacologic VTE prophylaxis in postpartum cesarean patients.

Self Assessment Questions:

Which of the following best describes the recommended approach to venous thromboembolism (VTE) prophylaxis for patients undergoing cesarean delivery according to the ACOG guidelines?

A. All patients should receive routine anticoagulation postpartum, regardless of individual risk factors.

B. A standardized risk assessment protocol should be adopted and systematically implemented at each facility to guide VTE prophylaxis.

C. Only patients with a history of thromboembolic events require prophylaxis after cesarean delivery.

D. Mechanical prophylaxis (e.g., sequential compression devices) is sufficient for all cesarean delivery patients without the need for pharmacologic intervention.

Which of the following is a potential complication of pharmacologic VTE prophylaxis in postpartum cesarean patients?

A. Increased risk of wound hematomas

B. Increased incidence of VTE events

C. Decreased need for mechanical prophylaxis

D. Lower rates of postpartum hemorrhage

Q1 Answer: B Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-783-L05-P

Evaluation of Hyper-Hydration for High-Dose Methotrexate Clearance in Pediatric and Adolescent Patients

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Purpose: Maintaining adequate clearance in patients receiving high-dose methotrexate is essential for minimizing toxicities. This can be achieved through concurrent continuous intravenous (IV) hydration during treatment. However, maintenance IV fluid rates in pediatric oncology protocols generally exceed those of adult protocols, as fluid rate calculations are based on body surface area. Further, high IV fluid rates can cause fluid overload resulting in hyper-hydration and subsequent sequelae, prolonging patientsâ€™ hospitalizations. This study aims to determine the clinical consequences of hyper-hydration for high-dose methotrexate clearance.
Methods: Data was extracted through retrospective chart review of adolescent and young adult oncology patients that were admitted for administration of high-dose methotrexate at American Family Childrenâ€™s Hospital from January 2018 to August 2024. Collected data included patient demographics, cancer diagnosis, composition of IV fluids given concurrently with high-dose methotrexate, rate of IV fluid administration, urine output, changes in renal function, serum sodium levels, vital signs, and requirement of supplemental oxygen. Finally, physician and nursing notes were analyzed for written reports of cardiac or respiratory changes.
Results: This project aims to categorize the relationship between hyper-hydration and cardiac or respiratory dysfunction as surrogate markers for iatrogenic events when used for clearance of high-dose methotrexate. Preliminary results indicate a higher incidence of cardiac compromise in patients with high rates of IV fluids. The data and subsequent analysis will inform future hydration fluid dosing practices that will allow for adequate drug clearance while minimizing fluid overload requiring intervention.
Conclusion: Conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe concerns regarding the use of hyper-hydration in pediatric and adolescent patients.

Identify indications for hyper-hydration with high-dose methotrexate administration at American Family Children's Hospital.

Self Assessment Questions:

Which side effect is associated with hyper-hydration?

A. Diarrhea

B. Kidney dysfunction

C. Reduced methotrexate clearance

D. Respiratory compromise

Which of the following conditions is an indication for hyper-hydration with high-dose methotrexate administration at American Family and Childrenâ€™s Hospital?

A. Graft-versus-host disease

B. Hepatoblastoma

C. Neuroblastoma

D. Osteosarcoma

Q1 Answer: D Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-714-L01-P

Enoxaparin Dosing Strategies in Obese Patients with Cancer-Associated VTE

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Purpose: While direct oral anticoagulants are increasingly used for treating cancer-associated venous thromboembolism (CA-VTE), low-molecular-weight-heparin (LMWH) remains preferred for patients with high bleed risk or significant clot burden. The National Comprehensive Cancer Network (NCCN) guidelines recommend a reduced dose of 0.8 mg/kg every 12 hours for patients whose BMI â‰¥40 kg/m2. However, this recommendation is based on an underpowered trial that didnâ€™t specify whether patients with active malignancy were included. Our study will compare safety and efficacy outcomes between standard (1 mg/kg) and reduced-dose (0.8 mg/kg) enoxaparin in obese patients with CA-VTE.

Methods: This will be a single-center, retrospective observational cohort of adults with BMI â‰¥30 kg/m2 and cancer receiving twice-daily enoxaparin for acute VTE from January 2019 - November 2024. Patients will be excluded if they received concurrent warfarin, underwent >5 days of anticoagulation before starting enoxaparin, have a creatinine clearance <30 mL/min or incomplete records. Data to be collected will characterize demographics, malignancy characteristics and treatment, and bleeding/VTE characteristics and treatment. Patients will be divided into two cohorts; the control group, who received standard enoxaparin dosing, defined as 1 mg/kg (+/-10%) Q12h, and those who received reduced-dosing, defined as 0.8 mg/kg (+/-10%) Q12h. The primary outcome will be the rate of major and clinically relevant non-major bleeding (CRNMB). Baseline characteristics will be analyzed using measures of variability/central tendency. Comparisons between nominal data will be completed via Chi-squared testing, whereas continuous data will be compared using the studentsâ€™ T or Mann-Whitney U.

Results/Conclusions: Non-applicable, research is in progress for results and conclusions.

Learning Objectives:

Identify current treatment recommendations for the management of cancer-associated venous thromboembolism (CA-VTE).

Describe the safety and efficacy low-molecular-weight heparin (LMWH) for treatment of CA-VTE.

Self Assessment Questions:

Which of the following anticoagulant agents are preferred in patients with gastrointestinal malignancies?

A. Edoxaban

B. Rivaroxaban

C. Apixaban

D. Enoxaparin

Standard weight-based (1 mg/kg q12h) enoxaparin dosing for obese patients may incur which of the following effects?

A. Supratherapeutic anti-Xa levels, increasing risk for bleeding

B. Subtherapeutic anti-Xa levels, increasing risk for thrombotic events

C. Supratherapeutic anti-Xa levels, increasing risk for thrombotic events

D. Subtherapeutic anti-Xa levels, reducing risk for bleeding

Q1 Answer: D Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-655-L01-P

Evaluation of the Medication Use Process for Medicare Observation Patients at a Community Health System

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Purpose: Medicareâ€™s fee-for-service (FFS) program does not cover prescription medication administrations for patients under observation status during a hospitalization. This leaves patients with high medical costs following observation hospital stays. Medicare patients may use their own supply of medications during observation visit to reduce medication expenses. This study aimed to define the current state of patient-own-supply (POS) utilization at a community health system and determine a future impact model for optimization of POS utilization for Medicare patients in observation.

Methods: A retrospective chart review was performed including patients with Medicare A and B coverage aged 18 years or older with an observation stay between October-December 2023 and January-March 2024. Baseline demographic and hospital visit data were collected, including information on prescription medications and POS utilization. The primary outcome evaluated current utilization of POS medications at Norton Healthcare (NHC). Secondary outcomes evaluated potential models in which use of POS medications would provide cost benefit for the patient and the health system, pharmacist time for POS medication verification, and pharmacist perspective on the POS process.

Results: Fifty patients were analyzed to define the current utilization of POS medications at NHC. 5 patients (10%) utilized POS medications and 13/458 (2.8%) of total medications were verified as POS. Cost to the health system was $26.42 per patient and cost to the patient was $47.38 per patient. Total cost was extrapolated to annual cost of $53,096.96 and $95,230.99 respectively. The use of POS for brand name medications for patients undergoing orthopedic surgeries is estimated to reduce cost to the health system and patient by 87.8% and 81.7%, respectively.

Conclusion: At NHC, the utilization of POS for brand name medications of patients undergoing orthopedic surgery was most effective in reducing patient cost and integrating into pharmacist workflow.

Learning Objectives:

Recall Medicare Parts A, B, and D including their specific coverage areas

Recognize the proposed impact of the utilization of patient-own-supply medications for Medicare observation patients

Self Assessment Questions:

Self-administered medications during an observation hospital stay are covered under which part of Medicare?

A. Part A

B. Part B

C. Part D

D. None

What is the proposed benefit for patients with the use of patient-own-supply medications during an observation hospital stay?

A. Reduced nursing time

B. Shorter hospital length of stay

C. Reduced cost for medications administered

D. Improved medication adherence post-discharge

Q1 Answer: D Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-761-L04-P

One-Time Initial Intravenous Versus Oral Only Antibiotics for the Management of Pyelonephritis in The Emergency Department

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Purpose: Urinary tract infections (UTIs) are a prevalent condition that often lead to emergency department (ED) visits. Oral (PO) antibiotics are mistakenly believed to be less effective compared to intravenous (IV). However, high-quality evidence has disproven these misconceptions. IV antibiotics carry additional risks of complications and require more resources. The purpose of this study is to compare the efficacy of a single dose of IV antibiotics prior to PO, compared to PO alone, in patients with pyelonephritis discharged from the ED.

Methods: This is a retrospective cohort of patients at Henry Ford Health between 7/1/2023 and 6/30/2024. Cohorts included patients who received a one-time IV antibiotic dose for pyelonephritis prior to discharge and patients who received only oral antibiotic therapy for pyelonephritis. Adult patients diagnosed with pyelonephritis, with a urine culture displaying organism growth > 10^3 colony forming units, and discharged from the ED were included. Patients allergic to sulfamethoxazole-trimethoprim and ciprofloxacin, received >one dose of IV antibiotics, required hospital admission, structural abnormalities of the urinary tract, prostatitis or renal abscess, or had concurrent infections were excluded. The primary outcome was 72-hour all cause ED revisit. Secondary outcomes include ED throughput and clinical cure. 178 patients will be included, 89 per group, calculated with a significance level of 0.05, 5% two-sided confidence interval, powered to 80%, with a percentage â€˜successâ€™ in the one-time IV and oral only antibiotic treatment groups 94%, and a non-inferiority limit (d) of 10%. Patient cohorts will be compared using students t-test or Mann Whitney U-test for continuous data. Categorical data will be analyzed using Chi-square or Fisherâ€™s exact test. Variables with P<0.2 in bivariate analysis with clinical rationale will be considered for a multivariable logistic regression to determine variables independently associated 72-hour ED revisit.

Results and Conclusion: To be presented.

Learning Objectives:

Describe effective management practices for pyelonephritis in the emergency department.

Identify whether the initial use of intravenous antibiotics offers a significant clinical advantage over starting treatment with oral antibiotics alone.

Self Assessment Questions:

According to the 2010 IDSA clinical practice guidelines for the treatment of acute uncomplicated cystitis and pyelonephritis, which of the following oral antimicrobial agents can be recommended for the initial management of pyelonephritis?

A. Cephalexin

B. Amoxicillin

C. Sulfamethoxazole-trimethoprim

D. Amoxicillin-clavulanate

A 38-year-old female is presenting to the emergency department for the first time complaining of increased frequency and urgency when urinating for the past 48 hours. Upon physical exam, there is noted left-sided flank pain. The patient has no other significant past medical history or recent surgery within 6-months. The team is asking what regimen they should prescribe for the patient.

A. Sulfamethoxazole-trimethoprim oral for 7 days

B. Ceftriaxone IV for one dose, then oral transition to sulfamethoxazole-trimethoprim for 14 days

C. Ceftriaxone IV for one dose, then oral transition to sulfamethoxazole-trimethoprim for 7 days

D. Sulfamethoxazole-trimethoprim oral for 14 days

Q1 Answer: C Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-515-L01-P

Implementation of Health-System Retail Pharmacist Transitions of Care Service

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Purpose

According to the Centers for Disease Control and Prevention (CDC), they are approximately 36 million hospital stays each year. The transitions of care (TOC) process involves a patient moving from one care setting to another (i.e. transitioning from the hospital to home). This can be considered a vulnerable period where the patient is at risk for adverse outcomes including medication errors, challenges related to medication affordability, and misunderstanding of discharge instructions.

An opportunity exists as it relates to the role of a health-system retail pharmacists (HSRP) within the TOC space. An HSRP is uniquely suited to assist patients given their training in motivational interviewing, knowledge of improving medication adherence, and ability to navigate the complexities related to sustainable medication access. Literature states that the success of a TOC program depends on the ability to navigate these factors effectively, as well as ensuring patient engagement and resource availability. Eskenazi Health aims to empower HSRPs to be proactive in their work preventing issues related to TOC. The purpose of the study is to assess a new TOC program by quantifying and describing interventions made by an HSRP. Some secondary endpoints that will be evaluated are patient satisfaction and pharmacist perceptions of the service.

Methods

The implementation of an HSRP-led TOC service is influenced by various external factors such as reimbursement for pharmacy clinical services. Addressing the potential for reimbursement in these services will be important to address in order to develop a sustainable service that aims to improve patient outcomes and understanding of their care.

Results

Preliminary results and conclusion will be presented at the Great Lakes Pharmacy Residents Conference in April 2025.

Word Count: 269

Learning Objectives:

Identify the gaps in current literature regarding the role of health-system retail pharmacists in the transitions of care process.

Discuss the process of implementation and evaluation of a health-systems retail pharmacist transitions of care service.

Self Assessment Questions:

Which of the following best explains the benefits and/or outcomes of a health-system retail pharmacist led transitions of care service?

A. Providing emotional support to patients during discharge to alleviate stress

B. Enhancing medication adherence and reducing adverse events through comprehensive medication reconciliation and patient education

C. Assisting physicians in creating discharge plans without direct patient interaction

D. Focusing solely on dispensing medications without addressing patient-specific care plans

What is a significant advantage of involving health-system retail pharmacists in transitions of care compared to traditional retail pharmacists?

A. Greater knowledge of over-the-counter medications

B. Ability to prescribe medications directly without physician approval

C. Increased access to electronic health records and collaboration with providers

D. More focus on dispensing rather than clinical services

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-817-L99-P

Medication Safety in Hospitalized Older Adults: Electronic Health Record Enhancements for Potentially Inappropriate Medications

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Statement of Purpose:
Medication management in hospitalized older adults presents a significant challenge due to complex health status and increased likelihood of experiencing adverse drug events (ADEs). Potentially inappropriate medications (PIMs) pose a heightened risk of ADEs that often outweighs their benefits in this population. The American Geriatrics Society Beers Criteria is a globally recognized, evidence-based tool listing PIMs to avoid in older adults to support safe prescribing practices. However, limited data demonstrate the impact of leveraging this list and restricting use in the inpatient setting. The purpose of this study is to evaluate the rates of PIM prescribing in hospitalized older adults, and assess if electronic health record (EHR) prescribing restrictions impact these rates, as well as associated adverse outcomes such as falls and delirium.

Methods:
This single-center, retrospective chart review examines elderly patients who were prescribed at least one predetermined PIM during hospitalization between January 1, 2024, and March 31, 2024 (pre-intervention), and November 11, 2024, through December 11, 2024 (post-intervention). Patients under the age of 65 and those with multiple admissions during the pre- or post-intervention timeframe were excluded. Patients were identified through the EHR if they had an order for any of the following medications during their inpatient stay: benzodiazepines, zolpidem, doxylamine, diphenhydramine, meclizine, hydroxyzine, prochlorperazine, methocarbamol, tizanidine, baclofen, or any first- or second-generation antipsychotics. The primary outcome is a descriptive analysis of PIM prescribing rates in hospitalized patients before and after the implementation of EHR enhancements for these agents in elderly patients. Secondary outcomes include the incidence of inpatient falls, delirium, and the occurrence of new adverse effects (central nervous system depression, respiratory depression, and anticholinergic side effects). Outcomes will be analyzed using descriptive statistics.

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

Learning Objectives:

Identify key prescribing changes prior to and after implementation of EHR enhancements limiting the prescribing of potentially inappropriate medications.

Discuss the potential benefits and limitations of EHR interventions in improving medication safety for older adults.

Self Assessment Questions:

Which of the following is a common adverse effect associated with potentially inappropriate medications (PIMs) in older adults?

A. Gastrointestinal bleeding
B. Central nervous system depression
C. Hypertension
D. Hyperglycemia

What secondary outcome is measured in the study that directly relates to patient safety?

A. Medication cost
B. Length of inpatient stay
C. Incidence of inpatient falls
D. Patient satisfaction scores

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-773-L05-P

Impact of Time to Antibiotics in High-Risk Febrile Neutropenia

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Febrile Neutropenia (FN) is defined as a single oral temperature of > 101Â°F or â‰¥ 100.4Â°F sustained over an hour, in addition to an absolute neutrophil count (ANC) < 500 cells/microliter or an ANC expected to decrease to < 500 cells/microliter over 48 hours. Patients with acute leukemia or who are undergoing an allogenic hematopoietic stem cell transplant are at high risk for FN due to their amount of immunosuppression. The purpose of this study is to determine the relationship between the time to antibiotic administration and outcomes in high-risk patients. Current Infectious Disease Society of America and National Comprehensive Cancer Network guidelines recommend empiric antibiotic administration within one hour of neutropenic fever development. These guidelines are based upon a low quality of evidence and existing research in sepsis. Despite the existence of these recommendations, not all patients receive antibiotics within one hour of fever development and little data exists comparing the time to antibiotics and adverse outcomes.

This retrospective, single-center, cohort study aims to compare the rates of a composite endpoint in high-risk FN patients admitted to the bone marrow transplant and hematologic malignancy services at University of Michigan Health between July 2023 and July 2024. The primary outcome is a composite endpoint of 30-day all-cause mortality and escalation of care. To assess the study outcomes, patients were screened and divided into two cohorts based on whether they received empiric antibiotic therapy â‰¤ 1 hour or â‰¥ 1 hour after the first incidence of fever during their admission. High-risk patients aged 18 and up who developed FN during their admission were included. Patients receiving broad spectrum antibiotic treatment for an active infection prior to fever development were excluded.

Data analysis is currently in progress. Results will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe current literature and guidelines suggesting the time to antibiotic administration in febrile neutropenia.

Outline the optimal steps for the initial management of febrile neutropenia.

Self Assessment Questions:

Which of the following is true regarding current guideline recommendations for antibiotic administration in febrile neutropenia?

A. Infectious Disease Society of America guidelines recommend antibiotic administration with 12 hours of fever development

B. National Comprehensive Cancer Network guidelines recommend antibiotic administration within 4 hours of fever developement.

C. Both Infectious Disease Society of America and National Comprehensive Cancer Network guidelines recommend antibiotic administration within 1 hour of fever development.

D. Infectious Disease Society of America guidelines recommending waiting for blood culture results prior to administering empiric antibiotics.

How many sets of initial blood cultures are recommended in a patient with no central venous catheter?

A. 1

B. 0

C. 2 from the same peripheral site

D. 2 from different peripheral sites

Q1 Answer: C Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-525-L01-P

Investigating How Pegfilgrastim Influences Pulmonary Toxicity with Bleomycin Therapy

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Purpose: The relationship between granulocyte colony-stimulating factors (G-CSFs), particularly pegfilgrastim, and the risk of bleomycin-induced pulmonary toxicity (BPT) remains unclear, with conflicting study outcomes. Bleomycin, commonly used in treating Hodgkin lymphoma and other cancers, carries a known risk of pulmonary toxicity. The NCCN guidelines advise against routine G-CSF use in Hodgkin lymphoma patients receiving ABVD or Stanford V regimens due to increased BPT risk but recommend its use in escalated BEACOPP to mitigate treatment-related toxicities. While G-CSFs are crucial for preventing chemotherapy-induced neutropenia, their potential role in increasing BPT risk requires further evaluation. This study aims to address this knowledge gap by analyzing a cohort of patients receiving concurrent bleomycin and pegfilgrastim therapy.

Methods: This IRB-approved retrospective case series examined patients aged 18 years or older diagnosed with various cancers who received bleomycin-containing chemotherapy with pegfilgrastim support at Henry Ford Health System institutions. The primary outcome was the incidence of BPT in patients receiving both agents concurrently. Pegfilgrastim use was defined as at least one dose administered during chemotherapy. BPT incidence was determined based on radiologic findings of pneumonitis within 90 days of bleomycin administration, physical exam findings suggestive of an interstitial process (e.g., basilar crackles, inspiratory lag), or symptoms such as persistent dry cough or dyspnea. Secondary outcomes included severity, time to onset, treatment modifications, and BPT incidence by cancer type. Statistical analyses, including descriptive statistics, paired t-tests/Wilcoxon signed rank tests, Kaplan-Meier analysis, and ANOVA, were used to assess outcomes as appropriate.

Results/Conclusion: Findings will be presented at the conference.

Learning Objectives:

Recognize common complications associated with bleomycin use in chemotherapeutic regimens.

Identify potential risks associated with pegfilgrastim use in patients receiving bleomycin-containing chemotherapy.

Self Assessment Questions:

What is a common side effect associated with bleomycin use in chemotherapeutic regimens?

A. Pneumonitis

B. Bone pain

C. Nephrotoxicity

D. Ototoxicity

What is a potential concern regarding the use of pegfilgrastim in patients receiving bleomycin?

A. Increased risk of anemia

B. Increased risk of febrile neutropenia

C. Increased risk of pulmonary toxicity

D. Reduced immune function

Q1 Answer: A Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-501-L01-P

Long-Acting Lipoglycopeptides versus Standard of Care in Non-Skin and Soft Tissue Infections

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Purpose: Dalbavancin and oritavancin are long-acting lipoglycopeptide antibiotics that inhibit cell wall synthesis. These agents are currently FDA-approved for the treatment of acute bacterial skin and soft tissue infections. Lipoglycopeptides have extended half-lives, allowing for less frequent dosing. While approved for skin and soft tissue infections, the study seeks to explore their use for infections requiring prolonged treatment, such as osteomyelitis. The study acknowledges that evidence supporting the use of these agents outside of their approved indications is limited. Therefore, the research aims to provide valuable insights into the potential benefits and drawbacks of utilizing long-acting lipoglycopeptides, aiding clinicians in making informed treatment choices and potentially optimizing patient care.
Methods: This is a retrospective chart review of adult patients treated at Bronson Methodist Hospital for a non-skin and soft tissue infection with dalbavancin or oritavancin from January 1, 2015, through November 15, 2024. Subjects treated with a long-acting lipoglycopeptide were matched to those treated with standard of care for similar indications. Patients with at least one follow-up visit within 6 months after completion of therapy were included in the study. The primary outcome of this study is clinical success 6 months following the completion of antibiotics. Clinical success is defined as the absence of any of the following: admission to hospital for similar indication, change in antibiotic therapy, surgical intervention related to infection, or death. Secondary outcomes included clinical success at 1 year after completion of antibiotics, and adverse drug reactions (renal toxicity, infusion-related reaction, or central line complication).

Learning Objectives:

Define the mechanisms of action and clinical efficacy of long-acting lipoglycopeptides in the treatment of non-SSTIs, specifically osteomyelitis

Describe the clinical and logistical benefits of utilizing long-acting lipoglycopeptides.

Self Assessment Questions:

Which of the following best describes the mechanism of action of long-acting lipoglycopeptides?

A. Inhibition of bacterial cell wall synthesis through binding to the D-Ala-D-Ala terminus

B. Disruption of bacterial protein synthesis by binding to the 30S ribosomal subunit

C. Inhibition of bacterial DNA gyrase and topoisomerase IV

D. Disruption of bacterial folic acid synthesis

What is a key advantage of long-acting lipoglycopeptides compared to standard of care for treating osteomyelitis?

A. Reduced risk of nephrotoxicity

B. Longer dosing intervals with sustained therapeutic levels

C. Broader spectrum of activity against gram-negative bacteria

D. Fewer gastrointestinal side effects

Q1 Answer: A Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-575-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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Background: Acute bacterial skin and skin structure infections (ABSSSIs), including cutaneous abscesses, are a common cause of emergency department (ED) visits. The standard management for abscesses involves incision and drainage (I&D), but the optimal duration of adjunctive antibiotic therapy remains unclear. While the Infectious Diseases Society of America (IDSA) recommends I&D alone for uncomplicated abscesses, the Surgical Infection Society (SIS) suggests a 7 to 10-day antibiotic course. This study evaluates the impact of short (â‰¤7 days) versus long (>7 days) antibiotic courses on outcomes in patients with uncomplicated skin abscesses.

Methods: This multicenter, retrospective cohort study included adults discharged from one of four Norton Healthcare EDs from January 1, 2019, to December 31, 2022, following I&D for uncomplicated skin abscesses. Patients were assigned to short-course (â‰¤7 days) or long-course (>7 days) antibiotic cohorts. The primary outcome was clinical failure within 14 days post-I&D, defined by follow-up visits for ABSSSI or an antibiotic change not due to drug-bug mismatch. Secondary outcomes included 30-day clinical failure and Clostridioides difficile infection rates within 90 days.

Results: The primary outcome of clinical failure within 14 days post-incision and drainage was observed in 10.2% of the short-course group and 10.4% of the long-course group ($p = 0.101$). For the secondary outcomes, clinical failure within 30 days was 12.9% in the short-course group and 13.9% in the long-course group ($p = 0.897$). The incidence of Clostridioides difficile infection was low, with one case in the short-course group and none in the long-course group ($p > 0.999$).

Conclusion: This study found no difference in clinical failure rates between short-course and long-course antibiotic therapy for uncomplicated skin abscesses post-incision and drainage. These findings support the potential use of shorter antibiotic courses for uncomplicated skin abscesses after I&D.

Learning Objectives:

Recall evidence-based guidelines for the management of uncomplicated skin abscesses

Review the clinical outcomes for patients receiving shorter versus longer courses of antibiotics for uncomplicated skin abscess following incision and drainage

Self Assessment Questions:

1. According to the 2020 Surgical Infection Society (SIS) guidelines, what is the recommended antibiotic duration for uncomplicated skin abscesses after I&D?

A. No antibiotics are recommended

B. 3-5 days

C. 5-7 days

D. 7-10 days

Which of the following statements is correct regarding the use of antibiotic therapy for uncomplicated skin abscesses?

A. Short-course therapy has a higher clinical failure rate than long-course therapy

B. Long-course therapy has a higher clinical failure rate than short-course therapy

C. No studies have specifically evaluated short versus long antibiotic courses in uncomplicated skin abscesses

D. Clinical failure rates do not differ significantly between patients receiving short versus long courses of antibiotics

Q1 Answer: D Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-621-L01-P

Efficacy of Midodrine Use Post-Kidney Transplantation for Tapering off Vasopressors

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Purpose: Vasopressors are commonly used post-kidney transplantation to manage hypotension. We hypothesized that the administration of midodrine, an oral alpha-1 agonist, would shorten the duration of angiotensin II use by facilitating weaning off vasopressors.

Methods: This single-center, retrospective study included patients who received angiotensin II (AT2) post-kidney transplantation between January 2021 and August 2024. The primary outcome was the duration of AT2 use. Secondary outcomes included the length of hospital stay (LOS) and intensive care unit (ICU) stay. Safety outcomes included incidence of hypertension, bradycardia, and arrhythmias.

Results: The analysis included 116 patients (35 no-midodrine and 81 midodrine). The mean age was 53 years, 44.8% were African American, and 52.6% were male. The no-midodrine group received AT2 for a significantly shorter duration compared to the midodrine group (median 29.5[IQR 7-54] hours vs 50 [IQR 7-54] hours, p<0.001). The median LOS was 9.25 (IQR 5.5â€“14) days in the no-midodrine group and 6.78(IQR 5.1â€“9.2) days in the midodrine group (p=0.029). The median ICU stay was 6.5(IQR 4.75â€“10) days in the no-midodrine group and 5.25(IQR 4â€“6.63) days in the midodrine group (p=0.045). The midodrine group had a higher incidence of hypertension (98.8% vs 91.4%, p=0.047). The incidence of bradycardia (6.2% vs 8.6%, p=0.640) and arrhythmias (22.2% vs 34.3%, p=0.173) were similar between the midodrine and no-midodrine groups.

Conclusion: Midodrine did not accelerate discontinuation of AT2 but did have significantly shorter LOS and ICU stays. The midodrine group had higher incidence of hypertension but no difference in incidence of bradycardia or arrhythmias.

Learning Objectives:

Review current evidence on the use of midodrine to accelerate the discontinuation of vasopressors

Describe the impact of midodrine on the duration of angiotensin II use post-kidney transplantation

Self Assessment Questions:

According to the MIDAS trial, was there a significant difference in the time to vasopressor discontinuation between the midodrine and placebo groups?

A. Yes, the midodrine group had a significantly shorter time to vasopressor discontinuation.

B. No, the time to vasopressor discontinuation was similar between the midodrine and placebo groups.

C. The placebo group had a significantly shorter time to vasopressor discontinuation.

D. The midodrine group had a significantly longer time to vasopressor discontinuation.

Based on the mechanism of action of midodrine and current evidence, why might midodrine be considered as a potential adjunct for facilitating the weaning off vasopressors in critically ill patients?

A. Midodrine's vasoconstrictive effect on peripheral arteries increases systemic vascular resistance, improving blood pressure and potentially reducing reliance on intravenous vasopressors.

B. Midodrine acts as a non-selective adrenergic agonist, enhancing both alpha-1 and beta-2 receptor activity, which accelerates the weaning process by increasing myocardial contractility and peripheral vasodilation.

C. Midodrine inhibits the synthesis of catecholamines, decreasing the need for vasopressors by reducing the body's endogenous vasoconstrictor levels.

D. Midodrine directly stimulates renin-angiotensin system activation, counteracting the effects of vasopressors and promoting faster discontinuation.

Q1 Answer: B Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-534-L01-P

Impact of Supportive Care Order Sentence Implementation on Outpatient Antibiotic Prescribing for Acute Bronchitis and Acute Rhinosinusitis

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Background: Upper respiratory tract infections (URIs) such as bronchitis and sinusitis are frequently treated by primary care providers with antibiotics despite being largely viral in nature with an estimated â‰¥90% incidence of viral etiology for each condition. Literature has shown that prescribing of non-antibiotic, supportive care therapies can result in comparable patient satisfaction scores to that of antibiotic prescribing. The purpose of this study is to assess the impact of interprofessional education paired with order sentence favorite implementation for supportive care options within the outpatient electronic health record on antibiotic prescribing.

Methods: This retrospective, quasi-experimental study evaluated patients aged 3 months and older who were diagnosed with acute bronchitis or acute rhinosinusitis in an encounter at three primary care clinics within Grand Rapids, Michigan. Patients diagnosed with acute bronchitis or rhinosinusitis between October 1, 2023, and January 31, 2024 were included in the pre-order sentence implementation group (pre-ASP) while the post-order sentence implementation group (post-ASP) included patients seen for the same indications between October 1, 2024 and January 31, 2025. Patients were excluded who had encounters that resulted in hospitalization, antibiotics ordered for refill, were receiving hospice care, or were identified as deceased prior to the last day of the study timeframe. The primary outcome is the incidence of antibiotics prescribed for an encounter with an associated diagnosis of acute bronchitis or acute rhinosinusitis. Secondary outcomes include comparing prescribing based on clinic location and provider, evaluating appropriateness of antibiotic regimens prescribed (indication, agent, dose, duration), supportive care ordered, incidence of reported adverse events from antibiotic and/or supportive care therapy within 7 and 30 days, follow-up encounter due to clinical decline within 7 and 30 days, and antibiotics ordered at follow-up encounter for clinical decline.

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

Learning Objectives:

Identify the impact of Healthcare Effectiveness Data and Information Set (HEDIS) measures on outpatient antimicrobial prescribing, reimbursement, and quality of care

Recognize the outcomes associated with antibiotic use in acute bronchitis

Self Assessment Questions:

It is estimated that HEDIS measures are utilized by what percentage of US health plans to evaluate performance and identify areas of improvement for care?

A. 0.3

B. 0.5

C. 0.7

D. 0.9

Smith and colleagues' evaluation of the existing studies using antibiotics to treat acute bronchitis found which of the following outcomes?

A. Daytime cough improved significantly with antibiotic utilization

B. Mean duration of cough was reduced by less than half a day for those on antibiotics

C. Lack of antibiotic use was associated with severe complications

D. Those receiving antibiotics were more likely described as â€œclinically improvedâ€ when compared to those without treatment

Q1 Answer: D Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-725-L01-P

Safety and Efficacy of Immediate vs Delayed Anticoagulation Reinitiation Post Total Hip Arthroplasty (THA) and Total Knee Arthroplasty (TKA)

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Statement of Purpose: At Indiana University Health, a guideline addressing anticoagulation interruption around elective procedures was developed but prescribing patterns vary. Adult data analyzing the safety and efficacy of anticoagulant interruption has found no difference when comparing bridging vs non bridging. However, there is limited data on the recommended reinitiation of anticoagulation around elective procedures. The purpose of this study will be to describe timing of anticoagulation reinitiation, analyze associated patient outcomes, and inform optimization of perioperative anticoagulation for patients undergoing total hip arthroplasty (THA) and total knee arthroplasty (TKA).
Statement of Methods: This retrospective cohort study was approved by the Indiana University Institutional Review Board. Adult patients on therapeutic anticoagulation undergoing elective THA or TKA from July 2020 to July 2024 were included. The primary efficacy outcome was incidence or arterial or venous thrombosis within 30 days of surgery between patients reinitiated on anticoagulation within 72 hours of surgery compared to those reinitiated on anticoagulation more than 72 hours postoperatively. The primary safety outcome was incidence of any bleeding event within 30 days of surgery among patients on therapeutic oral anticoagulation for whom anticoagulation was reinitiated within 72 hours vs more than 72 hours postoperatively. Secondary subgroup analysis analyzed the incidence of bleeding and thrombosis of patients on warfarin who were bridged vs not bridged postoperatively.
Summary of results to support conclusion: Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:
Discuss the safety and efficacy of delayed anticoagulation reinitiation after THA or TKA.
Select the appropriate time for anticoagulation reinitiation in patients post an elective THA or TKA.
Self Assessment Questions:
According to the CHEST guidelines, when should anticoagulants be reinitiated post elective THA or TKA procedures?
A. Anticoagulation does not need held
B. 12 hours
C. 24-48 hours
D. 5 days
All of the following indications would impact the consideration to reinitiate anticoagulation postoperatively except:
A. History of atrial fibrillation
B. Left ventricular ejection fraction less than 40%
C. Bilateral pulmonary embolisms 2 months ago
D. Mechanical mitral valve
Q1 Answer: C Q2 Answer: B
APCE Universal Activity Number 0121-9999-25-774-L05-P

Evaluation of a Pharmacist-Led Telehealth Service to Improve Adherence to Evidence-Based Recommendations for Patients with Hypertensive Disorders of Pregnancy

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Purpose: Hypertensive disorders of pregnancy (HDP) are a leading cause of maternal morbidity and mortality in the United States and prevalence is on the rise. The overarching goal of pharmacist-led Womenâ€™s Health Services at Community Health Network is to reduce maternal morbidity and mortality. For this study, women are followed within the first 6 weeks postpartum as they are among the highest risk for complications related to hypertension. The study's primary objective is to evaluate adherence to evidence-based postpartum blood-pressure checks for HDP among patients followed by a pharmacist compared to those followed by a different healthcare provider.

Methods: This study is a retrospective chart review of patients from October 1, 2023, to September 31, 2024. Eligible patients were divided into two cohorts: one managed by standard of care and the other by clinical pharmacists. Inclusion criteria include adults â‰¥18 years with hypertensive disorders, postpartum status, and on at least 2 antihypertensive medications. Exclusion criteria for the pharmacist group was any referral for pharmacy services but no hypertension visit occurred or was not completed with the pharmacist. Data collection included demographics and outcomes (follow-up adherence, home blood pressure assessment, hospital readmission, pharmacist-identified medication issues and interventions). Demographic data will be analyzed using descriptive statistics. The primary outcome will be analyzed using either a Chi-Square or McNemar test.

Results: A total of 152 patients met inclusion criteria for the study (pharmacist cohort, n=76 and standard of care cohort, n=76). Preliminary demographic data for the pharmacist cohort shows that 52.6% of patients are Black, 97.4% are not Hispanic or Latino, 40.8% are 35 or older, and 35.5% have IN Medicaid. However, data collection is ongoing, and results will be presented at Great Lakes Pharmacy Residency Conference.

Conclusion: Will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the impact of pharmacist-led Women's Health services on postpartum hypertension management and adherence to recommended follow-up interval.

List the key outcomes associated with pharmacist involvement in managing hypertensive disorders of pregnancy.

Self Assessment Questions:

According to ACOG guidelines, what is the recommended interval for postpartum blood pressure measurement following discharge?

A. Within 24 hours for severe hypertension and within 72 hours for hypertension

B. Within 7-10 days for all women with hypertension

C. Within 72 hours for severe hypertension and 7-10 days for hypertension

D. Within 30 days for all women with hypertension

All of the following are a potential outcome of pharmacist-led telehealth services on postpartum hypertension management except:

A. Improved adherence to follow-up blood pressure monitoring

B. Decreased need for OB/GYN visits, pharmacist service replaces recommended postpartum care

C. Increased access to care despite transportation or childcare barriers

D. Enhanced patient education on medications and long-term risks associated with HDP

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-527-L01-P

Evaluation of Clinical Outcomes with Varying Doses of Induction and Paralytic Agents in Rapid Sequence Intubation

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There has been significant heterogeneity in rapid sequence intubation practices in the past. Some key areas of variance include medication selection, medication dose, pre-induction, and paralysis practices. A large observational study encompassing a multitude of geographically diverse institutions assessed practices in 2018 and reported that succinylcholine was administered to 13% of patients in which it was contraindicated. In addition, most patients who received a non-depolarizing paralytic, primarily rocuronium, did not receive adequate sedation following intubation. Due to these findings the author concluded there is high variability amongst providers and medications are often used inappropriately. Currently, there is very limited evidence assessing the safety and efficacy when comparing lower doses of agents for rapid sequence intubation (RSI) vs. standard recommended doses. Our research team intends to provide evidence in this area to inform medication dosing decisions for RSI. This is a multi-center retrospective analysis of patients undergoing rapid sequence intubation in the medical intensive care unit with an induction and paralytic agent at TriHealth institutes between July 1, 2022 and July 1, 2024. Pregnant patients and prisoners were excluded as well as patients with the presence of known contraindication or allergy to RSI agents, Covid-19, or no documented weight. The primary outcome will be first pass success rate. Secondary outcomes will include a composite of hemodynamic instability, hypotension, and hypoxemia. Results and conclusion will be reported at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe agents commonly utilized in rapid sequence intubation

Identify key considerations of rapid sequence intubation

Self Assessment Questions:

Which reversal agent is indicated for reversal of non-depolarizing neuromuscular blockers?

A. Protamine

B. Dantrolene

C. Sugammadex

D. Naloxone

What is a contraindication for the use of succinylcholine

A. Renal failure

B. Hyperkalemia

C. Fever

D. Obesity

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-622-L01-P

Impact of pharmacist led medication adherence calls on readmission rates, blood pressure and A1C trends, and medication adherence status according to the payor

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Statement of Purpose: In 2012, the Surgeon General reported approximately 133 million people suffered from a chronic disease state and about 125,000 deaths per year were associated with medication nonadherence. Hospital admissions are 33 â€“ 69% likely to be associated with poor adherence to medications. Hospitals receive lower reimbursement rates for higher rates of hospital readmissions. Poor adherence has been estimated to cost $300 billion in both direct and indirect expenses. In 2022, it was reported that about 50% of Americans failed to take their medications as prescribed. Pharmacists are under-utilized members of the healthcare team in many settings. If pharmacist-initiated medication adherence calls improve medication adherence, then it may suggest that this ongoing service could help determine the benefit pharmacists have in patient care and in decreasing hospital readmission and the associated financial implications. Statement of Methods Used: Using insurance generated reports that identify nonadherent patients, population health and quality improvement personnel create a compiled report that is screened by the pharmacists. Two companies were randomly chosen as the pool for the patient population and all reports from April 2023 - May 2024 were compiled into separate spreadsheets. Patients were randomly chosen and placed into two study groups. The intervention group included patients that received a medication adherence call from a pharmacist within Saint Joseph Health System and the control group consisted of patients that did not receive a medication adherence call. Chart review of the electronic health record will aid in gathering the necessary information for statistical analysis: patientâ€™s medication adherence status, emergency department visits, and A1C and blood pressure measurements during the study period. Results/Conclusions: Data analysis is currently in progress and results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Explain the correlation between medication non-adherence and poor outcomes such as hospital readmission or labs associated with uncontrolled diabetes or hypertension according to current practice guidelines.

Recognize the role that pharmacists can have in improving medication adherence and the associated direct and indirect cost to the patient and the healthcare system.

Self Assessment Questions:

1. What is the correlation between medication non-adherence and rates of hospital readmission, according to a report from the Surgeon General in 2012?

A. direct correlation

B. indirect correlation

C. no correlation

D. unknown

2. Which of the following best describes the role of pharmacists in improving medication adherence and its impact on healthcare costs?

A. a. Pharmacists can only dispense medications and do not have a role in improving adherence, reducing hospitalizations, or preventing complications.

B. b. Pharmacists are responsible for diagnosing patients and prescribing medications, but are not concerned with adherence, hospitalizations, or complications.

C. c. Pharmacists can only focus on lowering the cost of medications but have no influence on adherence or reducing hospitalizations and complications.

D. d. Pharmacists can educate patients and provide reminders to improve adherence which could reduce hospitalizations and prevent complications.

Q1 Answer: A Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-805-L99-P

Association Between Vancomycin Area Under the Curve and Nephrotoxicity: A Retrospective Study

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Purpose

Vancomycin, a glycopeptide antibiotic, is commonly associated with nephrotoxicity. This adverse effect can often cause increased length of stay, additional interventions, and failure of treatment. Current guidelines recommend a targeted AUC to minimum inhibitory concentration (MIC) ratio of 400-600 mg*h/L for both efficacy and safety, but multiple reviews have suggested increased nephrotoxicity with vancomycin regimens that target a ratio greater than 550 mg*h/L. The objective of this study is to analyze the relationship between vancomycin AUC and acute kidney injury (AKI).

Methods

This study will evaluate the incidence of AKI, as defined by an increase in the serum creatinine (SCr) level of â‰¥0.5 mg/dL, or a 50% increase from baseline in consecutive daily readings, or a decrease in calculated creatinine clearance (CrCl) of 50% from baseline on two consecutive days, in patients treated with vancomycin. The electronic health record will be used to identify patients admitted to three community hospitals in central Indiana between July 2023 and June 2024, who received at least one dose of intravenous vancomycin and had a at least one vancomycin serum level measured. Patients with end stage renal disease, no baseline SCr, pregnant or less than 18 years of age will be excluded. The following data will be collected: patient age, gender, height, weight, SCr, CrCl, current medications, vancomycin dosage regimen and levels. The data will be analyzed to determine the frequency of AKI in patients with AUC values grouped into the following ranges: <400, 401-450, 451-500, 501-550, 551-600, and >600. Descriptive statistics will be used to outline the patient characteristics in each AUC group. Inferential statistics will be used to determine the relationship between vancomycin AUC and frequency of AKI.

Learning Objectives:

Describe the risk factors that increase the potential for vancomycin-associated nephrotoxicity

Relate the calculated area under the curve (AUC) of vancomycin to its therapeutic effect

Self Assessment Questions:

Which of the following patients is most likely to develop nephrotoxicity with a vancomycin regimen that produces an AUC of 556?

A. A 24-year-old female presenting with community-associated pneumonia

B. A 68-year-old male with a history of urinary tract infections presenting with a methicillin-resistant Staph aureus (MRSA) bacteremia

C. An 89-year-old female with stage 4 chronic kidney disease, who is receiving chronic naproxen for osteoarthritis, presenting with septic arthritis status post total knee replacement

D. A 54-year-old male with a history of type 2 diabetes mellitus presenting with osteomyelitis secondary to a diabetic foot infection

Which statement most accurately describes a vancomycin dosing regimen with a calculated AUC of 389?

A. This regimen is likely to be effective against infections with confirmed methicillin-resistant Staph aureus (MRSA)

B. This regimen is unlikely to cause nephrotoxicity in most patients

C. The AUC can be increased by extending the dosing interval

D. The AUC can be increased by higher doses, which will result in more rapid killing of pathogens

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-704-L01-P

Unraveling the Delirious Knot: Cyclobenzaprine vs. Methocarbamol in Cardiac Surgery Patients

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Purpose:
Delirium is associated with higher mortality, longer hospital stays, extended mechanical ventilation, increased costs, and more cognitive disorders after ICU discharge. The etiology and risk factors for delirium include electrolyte imbalances, inflammation, metabolic disturbances, physiological stressors, and neurotransmitter alterations. Postoperative cardiac surgery patients experience many of these risk factors. Effective pain control can reduce development of delirium and is crucial for recovery and mobilization, where multimodal analgesia is recommended. Muscle relaxants like cyclobenzaprine or methocarbamol are an element of multimodal analgesia. There are differences in the mechanism of action and neurotransmitter effects between cyclobenzaprine and methocarbamol, and impact of these agents on delirium in cardiac surgery has not been described. This study aims to compare the incidence of post-operative delirium in patients receiving cyclobenzaprine versus methocarbamol.
Methods:
This retrospective cohort study will include adult post-cardiac surgery patients admitted to the Cardiovascular Intensive Care Unit between January 1, 2020, and August 31, 2024. Patients will be separated into two cohorts based on whether they received methocarbamol or cyclobenzaprine post-operatively. Patients will be followed for 14 days from the date of surgery or until ICU discharge, whichever is earlier. The study will analyze the incidence of delirium in patients receiving methocarbamol or cyclobenzaprine, determined using the CAM-ICU. The primary outcome is the incidence of post-operative delirium. Secondary outcomes include ICU length of stay (LOS), requirements for anti-psychotic or sedative medications, physical and occupational therapy participation, incidence of new-onset atrial fibrillation, hypotensive events, and opioid requirements during ICU LOS. Descriptive statistics will describe baseline characteristics. Categorical variables will be compared using Chi-square or Fisherâ€™s exact test. Continuous variables will be assessed using Mann-Whitney U or Studentâ€™s t-test. Multivariable logistic regression will describe relationships and assess correlations between independent variables and potential confounders.
Results and Conclusion: To be presented.
Learning Objectives:

Describe the pharmacology, mechanism of action, and adverse effect profiles of cyclobenzaprine and methocarbamol.
Outline risk factors, prevention strategies, and assessment of delirium in the ICU.
Self Assessment Questions:
Delirium etiology is multifactorial. Which of the following is a proposed factor for delirium development?
A. Fast inpatient discharge
B. Neurotransmitter Alterations
C. Participation in daily physical therapy/ occupational therapy sessions
D. Increased and frequent reorientation for patient
After cardiac surgery, effective pain control is crucial for comfort, healing, and early mobilization. A multimodal pain regimen is recommended because it uses various analgesics targeting different receptors, providing more effective pain relief than a single agent. Which of the following is a medication commonly used in multimodal pain control?
A. Quetiapine
B. Trazadone
C. Acetaminophen
D. Clonidine
Q1 Answer: B Q2 Answer: C
APCE Universal Activity Number 0121-9999-25-508-L01-P

Evaluating Administration of Norepinephrine: An Analysis of Duration of Peripheral Administration

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Purpose: Norepinephrine is the preferred vasopressor for maintaining the mean arterial pressure in adult patients with septic shock. The administration of norepinephrine is recommended via a central line due to the risk of extravasation and tissue injury. However, peripheral administration is acceptable when a central line cannot be placed. Current literature suggests that the benefits of early administration outweigh risks of administration via a peripheral line until a central line can be placed. This study aimed to assess the adherence to recommendations at a network of community hospitals. The data found in the study will be used to support process improvements in placement of central lines and medication evaluation as necessary.

Methods: Patients who were initiated on norepinephrine at three urban community hospitals between January 1st, 2024, and July 31st, 2024, were identified from the electronic medical record system. 200 patients were randomly selected and assigned a study number and data was stored without identifiers and confidentially. Inclusion criteria was age â‰¥18 years old who required a continuous infusion of norepinephrine for a minimum of 24 hours. Exclusion criteria included patients who are pregnant, prisoners, or age above 90. Demographic data included age, sex, weight, race, Sequential Organ Failure Assessment score, and vasopressor indication was collected. Clinical information also obtained pertaining to the venous access and norepinephrine included IV-gauge and location, duration infused peripherally, concentration, maximum rate, location where norepinephrine was initiated within hospital, and central line placement. Lastly, time until extravasation, administration of antidotes, and location of extravasation was collected. The primary outcome was duration infused peripherally. The secondary outcomes of this study were the incidence of extravasation, time to extravasation, and the incidence of administration peripheral vs centrally.

Data collection is in progress. Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Explain the benefits and risks associated with administration of norepinephrine peripherally and when peripheral administration is appropriate or necessary

Select an appropriate treatment for extravasation of norepinephrine.

Self Assessment Questions:

Norepinephrine should be administered via a peripheral line if

A. The patient is expected to be on norepinephrine for 2 days or less

B. If it is being administered in an IV where extravasation can be easily observed

C. Use is needed immediately to maintain mean arterial pressure until central line be placed

D. Being used with at least one other vasopressor

If extravasation of norepinephrine occurs an appropriate choice of treatment would be

A. Hyaluronidase

B. Dimethyl sulfoxide

C. Cold compress

D. Phentolamine

Q1 Answer: C Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-778-L05-P

Aminoglycoside Guideline Update and AKI Rate

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Aminoglycosides are used to empirically treat gram negative infections however, due to risk for adverse effects such as nephrotoxicity use is generally limited. In June of 2023, the Clinical and Laboratory Standards Institute (CLSI) updated the aminoglycoside breakpoints for Pseudomonas aeruginosa and Enterobacterales based on the review of more recent pharmacokinetic and pharmacodynamics (PK/PD) data. These breakpoint changes included removing breakpoints for gentamicin and amikacin, for sites outside the urine, for Pseudomonas aeruginosa. A tobramycin dose of 7 mg/kg was used to establish the updated breakpoints, as using a lower dose would have reduced likelihood of meeting the PK/PD targets. Consequently, our center released an updated aminoglycoside guideline in March of 2024. The primary modification was the recommendation to give a one-time dose of tobramycin 7 mg/kg when empiric gram negative coverage is desired.

The primary purpose of this study is to assess guideline adherence and rates of AKI with high-dose aminoglycosides.

This study is a retrospective chart review that will include adults admitted to our center who received an IV aminoglycoside dose between October 1st 2023 and November 20th 2024. Patients were excluded if the indication was for gram positive synergy, or if the patient was in the obstetric or cystic fibrosis population. The first primary outcome of the study will be comparing the difference in AKI rates between patients getting a high-dose of an aminoglycoside (defined as >6.3 mg/kg gentamicin or tobramycin or >18 mg/kg for amikacin) and a low-dose. Patients were excluded from AKI analysis if they died within 5 days of the last aminoglycoside dose. The second primary outcome will be assessing what percentage of aminoglycoside doses were adherent to the guideline update.

Data collection and analysis is currently ongoing. Results will be presented at the 2025 Great Lakes Pharmacy Residency Conference.

Learning Objectives:
Describe the main adverse effects of aminoglycosides and the historical trends of aminoglycoside use
Recognize how the new CLSI breakpoint changes affected dosing strategies for aminoglycosides
Self Assessment Questions:
Why has the use of aminoglycosides declined in recent years?
A. Inconveniently frequent dosing regimens
B. Increased resistance patterns and concerns over nephrotoxicity
C. High cost
D. Only available in IV formulations
How did the 2023 CLSI breakpoint changes affect the use of aminoglycosides for Pseudomonas aeruginosa and Enterobacterales?
A. They recommended lower doses of aminoglycosides to minimize toxicity

B. They removed or lowered breakpoints for amikacin and gentamicin, depending on the species and origin of isolates
C. They classified all aminoglycosides as ineffective against these pathogens
D. They mandated the use of combination therapy with beta-lactams for synergy
Q1 Answer: B Q2 Answer: B
APCE Universal Activity Number 0121-9999-25-518-L01-P

Comparison Between Megestrol Acetate and Dronabinol for Appetite Stimulation in Cancer Patients
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Purpose:
Cachexia is a characterized by loss of skeletal muscle mass (with or without loss of fat mass) that cannot be entirely reversed by standard dietary supplementation, leading to gradual functional impairment. It is marked by a negative protein and energy balance caused by a varied mix of decreased food intake and aberrant metabolism. The condition is prevalent among cancer patients with advanced disease. The 2011 American Society of Clinical Oncology practice guidelines have noted there are multiple agents utilized for cachexia, but current evidence is insufficient to recommend a specific drug. The purpose of this study is to evaluate two of the preferred institutional agents, megestrol acetate and dronabinol, and to determine the potential benefit in the setting of cancer-associated weight loss.

Methods:
This study is a retrospective chart review of cancer patients who received megestrol acetate or dronabinol at Powers Health between January 1, 2021, and January 1, 2024. Inclusion criteria are as follows: adults (greater than or equal to 18 years) with active cancer or blood disorders, ECOG score 0-3, able to tolerate oral intake, and naÃ¯ve to either medication, with at least 7 days of therapy. Patients were excluded if they had feeding tubes or TPN, documented edema, ascites, ECOG score 4, pregnancy, uncontrolled hypertension, heart failure exacerbation, history of thromboembolic disease, alimentary tract obstruction, malabsorption, intractable vomiting, or AIDS. Data collection will include age, gender, weight at admission, ECOG score, cancer type/stage, chemotherapy received, diet, meal intake before and after therapy, and average medication dose. The primary endpoint is meal intake improvement, assessed after at least 7 days of treatment. Secondary endpoints include weight gain and therapy duration. Safety endpoints include adverse drug reactions and development of DVT/PE.
Results and Conclusions:
Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.
Learning Objectives:
Identify potential options for treatment of cachexia in the setting of cancer
Discuss the potential benefits of utilizing the different treatment options for cachexia
Self Assessment Questions:
Which of the following is most likely to be associated with cachexia?
A. Lung
B. Gastrointestinal
C. Thyroid
D. Multiple Myeloma
What is a common side effect associated with megestrol acetate?
A. Nausea
B. Tinnitus
C. Venous thromboembolism
D. Visual disturbances
Q1 Answer: A Q2 Answer: C
APCE Universal Activity Number 0121-9999-25-552-L01-P

Quality Improvement Study: Evaluating the Time of First Antibiotic Dose in Pediatric Critical Care Patients.
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Statement of Purpose. Sepsis, bacteremia and pneumonia carry a substantial morbidity and mortality burden in infants and children. Antibiotics are recommended to be initiated within 60 minutes of identification of selected infectious diagnosis to improve outcomes. Not only is prompt initiation of antibiotics important, but the selection of appropriate antibiotics is also crucial. However, despite established guidelines, delays in antibiotic administration beyond the recommended timeframe and incorrect antibiotic selection continues to be observed in clinical practice. The aim for this project is to address delays and improve the antibiotic management of pediatric sepsis, bacteremia, and pneumonia.
Statement of Methods Used. This was a single-center, retrospective study of pediatric patients admitted from January 1, 2023 to December 31, 2023 at a tertiary care centerâ€™s pediatric intensive care unit (PICU). The primary objective was to assess the frequency of delayed administration of intravenous (IV) antibiotics among PICU patients. Secondary objectives included identification of rate-limiting steps causing delays and appropriate antibiotics selection.
Summary of Results. The average time from order entry to administration was 1 hour and 41 minutes. Only 25% of orders were administered within 60 minutes, which is the recommended timeframe. Analysis of individual steps revealed the average time from order entry to verification was 14 minutes; whereas, average time from verification to antibiotic administration was 1 hour and 27 minutes.
Conclusions Reached. This study shows there is an opportunity for process improvement from pharmacist verification to nurse administration. Steps that can be optimized through process changes include adjusting order urgency, and education of staff to prioritize first dose antibiotic administration.

Learning Objectives:

Describe the importance of timeliness of antibiotic administration and appropriateness of antibiotic selection.
Review areas of opportunity to improve timeliness of antibiotic administration to pediatric critical care patients.

Self Assessment Questions:

What is the ideal time from order entry to administration of antibiotics to patients with suspected sepsis?
A. Less than 90 minutes
B. Less than 60 minutes
C. Less than 45 minutes
D. Less than 30 minutes
From this quality improvement project, what area was identified as an opportunity for improving timeliness of antibiotic administration?
A. Time to sepsis recognition
B. Time from order entry to order verification
C. Time from order verification to antibiotic administration
D. Time to make the antibiotics in the IV room
Q1 Answer: B Q2 Answer: C
APCE Universal Activity Number 0121-9999-25-537-L01-P

Anti-Xa Driven Compared to Empiric Initiation of VTE Prophylaxis in Patients on Apixaban/Rivaroxaban

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Venous thromboembolism (VTE) is a serious complication in acute trauma patients. The EAST, AAST, and WTA guidelines all recommend VTE prophylaxis initiation in trauma patients but make no recommendations for patients on direct oral anticoagulants (DOAC) prior to admission. Data suggest a strong correlation between low molecular weight heparin (LMWH) anti-Xa concentrations and both rivaroxaban and apixaban serum concentrations, which may aid clinicians in quantifying DOAC drug concentrations. However, there is currently no evidence evaluating the clinical impact of anti-Xa monitoring prior to VTE prophylaxis initiation. This study aims to evaluate anti-Xa monitoring compared to no monitoring prior to VTE prophylaxis initiation in trauma patients on apixaban or rivaroxaban prior to admission.

Adults admitted to the University of Cincinnati Medical Center for acute traumatic injuries and taking apixaban or rivaroxaban prior to arrival were included. Exclusion criteria were an anti-Xa <0.1 IU/mL on admission, no anticoagulant given within seven days of admission, pregnancy, and incarceration. Patients will be placed in two cohorts based on anti-Xa monitoring prior to VTE prophylaxis initiation: empiric (â‰¤1 anti-Xa) or monitored (>1 anti-Xa). The primary outcome compared VTE incidence between cohorts. Secondary outcomes compare major and minor bleeding events, time to VTE prophylaxis initiation, and identify the optimal anti-Xa threshold for VTE prophylaxis initiation. A multivariant logistical regression analysis will be performed to identify independent risk factors for VTE.

Data collection and analysis are ongoing and final results will be presented at the GLPRC conference.

A conclusion will be forthcoming based upon complete results of the study.

Learning Objectives:

Discuss current literature for VTE prophylaxis in trauma patients and correlation data between low molecular weight heparin anti-Xa and direct acting oral anticoagulant drug levels

Identify a research opportunity to optimize VTE prophylaxis initiation in trauma patients on direct oral anticoagulants prior to admission

Self Assessment Questions:

Which of the following is true regarding trauma guideline recommendations on venous thromboembolism (VTE) prophylaxis in patients taking direct oral anticoagulants (DOAC) prior to arrival?

A. Guidelines make no specific reference to patients taking DOACs, but state to initiate VTE prophylaxis once coagulopathy and ongoing bleeding has resolved

B. All current guidelines recommend starting VTE prophylaxis between 48 and 72 hours after admission inpatients taking DOACs

C. Guidelines recommend not delay VTE prophylaxis for patients on DOACs

D. Guidelines only recommend VTE prophylaxis in these patients if their injury severity score is less than 9

Which statement regarding current correlation data between LMWH anti-Xa concentrations and direct acting oral anticoagulant (DOAC) drug concentrations is true?

A. Heparin/LMWH anti-Xa levels cannot be reported once >1.8 so correlation data does not translate to clinical applicability

B. Heparin/LMWH anti-Xa levels and DOAC drug concentrations do not correlate strongly, therefore limiting the clinical applicability

C. Anti-Xa and DOAC drug concentrations correlate strongly however no literature has evaluated the clinical utility of these findings

D. Anti-Xa and DOAC drug concentrations correlate strongly and anti-xa levels can be used to decrease rates of VTE

Q1 Answer: A Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-616-L01-P

Minocycline vs. trimethoprim/sulfamethoxazole for treatment of Stenotrophomonas maltophilia infections

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Trimethoprim/sulfamethoxazole (TMP/SMX) or minocycline (Mino) are recommended for the treatment of Stenotrophomonas maltophilia however, there is a lack of comparative clinical data. The objective of this study was to assess clinical outcomes between patients treated with TMP/SMX or Mino for infections due to S. maltophilia.
This was a retrospective cohort study of patients admitted from 8/20/2019 to 2/19/2024. Adult patients with clinical signs of infection; a culture growing S. maltophilia; and who received TMP/SMX or Mino â‰¥ 48 hours were included. Patients were excluded if they received combination therapy; had a non-susceptible S. maltophilia isolate; died or were transferred to hospice within 48 hours of treatment; or had S. maltophilia isolated from the urine. The primary outcome was 28-day all-cause mortality. Secondary outcomes included in-hospital mortality, microbiological cure at the end of therapy (EOT), clinical response at EOT, and adverse effects requiring treatment discontinuation.
A total of 109 patients were included (TMP/SMX, n=59; Mino, n=50). A majority of patients were male (64%) and African American (65%). The median age was 64 (45-72) yo for Mino group and 57 (46-66) yo for TMP/SMX group. Overall, the most common infection was pneumonia (79%), and a majority of cultures were polymicrobial (81%). The median TMP/SMX dose was 12.5 mg/kg/day, and the median Mino dose was 200 mg/day. The primary outcome of 28-day all-cause mortality occurred in 25% of TMP/SMX patients and 20% of Mino patients. In-hospital mortality (30% vs. 32%), and clinical response at EOT (41% vs. 62%) were also simliar for TMP/SMX and Mino, respectively. No treatments were discontinued due to adverse effects. Further statistical analysis is pending.
TMP/SMX had similar rates of mortality and clinical outcomes when compared to Mino for the treatment of S. maltophilia. Further analysis should be conducted to confirm the findings of this study.

Learning Objectives:

Identify potential treatment options for Stenotrophomonas maltophilia infections and describe their potential adverse effects

Report the findings of the this research project and identify how these findings fit into clinical practice.

Self Assessment Questions:

Stenotrophomonas maltophilia has developed which of the following for antibiotic resistance?

A. Beta-lactamases

B. Aminoglycoside acetyltransferase enzymes

C. Efflux pumps

D. All of the above

The patient is a 54 year old male who presents with a pneumonia. Respiratory cultures taken on admission are growing Stenotrophomonas maltophilia? All labs are within normal limits, and his vitals are stable. Which of the following would be the most appropriate therapy?

A. TMP/SMX

B. Levofloxacin

C. A and C

D. A and C

Q1 Answer: D Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-683-L01-P

A Review of Weight-Based Enoxaparin Dosing in Underweight Hospital Patients Receiving Venous Thromboembolism Prophylaxis

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Venous thromboembolism (VTE) is a broad term used to encompass deep vein thrombosis (DVT) and pulmonary embolism (PE) which are blood clots that form in veins. VTE can be prevented by moving the legs every few hours when sitting for long periods of time, medical compression stockings, and anticoagulation medication which can also be used to prevent VTE. Several anticoagulants are approved for prophylaxis such as heparin, rivaroxaban, fondaparinux, and enoxaparin. Enoxaparin may be preferred over other anticoagulants due to the quick onset of action and subcutaneous administration. Enoxaparin prophylaxis dosing is standardized while treatment dosing is based on weight. For those who are underweight, the standard prophylaxis dose of enoxaparin may be the same dose or like the treatment dose for those patients.

The purpose of this research is to assess the safety and efficacy of enoxaparin weight-based dosing in underweight patients receiving VTE prophylaxis.

Reports will be used to collect data from January 1, 2023 â€“ December 31, 2024 on patients who received enoxaparin at the McLaren Greater Lansing hospital. Records will be identified from a report of inpatients that received at least one dose of enoxaparin and pulled using an Encounter Number. Patients will be excluded if they are under 18 years of age, pregnant, incarcerated, or are found to be SARS-CoV-2 positive. The primary objective is to evaluate bleed risk, in regard to hemoglobin levels, and VTE occurrence within 30 days of hospital discharge of standard vs. reduced enoxaparin prophylaxis for VTE in low body weight patients. Studies collected from the American Society of Hematology (ASH) Clinical Practice Guidelines on Venous Thromboembolism will be utilized to assess appropriateness of enoxaparin dosing and frequency. Descriptive statistics will be used to analyze the data.

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

Learning Objectives:

Explain why enoxaparin is weight based

List two major risks associated with enoxaparin use

Self Assessment Questions:

Why is enoxaparin weight based?

A. Toxicity levels

B. Volume of distribution

C. Amount of muscle mass

D. Hepatic metabolism

What are two major risks associated with enoxaparin?

A. Organ damage, infertility

B. Cirrhosis, nausea/vomiting

C. Bleeding, thrombocytopenia

D. Alopecia, dermatitis

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-730-L01-P

Appropriateness of discharge antibiotic durations for patients with urinary tract infections

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Purpose: Urinary tract infections (UTIs) are one of the most common sites of bacterial infection, but over the last decade, there has been an increase in UTI related antimicrobial resistance which is likely due to treatment overprescribing and inadequate treatment agent selection. The purpose of this study was to determine the incidence of inappropriate antibiotic durations prescribed for the treatment of UTIs at the time of discharge in patients who were admitted for less than versus greater than 48 hours.
Methods: This study was a single-center retrospective chart review of patients admitted from October 20, 2023, to June 18, 2024. Patients at least 18 years of age were included if they received a discharge antibiotic prescription for a UTI. Patients were excluded if they had a chronic indwelling catheter, were immunocompromised, required antibiotics for another source of infection, or were discharged to a facility. The primary outcome was to compare the percentage of inappropriate treatment durations based on length of stay. Appropriate durations were defined as within 48 hours of guideline recommendations. Secondary outcomes were to compare 30-day readmission rates based on appropriateness of antibiotic duration and compare usual duration of antibiotic therapy prescribed for the treatment based on length of stay. Chi-squared, Fisherâ€™s Exact, and Mann-Whitney U tests were used to evaluate data in IBMÂ® SPSS Statistics, as appropriate.
Results/Conclusions: Of 250 patients evaluated, 178 were prescribed appropriate treatment durations while 72 were prescribed inappropriate treatment duration. Of patients admitted less than vs greater than 48 hours, there was no difference in percentage of inappropriate treatment durations (33.6% vs 24.0%, p=0.094). This study also demonstrated that there was no difference in the usual duration of antibiotics prescribed based on length of stay (p=0.704). On average, patients were treated for a total duration of 7.73 days.

Learning Objectives:

Recall current IDSA recommended treatment courses including appropriate agents for uncomplicated vs complicated UTI coverage.

Identify appropriate antibiotic treatment durations based on specific agent selected for uncomplicated vs complicated UTI coverage.

Self Assessment Questions:

All of the following are appropriate empiric agents for the treatment of uncomplicated urinary tract infections except:
A. Nitrofurantoin
B. Trimethoprim/sulfamethoxazole
C. Doxycycline
D. Ciprofloxacin
2.A 45 year old female presents with a low grade fever and complaints of increased urinary urgency and worsening flank pain. Which of the following would be the most appropriate empiric treatment course for her?
A. Ciprofloxacin 500 mg BID x3 days
B. Amoxicillin/clavulanate 875 mg BID x7 days
C. Nitrofurantoin monohydrate 100 mg BID x7 days
D. Trimethoprim/sulfamethoxazole 2 DS tabs BID x7 days
Q1 Answer: C Q2 Answer: B
APCE Universal Activity Number 0121-9999-25-608-L01-P

Leveraging LLMs and Prompt Engineering to Structure Clinical Text

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The healthcare industry relies heavily on detailed clinical notes, but their unstructured nature hinders efficient data retrieval and standardization, as well as clinical decision-making. This study investigates the potential of Large Language Models (LLMs) and prompt engineering to transform unstructured clinical notes into structured data. LLMs can interpret context and extract key information, making them useful for structuring clinical notes.

The objective of this study is to leverage LLMs to convert unstructured clinical notes into structured data, improving standardization and accessibility in healthcare documentation.

The study will examine history and physical (H&P) notes from pediatric patients at C.S. Mott Children's Hospital and adult patients in the Surgical Intensive Care Unit (SICU) at the University of Michigan Hospital. For each unstructured note, a gold standard will be manually created as a reference for comparison. The LLM will then process these same unstructured clinical notes using a set of prompts to generate structured data (silver standard). By analyzing the differences between the silver and gold standards, the prompts can be fine-tuned and optimized to improve the accuracy of the LLM-generated outputs.

The primary endpoints are the overall accuracy, completeness, and conciseness of structured data elements extracted from clinical notes after prompt optimization. Secondary endpoints include accuracy, completeness, and conciseness metrics for specific categories of extracted data, such as medications and diagnoses.

Strategic prompt engineering demonstrates the potential of LLMs to transform unstructured clinical notes into structured data, improving information retrieval and usability. This process enhances documentation by organizing critical clinical details that may otherwise be difficult to extract from free-text notes. Structured data also supports advanced analytics and integration with clinical decision support systems, enabling more efficient decision-making and automation in healthcare. Ultimately, our approach leverages the full potential of clinical data to improve patient care outcomes.

Learning Objectives:

Define Large Language Models (LLMs)

Identify structured data

Self Assessment Questions:

A Large Language Model (LLM) is:

A. a type of machine learning model designed for natural language processing tasks.

B. a set of rules and specifications for the secure exchange of electronic health care data.

C. a standard for the collection of health care data.

D. a type of code through which health care data is processed.

Structured data is:

A. Concise

B. Complete

C. Correct

D. All of the above

Q1 Answer: A Q2 Answer: D

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Sending Gault to the Vault: Oh Say, Can You Cystatin C?

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Serum creatinine (SCr) is the standard biomarker for estimating kidney function; however, its utility is limited in patients with cirrhosis due to reduced creatine and creatinine production caused by liver dysfunction. This often leads to falsely low SCr levels and an overestimation of renal function when using the Cockcroft gault (CG) equation in cirrhosis patients. Unlike creatinine, cystatin C is a promising alternative biomarker for assessing kidney function in patients with cirrhosis, as its levels are independent of muscle mass, gender, race or body weight. This study aims to compare the lab-reported cystatin C estimated glomerular filtration rate (eGFR) with calculated Cockcroft gault (CG) creatinine clearance (CrCl) in patients with and without cirrhosis.

This single-center, retrospective cohort study will include 200 patients admitted to University of Michigan Health, divided into two groups: 100 patients with cirrhosis and 100 patients without. Same-day cystatin C eGFR and SCr values will be collected, and the SCr will be used to calculate the CrCl using the Cockcroft gault (CG) equation. Patients will be excluded if they are pregnant, in the ICU, have a BMI â‰¥ 40 or â‰¤ 18.5, or have a missing height or weight data. To ensure stable renal function in this study, patients with end-stage renal disease (ESRD), significant serum creatinine (SCr) fluctuations (â‰¥ 0.3 mg/dL) the day before or after, or those whose SCr was not performed within Â±3 days of the cystatin C eGFR lab, will be excluded. Baseline demographics, cirrhosis classification, and comorbid conditions will be recorded. The primary endpoint is the discordance between cystatin C eGFR and Cockcroft-Gault CrCl (CC eGFR/CG CrCl) ratio in each group. By establishing this comparison, the study seeks to improve the assessment of renal function in patients with cirrhosis, refine diagnostic and prognostic tools, and optimize renal dose adjustments in this population.

Learning Objectives:

Identify the limitations of using serum creatinine to estimate renal function in cirrhosis patients

Explain the role of cystatin C as a biomarker for estimating renal function and highlight the key differences between cystatin C and serum creatinine

Self Assessment Questions:

In cirrhosis patients, which of the following best explains why serum creatinine may inaccurately estimate renal function?

A. The liver produces excess creatinine, resulting in overestimation of renal function

B. Liver dysfunction reduces creatine production, which in turn decreases the amount of creatinine produced

C. Liver dysfunction has no effect on creatine or creatinine production

D. Liver dysfunction increases the production of creatinine due to accelerated muscle metabolism

Which of the following is a key difference between cystatin C and serum creatinine as biomarkers for kidney function?

A. Cystatin C has a longer half-life than serum creatinine, allowing it to remain elevated in the bloodstream longer

B. Serum creatinine is excreted more efficiently by the kidneys, leading to higher concentrations in the blood compared to cystatin C

C. Unlike serum creatinine, cystatin C is not dependent on muscle mass, gender, race, body weight or dietary intake.

D. Cystatin C is less sensitive to changes in kidney function compared to serum creatinine

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-807-L01-P

Impact of Continuous Glucose Monitors on De-escalation of Diabetic Therapy in a Veteran Population

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Background: Diabetes is prevalent in one out of four Veterans and can lead to significant microvascular and macrovascular complications. Continuous glucose monitors (CGM) have assisted in managing long-term glycemic control while decreasing the rate of hypoglycemic events. Although CGM usage has significantly expanded in the past decade, literature on the impact on diabetic therapy is minimal. The purpose of this study is to evaluate the impact of CGMs on changes in diabetic regimens. This is a single-center, retrospective cohort study of Veterans with diabetes at the Robley Rex Veterans Affairs Medical Center in Louisville, KY between June 1, 2022, and September 20, 2024. Patients will be included in the study if they have a diagnosis of type 2 diabetes mellitus, on any insulin regimen, utilizing either CGM or blood glucose monitor (BGM) for at least six months, and are managed by a Veterans Affairs endocrine provider or primary care clinical pharmacist practitioner during that period. The CGM group and BGM for age, race, body mass index, hemoglobin A1C, baseline insulin regimen, use of GLP-1 agonist, and provider service. Primary outcomes include de-escalation of diabetic therapy (decrease in total daily insulin units or decrease in dose or number of non-insulin therapies) between groups at eight months and fourteen months. Secondary outcomes include but are not limited to changes in the total daily dose of insulin and number of insulin injections per day, changes in non-insulin therapy, hemoglobin A1C, and safety events. Outcomes will be evaluated by Chi-squared or Fisherâ€™s exact tests for nominal data, and t-tests will be used for continuous variables.

Learning Objectives:

Discuss currently known benefits of CGM use

Identify patients that are appropriate for CGM initiation

Self Assessment Questions:

According to the American Diabetes Association, which of the following is a clinical benefit of CGM use?

A. De-escalation of insulin therapy

B. Reduction of hypoglycemia

C. De-escalation of oral diabetes medications

D. Reduction of hyperglycemia

According to the ADA Standards of Care, which patient would be an ideal candidate for CGM initiation?

A. 72 year-old man on metformin and empagliflozin currently testing x2 daily with a PMH of HTN, HLD, and Obesity who is technology literate

B. 48 year-old women on metformin, liraglutide, and insulin glargine testing x1 daily with a PMH of CKD, CAD, and OA who is technology literate

C. 80 year-old man on metformin, semaglutide, glipizide, and insulin 70/30 testing x3 daily with a history of HTN, HLD, and CAD who has difficulty using technology

D. 55 year-old women on metformin and glipizide testing x1 daily with a history of rheumatoid arthritis, GERD, and HTN who is technology literate

Q1 Answer: B Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-729-L01-P

Clinical Outcomes of Twice Daily versus Thrice Daily Metronidazole Dosing Strategy for Suspected and Confirmed Anaerobic Infections

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Purpose: Metronidazole is considered the primary antibiotic of choice in treating anaerobic infections. Currently, the recommended dosing of metronidazole for anaerobic infections is 500 mg every 8 hours (q8h). However, there has been pharmacokinetic and clinical evidence to suggest that metronidazole 500 mg every 12 hours (q12h) dosing is just as clinically effective when compared to 500 mg q8h dosing regimen. There are only two studies that have compared efficacy between the regimens. Additionally, no literature has looked at the pharmacoeconomic nor safety outcomes of q12h versus q8h regimens. This study aims to confirm the clinical efficacy, as well as explore the pharmacoeconomic and safety outcomes, of metronidazole q12h regimen versus q8h regimen.
Methods: This retrospective cohort study has been exempted by the Ascension Institutional Review Board. This study will aim to include 200 patients who were admitted and prescribed metronidazole between January 1st 2023 and October 31th 2024. Data will be reviewed and collected via the electronic medical record. Patients included in this study must be 18 years or older and have received at least 72 hours of metronidazole inpatient. The primary outcome is clinical cure defined as normalization of white blood cell count (between 4,000 and 12,000) and body temperature (between 36 and 38 degree Celsius) at the end of therapy or discharge. Secondary outcomes include: 30-day all-cause mortality, 30-day readmission due to the same type of infection, hospital length of stay, length of therapy, cost of regimen ,and number of missed doses. Safety outcomes include incidence of leukopenia, seizure, encephalopathy.
Result: Data collection is ongoing and full results will be presented at the Great Lakes Pharmacy Conference

Learning Objectives:
Discuss the pharmacokinetic and pharmacodynamic properties of metronidazole and its metabolite
Identify the proper therapeutic regimen of metronidazole
Self Assessment Questions:

What is the active metabolite of metronidazole that allows the dosing frequency to be extended to every -12-hours?
A. Metronidazole glucuronide
B. N-(2-hydroxyethyl)-oxamic acid
C. Hydroxymetronidazole
D. 1-acetic acid-2-methyl-5-nitroimidazole
What indication is a potential exclusion for using metronidazole every-12-hour dosing?
A. Skin and soft tissue infection
B. Meningitis
C. Bacteremia
D. Empyema
Q1 Answer: C Q2 Answer: B
APCE Universal Activity Number 0121-9999-25-664-L01-P

Assessing Rates of Co-Infection in Patients Screened for Hepatitis C in an Academic Medical Center
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Background: Hepatitis C virus (HCV) infection represents a significant public health concern with an estimated 4 million individuals affected in the United States. In 2023, University of Kentucky HealthCare (UKHC) implemented a pharmacist-led hepatitis C screening, assessment, and treatment initiative in the Emergency Department (ED). This initiative increased UKHC's HCV treatment attachment rate from approximately 10% to 54% and reduced the median time to treatment from 420 to 17 days. Patients positively screened for HCV are also tested for HIV and hepatitis B (HBV) per protocol, however syphilis screening is not routinely performed despite evidence for high co-infection rates. The purpose of this study is to estimate co-infection rates in the UKHC population and to identify opportunities for expanding pharmacist-led screening and treatment services.

Methods: This was a retrospective cross-sectional study that identified eligible patients 18 years or older screened for HCV at UKHC between June 1, 2023 through June 1, 2024. Pediatric patients and pregnant patients were excluded from this study. HBV, HCV, HIV and syphilis screenings and patient demographic data were collected to evaluate co-infection rates. Univariate logistic regression models were used to identify significant risk modifiers for HBV, HCV, and HIV infection.

Results: Of 33,500 patients screened, 6.81% tested positive for HCV, 0.64% for HIV, 0.21% for HBV, and 0.35% for syphilis. HCV antibody positivity was significantly correlated with HIV positivity (OR 2.68, 95%CI 1.86 â€“ 3.86), HBV positivity (OR 3.40, 95%CI 2.11 â€“ 5.47), and syphilis positivity (OR 1.60, 95%CI 1.01 â€“ 2.54), The syphilis screening rate was notably low at 4.78%, and 7.4% of those tested for syphilis were positive.

Conclusion: In patients positive for HCV antibodies, there is significantly higher odds of HIV, HBV, and syphilis infection in the UKHC patient population. Expansion of screening and treatment services to include syphilis may be indicated.

Learning Objectives:

Discuss the correlations between HCV and HIV, HBV, and syphilis co-infections.

Explain the need for pharmacist-driven syphilis screening and management protocols in clinical settings.

Self Assessment Questions:

What are potential challenges of initiation of a simplified syphilis treatment protocol?

A. Need for infection staging

B. 2 confirmatory tests required

C. Loss to follow up

D. All of the above

Which of the following is NOT true regarding HCV infection?

A. HCV is a chronic condition that is not curable with antiviral therapy.

B. One of the most common routes of transmission is through injection drug use.

C. Potential complications of HCV infection include cirrhosis, liver failure, and liver cancer.

D. HCV RNA testing can confirm active infection.

Q1 Answer: D Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-838-L99-P

Assessment of PGY-1 and PGY-2 Pharmacy Residency Programs' Adaptation of ASHP's Wellbeing/Resiliency Standards

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Purpose: The American Society of Health-System Pharmacists (ASHP) revised accreditation standards to address wellbeing and resiliency in pharmacy residency programs effective July 2023. Revisions related to wellbeing are addressed in several standards, including standards 2.3, 3.1.a.4, 3.3, and 5.1.c. These updates detail wellbeing and resiliency considerations relating to duty hour requirements, orientation to residency, resident development plans, and pharmacy leadership. To date, only five studies have been published to ascertain effective wellbeing and resiliency measures within a pharmacy residency program. The goal of this study is to assess current practices and perceptions regarding the wellbeing and resiliency requirements through a survey of Residency Program Directors (RPDs). The data collected from this study will help identify implementation strategies of different wellbeing and resiliency practices and ways to improve pharmacy residency programâ€™s wellbeing and resiliency policies. This first-of-its kind study aims to improve the prospect of pharmacy residency programs across the country.â€¯â€¯â€¯
Methods: Residency program directors, whose email addresses were readily available through online directories or program websites, were invited to complete a 25-question online survey. The survey assessed their programâ€™s current wellbeing and resiliency practices and perceptions of the ASHP accreditation standard updates. The survey consists of 3 domains: residency program demographics, wellbeing and resiliency program information, and the RPDâ€™s assessment of current wellbeing and resiliency efforts. Perception questions were assessed using a 5-point Likert scale ranging from strongly agree to strongly disagree. Wellbeing practices were assessed using a scale of current practice, plans to implement, would like to implement, or no desire to implement.â€¯This study was reviewed by the Trinity Health Institutional Review Board.
Results/Conclusion: Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference

Learning Objectives:

Identify current wellbeing and resiliency practices utilized by PGY1 and PGY2 pharmacy residency programs to meet the American Society of Health-System Pharmacists (ASHP) wellbeing and resiliency standards

Discuss residency program directors (RPDs perceptions on the guidance for implementing ASHP's wellbeing and resiliency standards

Self Assessment Questions:

Which of the following wellbeing and resiliency practices were noted as â€œNo Desire to Implementâ€ for majority of residency programs?

A. Book clubs

B. Article discussions

C. Personal development plans

D. Social outings

Which of the following statements is true:

A. A majority of residency programs have a designated wellbeing coordinator.

B. A majority of RPDs agree that residents have access to tools and resources for their wellbeing.

C. A majority of programs collaborated with others to create wellbeing standards.

D. Very few RPDs agree that residents benefit from the wellbeing practices in their program.

Q1 Answer: A Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-766-L04-P

Impact of Institutional Guideline on Anti-Pseudomonal Î²-lactam Prescribing in Abdominal Infections

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National guidelines suggest empiric coverage of Pseudomonas aeruginosa for healthcare-associated or severe intra-abdominal infection (IAI), but classification of severe IAI differs between guidelines. IAIs with Pseudomonas aeruginosa are relatively rare with multiple studies indicating prevalence of approximately 5% in both community and healthcare-associated infections. Consequently, coverage of this pathogen is likely unnecessary and potentially harmful. We developed an institutional guideline using more stringent criteria for anti-pseudomonal antibiotics in IAI. These criteria include severe disease, immunocompromise, recent IV antibiotics or fluoroquinolones, recent abdominal procedure, or history of ceftriaxone resistant gastrointestinal, genitourinary, or bloodstream infection within 12 months. This study was designed to describe the impact of our guideline on treatment selection and outcomes. This retrospective quasi experimental study included adult patients aged 18 or older who were treated for IAI and subsequently underwent surgical source control at three of the acute care hospitals within our health system. The pre-intervention group evaluated patients admitted between Feb 1 and April 30, 2024, while post-intervention evaluated the same date range in 2025. Exclusion criteria included inadequate source control or source control via percutaneous drainage, empiric fluoroquinolone use, liver abscess, pancreatitis, gynecologic or anorectal involvement and patients with other concomitant infections. The primary outcome was percentage of patients receiving at least one dose of antipseudomonal Î²-lactam based regimen as empiric therapy. Key secondary outcomes included percentage of patient who received anti-pseudomonals after admission from the emergency department, average duration of therapy, rates of treatment failure, Clostridioides difficile infection, and 30-day mortality. Additionally, we will access rates of guideline compliance in the post-group to determine guideline impact.

Learning Objectives:

Identify relevant risk factors and indications for broad-spectrum antibiotic use in intra-abdominal infections.

Select appropriate empiric antibiotic regimens for patients with intra-abdominal infections.

Self Assessment Questions:

Which of these patients should receive empiric anti-pseudomonal therapy?

A. 64-year-old male with history of GERD associated with chronic NSAID use, HLD, HTN, presenting with new onset abdominal pain, fever, WBC 13.2, BP 137/84, RR 16 BPM found to have gastroduodenal perforation.

B. 71-year-old male receiving treatment for colorectal cancer with FOLFOX who presents with worsening diarrhea with 7 BM the day prior, vitals WNL, WBC 5.2, reports worsening fatigue. CTAP reveals mild colitis without signs of abscess or free air.

C. 82-year-old female nursing home resident with history of recurrent UTIs recently treated with sulfamethoxazole/trimethoprim and ciprofloxacin, now on suppressive nitrofurantoin. Presenting with complicated diverticulitis with abscess.

D. 59-year-old-male with obesity, HTN, HLD, T2DM, calculous cholecystitis treated via cholecystectomy

Which of these risk factors would necessitate coverage for pseudomonas aeruginosa?

A. IAI associated with penetrating trauma

B. Recent abdominal procedure

C. Patient over the age of 70

D. Large bowel perforation

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-689-L01-P

Improving time to prior authorization medication approval for patients with atopic dermatitis by implementing electronic prescriber denial notifications within a health-system-based specialty pharmacy

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Purpose:
Atopic dermatitis (AD) is a dermatologic disease that affects up to 12.7% of pediatric and 7.6% of adults in the United States. The National Association of Specialty Pharmacy (NASP) defines specialty medications as having a complex mechanism of action, administration, adverse effect profile, specialized disease state, and/or high cost, amongst other characteristics. Many of the medications recommended in the AD treatment guidelines would be classified as a specialty medication and often require prior authorization (PA) approval through insurance. Within our Health System Specialty Pharmacy (HSSP), the specialty pharmacy completes all PAs for specialty medications. The workflow within our HSSP previously was based around sending the provider a fax notification of the denial letter, but the workflow was recently updated to now send an electronic notification. The purpose of this study is to evaluate the difference in time to treatment with a specialty medication for patients with AD through faxed denial notifications versus electronic denial notifications.

Methods:
This is a pretest-posttest quasi-experimental study to evaluate whether the implementation of an electronic prescriber notification resulted in a faster time to treatment for patients with a denied AD prescription, when compared to a faxed prescriber notification. We included commercially-insured patients that see a dermatologist within our health system that attempted to fill a specialty medication prescription at our HSSP, which had a subsequent denial for ruxolitinib, crisaborole, dupilumab, tralokinumab-ldrm, abrocitinib, baricitinib, upadacitinib, or topical roflumilast. The patient then had to have a prescription for a specialty from the same dermatology office that was approved through insurance. The primary outcome of this pretest-posttest quasi-experimental study is to evaluate the time to treatment approval of a new specialty medication after an initial PA denial.

Results:
Data analysis is ongoing at the time of abstract submission.

Conclusions:
Pending

Learning Objectives:
Describe the complications of uncontrolled Atopic Dermatitis
Recall the characteristics that are generally used to define a specialty medication
Self Assessment Questions:
1. Which of the following medications is recommended by the American Academy of Allergy, Asthma, and Immunology Joint Task Force on Practice Parameters for the treatment of moderate-to-severe atopic dermatitis?
A. dupilumab
B. adalimumab
C. tofacitnib
D. sarilumab
2. Which of the following characteristics are often associated with specialty medications?
A. Complex mechanism of action
B. Indicated for the treatment of a specialized disease state
C. High cost
D. All of the above
Q1 Answer: A Q2 Answer: D
APCE Universal Activity Number 0121-9999-25-850-L99-P

Opioid Reversal with Naloxone in Hospitalized Patients: Risk Factor Assessment

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STATEMENT OF PURPOSE:
At Froedtert & the Medical College of Wisconsin, a trigger tool methodology is utilized to track the administration of naloxone after hospitalized patients receive opioids. The subsequent report includes patient characteristics alongside opioid and naloxone administration details. While these data have been valuable in determining some trends, a more comprehensive review is needed to identify more subtle trends and patient characteristics that may increase their risk of opioid toxicity. By using â€œBig Data" to identify patients who are at risk, we will ideally improve patient safety and decrease the need for inpatient naloxone administration.

STATEMENT OF METHODS USED:
This is a single enterprise, multi-site, retrospective, case-controlled study. The primary outcome is to identify risk factors for opioid toxicity necessitating reversal with naloxone following administration of an opioid within a Froedtert Health facility. A multivariable regression analysis will be performed to identify risk factors. Secondary outcomes include determining if risk factors differ between academic and non-academic medical centers. We will evaluate four years of data spanning July 2020 through June 2024, with an estimated sample size of 400,000 patients. During this period, patients who received facility administered opioids and subsequent naloxone reversal will be compared to all patients who received facility administered opioids. Inclusion criteria includes all Froedtert Health facilities, patients of 18 years of age and older, and facility administration of an opioid agonist. Exclusion criteria includes patients who received opioid antagonists for any reasons other than the use of opioid reversal.
SUMMARY OF PRELIMINARY RESULTS TO SUPPORT CONCLUSION:
From the electronic health record, over 40 variables will be collected to include in the regression analysis representing baseline characteristics, comorbidities, opioid status prior to admission, medication exposure to opioids and/or other sedating medications, and procedures.
CONCLUSIONS REACHED:
Results to be discussed at conference.

Learning Objectives:
Describe known risk factors for opioid toxicity
Restate the potential benefits of identifying patients who are at increased risk of opioid toxicity necessitating reversal with naloxone
Self Assessment Questions:
Which of the following is a known risk factor for opioid toxicity?
A. Past medical history of Type 2 Diabetes
B. Normal liver function
C. General anesthesia within 24 hours
D. Exercise within the past 24 hours
What are the potential benefits of characterizing patients who are at increased risk of opioid toxicity
A. Facilitate development of tools within the electronic health record to identify patients at increased risk
B. Proactively identify patients at increased risk and adjust drug or dose
C. Develop tools to assist in monitoring patients who are identified as at an increased risk of opioid toxicity
D. All of the above
Q1 Answer: C Q2 Answer: D
APCE Universal Activity Number 0121-9999-25-787-L08-P

Evaluating the effectiveness of N-acetylcysteine in acute alcoholic hepatitis

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Purpose: Current gastroenterology guidelines recommend corticosteroids as the primary treatment for alcoholic hepatitis with N-acetylcysteine (NAC) suggested as an adjunctive agent. At Community Health Network, there has been an increased use in NAC as a 5-day course to treat alcoholic hepatitis, prompting evaluation of its efficacy. The purpose of this study is to assess the efficacy of N-acetylcysteine in patients admitted with acute alcoholic hepatitis.

Methods: This is a retrospective cohort chart review consisting of patients admitted to Community Health Network from January 1, 2020 to May 31, 2024. Patients will be included in the study if they are 18 years of age or older, admitted with a diagnosis of alcoholic hepatitis, and have a Maddreyâ€™s discriminant function (MDF) score â‰¥32. Patients will be excluded for any of the following: pregnancy, hepatitis C virus, hepatitis B virus, autoimmune hepatitis, acetaminophen-induced hepatitis, human immunodeficiency virus (HIV) on antiretroviral therapy, and admission for acetaminophen overdose. The primary outcome is hospital length of stay in patients who received N-acetylcysteine compared to those who did not receive N-acetylcysteine. Secondary outcomes include change in bilirubin at baseline and day 7, and cost effectiveness of N-acetylcysteine. Data collected for the study will include duration of N-acetylcysteine, duration and dose of corticosteroid(s), and 30-day mortality. All study variables will be analyzed using descriptive statistics. A chi-squared test will be used to evaluate the independent variables of receiving N-acetylcysteine and corticosteroid therapy. Paired t-tests will measure statistical significance of hospital length of stay and change in bilirubin level between study groups after these variables are tested for normalcy.

Results/Conclusion: Data collection is in progress. Results and conclusions will be presented at GLPRC.

Learning Objectives:

Identify current guideline recommended therapy for alcoholic hepatitis
Describe the role of the Maddrey's discriminant function (MDF) score in alcoholic hepatitis

Self Assessment Questions:

Which of the following medications are considered primary treatment for alcoholic hepatitis per gastroenterology guidelines?
A. N-acetylcysteine
B. Rifaximin
C. Prednisolone
D. Pentoxifylline
What is the function of Maddreyâ€™s discriminant function (MDF) score?
A. Assess the prognosis of patients presenting with alcoholic hepatitis
B. Estimate prognosis for end-stage liver disease and assign liver transplant priority
C. Estimate severity of alcohol withdrawal
D. Predict mortality in patients with alcoholic hepatitis not responding to steroids
Q1 Answer: C Q2 Answer: A
APCE Universal Activity Number 0121-9999-25-658-L01-P

Efficacy of Ephedrine vs. Phenylephrine for Intraoperative Hypotension Management in THA/TKA

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Statement of purpose: Total hip arthroplasty (THA) and total knee arthroplasty (TKA) are among the most common surgeries in the United States. A common intraoperative complication is hypotension, which can occur in up to 29% of cases and is often managed with vasopressors. This study aims to compare the efficacy and safety of phenylephrine versus ephedrine for managing intraoperative hypotension, with a focus on optimizing blood pressure control and exploring potential cost savings.

Statement of methods used: This study is a retrospective chart review of patients who underwent single-side THA and TKA at Parkview Orthopedic Hospital from January to June 2024. Patients were included if they received either phenylephrine or ephedrine intraoperatively. Exclusion criteria included patients who received both phenylephrine and ephedrine, those on continuous vasopressor infusions, and individuals who did not require a general or spinal anesthetic. Blood pressure values and vasopressor administration times were collected from anesthesia records to retrospectively identify hypotensive episodes. The primary outcomes include the rate of hypotension resolution and the absolute change in blood pressure within 10 minutes post-administration for each drug. Any repeat doses administered 10 minutes or less apart were considered one â€œepisode,â€ and a new â€œepisodeâ€ was classified if a dose was given more than 10 minutes after the previous dose. Because real-time monitoring data were unavailable, we relied on documented timestamps of vasopressor administration and corresponding blood pressure measurements in the anesthesia records to approximate the relationship between dose given and hemodynamic response. Episodes requiring more than three doses were excluded to minimize confounding from complex scenarios. Secondary outcomes include the incidence of bradycardia, tachycardia, hypertension following administration, and the incidence of postoperative acute kidney injury.

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

Learning Objectives:

Identify the mechanisms of action of phenylephrine and ephedrine in managing intraoperative hypotension.

Describe the comparative efficacy and safety profiles of phenylephrine versus ephedrine in resolving intraoperative hypotension.

Self Assessment Questions:

Which vasopressor is associated with causing bradycardia due to its adrenergic receptor activity?

A. Ephedrine

B. Dopamine

C. Norepinephrine

D. Phenylephrine

Which of the following clinical scenarios is ephedrine most beneficial?

A. Hypotension with tachycardia

B. Hypotension with bradycardia

C. Hypertension with tachycardia

D. Hypertension with bradycardia

Q1 Answer: D Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-731-L01-P

Community Hospital Comparison of Activated Partial Thromboplastin Time vs Anti-Factor Xa Levels in Unfractionated Heparin Monitoring

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Purpose: Therapeutic monitoring of unfractionated heparin (UFH) has traditionally been accomplished through the Activated Partial Thromboplastin Time (aPTT) test because of its relative accessibility. However, preanalytic, analytic, and biological variables can influence the result of an aPTT, leading to variability in results. Anti-factor Xa monitoring is less affected by biological variables and is a more direct measure of heparin activity. Prior research has shown faster attainment of therapeutic goal range, fewer dosage adjustments, and more time in therapeutic range when utilizing anti-factor Xa monitoring. This study aims to compare an aPTT based monitoring protocol to an anti-factor Xa monitoring protocol at Saint Joseph Health System (SJHS).
Methods: This is a retrospective study that consists of data collection using SJHS pharmacy departmentâ€™s heparin monitoring sheets and review of patientsâ€™ electronic medication administration records (eMAR). A preliminary retrospective review will be conducted analyzing aPTT monitoring. A secondary retrospective review will be conducted using anti-factor Xa monitoring after its implementation at SJHS. Two randomly selected months will be chosen for each method of heparin monitoring to analyze the data. Patients will be included if they are >18 years old and receiving high intensity, low intensity, or no bolus heparin therapy according to the selected institutional nomogram. Patients will be excluded if they received concomitant anticoagulation and/or bridging, received UFH for less than 24 hours, if there was 25% of more deviation from the institutional nomogram, and if nonstandard goal ranges were utilized. Primary outcomes include percentage of patients within goal therapeutic range 24 hours after the initiation of UFH, percent of tests within therapeutic range, and the mean number of rate adjustments. Secondary outcomes include the number of adverse bleeding events and recurrent thromboembolic events. Results and Conclusions: Preliminary results will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Outline the advantages of anti-factor Xa based monitoring over aPTT based monitoring for patients on therapeutic heparin.

Recognize the preanalytic, analytic, and biological variables that can affect aPTT levels versus anti-factor Xa levels.

Self Assessment Questions:

Which of the following variables can affect an anti-factor Xa level?

A. Deficiency in factor IX, XI, and XII

B. Hypertriglyceridemia

C. Consumptive coagulopathy

D. Lupus anticoagulant

Which of the following would have the greatest impact on an anti-factor Xa level?

A. Warfarin

B. Aspirin

C. Dabigatran

D. Apixaban

Q1 Answer: B Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-857-L01-P

Examining Pharmacy Staff Knowledge on Medication Reconciliation Process: Assessment of Baseline Knowledge and Implementation of Targeted Training Interventions

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Purpose:
Patients are often prescribed new medications or changes are made to existing medications at times of transitions of care such as hospital admission or discharge from hospital to home or facility. Most medication changes are intentional, however unintended changes occur frequently. Medication reconciliation refers to the process of avoiding inconsistencies across transitions of care by reviewing patientsâ€™ complete medication regimen via chart review and with the patient at the time of admission, transfer, and discharge. At Veteran Health Indiana (VHI) pharmacists complete a medication reconciliation prior to a patient discharging. At VHI there is no standardized medication reconciliation training process or documents that outline the appropriate process. A LEAN process improvement initiative was initiated in Fall 2024 to implement changes to medication reconciliation process.
Methods:
This study was a retrospective analysis of effectiveness of Lean Process Improvement Initiative evaluating medication reconciliation process education and training conducted by participating staff in the pharmacy department at VHI from December 1, 2024, to March 1, 2025. Participants were included they responded to the Voice of the Customer (VOC). The primary outcome was the change in pharmacy personnel knowledge before and after implementation of education and trainings. Secondary outcomes included differences in baseline employee knowledge between different areas of the pharmacy department, differences in baseline employee knowledge between years of employment, differences in encounter credit and time spent between different areas of the pharmacy department, identify which areas in the pharmacy department employees are the least knowledgeable regarding medication reconciliation process, number of JPSRs related to medication errors during medication reconciliation before and after education and training. Data will be collected from VOC Microsoft Forms before and after implementation of education and trainings. Data analysis is ongoing and results and conclusions will be presented at the Great Lakes Residency Conference.

Learning Objectives:
Describe common sources of patient harm
Explain the purpose of completing medication reconciliations
Self Assessment Questions:
Why is an accurate medication reconciliation important?
A. Identifying drug interactions
B. Recognizing medication non-compliance
C. Consistency in medication list during transitions of care process
D. All of the above
Which of the following is the most common patient safety error?
A. Medication errors
B. Diagnostic errors
C. Patient misidentification
D. Falls
Q1 Answer: D Q2 Answer: A
APCE Universal Activity Number 0121-9999-25-782-L05-P

Alcohol Withdrawal Syndrome in Critical Care: A Phenobarbital versus Benzodiazepine Protocol Comparison
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Purpose: Alcohol withdrawal syndrome (AWS) can be a life-threatening medical condition requiring urgent intervention from an interprofessional healthcare team to ensure timely care for patients. Without appropriate treatment, mild symptoms can quickly progress to hallucinations, seizures, and delirium tremens. The typical historical treatment of benzodiazepines has several limitations that can affect patient outcomes; therefore, phenobarbital has been utilized as an alternative for AWS in critically ill patients. This study's main objective is to compare the clinical impact using a new institutional phenobarbital order set for AWS patients in the intensive care unit (ICU) versus the use of traditional symptom-triggered benzodiazepines. Based on our findings, we hope to identify areas of improvement for institutional guidelines and provide education to our providers.

Methods: This retrospective, single-center, pre-post cohort study aims to evaluate clinical outcomes following the introduction of a phenobarbital order set for the treatment of AWS. The primary outcome will compare ICU length of stay by retrospectively reviewing patient charts. Secondary outcomes include total hospital length of stay (LOS), incidence of invasive mechanical ventilation, use of adjunctive pharmacotherapy after treatment initiation, total cumulative dose of phenobarbital in milligrams, and total cumulative dose of benzodiazepines in lorazepam milligram equivalents. A sample size for the primary outcome was determined based on previous literature to detect a 5% difference between groups with a significance level of 0.05 and 80% power. It was estimated that 120 patients need to be enrolled in the study to detect a statistically significant difference.

Results & Conclusions: Data interpretation is in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe potential limitations in using a symptom-triggered benzodiazepine protocol in the treatment of alcohol withdrawal syndrome in critically ill patients.

Explain the mechanism of action and pharmacokinetics of phenobarbital which contribute to its usefulness within the treatment of alcohol withdrawal syndrome.

Self Assessment Questions:

Which of the following is a potential limitation in using a symptom-triggered benzodiazepine protocol in treatment of AMS in critically ill patients?Â

A. Difficulty evaluating symptoms

B. Reactive management

C. High nursing burden

D. All the Above

Which of the following correctly describes the mechanism and half-life of phenobarbital in the setting of alcohol withdrawal syndrome?

A. Increase in the duration of GABA chloride channel opening with a long half-life

B. Increase in the frequency and duration of GABA chloride channel opening with a long half-life

C. Increase in the frequency and duration of GABA chloride channel opening with a short half-life

D. Increase in the frequency of GABA chloride channel opening with a short half-life

Q1 Answer: D Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-502-L01-P

Evaluation of Initial Benzodiazepine Dosing Strategies in the Management of Status Epilepticus

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Purpose:
Current guideline-recommended therapy states a benzodiazepine is the initial therapy choice in status epilepticus. However, guideline-recommended treatment with benzodiazepines is often neglected, primarily through under-dosing. The purpose of this study is to assess the impact of different initial benzodiazepine dosing strategies in status epilepticus on seizure cessation at Powers Health hospitals. Initial benzodiazepine treatment in greater doses was assessed for efficacy in comparison to smaller doses.

Methods:
This study is a retrospective chart review and analysis for patients at least 18 years of age who were admitted to a Powers Health hospital for status epilepticus or who had an episode after already being admitted from 1/1/2022- 8/1/2024. Treatment success is seizure cessation, defined as no benzodiazepine dose given within 5 minutes of the last benzodiazepine dose. If a benzodiazepine dose was given after 5 minutes of a previous dose, then it was considered to be a new seizure. Early treatment success is defined as the receipt of one dose of benzodiazepine and cessation of seizing. Treatment failure is defined as progression to refractory status epilepticus or the initiation of at least 2 second-line antiepileptic agents. Seizure cessation is assessed through previous documentation in clinical notes or timing of benzodiazepine administration in the MAR report.

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

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

Learning Objectives:

Explain the current guideline recommendations for benzodiazepine dosing and second-line therapies in the case of status epilepticus

Identify the impact on seizure cessation for guideline-recommended benzodiazepine dosing strategies in comparison to lower doses for status epilepticus

Self Assessment Questions:

According to current American Epilepsy Society guideline recommendations, what is the recommended initial lorazepam dose for status epilepticus for a patient weighing 70 kg?

A. 1 mg
B. 2 mg
C. 4 mg
D. 7 mg

According to current American Epilepsy Society guideline recommendations for status epilepticus, how many times should a benzodiazepine dose be repeated until a second-line agent is initiated?

A. Never
B. Once
C. Twice
D. No limit

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-595-L01-P

Reducing Community-Acquired-Pneumonia Treatment Duration Rates

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Purpose: Patients at Riverside Medical Center who are diagnosed with community-acquired pneumonia (CAP) may be receiving antibiotics for 7 days and may be being discharged with an additional 5 or 7 days of antibiotic therapy. The 2019 Infectious Disease Society of America (IDSA) CAP guidelines recommend a treatment duration of 5 days including switching from parenteral to oral antibiotics using the same drug or the same drug class. The main objective of this study is to decrease the patientâ€™s antibiotic treatment duration for CAP from Riverside Medical Centerâ€™s Epic default duration of 7 days to guideline recommendation of 5 days. Methods: The research being conducted is a retrospective chart review of patients who were diagnosed with CAP. The data being collected will look at providers prescribing patterns and how many days of antibiotics patients received. The pharmacy department will be making implementations in December to change patientâ€™s antibiotic treatment from 7 days to the recommended 5 days for pneumonia. The role of my research will be to collect information and gather information from before the implementation, educate pharmacist, and collect information after the implementation. The investigator will pull all information from Epic that had been collected from October 1, 2023 to October 31, 2024 for pre-implementation data. The investigator will pull all information from monthly data reports on Epic starting January 1, 2025 to March 30, 2025. Results and Conclusions: Data analysis ongoing. Results and Conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Define the clinical signs and symptoms of community-acquired pneumonia.

Recognize a pharmacists' role in decreasing community-acquired pneumonia treatment duration.

Self Assessment Questions:

Which of the following is consistent with a true CAP diagnosis according to the IDSA guidelines?

A. Chest imaging opacities, elevated WBC (>10,000 cells/ÂµL), and positive symptoms such as fever, dyspnea, sputum production, and cough.

B. Chest imaging opacities, normal WBC count, and no symptoms.

C. Normal chest imaging, elevated WBC (>10,000 cells/ÂµL), and absence of fever.

D. Chest imaging opacities, elevated WBC (>10,000 cells/ÂµL), and only fever present.

What is the clinical impact of prolonged antibiotic therapy in patients diagnosed with CAP?

A. It is associated with a decreased risk of antibiotic resistance and fewer adverse effects.

B. It increases the likelihood of antibiotic resistance, higher hospitalization costs, increased medication expenses, and greater risk of toxicities and side effects.

C. It improves patient outcomes by eliminating pathogens more effectively.

D. It has no significant impact on patient outcomes or healthcare costs.

Q1 Answer: A Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-581-L01-P

Evaluation of Milrinone versus Dobutamine Use in Cardiogenic Shock

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Milrinone and dobutamine are inotropes commonly used in cardiogenic shock treatment, yet limited literature exists to provide guidance on choosing an individual agent. The purpose of this study was to evaluate milrinone and dobutamine utilization in cardiogenic shock and compare outcomes in those who received either agent as initial inotropic support. Methods: This single-center, retrospective cohort study was conducted among patients admitted to the cardiac intensive care (ICU) or telemetry units in 2021. Included patients were adults who received initial treatment with either milrinone or dobutamine for â‰¥ 24 hours and met Society for Cardiovascular Angiography and Interventions (SCAI) cardiogenic shock diagnostic criteria. Patients were randomized in a 3:1 dobutamine to milrinone ratio for analysis based on institution-specific usage. Results: Among 100 patients, baseline characteristics were similar between study groups, except for a higher prevalence of ventricular arrhythmia history in the milrinone group compared to the dobutamine group (55.6% vs. 27.4%, respectively; p = 0.017). Milrinone had significantly longer median hospital length of stay (LOS) (38 vs. 13 days, p = 0.0019), ICU LOS (25 vs. 9 days, p = 0.015), and inotropic therapy duration (21.8 vs. 7.9 days; p = 0.00053). Milrinone had a higher rate of cardiac transplantation or mechanical circulatory support (74.1% vs. 34.2%, RR 2.16, 95% CI 1.42-3.32; p < 0.0006), and nearly half of the milrinone group transitioned to dobutamine while inpatient (48.1% vs. 2.7%, RR 17.58, 95% CI 5.25-58.65; p < 0.00001). Conclusion: Despite largely similar baseline characteristics between the two groups, initial treatment with milrinone was linked to a more complex clinical course compared to dobutamine. Given the high incidence of milrinone discontinuation, further research is needed to explore the clinical events behind this change.

Learning Objectives:

Discuss current literature evaluating inotrope use in cardiogenic shock treatment

Identify patient-specific factors that influence the choice of inotrope in cardiogenic shock

Self Assessment Questions:

Based on the Society for Cardiovascular Angiography and Interventions (SCAI) criteria for cardiogenic shock, which of the following stages would not qualify for inotropic use?

A. Stage A

B. Stage C

C. Stage D

D. Stage E

Which of the following patient characteristics may influence the choice of milrinone over dobutamine for the treatment of cardiogenic shock?

A. Hypotension

B. Renal failure

C. History of arrhythmias

D. Sulfa allergy

Q1 Answer: A Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-596-L01-P

Impact of Continuous Glucose Monitors on Glycemic Control in Patients with Type 2 Diabetes on Noninsulin Therapies

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Purpose: The American Diabetes Association recommends continuous glucose monitors (CGM) for diabetes management in patients with type 2 diabetes on insulin therapy. Several studies have demonstrated a reduction in hemoglobin A1c (HbA1c) after initiation of a CGM in patients on insulin therapy. Very few studies have shown the benefit of CGM use in patients on noninsulin therapies. This study will evaluate the impact of CGMs on glycemic control in patients with type 2 diabetes on noninsulin therapies.
Methods: This is a single-center, retrospective study conducted at the University of Louisville (UofL) Healthâ€™s Medication Management Clinic from January 1, 2021, to December 31, 2023. Adult patients with a diagnosis of type 2 diabetes utilizing a CGM for at least three months were included. Patients were excluded if they had type 1 diabetes, prediabetes, or gestational diabetes; if they received insulin up to 3 months prior to CGM initiation; or if they had a diagnosis or recently underwent a procedure that could alter HbA1c. The primary endpoint was the change in HbA1c prior to CGM initiation compared to HbA1c 3 months after CGM initiation. Key secondary endpoints include time in, above, and below blood glucose range, mean plasma blood glucose, change in antidiabetic regimen after CGM initiation, and cost-effectiveness analysis.
Results: The mean change in HbA1c following initiation of a CGM was -1.1% (p-value < 0.001). The mean HbA1c prior to CGM initiation was 7.7%. Following CGM initiation, the average HbA1c measured at least 3 months from CGM initiation date was 6.6%.
Conclusion: This study demonstrates that the use CGMs in patients with type 2 diabetes on noninsulin therapies significantly improve glycemic control as shown by a mean reduction in HbA1c of 1.1%.

Learning Objectives:

Explain the current use and differences in continuous glucose monitors (CGMs) for diabetes management.
Describe the impact of CGMs on glycemic control in patients with type 2 diabetes.

Self Assessment Questions:

Which of the following accurately describes a real-time continuous glucose monitor (CGM)?
A. Intermittently measure blood glucose without requiring patient to scan device
B. Continuously measure blood glucose and require patient to scan device
C. Continuously measure and display blood glucose without requiring patient to scan device
D. Intermittently measure blood glucose and require patient to scan device
CGMs can lower A1c by what percentage when used in patients with type 2 diabetes on insulin?
A. 0.002
B. 0.011
C. 0.015
D. 0.021
Q1 Answer: C Q2 Answer: B
APCE Universal Activity Number 0121-9999-25-728-L01-P

Improving Detection, Assessment, and Reporting of Inpatient Adverse Drug Reactions at a Single VA Health Care System

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Background
An adverse drug reaction (ADR) is an undesirable effect of a medication and can range in severity from mild to life-threatening. ADRs are one of the leading causes of hospitalizations and an estimated 16% of inpatients will experience an ADR during hospitalization. Detection, documentation, and reporting of ADRs are essential to patient safety and to ongoing pharmacovigilance for informing risk/benefit profiles of medications. However, ADR underreporting is widespread, with one study finding a 94% underreporting rate.

Methods
This quality improvement project occurred at a single VA Health Care System (VAHCS). A team of pharmacists utilized Electronic Health Record (EHR) surveillance identifying inpatients with an ICD-10 diagnosis code of a potential ADR. Data analysis included a retrospective review from May 1 to June 30, 2024, to establish a baseline ADR occurrence and ADR reporting rate for the facility. The electronic surveillance intervention went live on October 1, 2024, with data reviewed weekly and collected through November 30, 2024. Changes in ADR documentation and reporting rates were measured.

Results
A total of 163 patients were identified. There were 101 ADRs identified in the pre-intervention group and 91 ADRs in the post-intervention group. The pharmacist-driven electronic surveillance tool improved reporting of inpatient ADRs at the single VAHCS from 16.7% to 100% for the primary reporting system (EHR); 6.9% to 100% for the secondary reporting system (VA Adverse Drug Event Reporting System); and 11.6% to 100% for the tertiary reporting system (MedWatch). The three most common drug classes associated with inpatient ADR were antihypertensives (23.4%), analgesics (10.9%), and antineoplastics (9.4%). The three most common ADR presentations were blood pressure/heart rate changes/shock (25.0%), fluid/electrolyte disturbances (20.8%), and gastrointestinal disorders (15.1%).

Conclusion
An EHR surveillance tool was successful at identifying inpatient ADRs, and was associated with improved pharmacovigilance efforts at a single VAHCS.

Learning Objectives:

Recognize the prevalence of inpatient adverse drug reactions

Describe the use of an electronic health record surveillance tool as a method for detecting underreported adverse drug reactions

Self Assessment Questions:

What is the estimated prevalence of inpatients who experience adverse drug reaction?

A. 0.02

B. 0.09

C. 0.16

D. 0.24

What effect did an electronic health surveillance tool have on inpatient ADR reporting rates at a single VAHCS?

A. No change

B. Improved reporting to VA Adverse Drug Event Reporting System

C. Improved reporting to MedWatch

D. Both B and C

Q1 Answer: C Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-776-L05-P

Comparison of Clinical and Safety Outcomes with Adjuvant Linezolid Versus Clindamycin in the Treatment of Necrotizing Soft Tissue Infections

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Purpose: Clindamycin has been the traditional toxin suppressive agent in necrotizing group A streptococcal infections. Due to decreasing susceptibility of clindamycin against Streptococcus pyogenes, the Detroit Medical Center has replaced clindamycin with linezolid for the empiric treatment of necrotizing soft tissue infections (NSTIs) since September 2018. Linezolidâ€™s toxin-suppressing properties and broad gram-positive coverage make it an ideal option for treating NSTIs. However, there is limited clinical data supporting its use compared to clindamycin. This study aims to compare the clinical and safety outcomes between the use of linezolid versus clindamycin in patients with NSTIs.

Methods: This is a retrospective cohort study conducted at a large academic medical center of patients admitted from August 1st, 2014 to August 1st, 2018 (clindamycin) and August 1st, 2020 to August 1st, 2024 (linezolid). Patients were included if they met the following criteria: age 18-90, documented NSTIs, including Fournierâ€™s gangrene, received adjunct therapy with either clindamycin or linezolid for a minimum of 48 hours, and underwent surgery within 24 hours of admission. Patients were excluded if they received both clindamycin and linezolid for more than 1 dose, had concurrent other infection, had a culture with an organism not susceptible to the empiric regimen, were immunocompromised, or were subjected to comfort measures or expired within 48 hours of admission. The primary outcome will be 30-day mortality. Secondary outcomes will include: drug related adverse events, ICU length of stay, and change in SOFA score from baseline to day 5. This study has been approved by the Wayne State University Institutional Review Board.

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

Learning Objectives:

Discuss the existing literature to support the use of clindamycin and linezolid for necrotizing soft tissue infections (NSTIs)
Describe the advantages and disadvantages of clindamycin and linezolid in the management of NSTIs

Self Assessment Questions:

Which of the following statements is correct regarding the role of clindamycin in the treatment of NSTIs caused by Group A streptococcus

A. Clindamycin is used as monotherapy in NSTIs due to its broad coverage of both Gram-positive and anaerobic organisms
B. Clindamycin is used as adjunct therapy for its ability to suppress toxin production
C. Clindamycin is the preferred agent for targeting Group A streptococcus as it has maintained great susceptibilities

D. Randomized controlled trials have demonstrated that clindamycin is superior to linezolid in the treatment of NSTIs

What is an advantage of linezolid over clindamycin in the treatment of NSTIs?

A. Linezolid has been shown to be superior to clindamycin for its ability to suppress toxin production in vitro
B. Linezolid carries no risk of gastrointestinal adverse effects compared to clindamycin
C. An empiric regimen including linezolid removes the need for vancomycin, lowering the risk of nephrotoxicity
D. Linezolid carries a lower risk of thrombocytopenia when compared to clindamycin

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-569-L01-P

Use of Oral Tranexamic Acid (TXA) Peri-operatively in Orthopedic Patients

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Statement of purpose:
The purpose was to determine if patients who underwent elective orthopedic procedures and received IV TXA peri-operatively and oral TXA peri-operatively experienced an increased incidence of thromboembolism when compared to patients who did not receive oral TXA.

Methods/Study Design:
This was a retrospective, single-center, observational cohort study of patients who underwent elective orthopedic procedures at UofL Health â€“ Jewish Hospital from July 1, 2023 to June 30, 2024. Patients were screened for inclusion and grouped by those who received oral TXA peri-operatively compared to those who did not receive oral TXA. Inclusion criteria consisted of the administration of IV TXA peri-operatively, 18 years and older, and inpatient at Jewish Hospital. Exclusion criteria included patients who were pregnant, incarcerated, or allergic to TXA. The primary endpoint was the occurrence of any clotting event within 30 days following the administration of IV TXA. Clotting diagnoses were confirmed via imaging and laboratory results. Secondary endpoints included minor bleeding events, administration of fresh frozen plasma, blood transfusions, or major bleeding events, fatal bleeding, bleeding that caused a decrease in hemoglobin great than 2 g/dL, or symptomatic bleeding in a critical area or organ.

Results:
Data collection is still ongoing. The oral and IV group included 98 patients and 70 were included in the IV group. Statistical analysis of results is in progress. Final results will be presented at the Great Lakes Pharmacy Regional Conference.

Conclusion:
Statistical analysis of results is in progress. Final results will be presented at the Great Lakes Pharmacy Regional Conference.

Learning Objectives:
Describe historical safety concerns with agents used to minimize blood loss in elective orthopedic procedures.
Review the mechanism of action of tranexamic acid and factors needed for clot formation

Self Assessment Questions:
What major safety-focused, adverse event has led to cautious use of TXA?
A. Thromboembolic events
B. Bleeding events
C. Angioedema
D. QTc prolongation
How does TXA support clot formation?
A. Inhibits factor Xa
B. Vitamin K analog
C. Inhibits plasminogen activation upstream which stops the activation of plasmin
D. Direct thrombin agonist
Q1 Answer: A Q2 Answer: C
APCE Universal Activity Number 0121-9999-25-638-L01-P

Impact of BK Viremia Management on Progression to Nephropathy

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Purpose: The purpose of this study is to assess the incidence of BK viremia progression to BK nephropathy, associated therapeutic measures taken to limit disease progression, and incidence of rejection at our center. Additionally, the study aims to use this information to develop criteria for immunosuppression reduction to limit BK viremia progression to BK nephropathy.
Methods: This is a retrospective, single-center analysis of adult transplant patients who received a kidney transplant between July 1, 2020 â€“ July 1, 2023. Patients were excluded if they received a combined organ transplant. The primary outcome was the incidence of BK nephropathy. Secondary outcomes included time from transplant to viremia, median viral load, time to viremia clearance less than 1,000 copies per milliliter, allograft loss, and biopsy proven allograft rejection. This study was approved by the University of Louisville Institutional Review Board.
Preliminary Results/Conclusions: A total of 202 patients were included in this study. Of those, 27 (13.4%) had BK viremia defined as a BK DNA PCR > 1,000 for at least 2 weeks or one level > 10,000 during the study period. Four (15%) patients had biopsy proven BK nephropathy. All 4 patients that had biopsy proven nephropathy were managed differently throughout the study period based on patient-specific factors and provider preference. One (25%) had allograft loss due to BK nephropathy. Recipients of anti-thymoglobulin had the highest incidence of BK viremia, n = 103 (51%), but this was the most common induction agent. In 2022, institutional protocol changed from induction with alemtuzumab to anti-thymocyte globulin which is correlated with a decreased incidence of BK viremia over all: 6 (14%) in 2020, 11 (19%) in 2021, 7 (12%) in 2022, and 4 (9%) in 2023. Final results and conclusions to be shared at the 2025 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss current recommendations and policies surrounding BK viremia management in kidney transplant patients
Identify treatment strategies for patients with BK viremia

Self Assessment Questions:

What is the preferred approach to managing BK viremia in kidney transplant recipients?
A. Cidofovir
B. Close observation of viral load
C. IVIG
D. Decrease in immunosuppression
When is it recommended that kidney transplant patients receive kidney biopsy?
A. When BK viremia levels reach > 10,000 copies/mLÂ
B. When BK viremia levels are sustained >1,000 copies/mL for >2 weeks
C. When serum creatinine levels are elevated
D. Both a and b
Q1 Answer: D Q2 Answer: C
APCE Universal Activity Number 0121-9999-25-741-L01-P

Angiotensin II in Septic Shock

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Background:
Septic shock is associated with high mortality with in-hospital mortality rates exceeding 40%. The Surviving Sepsis Campaign provides guidance for practitioners to quickly recognize and treat sepsis by prompt administration of intravenous crystalloids at 30 mL/kg, appropriate empiric antibiotics, initiation of vasopressors to maintain mean arterial pressure (MAP) above 65 mmHg, and corticosteroids. Catecholamine vasopressors such as norepinephrine, epinephrine, phenylephrine, dobutamine, and dopamine have serious adverse effects that become more common at higher doses including ischemia, tachycardia, arrhythmia, and acute kidney injury. Utilizing non-catecholamine vasopressors, such as angiotensin II, may allow practitioners to use lower doses of catecholamine vasopressors while maintaining a target MAP of at least 65 mmHg. Previous studies have evaluated the efficacy of angiotensin II as a third- and fourth-line vasopressor for shock, but its use as a fifth-line vasopressor for septic shock in patients receiving standard of care treatment is still uncertain. This study aims to assess the hemodynamic efficacy of ATII in patients receiving standard of care.

Methods:
This was a retrospective, single-center chart review. Adults 18 years and older admitted to the Franciscan Health Indianapolis adult intensive care unit for septic shock were eligible for inclusion if they received at least 0.25 mcg/kg/min norepinephrine equivalent dose and standard of care. Patients were excluded if they had other forms of shock, positive initial blood cultures not covered by empiric antibiotics, extracorporeal membrane oxygenation, or were pregnant. The primary objective of the study was to evaluate the hemodynamic efficacy of angiotensin II as a fifth-line vasopressor in patients with septic shock receiving standard of care. Secondary objectives included association between angiotensin II utilization and intensive care unit length of stay, association between mortality, and incidence of deep vein thrombosis or pulmonary embolism.

Results and conclusion: Will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recall the guideline recommendations for the treatment of septic shock.
Identify adverse effects associated with high-dose vasopressors.

Self Assessment Questions:

Which of the following vasopressors is generally recommended as the first-line vasopressor for the treatment of septic shock?
A. Epinephrine
B. Norepinephrine
C. Dopamine
D. Vasopressin
What adverse effect is mostly likely to be seen with increasing doses of norepinephrine?
A. Pancreatitis
B. Myalgia
C. Peripheral edema
D. Arrhythmia
Q1 Answer: B Q2 Answer: D
APCE Universal Activity Number 0121-9999-25-585-L01-P

Impact of Birth Order on Report of Behavioral Side Effects with elexacaftor/tezacaftor/ivacaftor in People with CF Age 2-5 years old

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Purpose: Cystic fibrosis conductance regulator (CFTR) modulators have been transformative for the care of people with cystic fibrosis (PwCF). The clinical trials showing safety and efficacy of elexacaftor/tezacaftor/ivacaftor (ETI) for use in PwCF reported the most common side effects to be headache, rash, increased serum transaminases, abdominal pain, increased sputum production, diarrhea, cough, upper respiratory tract infection, and nausea. A few post marketing reports have suggested that ETI may have side effects related to mood changes, but there remains a lack of evidence on the topic. The objective of this study was to compare the rate of behavioral/mental health/sleep adverse effects with ETI in PwCF ages 2-5 years old who are first-born children versus not first-born children.

Methods: This study was a retrospective analysis that included pediatric patients at Riley Hospital for Children pediatric cystic fibrosis center ages 2-5 years old between April 1, 2023 to July 31, 2024 who were started on ETI. Patients were excluded if they discontinued ETI within 48 hours of initiation or did not follow up after starting ETI. The primary outcome was the incidence of behavioral/mental health/sleep adverse effects reports for first born patients aged 2-5 years old with CF as compared to not first-born patients. Secondary outcomes included time from initiation of therapy to reported behavioral/mental health/sleep adverse effects, incidence of behavioral/mental/sleep health adverse effects for patients with a psychiatrist/psychologist referral or autism diagnosis during time on ETI, number of reported behavioral/mental health/sleep adverse effects based on age at CF diagnosis, dose of ETI, and the number of hospitalizations in the past year compared to incidence of behavioral/mental health/sleep side effects.

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

Learning Objectives:

Describe the mechanism and clinical benefit of elexacaftor/tezacaftor/ivacaftor for people with cystic fibrosis

Recognize the potential adverse effects of elexacaftor/tezacaftor/ivacaftor in pediatric people with CF

Self Assessment Questions:

Which component of elexacaftor/tezacaftor/ivacaftor binds directly to the CFTR protein to increase ion movement?

A. Elexacaftor

B. Tezacaftor

C. Ivacaftor

D. None of the components of ETI bind directly to the CFTR protein

Which of the following potential adverse events would you anticipate when using ETI in patients ages 2 to 5 years old with CF?

A. Mental Fogginess

B. Increased Serum Creatinine

C. Urinary Tract Infection

D. Myopathy

Q1 Answer: C Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-649-L01-P

Fixed Versus Weight-Based Enoxaparin Dosing in Adult Trauma Patients

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Purpose: Trauma patients are at an increased risk of venous thromboembolism (VTE) and prophylaxis is a critical component of care. A common VTE prophylaxis recommendation in trauma patients has been a fixed dosing strategy of enoxaparin 30 mg subcutaneously every 12 hours. However, newer evidence has shown a weight-based strategy of 0.5mg/kg subcutaneously every 12 hours may be superior. While studies have shown benefit with weight-based dosing in trauma patients, certain trauma subpopulations (e.g., spinal cord injury, traumatic brain injury, and intracranial hemorrhage) are often excluded or underrepresented. The purpose of this study is to compare the efficacy and safety of fixed versus weight-based dosing of enoxaparin in adult trauma patients while bridging the gap in research by including underrepresented trauma subpopulations.

Methods: This was a retrospective pre-post cohort study that evaluated adult trauma patients admitted to a level one trauma center that received enoxaparin for VTE prophylaxis. The intervention group received weight-based enoxaparin following an institutional guideline update recommending that dosing strategy. This group was compared to patients that received a fixed dosing strategy of enoxaparin prior to the guideline update. The primary endpoint was the attainment of a low molecular weight heparin peak anti-Xa level within the prophylactic range of 0.2-0.5 IU/mL at time of first check. Secondary endpoints included incidence of deep vein thrombosis, pulmonary embolism, and bleeding. Statistical tests included: student t-test (normally distributed continuous data), Mann-Whitney U test (non-normally distributed continuous data, ordinal data), and chi square test or Fisherâ€™s exact test (nominal data). Use of previous literature determined a minimum sample size of 304 patients total, which was calculated based on an alpha of 0.05 and beta of 0.2, anticipating a 12.5% difference between study groups.

Results and Conclusion: To be presented at the 2025 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the benefits of weight-based dosing of enoxaparin for adult trauma patients.

Identify the appropriate VTE prophylaxis plan for an adult trauma patient.

Self Assessment Questions:

Which best describes a benefit of weight-based dosing of enoxaparin in adult trauma patients?

A. Weight-based dosing of enoxaparin requires less monitoring than a fixed dosing strategy.

B. Weight-based dosing of enoxaparin promotes achievement of target peak anti-Xa levels more reliably than fixed-dosing regimens.

C. Weight-based dosing of enoxaparin has been shown to save hospitals a significant amount of money, allowing funds to be allocated to improve other areas of patient care.

D. Weight-based dosing of enoxaparin has been shown to reduce hospital length of stay.

Which of the following is true regarding the dosing and monitoring of enoxaparin for VTE prophylaxis in adult trauma patients?

A. Patients with a BMI >50 kg/m2 should receive enoxaparin 1.5mg/kg SQ twice daily.

B. An appropriately timed low molecular weight heparin peak anti-Xa level could be drawn four hours after the third dose of enoxaparin.

C. The patientâ€™s ideal body weight should be used to calculate the weight-based enoxaparin dose.

D. Patients who are on an anticoagulant prior to admission to a trauma unit should never receive enoxaparin for VTE prophylaxis.

Q1 Answer: B Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-561-L01-P

Improving Prescription Capture Rates through a Standardized Meds to Beds Program at Parkview Heart Institute

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Purpose: Medication adherence is critical for cardiac patients discharged with new prescriptions. Barriers such as high costs, insurance challenges, and lack of transportation often prevent patients from accessing prescribed therapies, leading to readmissions, increased healthcare costs, and worse outcomes. Meds to beds programs offer patients a convenient, patient-centered solution by delivering discharge prescriptions directly to patientsâ€™ rooms, reducing readmission rates and enhancing adherence. Despite success in other departments at Parkview Health, utilization in the Parkview Heart Institute (PHI) remains limited. The purpose of this research is to assess the implementation of a standardized process for meds to bed in PHI to improve prescription capture rates and patient outcomes. Methods: This is an improvement process within a larger health system, Parkview Health, at its Parkview Regional Medical Center campus. Retrospective chart review utilizing the electronic medical record will provide the necessary information to evaluate the success of the project. Data analysis includes a pre-implementation cohort with data collection from September 1, 2023 to August 31, 2024 and a post-implementation cohort with monthly data from the go-live date of September 30, 2024 . Patients were included in this study if they were at least age 18, admitted to PHI, and prescribed medications at discharge. Patients were excluded if they were discharged without a new medication, while M2B was not available, elsewhere besides home, in February 2024 (due to Change HealthCare downtime) or were 24-hour observation patients. The primary endpoint is prescription capture rates for PHI meds to beds patients in the Medical Park 11 Outpatient Pharmacy. Secondary endpoints include revenue/margin, turnaround time, readmission rates, and trends in M2B scripts. Results/Conclusion: Data results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the barriers to medication adherence as documented in literature.

Recognize the methods and outcomes of implementing a standardized meds to beds process to enhance prescription capture rates and improve patient care.

Self Assessment Questions:

Which of the following is a common barrier to medication adherence identified in literature?

A. Excessive patient counseling time

B. Unreliable transportation

C. Limited medication options at discharge

D. High patient satisfaction scores

What was the primary endpoint for evaluating the meds to beds program in the Parkview Heart Institute?

A. All-cause hospital readmission rates

B. Prescription turnaround time

C. Staff and patient engagement

D. Prescription Capture Rates

Q1 Answer: B Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-858-L99-P

Evaluating Infectious Diseases Specialist Involvement on Gram Negative Bacteremia Outcomes

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Purpose: Bacterial infections are a common cause of hospitalization, often leading to sepsis and mortality. While gram-positive organisms have historically been major contributors, multidrug-resistant (MDR) Gram-negative bacteremia (GNB) is increasingly prevalent. Consultation with infectious diseases (ID) specialists improves outcomes for blood stream infections (BSI) caused by gram-positive pathogens, like Staphylococcus aureus, but similar data for gram-negative pathogens is lacking. Mortality from gram-negative BSIs ranges from 14-60%, highest in intensive care unit (ICU) patients, and depends on factors such as comorbidities, clinical condition, interventions, and pathogens resistance.
Methods: This single-center, retrospective study evaluated first isolated, mono-microbial GNB cases in pediatric and adult patients admitted to UK HealthCare from September 1, 2023, through December 2024. Data were collected from institutional electronic health record and supplemented by the UK Center for Clinical and Translational Science (CCTS). The primary outcome is 30-day mortality, with secondary outcomes including microbiological data, antimicrobial therapy, demographics, comorbidities, qPitt bacteremia scores and Charlson Comorbidity Index. Data will be analyzed using univariate (Pearson chi square, Fisher's exact test) and multivariate analysis to observe mortality and the factors listed above with significance considered of $p<0.05$.
Results/Conclusions: Data collection is ongoing. Preliminary results are as follows: a total of 1,208 patients with blood cultures positive for gram-negative organisms were identified over the 16-month period; 13 patients are yet to be discharged; 41 patients passed away within 48 hours; 391 duplicate isolates were identified; 82 cultures were polymicrobial for gram-negative organisms; and 65 cultures were of anaerobic organisms. A total of 616 cases will be included in the final analysis. A total of 57.6% of patients were male, with an average age of 56.5 years. The most prevalent organisms identified were Escherichia coli (39%), Klebsiella pneumoniae (16.4%), and Pseudomonas aeruginosa (9.4%). Additional results and conclusions will be presented at the 2025 GLPRC.

Learning Objectives:

Discuss the public health implications of the increasing rate of multidrug resistant gram-negative organisms.
Identify potential risk factors for that could increase mortality risk in patient with gram-negative bacteremia.

Self Assessment Questions:

1. Which of the following statements is true about the relationship between antimicrobial resistance and bloodstream infections (BSI)?

A. Antimicrobial resistance decreases the need for long-term hospital stays for BSI patients.

B. Multidrug-resistant gram-negative organisms complicate treatment, leading to higher mortality and longer hospitalizations.

C. Resistance only affects gram-positive organisms, with little impact on gram-negative pathogens.

D. Antimicrobial resistance has no impact on patient outcomes in bloodstream infections.

2. Which of the following is most associated with increased mortality in patients with gram-negative bacteremia?

A. Young age and absence of comorbidities

B. Presence of comorbidities, clinical status at the time of infection, ICU admission, and the level of pathogen resistance

C. Rapid initiation of broad-spectrum antibiotics

D. Decreased antimicrobial resistance in the pathogens involved

Q1 Answer: B Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-645-L01-P

Anticoagulation post IVC Thrombectomy in Renal Cell Carcinoma with Tumor Thrombus

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Objective/Purpose: Tumor thrombus (TT) can manifest in different cancers but is most common in renal cell carcinoma (RCC). Tumor burden can extend to the inferior vena cava (IVC) and is thought to disrupt vascular integrity and venous blood flow, increasing the risk of a venous thromboembolism (VTE).â€¯It remains unknown whether anticoagulation improves survival in these patients. The amount of literature comparing the safety and efficacy of different anticoagulants is sparse.â€¯Our objective is to evaluate the bleeding and clotting rates in patients with RCC-associated TT status post IVC thrombectomy and assess the impact of anticoagulation on these rates.
Methods: Data will be collected through a chart review of patientâ€™s electronic medical records. We will review adult patients that were diagnosed with RCC, presented with TT and underwent IVC thrombectomy from 2014 to 2023. Data will be stored in an Excel file through a password-protected Dropbox and REDCap, a secure, HIPAA-compliant, web-based application used for capturing electronic data for research projects. Our primary outcome will evaluate the rate of VTE events in patients with RCC-associated TT post IVC thrombectomy in those that are on therapeutic anticoagulation compared to those that are not. Secondary outcomes will include mortality, arterial thromboembolisms, and a composite of clinically relevant non-major and major bleeds, as defined by ISTH. Venous thromboembolism will be defined as symptomatic or incidental pulmonary embolism, deep vein thrombosis of the upper or lower extremities, cerebral sinus vein thrombosis, or splanchnic vein thrombosis, confirmed by imaging. Statistical analysis will include a chi-squared, student t-test, pearson x2 or fisher exact test, as appropriate. Variables with p-values <.05 in univariable analysis will be considered for multivariable analysis, which will be performed using the logistic regression model.
Results/Conclusions: Data analysis is currently in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:
Identify the bleeding and clotting rates in patients with RCC-associated TT status post IVC thrombectomy.
Express the impact of anticoagulation on these rates.
Self Assessment Questions:
Tumor thrombus can manifest in multiple types of cancer but is most common in:
A. Renal Cell Carcinoma
B. Hepatic Cell Carcinoma
C. Splenic Cell Carcinoma
D. Squamous Cell Carcinoma
Which of the following is a criteria of a major bleed per ISTH definitions?
A. Non-fatal bleeding
B. Asymptomatic bleeding of a critical area
C. Hemoglobin drop of at least 2 grams per deciliter
D. A transfusion of less than 2 units of packed red blood cells
Q1 Answer: A Q2 Answer: C
APCE Universal Activity Number 0121-9999-25-503-L01-P

Guideline Adherence and Outcomes Among Staphylococcus aureus Bacteremia Patients before and after Routine Review by Infectious Diseases Pharmacist and Tele-Antimicrobial Stewardship Physician

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Purpose:
Staphylococcus aureus bacteremia (SAB) is associated with high rates of morbidity and mortality. Multiple studies show that infectious diseases (ID) consultation in SAB reduces morbidity and mortality, while improving adherence to performance measures. We aimed to determine if routine review of all patients with SAB by ID pharmacist and tele-AMS physician is associated with improved adherence to guideline-directed performance measures.

Methods:
We conducted a retrospective, quasi-experimental cohort study at a 300-bed community hospital in Kentucky. We evaluated patients admitted at the time of or within 48 hours of blood cultures growing S. aureus before and after routine review by an ID pharmacist and tele-AMS physician. The pre- & post-intervention periods were 5/2021â€“7/2022 and 1/2023â€“7/2024, respectively. The primary outcome was adherence to all guideline performance measures for management of SAB which included source identification with source control, repeat blood cultures within four days, optimal antibiotic therapy within 24 hours after BioFire Blood Culture Identification (BCID) result, echocardiogram obtainment, and appropriate treatment duration according to infection complexity. Secondary outcomes included: in-hospital mortality, 30-day mortality, persistent bacteremia (â‰¥7 days), length of stay, 30-day SAB-related readmission, 90-day recurrent bacteremia, and time to readmission and achievement of performance measures.

Results:
We screened 185 patients with SAB. After applying exclusion criteria, 133 patients were included with 63 and 70 from the pre- & post-intervention periods, respectively. Baseline characteristics were similar between groups except for osteo-articular source occurring more frequently in the post-intervention group. Achievement of all performance measures occurred significantly more often in the post-intervention group (17.5% vs 34.3%, p = 0.028).

Conclusion:
This study showed that routine review by ID pharmacist and tele-AMS physician with pharmacist intervention of SAB patients improved adherence to guideline-recommended performance measures. Additional outcomes, conclusions, and future directions will be presented at Great Lakes Pharmacy Residents Conference.

Learning Objectives:

Recognize complicating factors of Staphylococcus aureus bacteremia

Describe the role a pharmacist can play in optimizing performance measures related to Staphylococccus aureus bacteremia

Self Assessment Questions:

HI is a 73 YOF presenting to the ED for evaluation of shortness of breath. PMH is significant for HTN, CKD, COPD not on oxygen at baseline, and THA in 2020. On examination, patient is confused and weak and is requiring 3L NC. Pertinent labs include: WBC 20,000/mm3, lactate 5.7 mmol/L, Scr 5.9 mg/dL. Patient met SIRS criteria in the ED with T 101.1Â°F, HR 111 BPM, and RR 23. Patient has pneumonia on imaging and positive pneumonia panel for staphylococcus aureus no mecA/C or MREJ gene detected. Blood cultures were drawn in the ER and are growing MSSA in 2/2 bottles. The patient was empirically started on vancomycin and piperacillin/tazobactam. The resident physician has never seen a SAB patient before and asks you as the pharmacist for treatment recommendations. 1.Along with optimization of antibiotics from vancomycin and Zosyn to cefazolin, which of the following performance measures should you communicate to the resident physician to obtain?

A. Performance of an echocardiogram

B. Repeat blood cultures only if the patient remains febrile

C. Chest X-ray to evaluate for pneumonia

D. Treatment duration of 2 weeks

Question 2 relates to the patient case from question 1. Which of the following factors qualifies this patient as having complicated SAB?

A. She meets SIRS criteria

B. She has CKD

C. She has a prosthetic hip

D. She is > 65 years old

Q1 Answer: A Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-544-L01-P

Development of a Patient Prioritization Process for Pharmacists in the Primary Care Setting

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Purpose. The primary care practitioner shortage continues to worsen as patients with chronic diseases and complex care needs rises, consuming significant healthcare resources and provider time. The contributions that pharmacists can make to interdisciplinary healthcare settings have long been underutilized. Previous evidence has demonstrated improved clinical outcomes, cost savings, access to care, patient satisfaction, and primary care provider clinical workload burden when pharmacists are integrated into primary care. Currently in the Norton Community Medical Associates Audubon primary care practice there are a total of 24 hours per week of dedicated clinical pharmacist time. These pharmacists work via consults from the 24 providers within the practice to provide comprehensive medication management. Due to limited pharmacist resources in this practice, this project aims to create a process to identify patients with complex chronic conditions at high risk for hospitalization or those at high risk for medication related problems.
Methods. This was a process improvement project that followed the Plan, Do, Study, Act (PDSA) methodology. Patient outreach, pharmacist visits, and data collection occurred from October 2024 through January 2025. Patients were included if they completed a visit with a provider at Norton Community Medical Associates Audubon in the 6 months prior to the report date, with a chief complaint for the visit related to asthma, chronic obstructive pulmonary disease, hypertension, hyperlipidemia, diabetes, or heart failure. The primary outcome of this study was the number of interventions identified by a pharmacist. Secondary outcomes included types of interventions, disease states impacted, and provider acceptance rate of pharmacist recommendations.
Results & Conclusion. To be presented at the 2025 Great Lakes Pharmacy Residents Conference

Learning Objectives:

Describe medication management models utilized in primary care practices
Identify how pharmacists impact chronic disease state and medication therapy management

Self Assessment Questions:

Which of the following steps of the comprehensive medication management process occurs in the Expanded Care Team model?

A. The pharmacist develops recommendations
B. The pharmacist sends recommendations to the provider
C. The pharmacist implements the plan with the patient
D. The provider reviews recommendation and implements the plan

Several studies have highlighted the ability of pharmacists to identify drug therapy problems and medication discrepancies. In a study by the Ontario Family Health Teams, what percentage of patients has at least one drug related problem identified by a pharmacist?

A. 0.36
B. 0.44
C. 0.79
D. 0.94

Q1 Answer: C Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-606-L04-P

Management of Nosocomial Spontaneous Bacterial Peritonitis in Adult Hospitalized Patients with Cirrhosis

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Purpose: Spontaneous bacterial peritonitis (SBP) is an infection of ascitic fluid that occurs in patients with cirrhosis and selecting appropriate empiric antibiotic treatment is essential to improve morbidity and mortality. SBP is diagnosed by paracentesis with ascitic polymorphonuclear neutrophils (PMN) greater than or equal to 250 cells/mm3. Previously, guidelines recommended the use of third-generation cephalosporins (TGC) without the differentiation of nosocomial or community acquired SBP. Nosocomial SBP, defined as diagnosis greater than 48 hours after hospital admission, has multidrug-resistant organism (MDRO) incidence of up to 35%. The 2021 American Association for the Study of Liver Diseases (AASLD) updated guidance suggests empiric use of carbapenems may lead to higher resolution and lower mortality in critically ill patients or nosocomial infections. The aim of this study is to address the use of TGC in comparison with empiric broad spectrum antibiotics such as carbapenems to determine the most effective treatment of nosocomial SBP in adult patients with cirrhosis.

Methods: A retrospective cohort review of adults with cirrhosis diagnosed with nosocomial SBP was completed within the Indiana University Health system from January 1, 2014, to December 31, 2024. Comparator arms included ceftriaxone and broad-spectrum antibiotics. The primary endpoint was resolution of infection as defined by decrease in PMN count of at least 25%â€¯at 48-hours or PMN count less than 250 cells/mm3 if repeat paracentesis was completed on days 5-7 from diagnosis. Secondary endpoints included readmission or reoccurrence of SBP at 30 or 90-days while on appropriate antibiotic SBP prophylaxis, in-hospital mortality, overall mortality rate at 30 and 90-days, transplant free-survival at 90-days, hospital length of stay, WBC count normalization with local symptoms alleviated per chart review and change in antimicrobial therapy based on follow-up cultures results.

Results and conclusions will be presented at the 2025 Great Lakes Pharmacy Resident Conference.

Learning Objectives:
Explain nosocomial SBP, its definition, and recommended treatment per AASLD
Discuss the recommended antibiotic management between nosocomial and community-acquired SBP
Self Assessment Questions:
Which of the following best describes nosocomial SBP and its diagnostic criteria?
A. PMN count at least 250 cells/mm3 within 48 hours of admission
B. PMN count at least 250 cells/mm3 after 48 hours of admission
C. PMN count less than 250 cells/mm3 within 48 hours of admission
D. PMN count less than 250 cells/mm3 after 48 hours of admission
Why are broad-spectrum antibiotics favored over TGCs for the treatment of nosocomial SBP?
A. Nosocomial SBP is associated with a higher prevalence of MDROs, which are less susceptible to TGCs
B. TGCs cause more severe side effects compared to broad-spectrum antibiotics

C. Broad-spectrum antibiotics have a higher efficacy against all bacterial causes of SBP regardless of resistance patterns
D. Nosocomial SBP is less severe than community-acquired SBP
Q1 Answer: B Q2 Answer: A
APCE Universal Activity Number 0121-9999-25-512-L01-P

Efficacy of Diltiazem Bolus Dosing Strategies in Atrial Fibrillation with Rapid Ventricular Response

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In the treatment of atrial fibrillation (AFIB) with rapid ventricular response (RVR), guidelines recommend diltiazem as a weight-based intravenous (IV) bolus of 0.25 mg/kg, followed by continuous infusion. Many providers utilize a 10 mg fixed-dose strategy to minimize potential adverse effects. Literature focusing on the subset of patients who receive both diltiazem bolus and continuous infusion is limited. This studyâ€™s purpose is to determine if a weight-based bolus dosing strategy is associated with an improved time to heart rate (HR) control versus lower doses for patients also started on continuous infusions.

This single-center, retrospective cohort study will be conducted via chart review at Union Hospital in Terre Haute, Indiana, analyzing patients seen between July 1, 2022, and June 30, 2024. The study will include patients at least 18 years of age with a diagnosis of AFIB with RVR and a HR of at least 120 beats per minute (bpm) who received a diltiazem bolus followed by continuous infusion in the emergency department. Patients will be excluded if they received another antiarrhythmic within 30 minutes of bolus administration, had insufficient vital sign documentation, no measured weight, were febrile, or were pregnant, breastfeeding, or a prisoner. Patients will be classified as low-dose (<0.15 mg/kg) or high-dose (> 0.15 mg/kg) based on the initial bolus dose administered. The primary outcome will be incidence of sustained HR < 100 bpm within 2 hours of bolus administration. Secondary outcomes will include time to sustained HR < 100 bpm after bolus administration, need for additional rate controlling agents, maximum continuous infusion rate, continuous infusion duration, hospital length of stay, incidence of hypotension, bradycardia, and in-hospital mortality.

Results and conclusions will be presented at the 2025 Great Lakes Pharmacy Residents Conference.

Learning Objectives:

Identify the guideline recommended bolus dose for diltiazem in the treatment of atrial fibrillation with rapid ventricular response.

Review common adverse effects associated with administration of intravenous diltiazem.

Self Assessment Questions:

What is the guideline recommended bolus dose for diltiazem in the treatment of atrial fibrillation with rapid ventricular response?

A. 0.1 mg/kg IV Push once

B. 0.15 mg IV Push once

C. 0.25 mg/kg IV Push once

D. 10 mg IV Push once

What is a common risk associated with diltiazem that presents a potential dose limiting effect in the treatment of atrial fibrillation with rapid ventricular response?

A. Supraventricular Tachycardia

B. Hypotension

C. Pulmonary Hypertension

D. Hepatic Toxicity

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-553-L01-P

Evaluating guideline adherence for venous thromboembolism prophylaxis in trauma patients

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Purpose:
Trauma patients are at higher risk for venous thromboembolism (VTE) compared to other patient populations. The Western Trauma Association guidelines include an algorithm that directs clinicians to the most appropriate enoxaparin or heparin dose in trauma patients. When a trauma patient is admitted to the intensive care unit (ICU) the rounding ICU pharmacist helps manage their enoxaparin dosing. However, there is nothing to determine if the dosing algorithm is accurately followed throughout the trauma admission. This study aims to determine if the algorithm is accurately followed.

Methods:
The local institutional review board has reviewed this study. This retrospective chart review will evaluate Springfield Memorial Hospitalâ€™s adherence to the updated 2020 Western Trauma Association algorithm for VTE prophylaxis. The period of chart review will be from March 1, 2021, through September 1, 2024. Exclusion criteria include less than 18 years of age, pregnancy, patients who did not receive enoxaparin or heparin during their stay, trauma readmissions, and patients whose length of stay was less than 24 hours.
The collected data for analysis includes demographic data, history of anticoagulation medications with indications, pertinent lab values, ICU and hospital length of stay, reason for admission and injuries sustained, timing of enoxaparin or heparin initiation, diagnosis of pulmonary embolism or deep vein thrombosis during admission, bleeding that required discontinuation of anticoagulants.0
This study's primary objective is to evaluate adherence to the Western Trauma Association Guidelines. Secondary outcomes include evaluating if the enoxaparin dose used was appropriate based on anti-Xa levels, the number of patients that experienced adverse effects from inappropriate dosing, appropriate length of time before enoxaparin or heparin was started, the length of stay in the ICU and hospital, and pharmacist interventions.

Results/Conclusion:
Final data and analysis will be presented at the Great Lakes Pharmacy Resident Conference in April 2025
Learning Objectives:

Identify appropriate VTE prophylaxis with enoxaparin and heparin using the Western Trauma Association guidelines.
Recognize appropriate anti-Xa level monitoring in trauma patients on VTE prophylaxis
Self Assessment Questions:
Which of the following is the appropriate starting dose for VTE prophylaxis in trauma patients?
A. Heparin continuous infusion
B. Enoxaparin 60 mg subcutaneously twice daily
C. Enoxaparin 40 mg subcutaneously twice daily
D. Enoxaparin 40 mg subcutaneously daily
What is the goal anti-Xa peak level for VTE prophylaxis in trauma patients
A. 0.5-1 units/mL
B. 0.2-0.4 units/mL
C. 0.1-0.2units/mL
D. 0.2-0.6 units/mL
Q1 Answer: C Q2 Answer: B
APCE Universal Activity Number 0121-9999-25-663-L01-P

Doxycycline for Symptomatic Gram-Negative Bacteriuria

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Urinary tract infections (UTIs) are among the most common bacterial infections that occur in clinical practice. Given the increasing prevalence of antibiotic resistance, discovering alternative agents for the treatment of UTIs is imperative. Doxycycline traditionally has not been recommended due to its presumed low urinary concentration and potential for resistance. However, emerging literature suggests that it may now be a viable treatment option. At UofL Health, doxycycline is empirically prescribed for suspected sexually transmitted infections (STIs). Pharmacists discovered that patients discharged on doxycycline with subsequent positive urine cultures experienced resolution of urinary symptoms. The purpose of this study is to determine if the use of doxycycline leads to clinical improvement in patients with symptomatic gram-negative bacteriuria.

This was a retrospective cohort study evaluating doxycycline monotherapy versus doxycycline plus a urinary organism-susceptible antibiotic in patients with gram-negative symptomatic bacteriuria at four UofL Health facilities from September 1, 2022, to December 31, 2024. Patients were included if they were â‰¥ 18 years of age, presented with urinary symptoms, had a positive urinalysis, were discharged from emergency department (ED) with doxycycline, and had a urine culture with a gram-negative organism susceptible to tetracycline. Patients were excluded if they were pregnant, incarcerated, or presented with flank pain suggestive of pyelonephritis. The primary endpoint was the rate of clinical improvement in patients discharged from the ED with doxycycline alone versus doxycycline plus another antibiotic for symptomatic gram-negative bacteriuria. Doxycycline tolerability was evaluated as a secondary endpoint. A subgroup analysis of clinical improvement was performed comparing patients with a STI and symptomatic gram-negative bacteriuria versus symptomatic gram-negative bacteriuria only.

Data analysis is ongoing. Results and conclusions will be presented at the 2025 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the implication of urinary spectrum for orally administered antibiotics.

Identify the safety and efficacy of doxycycline in symptomatic gram-negative bacteriuria.

Self Assessment Questions:

The concept of â€œurinary spectrumâ€ for orally administered antibiotics to treat non-systemic UTIs is based on the principle that renally eliminated antibiotics are concentrated to supra-serum levels in patients with what?

A. Impaired renal function

B. Dehydration

C. Intact renal function

D. High protein diet

Which of the following is not considered a urinary symptom?

A. Frequency

B. Increased vaginal discharge

C. Dysuria

D. Urgency

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-603-L01-P

Evaluation of Antibiotic Therapy Among Patients with Contaminated Blood Cultures Identified by Rapid Diagnostic Testing

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Purpose: Rapid diagnostic tests (RDTs) enhance our ability to identify and treat bloodstream infections with greater precision. However, their effectiveness relies on the ability to accurately distinguish contamination from true infections. Misinterpretation can undermine the quality of patient care, resulting in unnecessary antibiotic use, additional procedures, adverse reactions, and longer hospitalization. The objective of this study is to evaluate patient outcomes following contaminated blood cultures identified by RDTs, prioritizing the impact on hospitalization duration and antimicrobial use.
Methods: This study is a single-system, retrospective chart review assessing antimicrobial use and length of stay in patients with RDT confirmed blood culture contaminants at UW Health Northern Illinois. Electronic health records will be used to identify patients with positive blood cultures between January 1st, 2024, to July 15th, 2024. Study population includes patients aged 18 to 89 with positive RDT results for pre-specified contaminants. The data collected will include patient age, sex, prior to admission medication list, past medical history, date and time of positive RDT result, antibiotic use at the time of positive RDT result, indication for the antibiotic(s), name of antibiotic(s) prescribed, date and time antibiotic(s) was discontinued, number of antibiotic doses administered in between positive RDT result and the discontinuation of the antibiotic, the number of vancomycin troughs drawn between the time of the positive RDT result and the discontinuation of vancomycin, the number of repeat blood cultures ordered, the number of positive repeated blood cultures for index organism, discharge date and time, time between positive RDT and discharge, time between antibiotic initiation and discharge, and occurrence of Clostridioides difficile infection within 3 months of antibiotic discontinuation. Results will be utilized to design a protocol to improve patient outcomes in the aforementioned areas.
Results/Conclusions: Results and conclusions will be presented at the GLPRC

Learning Objectives:

Describe how rapid diagnostic testing can improve the identification of bloodstream infections and differentiate between contaminants and true infections.

Explain the negative outcomes of blood culture contamination on antimicrobial use and patient outcomes, including hospitalization duration

Self Assessment Questions:

Which of the following microorganisms, if identified by a rapid diagnostic test , is most likely to be classified as a contaminant?

A. Bacillus subtilis

B. Escherichia coli

C. Klebsiella pneumoniae

D. Staphylococcus aureus

What is the primary benefit of using rapid diagnostic tools in blood culture analysis?

A. Eliminate the risk of contamination during sample collection

B. Reduce the need for repeat cultures

C. Rapidly identify pathogens and their resistance markers

D. Shorten the duration of antimicrobial therapy

Q1 Answer: A Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-509-L01-P

Time is Medicine: Refill Request Turnaround in Primary Care Clinics with and Without Pharmacists

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In March 2022, Nationwide Childrenâ€™s Hospital primary care clinic-embedded pharmacists became credentialed and privileged allowing them to independently refill medications. The primary objective of this study is to evaluate and compare the time to complete medication refill requests between primary care network clinics with and without clinic-embedded pharmacists. Secondary objectives include comparing the time to complete refill requests pre- and post-pharmacist credentialing and quantify refill requests addressed by pharmacists.

A retrospective review was conducted utilizing an electronic health record (EHR) data report for refill requests completed within the Primary Care Network from January 2020 to December 2024. This network consists of 14 clinics that care for children from birth to 21 years old, one of which cares for children and adults; three clinics have a clinic-embedded pharmacist. The data report included patient age, clinic location, medication class, ordering provider credentials, and time to complete refill request. Requests for controlled medications and patients 21 years and older were excluded. Descriptive statistics and a generalized linear model were conducted for data analyzation using SAS 9.4 (Cary, NC 2016).

A total of 38,057 refill requests occurred in the clinics from January 2020 to December 2024. Clinics with a pharmacist completed requests in an average of 2.39 hours and clinics without a pharmacist averaged 2.72 hours ($p<0.0001$). The difference in time to complete a request between clinics with and without a pharmacist during pre-credentialing years was 0.04 hours (2.27 v 2.31 hours) and was 0.52 hours (2.47 v 2.99 hours) for post-credentialing years ($p<0.0001$). Pharmacists fulfilled 5.4% (N=575) of requests. On average, pharmacists completed a request in 1.78 hours compared to other providers who averaged 2.88 hours ($p<0.0001$).

Primary care clinics with a clinic-embedded credentialed and privileged pharmacist took significantly less time to complete refill requests compared to clinics without a pharmacist.

Learning Objectives:

Describe the role of a credentialed and privileged clinic-embedded pharmacist in a primary care clinic

Discuss the impact of having a credentialed and privileged clinic-embedded pharmacist in a primary care clinic on refill request completion time

Self Assessment Questions:

1. Which of the following actions is granted to clinic-embedded credentialed and privileged pharmacists at this pediatric institution?

A. Ability to order a medication refill excluding controlled medications

B. Ability to diagnose a patient based on an assessment

C. Ability to order a controlled medication for a patient

D. Ability to order laboratory tests related to the monitoring of medications

Within the primary care network at this pediatric institution, which of the following statements is correct?

A. Clinics without a credentialed pharmacist took significantly less time to complete refill requests compared to clinics with a pharmacist.

B. Credentialed pharmacists completed more refill requests compared to non-pharmacist providers.

C. Clinics with a credentialed pharmacist took significantly less time to complete refill requests compared to clinics without a pharmacist.

D. No difference was found in average refill completion time when comparing clinics with and without a credentialed pharmacist.

Q1 Answer: A Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-859-L99-P

Changes in Tobacco Usage in Patients Taking GLP-1 Receptor Agonists or GIP/GLP-1 Receptor Agonists

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Purpose: Tobacco use remains a significant public health concern, linked to numerous adverse health outcomes. Despite limited treatment options with mixed efficacy and high relapse rates, recent research suggests that GLP-1 receptor agonists (GLP-1 RAs) may hold potential for managing tobacco use disorder through the prevention of withdrawal-induced hyperphagia, weight gain, and cognitive deficits, potentially reducing relapse risk. Given their shared mechanisms of action, GIP/GLP-1 RAs may also offer similar benefits; however, their effects on smoking cessation have not yet been evaluated. The purpose of this study is to evaluate the effectiveness of GLP-1 and GIP/GLP-1 RAs in promoting smoking cessation in real-world setting.
Methods: This is a retrospective cohort chart review of patients prescribed and known to be taking GLP-1 RAs or GIP/GLP-1 RAs between 12/01/2016 to 09/01/2023. The primary objective is to determine if there is a significant change in tobacco use in people taking GLP-1 RAs or GIP/GLP-1 RAs. Secondary objectives include time to tobacco use cessation, weight change, and to identify predictors such as age, race, sex, medication prescribed, indication, route, dose, baseline smoking status, concomitant smoking cessation medications, previous cessation attempts, and tobacco/nicotine product used. Patients â‰¥ 18 years, receiving care at Riverside Medical Group, prescribed one of the six GLP-1 RAs or GIP/GLP-1 RAs (semaglutide, liraglutide, dulaglutide, exenatide, tirzepatide) for either type 2 diabetes or obesity with confirmed adherence for at least a month, and documented positive smoking status (dip, cigarettes, cigars), will be included. Exclusion criteria includes no documentation of medication adherence, smoking status, and/or follow up within 6 months. The first 300 charts that meet inclusion criteria will be included. Follow-up smoking status will be assessed at the following intervals over the first year: 1-3 months, 3-6 months, 6-9 months, 9-12 months.
Results and Conclusions: Results in progress.

Learning Objectives:

Identify the proposed mechanism by which GIP/GLP-1 and GLP-1 receptor agonists may facilitate smoking cessation.

Explain the potential advantages of utilizing GIP/GLP-1 and GLP-1 receptor agonists as adjunct therapies for smoking cessation compared to traditional approaches, considering factors such as efficacy, tolerability, and impact on weight management.

Self Assessment Questions:

1.Which of the following describes a potential benefit associated with the use of GIP/GLP-1 and GLP-1 receptor agonists for smoking cessation?

A. Reduction of weight gain often associated with smoking cessation

B. Increased number of medications required for smoking cessation

C. Improved quality of life

D. Intensification of nicotine withdrawal symptoms

What is the proposed mechanism behind the use of GIP/GLP-1 and GLP-1 receptor agonists for smoking cessation?

A. Induction of nausea or other adverse effects when tobacco is used with GIP/GLP-1 and GLP-1 receptor agonists

B. Altered taste of tobacco with GIP/GLP-1 and GLP-1 receptor agonists

C. Reduction in the rewarding effects of tobacco products

D. Replacement of tobacco cravings with food cravings

Q1 Answer: A Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-557-L01-P

Improving Outpatient Antimicrobial Stewardship Through Pharmacists' Assessment of Urine Cultures via a Mature Culture Follow-up Program

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Purpose: A collaborative practice agreement at our institution enables affiliated pharmacists to conduct symptom assessments on patients discharged from the emergency department (ED) or urgent care (UC) and prescribe treatment(s) for infectious diseases including urinary tract infections (UTIs). In 2018, study investigators published a proof-of-concept study focused on pharyngitis, which found a statistically significant decrease in antibiotic prescribing when comparing pre- and post-stewardship initiative groups and an increase in overall therapy appropriateness with follow-up symptom assessment prior to antibiotic prescribing. This study supported the decision to proceed with investigating infectious conditions where similar stewardship efforts have not been described. Current UTI stewardship program literature describes short term impacts like reduced time to culture review and increased appropriate antibiotic regimen prescribing. This study aims to evaluate the clinical impact of a mature ED and UC culture follow-up program on key outpatient antimicrobial stewardship measures for UTI.

Methods: This retrospective cohort study compares the difference in rate of retreatment for symptomatic UTI within 30 days of follow up for patients with a positive urine culture who received the standard of care to patients who were asymptomatic and were deprescribed or not prescribed antimicrobials between January 1, 2020, and September 9, 2024, across institutionally affiliated ED and UC sites. Secondary objectives include assessing the difference in days of antibiotic therapy, safety outcomes, and pharmacist workload. Female patients 18 years or older who had a positive urine culture and were contacted by the culture follow-up team were included. Key exclusion criteria include diagnosis of pyelonephritis, complicated, or recurrent UTI, prior UTI treatment within 30 days of presentation and one or more doses of intravenous (IV) or intramuscular (IM) antibiotics before oral therapy.

Results: Data collection and analysis are in progress.â€¯â€¯

Conclusions: To be presented at the Great Lakes Pharmacy Residents Conference.â€¯

Learning Objectives:

Identify current trends in outpatient antibiotic prescription appropriateness

Describe the impact pharmacists have on patient care through emergency department (ED) and urgent care (UC) culture follow-up programs.

Self Assessment Questions:

Which of the following most accurately describes the rate of unnecessary and inappropriate outpatient antibiotic prescriptions respectively?

A. 30% unnecessary; 30% inappropriate

B. 30% unnecessary; 50% inappropriate

C. 50% unnecessary; 30% inappropriate

D. 50% unnecessary; 50% inappropriate

Which of the following outcomes has been reported in the literature regarding the impact of pharmacist-led culture follow-up programs in the ED?â€¯

A. Decreased number of antibiotic discontinuationsâ€¯

B. Increased time to culture reviewâ€¯

C. Increase in antibiotic prescribing at follow-up

D. Increase in antibiotic free daysâ€¯

Q1 Answer: B Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-721-L01-P

Impact of Insurance Coverage of Metered Dose Inhaler Corticosteroid on Outcomes in Pediatric Asthma Patients

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Purpose: Across the United States, many children experience asthma exacerbations and require visits to the emergency department. Regardless of age, the mainstay of therapy for asthma is inhaled corticosteroid (ICS). An ICS can be administered via different delivery mechanisms including nebulizer, metered dose inhaler (MDI), and dry powder inhaler (DPI). Pediatric patients typically demonstrate inconsistent inhaler technique, which leads to preferential use of an MDI with spacer for pediatric patients. Insurance formularies may place restrictions on which types of inhalers are available to patients, limiting them to DPIs, which are not the ideal device for pediatric patients. Though limited, current literature suggests that pediatric patients who have switched from an MDI to a DPI demonstrate decreased lung function in comparison to those who switched from one MDI to another. The objective of this project is to compare asthma exacerbation rates in pediatric patients before and after a change in maintenance therapy from MDI to DPIâ€‹.

Methods: This retrospective study included patients under 18, who had an active prescription for an ICS MDI between January 2023 and December 2024 and had received at least 3 months of ICS MDI therapy before switching to a DPI. Patients were excluded if they were uninsured or were using an ICS for an indication other than asthma. The primary endpoint of this study was to identify the change in asthma exacerbation rate in patients before and after changing from an MDI to DPI. Secondary endpoints include the number of new prescriptions for oral corticosteroids, sick visits, ED visits, and admissions due to asthma exacerbation, Asthma Control Test scores, % predicted FEV1, % predicted FVC, and days without maintenance ICS.

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

Learning Objectives:

Identify the appropriate inhaler device for a pediatric patient with asthma

Recognize the appropriate pharmacotherapeutic management of pediatric asthma

Self Assessment Questions:

Which of the following is the most appropriate inhaler device for a 3-year-old patient with asthma?

A. MDI without spacer

B. Diskus

C. Ellipta

D. MDI with spacer

OC is 6-year-old female with a past medical history of allergies and eczema. She has been experiencing asthma symptoms 3 days per week. Per the 2024 GINA guidelines, which of the following is an appropriate low-dose ICS to treat her asthma?

A. Mometasone twisthaler 220 mcg 1 inhalation once daily with a spacer

B. Ciclesonide HFA 80 mcg 1 inhalation once daily with a spacer

C. Fluticasone propionate HFA 110 mcg 2 inhalations twice daily with a spacer

D. Fluticasone furoate Ellipta 50 mcg daily with a spacer

Q1 Answer: D Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-563-L01-P

Comparison of Alteplase vs Tenecteplase for Acute Ischemic Stroke in a Community Health System

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Purpose: Every year approximately 795,000 people in the United States experience a stroke with 87% being ischemic in nature. Stroke is the leading cause of long-term disability. For qualifying patients, acute ischemic stroke may be treated with systemic thrombolytic therapy. For, these patients, the American Heart Association recommends a door-to-needle time within 60 minutes. The study institutions transitioned from alteplase to tenecteplase for acute ischemic stroke treatment in March 2023. The purpose of this study was to evaluate the change in door-to-needle time between two thrombolytics in a community health system.

Methods: A retrospective chart review of patients admitted to any facility within the study health system from August 6, 2021 to October 17, 2024 was conducted. Patients 18 years or older who presented with acute ischemic stroke and received alteplase or tenecteplase were included. The primary endpoint of this study was change in door-to-needle time. Secondary endpoints include change in National Institutes of Health Stroke Scale (NIHSS), incidence of bleeding (intracranial, major, minor), and presence of angioedema. Demographic information was collected including age, weight, and sex. Information gathered regarding blood pressure management included blood pressure, anti-hypertensive agent(s) used, and order and administration time. Data regarding thrombolytic use was collected including agent, dose, order and administration time, and unit where administered. Safety data was also collected including incidence of bleeding and angioedema. Additional data collected included NIHSS scores, post thrombolytic imaging, reason(s) for delay in therapy, mode of arrival, and level of care at admission and discharge. Nominal data was analyzed with chi square tests, continuous data with t-tests, and ordinal data with Wilcoxon Signed Rank Sum.

Results/Conclusion: Data collection and analysis are ongoing. Results and conclusions will be presented at the 2025 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize thrombolytic dosages used for ischemic stroke

Review potential side effects of systemic thrombolytic therapy used for acute ischemic stroke

Self Assessment Questions:

JM is a 67-year-old, 100 kg male who presents to the ED with stroke-like symptoms. After further work-up he is a candidate for thrombolytic administration. What is the dose of tenecteplase you would recommend for acute ischemic stroke in this patient?

A. 90 mg

B. 25 mg

C. 100 mg

D. 50 mg

Which of the following is a potential medication side effect of thrombolytic therapies?

A. Hypertension

B. Agitation

C. Angioedema

D. Tinnitus

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-732-L01-P

Evaluation Of Gentamicin And Cefepime Usage For Empiric Therapy In Neonatal Sepsis

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Purpose: Recommendations for empiric antibiotic selection for suspected neonatal infections include the use of broad-spectrum antibiotics, such as an aminoglycoside in combination with ampicillin or an antistaphylococcal agent, depending on the timing of the infection onset. In certain clinical situations, such as suspected meningitis or acute kidney injury, substituting gentamicin with a cephalosporin may be considered. However, cephalosporins should be used with caution due to an increased risk of adverse effects, including necrotizing enterocolitis, invasive fungal infections, and late-onset sepsis. Guidelines at our institution recommend considering cefepime as an alternative to gentamicin for specific indications. The purpose of this study was to examine the adherence of providers to the institution's empiric antibiotic guideline, quantify the indication for cefepime, and evaluate the association between cephalosporin use and the occurrence of adverse effects. Methods: This single-center, retrospective study examined neonatal patients receiving empiric antibiotic therapy in the NICU at Peyton Manning Childrenâ€™s Hospital at Ascension St. Vincent from January 1, 2023, to January 31, 2024. It compared two groups of patients treated with gentamicin or cefepime for at least 24 hours. The primary objective was to assess provider adherence to empiric antibiotic guidelines, with gentamicin as the preferred gram-negative antibiotic. Secondary objectives included the incidence of adverse effects, therapy failure, and overall antibiotic exposure. Patient samples were identified from a Pharmacy Report using specific filters, and data was reviewed using SCM and NeoData. Descriptive statistics were applied to summarize and analyze the data. Results: Data analysis is currently in progress. Results will be presented at the 2025 Great Lakes Pharmacy Residency Conference. Conclusions: To be presented at the 2025 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify common sources and pathogens in neonatal infections.

Describe common regimens and risk-benefit considerations for empiric antimicrobial therapy in neonatal infections.

Self Assessment Questions:

Which of the following organisms is most commonly associated with early-onset sepsis in neonates?

A. Klebsiella pneumoniae

B. Enterococcus faecalis

C. Group B Streptococcus

D. Staphylococcus aureus

What would be the most appropriate antimicrobial regimen for a neonate presenting with early-onset sepsis?

A. Ampicillin + Ceftriaxone

B. Cefepime + Vancomycin

C. Gentamicin + Vancomycin

D. Ampicillin + Gentamicin

Q1 Answer: C Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-535-L01-P

Standardization of Protocols for Outpatient Management of Acute Hypoglycemia in a Veterans Affairs Medical Center

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Purpose: Veterans have an increased prevalence of diabetes compared to the general population in the United States. Many of these patients require treatment with antihyperglycemic agents, such as insulin. A potential side effect of insulin and other agents used to treat diabetes is hypoglycemia, which has been associated with poor outcomes and higher rates of death. Variability in the methods utilized to treat acute hypoglycemia in primary care clinics may increase risk of errors and cause delays in patient care. The objective of this study is to assess adherence to the existing hypoglycemia protocol and to standardize management of acute hypoglycemia in primary care clinics.
Methods: A retrospective electronic medical record review was used to identify patients who had a blood glucose measurement of less than or equal to 70 mg/dL or less than 80 mg/dL with hypoglycemia symptoms. Members of the health care team were anonymously surveyed to collect information regarding confidence in their ability to manage acute hypoglycemia in clinic, previous treatment of hypoglycemia in a face-to-face appointment, and if the established protocol was used during treatment. Data from patients experiencing hypoglycemia during face-to-face clinic appointments and provider feedback were reviewed to determine if existing hypoglycemia protocols were followed, assess provider awareness of hypoglycemia protocol existence, and assess appropriate documentation of hypoglycemia episodes.
Results and Conclusions: Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recall treatment recommendations for hypoglycemia in patients with diabetes
Identify potential methods to standardize management of acute hypoglycemia in primary care clinics

Self Assessment Questions:

Which of the following is an appropriate initial treatment option for hypoglycemia?
A. A package of cheese crackers
B. 4 ounces of orange juice
C. 12 ounces of soda
D. 1Â apple
Which of the following strategies could be used to standardize treatment of hypoglycemia in primary care clinics?
A. Stock a variety of fast acting carbohydrate sources in each primary care clinic
B. Implement a policy that considers patient preferences when selecting treatment options
C. Eliminate existing facility policies providing guidance and recommendations for treatment
D. Make stocked treatment options in automated dispensing cabinets uniform in the clinics
Q1 Answer: B Q2 Answer: D
APCE Universal Activity Number 0121-9999-25-576-L01-P

Multi-Step Order Transmittal for Optimizing Specialty Medication Management at Discharge

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Statement of Purpose: The purpose of this study is to implement a process within the electronic health record called Multistep Order Transmittal (MSOT) to improve management of specialty medication prescriptions at hospital discharge with a goal of improving prescription capture rates, reducing delays in access, and enhancing care continuity for patients requiring specialty medications.

Background: Specialty medications are high-cost treatments used to manage complex disease states which often require high-touch patient care. These therapies involve complicated dosing and monitoring, frequent dose adjustments and specialized handing and administration. Additionally, prior authorizations and copay assistance are often required, and many payers restrict members to fill these medications at specific specialty pharmacies.

At the University of Michigan Health, the processes for coordination of specialty medication access upon a patientâ€™s discharge from the hospital have developed in an uncoordinated manner over time as service expansions have targeted individual areas or disease states. This lack of standardization can lead to delays and increased length of stay. Additionally, while continuation of care with the health system specialty pharmacy offers advantages like coordinated care and prescriber access, there is no standardized process for offering these services at discharge. Patients typically receive an initial fill but are left to identify ongoing access independently, resulting in confusion, delays, and loss of continuity.

Methods: Select specialty medications will be assigned to MSOT when ordered at discharge, which temporarily interrupts these orders from being released and sends them to a queue to allow medication access work completion. A medication access team member will complete access work and adjust the receiving pharmacy if eligible to fill with the health system pharmacy or as required by the patientâ€™s insurance. Time to medication access and prescription capture rates will be assessed.

Results/Conclusions: Results/conclusions will be presented at the 2025 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the characteristics and challenges associated with specialty medications.

Describe the Multistep Order Transmittal (MSOT) process in the Epic EMR.

Self Assessment Questions:

Which of the following is NOT a common challenge associated with specialty medications?

A. Complex dosing and monitoring requirements

B. High costs along with prior authorization and copay assistance needs

C. Limited patient education requirements

D. Payer restrictions on where medications can be filled

What is the primary function of Multistep Order Transmittal (MSOT) in Epic's electronic health record system?

A. To automate billing processes for all medication orders

B. To interrupt the transmittal of medication orders, routing them to a dedicated work queue for additional review and the ability to change the receiving pharmacy

C. To bypass prior authorization requirements for specific medications

D. To directly transmit all medication orders to external pharmacies

Q1 Answer: C Q2 Answer: B

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CAPtivating Prescriptions: Optimizing Outcomes with the CAP Order Set for Community-Acquired Pneumonia Management

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Community acquired pneumonia (CAP) is one of the most common indications for inpatient antibiotic therapy and a major contributor to antibiotic overuse. The accurate diagnoses of bacterial infections and selection of preferred empiric antibiotics is imperative to prevent antibiotic overuse, antibiotic-related adverse drug events (ADE), and development of antimicrobial resistance. Order sets integrated into the electronic health record (EHR) provide clinical decision support to assist providers in prescribing appropriate antibiotic regimens and optimal duration of therapy. The purpose of this study was to evaluate and compare preferred antibiotic therapy in hospitalized patients with uncomplicated CAP following the integration of an order set into the EHR. This is an IRB-approved retrospective cohort study of hospitalized adult patients with an uncomplicated CAP diagnosis from 08/01/2023-08/01/2024 at a 5-hospital health system in southeast Michigan. The cohorts included patients who received treatment via the standardized CAP order set and compared to those who were treated based on the physician's clinical judgment. Patients were included if they were diagnosed with uncomplicated CAP within 48 hours of admission with an active antibiotic order for CAP in place. Patients were excluded if they were being treated with antibiotics for an infection other than pneumonia, had a documented allergy to penicillin, or expired before discharge. The primary outcome was the proportion of patients who received ampicillin/sulbactam for CAP, the health systemâ€™s preferred CAP antibiotic. Secondary endpoints included duration of therapy, days of therapy for atypical coverage, length of hospital stay, proportion of patients that experienced an ADE during hospitalization, and 30-day hospital readmission. Assuming a two-sided alpha of 0.05, beta (1-Î²) of 0.8, and to detect a 30% difference in frequency of outcome between any two levels of exposure variables, a total sample of 100 patients is needed. Results and Conclusion will be presented at the GLPRC.

Learning Objectives:

Describe concerns regarding prolonged durations of antibiotic therapy for uncomplicated CAP.

Identify the preferred antibiotic regimen for uncomplicated CAP.

Self Assessment Questions:

Which is one of the concerns regarding a prolonged duration of antibiotic therapy for uncomplicated CAP?

A. Rapid clinical stability

B. Development of antimicrobial resistance

C. Preservation of a healthy microbiome

D. Less antibiotic-related adverse events

LN is a 42-year-old female with a PMH of type II diabetes, hypertension, and hyperlipidemia. She presents to the hospital with shortness of breath, febrile, and leukocytosis. Chest X-ray reveals bilateral multifocal infiltrates. MRSA nares was obtained and is negative. She is then admitted to the hospital for uncomplicated CAP. She has no recent ED/hospital admissions. What is the preferred antibiotic regimen for LN?

A. Ampicillin/sulbactam + doxycycline

B. Vancomycin + Piperacillin/Tazobactam

C. Ceftriaxone monotherapy

D. Ceftriaxone + Metronidazole

Q1 Answer: B Q2 Answer: A

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Pharmacy Students' Empathy and Mortality Attitudes: Effects of a Death and Dying Elective Part 2

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End-of-life (EoL) care is increasingly being utilized in healthcare as life expectancies are improving and pharmacists are being asked to provide direct care to those patients. Although the Accreditation Council for Pharmacy Education standards do not explicitly mention EoL topics in PharmD curriculums, graduates should be prepared to care for this patient population. An initial pilot study evaluated the impact of a 3-week EoL elective course and found it effective in increasing student pharmacistsâ€™ empathy and attitudes toward mortality and caring for terminally ill persons. Following the pilot program, the EoL elective course was changed to a 12-week format followed by a change to a 16-week format. Previous literature suggests that it is vital to assess the effectiveness of changes made to courses over time. The purpose of this study is to compare the change in studentsâ€™ attitudes towards EoL care between a 3-week elective course and a 12- and 16-week elective course.

First through third year pharmacy students enrolled in an elective EoL course between Spring 2020 through Fall 2023. Students completed pre- and post-course surveys on self-perceptions of empathy and mortality which included Kiersma-Chen Empathy Scale (KCES), revised Collett-Lester Fear of Death and Dying Scale (CL-FODS), and Frommelt Attitudes Toward Care of the Dying Scale Form B (FATCOD-B). Survey results from an online survey software were graded for completion and anonymously linked using unique student identifiers. Surveys were excluded if the student did not complete both pre- and post-course surveys. This presentation will focus on a secondary outcome which analyzed the change in mean score of surveys from 3-week courses compared to extended courses. Descriptive statistics, paired t-tests, and independent sample t-tests were used for analysis.

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

Learning Objectives:

Describe the advantages of teaching a death and dying course within the PharmD curriculum.

Discuss how differences between a shortened and extended elective course may impact student self-perceptions of empathy and attitudes toward mortality and caring for terminally ill persons.

Self Assessment Questions:

Which standard from the Accreditation Council for Pharmacy Education (ACPE) 2025 Standards most appropriately addresses a need for end-of-life teaching in the PharmD curriculum?

A. Care across the lifespan

B. Humility at end-of-life

C. Advocacy for palliative care patients

D. Principles of death and dying

Which of the following survey instruments did not result in a statistically significant difference when comparing the shortened courses to the extended courses?

A. Revised Collett-Lester Fear of Death and Dying Scale (CL-FODS)

B. Frommelt Attitudes Toward Care of the Dying (FATCOD-B) Scale Form B

C. Kiersma-Chen Empathy Scale (KCES)

D. None of the above

Q1 Answer: A Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-840-L99-P

Cephalexin Versus Cefdinir for the Treatment of Uncomplicated Urinary Tract Infections

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Purpose: Due to its low bioavailability and poor urinary penetration, there are concerns that cefdinir is a suboptimal agent for the treatment of urinary tract infections (UTI). Limited available data have not demonstrated worse patient outcomes with cefdinir compared to other oral beta-lactams for UTI treatment. However, these studies had significant limitations, such as small sample size, short period of follow up, and lack of assessment of clinical cure. The purpose of this study is to compare the rate of treatment failure between cefdinir 300 mg twice daily and cephalexin 500 mg twice daily for the treatment of uncomplicated UTI (uUTI) in female patients.

Methods: This retrospective cohort study evaluates patients who received cefdinir 300 mg twice daily or cephalexin 500 mg twice daily between January 1, 2020, and September 30, 2024. Female patients aged 18 years or older diagnosed with uUTI were eligible for study inclusion. Key exclusion criteria include complicated UTI, pyelonephritis, concomitant infection, urine culture negative or non-susceptible to cefazolin, receipt of a dose of parenteral antibiotics prior to oral therapy, pregnancy, or urologic abnormalities. The primary outcome of treatment failure is defined as continued UTI symptoms or necessitation of new therapy while taking the initially prescribed 5 to 7 days of treatment or treatment of a recurrent symptomatic UTI within 30 days of therapy completion. Secondary outcomes compared between groups include time to treatment failure, Clostridioides difficile infection within 30 days of treatment completion, and adverse drug events within 7 days of treatment initiation. Nominal outcomes will be analyzed using the chi-squared or Fisherâ€™s exact test and continuous outcomes will be analyzed using the T-test or Mann-Whitney U test, as appropriate.

Data collection and analysis are currently in progress.

Results and conclusion to be presented at Great Lakes Pharmacy Resident Conference.â€¯

Learning Objectives:

Describe complicating factors that may limit the use of common agents recommended for the treatment of uncomplicated urinary tract infections (uUTIs)

Identify limitations of previously published literature surrounding cefdinir use for the treatment uUTIs

Self Assessment Questions:

Which is true regarding the recommended treatment options for uncomplicated urinary tract infections?

A. Resistance to trimethoprim/sulfamethoxazole among urinary isolates of E. coli in the United States is low (< 10%)

B. Highly bioavailable, appropriately dosed oral beta-lactams have similar rates of clinical cure compared to the other treatment options

C. Fluoroquinolones have a very favorable toxicity profile, making them appropriate for uncomplicated infections, like uUTIs

D. Fosfomycin's clinical cure rate is similar to nitrofurantoin

Which of the following is a limitation of previously published literature surrounding cefdinir for the treatment of urinary tract infections?

A. The outcomes measured were either inappropriate to assess clinical cure or measured too soon to capture recurrence

B. Cefdinir was compared to poorly bioavailable comparator agents for the treatment of uUTI

C. There were significant differences in resistance rates between cefdinir and the comparator

D. The durations of therapy were shorter than usual durations for uUTIs

Q1 Answer: B Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-720-L01-P

Evaluation of Agitation and Withdrawal Management in a Community Hospital Mixed ICU

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Purpose: The purpose of this study is to analyze the current management of agitation, withdrawal, and delirium among patients admitted to the intensive care unit (ICU) at UW Health SwedishAmerican Hospital with the intent to develop a protocol to guide therapy decisions, especially in the extremely agitated patient population.

Methods: This is a retrospective, observational chart review that analyzed ICU patients from June 1, 2024 to August 31, 2024. Inclusion criteria were patients age 18-90, patients with an active critical care consult identified by authorizing provider on a medication order, and patients who received any of the following medications during their ICU admission: lorazepam, chlordiazepoxide, phenobarbital, olanzapine, ziprasidone, quetiapine, haloperidol, clonidine, guanfacine, dexmedetomidine, fentanyl infusion, propofol infusion, midazolam infusion, methadone, or buprenorphine. Exclusion criteria were patients who are pregnant, patients who are incarcerated, patients with comfort care orders during ICU admission, and agitation, withdrawal, or delirium not documented as a problem in a critical care progress note. The primary outcome was percent of patients who received withdrawal or delirium management defined as: 1) positive alcohol screen, positive Clinical Institute Withdrawal Assessment (CIWA) (score ï‚³ 8), and lorazepam phenobarbital, or chlordiazepoxide administered; 2) positive opioids on urine drug screen, positive Clinical Opiate Withdrawal Scale (COWS) (score ï‚³ 5), and methadone, buprenorphine, clonidine, guanfacine, or dexmedetomidine administered; or 3) positive Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) score and haloperidol, quetiapine, olanzapine, or ziprasidone administered. Secondary outcomes include ICU length of stay, duration of mechanical ventilation, hospital length of stay, disposition at hospital discharge, percent patients with CIWA score, percent patients with COWS score, percent patients with CAM-ICU score, percent patients with positive alcohol screen, and highest QTc interval during ICU admission.

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

Learning Objectives:

Identify strengths and limitations to withdrawal and delirium scoring tools

Select appropriate treatment options for alcohol withdrawal, opioid withdrawal, and delirium

Self Assessment Questions:

What is a strength of the Clinical Institute Withdrawal Assessment (CIWA) scoring tool?

A. Allows for symptom-triggered dosing of lorazepam

B. Allows for fixed dosing of lorazepam

C. Can be completed without talking to the patient

D. Can be used to assess alcohol and opioid withdrawal

Which of the following is an appropriate treatment option for alcohol withdrawal?

A. Clonidine

B. Guanfacine

C. Dexmedetomidine

D. Symptom-triggered phenobarbital

Q1 Answer: A Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-580-L01-P

Considerations for Implementation of a Long-acting Lipoglycopeptide (LaLGP) Clinical Pathway in the Emergency Department (ED) for Prevention of Short-stay Hospitalizations for Cellulitis

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Purpose

This pragmatic, single-center retrospective cohort study aims to evaluate the clinical and economic implications of implementing a single-dose dalbavancin protocol for cellulitis treatment in the emergency department (ED) to prevent short-stay hospitalizations. It will compare 30-day admission rates, reimbursement amounts, and cost-effectiveness between an ED-dalbavancin protocol and current short-stay hospitalization standard of care for treatment of cellulitis. The study will also examine operational and institution-specific factors, such as orderable build development, insurance pathway mapping, manufacture-supported co-pay assistance, and vial replacement strategies.

Methods

The study will employ a retrospective analysis of medical records for patients who received dalbavancin at Munson Medical Centerâ€™s ED over a six-month period. This cohort study will compare outcomes of pre-implementation standard care for patients hospitalized â‰¤72 hours with post-implementation outcomes for those treated with dalbavancin in the ED. Inclusion criteria include adults aged â‰¥18 diagnosed with cellulitis, wound infection, or abscess due to gram-positive bacteria, who were either hospitalized for â‰¤72 hours or would have required hospital admission for intravenous antibiotics if dalbavancin was not administered in the ED. This applies if patients experienced treatment failure, intolerance, or adherence issues with oral antibiotics, had moderate to large cellulitis areas (â‰¥ 75 cmÂ²), stable comorbidities, or met â‰¥2 SIRS criteria, while remaining hemodynamically stable. Exclusion criteria include concurrent non-infectious diagnoses, unstable comorbidities, infections outside typical cellulitis treatment regimens, hemodynamic instability, small abscesses, immunocompromised status, glycopeptide allergies, pregnancy or breastfeeding, and patients who left against medical advice or have multiple hospital encounters for cellulitis. The primary outcome will assess 30-day hospital admission rates for recurrent cellulitis post-encounter. Secondary outcomes will include 30-day visits to the ED or urgent care, antibiotic prescriptions within 14 days of the initial encounter for recurrent cellulitis, 72-hour post-discharge all-cause hospital readmissions, and evaluations of reimbursement amounts, payer mix, and cost-effectiveness.

Learning Objectives:

Explain how dalbavancin (DALVANCE) can be utilized to reduced short-stay hospitalizations in the management of cellulitis

Discuss key considerations necessary for implementation of an emergency department (ED) long-acting lipoglycopeptide (LaLGP) clinical pathway for treatment of cellulitis

Self Assessment Questions:

The half-life of dalbavancin (DALVANCE) makes it an ideal treatment for optimizing cellulitis treatment and patient care in the emergency department. But what exactly is its half-life?

A. 7 days

B. 3 days

C. 14 days

D. 30 days

What is one of the most important considerations needed for proper implementing a long-acting lipoglycopeptide (LaLGP) clinical pathway for cellulitis treatment in the emergency department?

A. Focusing on minimizing the cost of the LaLGP antibiotic for the healthcare institution

B. Patients who do not meet at least two of the SIRS criteria are the most appropriate candidates for treatment with a LaLGP antibiotic

C. Follow-up from an ED provider or pharmacist is required for every patient who receives a LaLGP antibiotic in the ED for treatment of cellulitis

D. Ensuring that the implementation team has a clear understanding of insurance pathways to prevent patients from facing high co-pays

Q1 Answer: C Q2 Answer: D

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Pharmacy Students' Empathy and Mortality Attitudes: Effects of a Death and Dying Elective Part 1

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Purpose: Institutional end-of-life (EoL) care is increasingly being utilized in the United States as advancements in medicine have improved life expectancy and the leading causes of death have transitioned to â€œslow killersâ€ such as cancer, heart disease, Alzheimerâ€™s Disease, and diabetes, that require long-term medical care. Healthcare professionals, including pharmacists, are being asked to provide direct care to these patients. Graduates of PharmD programs should be equipped to care for patients approaching EoL and those individuals who experience sudden or traumatic loss. There is limited research on the effectiveness of covering EoL topics in a pharmacy curriculum. An initial pilot study showed improvements in student pharmacistsâ€™ empathy and attitudes toward mortality and caring for terminally ill persons after taking an EoL PharmD elective, thus the purpose of this study was to expand upon the results of the pilot study as the course has now been modified and conducted over multiple semesters.

Methods: First through third year pharmacy students enrolled in a conversations about death and dying elective course between Spring 2020 through Fall 2023. Students completed pre- and post-course surveys which included the Kierma-Chen Empathy Scale (KCES), the revised Collett-Lester Fear of Death and Dying Scale (CL-FODS), and the Frommelt Attitudes Toward Care of the Dying Scale Form B (FATCOD-B). Survey results from an online survey software were anonymous and linked using unique student identifiers. Survey results were excluded if a pre- and post-course survey were not both completed thus could not be linked via unique identifier. The primary outcome was the change in overall mean scores of all three surveys. Descriptive statistics and paired t-tests were used to analyze the data.

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

Learning Objectives:

Identify validated survey instruments that can be utilized to measure student self-perceptions of empathy and attitudes toward mortality and caring for terminally ill persons.

Discuss how a death and dying elective may fill current gaps in PharmD curriculums for addressing end-of-life care topics.

Self Assessment Questions:

Which validated learning instrument evaluates attitudes toward care of the dying?

A. KCES

B. CL-FODS

C. ASPECT

D. FATCOD-B

Which of the following statistically significant changes were seen in student empathy and attitudes toward mortality and caring for terminally ill persons after taking a death and dying elective?

A. Increased desire to find a job in palliative care

B. Decreased fear of death and dying topics

C. Decreased empathy

D. Increased fear toward care of the dying

Q1 Answer: D Q2 Answer: B

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The effect of folic acid supplementation on short-term weight gain in preterm infants receiving human-based milk fortifier

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To support the growth of preterm infants weighing < 1500 g, fortifiers are added to breastmilk to enhance the nutritional value. Human-based milk fortifiers (HBMF) have shown to decrease preterm infant complications such as necrotizing enterocolitis, retinopathy, and late onset sepsis compared to bovine-based fortifiers. Despite higher calorie intakes with HBMF, infants have, anecdotally, not had similar weight gain to infants changed to bovine-based fortifier, leading to investigations on micronutrient contents. Folic acid is hypothesized to have an association with infant growth. HBMF plus breastmilk contains less than the daily requirement recommendation by the 2021 Koletzko guidelines. This study aims to evaluate the impact of folic acid supplementation on short-term growth in preterm infants who are on a HBMF.
This single-center, retrospective study will examine preterm infants at UofL Health Hospital from August 1, 2019, to June 30, 2024. Data will be collected in preterm infants aged â‰¥ 10 days who received Prolact+6Â® or Prolact+8Â® and folic acid supplementation for at least 10 days. Infants will be excluded if transferred out of the NICU, NPO for > 48 hours, fluid-restricted to â‰¤ 140 mL/kg/day, on steroid therapy for â‰¥ 7 consecutive days, or received treatment for PDA or PHTN during the study period. The intervention group will be patients receiving folic acid in addition to zinc and HBMF compared to patients receiving zinc and HBMF alone. The primary outcome will be the effect of folic acid supplementation on short-term weight gain based on Z-Score. Secondary outcomes will include average daily weight gain (g/kg/day), number of blood transfusions, and the need for increased fortifier concentration. The study was approved by the University of Louisville Institutional Review Board.
Data analysis is ongoing, results and conclusions to be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the role and benefits of the addition of HBMF to breastmilk in preterm infants
Identify the potential role of vitamin supplementation to preterm infants

Self Assessment Questions:

1. What is the primary reason for adding human-based milk fortifiers (HBMF) to breastmilk for preterm infants?
A. To increase caloric density and decrease micronutrient requirements
B. To replace formula-based feeding in NICU settings
C. To enhance growth outcomes and reduce complications such as necrotizing enterocolitis
D. To meet the protein requirements of infants with PDA
2. Which of the following best describes the role of Z-Score in growth charting for preterm infants?
A. It measures the total caloric intake required to achieve optimal growth
B. It compares an infant's growth parameters to a standardized population mean, adjusted for age and sex
C. It identifies whether an infant's weight gain is proportional to head circumference growth
D. It predicts long-term developmental outcomes based on early growth trends

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-699-L01-P

Measuring the Impact of a Resident Clinical Pharmacist On-call Program on Resident Physician Training

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Purpose:
Pharmacy residency on-call programs provide essential clinical support to healthcare teams by participating in emergency responses, imparting drug information, and monitoring pharmacokinetics. While these interactions are patient-centered, the purpose of this study is to evaluate how they impact the education and training of physician residents. To assess the impact of the PharmD on-call program on physician resident professional development, we examined physician residentsâ€™ perceptions of its effect on their clinical confidence and overall satisfaction. This study focuses on their experiences across all inpatient specialties at the University of Illinois Hospital & Health Sciences System (UI Health).

Methods:
This prospective, cross-sectional study will survey all physician residents at UI Health, whether or not they have interacted with pharmacy residents during the PharmD on-call program. A pilot survey was conducted with select UI Health-trained medical attendings to gather feedback on the survey prior to official survey distribution. Physician residents will be invited via email to complete an anonymous Qualtrics survey, with up to two weekly reminder emails sent within a three-week timeframe. The primary outcome is the percentage of physician residents who report that the PharmD on-call program had a positive impact on their training.

Secondary outcomes include satisfaction stratified by specialty, the most strengthened areas of clinical knowledge, perceived pharmacist accessibility through the PharmD on-call, and improvements in physician resident confidence. The survey will incorporate Likert-type scales and open-ended questions, analyzed by descriptive statistics and thematic analysis, respectively. The findings from this study will be used to identify areas for improvement in the PharmD on-call program to better support physician residentsâ€™ training experience in the future.

Summary of (preliminary) results to support conclusion:
Results pending survey completion and analysis.

Conclusions Reached:
Conclusions pending survey completion and analysis.

Learning Objectives:

Identify the impact of the PharmD on-call program on the clinical knowledge, confidence, and satisfaction of physician residents.

Recognize opportunities for potential enhancement of physician resident education from on-call interactions.

Self Assessment Questions:

Which of the following aspects of physician residency training does the PharmD on-call program assess enhancement of?

A. Clinical knowledge

B. Confidence in decision-making

C. Satisfaction with PharmD on-call interactions

D. All of the above

Which of the following strategies could most likely enhance the educational value of on-call interactions with the PharmD on-call?

A. Encourage sharing of additional resources such as guidelines or literature during on-call interactions

B. Facilitate in-person discussions of recommendations to encourage real-time learning, clarification, and further questions during on-call interactions

C. Enhance visibility of the PharmD on-call during emergencies through better identification methods (e.g., distinctly colored scrubs, badges)

D. A and B

Q1 Answer: D Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-808-L99-P

Impact of Medication Reconciliation Program on Pharmacist Workload

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Purpose: Medication reconciliation is essential for preventing medication errors, especially when patients take multiple medications. Implementing a robust medication reconciliation process at every transition point has proven effective in preventing Adverse Drug Events (ADEs) and reducing overall medication errors in various healthcare settings. While pharmacy-led reconciliation has shown success in reducing adverse drug events, there is limited data on whether it increases pharmacists' workload, particularly regarding dose adjustments and resuming pre-admission medications. This study aims to quantify the impact of pharmacy-driven medication reconciliations on pharmacist workload.
Study Design: Single-center study of adult patients admitted to internal medicine services at Michigan Medicine.
Methods: Adults aged â‰¥ 18 years admitted to internal medicine services with â‰¥5 outpatient medication will be included in the study. The admission med rec scoring tool flags patients based on criteria, prioritizing those who may benefit from a pharmacy-driven medication reconciliation. Pharmacy interns filter the patient list and conduct bedside interviews, contacting secondary sources if needed. The intern then enters a note for the pharmacist, who reviews and updates the medication reconciliation in MiChart, addressing any discrepancies. The completion of the reconciliation is then documented, and the associated iVent is closed or marked for follow-up, if necessary. Qualtrics will be utilized for data collection from the electronic health record, focusing on demographics, patient information, and medication reconciliation details. Descriptive statistics will be applied to analyze the collected data. The primary outcome will be to measure and quantify the time required for medication reconciliation. Secondary endpoints include analyzing workload impact based on complexity and quantifying and analyzing interns' time to complete medication history. This project was reviewed by the Michigan Medicine IRB and determined it does not require IRB approval.
Results/Conclusions: Data collection is currently in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference

Learning Objectives:

Identify the importance of medication reconciliation in preventing adverse drug events.
Discuss the role of pharmacy personnel in improving medication safety during hospital admissions

Self Assessment Questions:

What is the primary goal of implementing pharmacy-driven medication reconciliation?
A. To increase pharmacist workload
B. To reduce medication errors and Adverse Drug Events (ADEs)
C. To prioritize patients for surgery
D. To streamline hospital admissions
When should medication reconciliation ideally be performed?
A. Only at the time of discharge
B. During each transition of care, such as admission, transfer, and discharge
C. After a medication error occurs
D. Once every few months during patient visits
Q1 Answer: B Q2 Answer: B
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The Impact of Pharmacist-Driven Continuous Glucose Monitoring (CGM) Services in Urban, Underserved, Collaborative Clinics

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Pharmacist-driven CGM is associated with reduced HbA1c and improved achievement of daily glycemic goals. Studies suggest pharmacist-driven CGM is beneficial in the ambulatory care setting, however it is not clear whether these benefits extend to underserved patient populations. The aim of this study is to evaluate the glycemic and non-glycemic impact of pharmacist driven CGM services in two urban, underserved clinics in Detroit Michigan.
This is a retrospective review of electronic health records, coupled with a prospective patient survey to assess the impact of pharmacist driven CGM services in adult patients with diabetes mellitus. Patient charts were included if patients were at least 18 years old with diabetes mellitus defined as an A1c of greater than 7%. CGM devices must have been initiated in collaboration with a pharmacist with a minimum of 6 months of use between January 1, 2020 to June 30, 2024. The Rosa Parks Geriatric Center and Health Centers Detroit Medical Group were the two clinic sites used; both sites have an embedded clinical pharmacists and corresponding collaborative practice agreements. This is a pre-post comparison, with patients serving as their own control prior to CGM placement. Patients identified during the chart review process will be contacted to assess satisfaction and feedback with CGM devices via a survey.
Data collected includes; demographics, medications, A1c, patientsâ€™ responses to satisfaction survey, and CGM data (shared with the patientâ€™s healthcare provider via the Freestyle Libre and Dexcom Clarity patient portals). CGM data includes time in range, time above range, time below range, and glucose management indicator. A1c is collected at baseline prior to CGM initiation. All data is to be collected before CGM initiation and at 2 timepoints after CGM initiation (3 and 6 months). Results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify the impact of pharmacist-driven CGM initiatives in urban, underserved collaborative practice settings
Describe patient satisfaction and feedback with their CGM experiences

Self Assessment Questions:

Which CGM metric is a calculated value that is an estimate of a hemoglobin A1c level based on average glucose levels?
A. Time in range
B. Time above range
C. Glucose management index
D. Glucose variability
How can pharmacist involvement impact patient outcomes with CGM?
A. Decreased patient satisfaction with diabetes care
B. Improved hemoglobin A1c and glycemic control
C. Replacing the need for endocrinologist consultations
D. Reduced access to CGM technology for patients
Q1 Answer: C Q2 Answer: B
APCE Universal Activity Number 0121-9999-25-835-L99-P

Impact of Electronic Medical Record Changes on Preoperative Antibiotic Prophylaxis and Surgical Site Infections

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Purpose: The purpose of this study is to determine the impact of a change in electronic medical record (EMR) as it relates to penicillin and cephalosporin allergy cross-reactivity on the incidence of appropriate preoperative antibiotic prophylaxis and subsequent rate of surgical site infections.

Methods: This study was approved by the local Institutional Review Board. This study includes patients admitted to Memorial Hospital of South Bend and who are at least 18 years of age undergoing elective surgical procedures (general or vascular surgery, including the following procedures: hernia repair, gastroduodenal, biliary tract) who have a documented penicillin or cephalosporin allergy in the EMR and received preoperative antibiotic prophylaxis from January 1, 2021 and October 31, 2022 and December 1, 2022 through September 30, 2023. The primary outcome will be the number of surgical site infections (SSIs) for various surgical procedures (e.g. hernia repair, gastroduodenal, and biliary tract) before and after intervention at 30 days in patients who were prescribed preoperative antibiotic prophylaxis. Secondary outcomes will include re-operation due to SSIs, rate of institutional guideline directed preoperative antibiotic prophylaxis adherence, 30-day readmission rate, and discharge disposition.

Preliminary Results: Preliminary results compared two groups of 15 patients: those who underwent surgery before alert removal and those who underwent surgery after alert removal. In the group prior to alert removal, the incidence of surgical site infections (SSI) was 0%, while in the group after alert removal, it was 7%. The rate of institutional guideline-directed prophylaxis increased from 66.7% before alert removal to 87% after alert removal. Re-operation due to SSI was 0% before alert removal and 7% after alert removal. Lastly, the 30-day readmission rate remained 0% in both groups.

Conclusions: Data collection is ongoing, and results will be presented at the 2025 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize the difference between a drug intolerance and a true drug allergy

Describe risk factors for incidence of surgical site infections

Self Assessment Questions:

Which of the following processes is an example of an IgE hypersensitivity reaction?

A. Itching

B. Anaphylaxis

C. Diarrhea

D. A rash that manifests 24 hours after antibiotic administration

Which of the following are risk factors for surgical site infections?

A. Hypertension

B. Male sex

C. Uncontrolled diabetes

D. BMI < 18

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-688-L01-P

Parent Perspectives on Gaps in Type 1 Diabetes Management for Children Aged 8-12 Years in Kentucky and Southern Indiana

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Statement of Purpose: Type 1 Diabetes Mellitus (T1DM) management in children requires consistent support from caregivers, schools, and healthcare providers. Despite advancements in diabetes care, gaps in management persist, particularly for children aged 8-12 years. This study aims to identify perceived barriers to effective diabetes management and explore parental perspectives on improving care for this population.

Statement of Methods Used: This descriptive study utilized an online survey administered via REDCap, a secure, HIPAA-compliant platform. The survey includes 34 items: demographic questions (e.g., childâ€™s age, duration of diabetes), Likert scale items assessing perceptions of care gaps, and open-ended questions exploring barriers to effective management. Likert scale responses range from 1 (strongly disagree) to 5 (strongly agree). Questions were structured using Bronfenbrennerâ€™s Ecological Systems Theory to capture influences across environmental layers, such as family, school, and healthcare systems.

Recruitment was facilitated by the Director of Camp Hendon, who distributed the survey via email to families of camp participants. Participants eligible for the study are parents/guardians of children aged 8-12 years with T1DM, living in Kentucky or Southern Indiana, and proficient in English. Ethical considerations include anonymous participation and optional consent to share contact information for a $25 gift card incentive.

Pilot testing ensured clarity and content validity of the survey instrument. Data analysis will focus on descriptive statistics to identify trends in parental responses, highlighting key areas for intervention.

Summary of Preliminary Results: The survey is ongoing. Preliminary findings are expected to emphasize gaps in school-based diabetes management and CGM access, providing insights for targeted interventions.

Conclusions Reached: Conclusions are pending survey completion.

Learning Objectives:

Identify common barriers to effective diabetes management in children aged 8-12 years with Type 1 Diabetes Mellitus (T1DM), as reported by parents.

Explain how Bronfenbrenner's Ecological Systems Theory can be applied to understanding the different factors influencing T1DM management for children in this age group.

Self Assessment Questions:

What is the main goal of the study on Type 1 Diabetes Mellitus (T1DM) management in children aged 8-12 years?

A. To determine the economic cost of T1DM management in the U.S.

B. To identify barriers parents perceive in managing T1DM for children aged 8-12.

C. To investigate the medical causes of Type 1 Diabetes Mellitus in children.

D. To evaluate the effectiveness of new diabetes medications for children.

How is Bronfenbrennerâ€™s Ecological Systems Theory applied to the study of T1DM management in children aged 8-12 years?

A. It helps examine how factors like family, school, and healthcare systems affect diabetes management.

B. It focuses only on the role of healthcare providers in managing T1DM.

C. It looks at genetic factors contributing to Type 1 Diabetes.

D. It ignores environmental factors and focuses only on biological factors.

Q1 Answer: B Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-847-L99-P

Evaluating the Impact of Multidisciplinary Care on Opioid Use Disorder: A Retrospective Study of Buprenorphine/Naloxone-Assisted Treatment in a Family Medicine Residency

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Purpose:

The purpose of this research is to evaluate the effectiveness of a multidisciplinary care model in improving patient adherence, retention, and health outcomes for individuals with opioid use disorder (OUD) receiving medication-assisted treatment (MAT) with buprenorphine/naloxone in a family medicine residency clinic. The study assesses how collaboration between family medicine physicians, residents, and a clinical pharmacist enhances MAT delivery, particularly for a medically underserved population. It also explores the implications for expanding MAT access and improving care in primary care settings, comparing our results to national benchmarks for MAT outcomes.

Methods:

This retrospective study includes patients diagnosed with OUD who received MAT with buprenorphine/naloxone between October 2020 and July 2024 at the Fort Wayne Medical Education Program (FWMEP) clinic.

Inclusion criteria include patients with OUD diagnosis and were prescribed buprenorphine/naloxone. Exclusion criteria include patients with polysubstance abuse or those who declined MAT services.

Data will be extracted from electronic medical records, including information on patient demographics, psychiatric comorbidities, opioid use history, and MAT treatment progress. This includes assessments of the Clinical Opioid Withdrawal Scale, numeric pain rating scale, buprenorphine maintenance dosage, appointment progression, wean-off attempts, rate of full recovery, maintenance or relapse, and urine drug screens.

Descriptive statistics will be used to analyze trends, and single-sample t-tests will compare outcomes to national benchmarks. These results of patient adherence, retention, and overall well-being will be evaluated to determine the effectiveness of the collaborative approach and the impact of a multidisciplinary care model that integrates a clinical pharmacist with family medicine physicians and residents.

The study's outcomes will help the FWMEP clinic assess trends and address care gaps, providing insights into the benefits of delivering OUD treatment in a primary care setting.

Learning Objectives:

Recall the effectiveness of a multidisciplinary care model in enhancing patient adherence, retention, and health outcomes for individuals with OUD receiving medication-assisted treatment with buprenorphine/naloxone in a family medicine residency clinic.

Discuss the collaboration between family medicine physicians, residents, and a clinical pharmacist in improving medication-assisted treatment delivery.

Self Assessment Questions:

Were the urine tests consistent at every visit for both the patients in remission and the patients that are still enrolled in the medication-assisted treatment program?

A. Yes, patients in remission and/or still enrolled, had consistent urine tests at every visit.

B. No, only patients in remission had consistent urine tests at every visit

C. No, only patients still enrolled in the program had consistent urine tests at every visit

D. No, none of the patients had consistent urine drug test at every visit.

How involved was the clinical pharmacist in medication-assisted treatment delivery?

A. Not involved

B. Somewhat involved

C. Involved most of the time

D. Involved at every visit

Q1 Answer: A Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-591-L08-P

Opioid Use Disorder Screening Initiative in the Primary Care Setting

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Purpose:
Opioid use disorder (OUD) is a problematic pattern of opioid use that causes significant impairment or distress. The 2022 CDC Practice Guidelines for Prescribing Opioid for Pain recommend screening patients at least every 3 months for OUD, or more frequently if they are considered high risk. Several screening tools exist for identifying OUD and the Current Opioid Misuse Measure (COMM) is preferred for identifying patients with aberrant drug-related behaviors on chronic prescription opioid therapy. Previous local retrospective review in 2023 found that only 4.2% of primary care patients were screened for OUD. The focus of this initiative is to increase OUD screening rates at Trinity Health Muskegon Medical Group by flagging high-risk patients on chronic opioid therapy to be screened using the COMM at their scheduled primary care provider appointment.

Methods:
Education will be provided to clinic staff regarding the project goals and COMM screening procedures prior to prospective intervention. Patients will be identified for screening through the electronic health record and will be included if prescribed â‰¥50 MME/day of opioids with an upcoming scheduled appointment at the primary care pilot site. Patients with active cancer-related or sickle cell-related pain, end-of-life or palliative care, acute pain, pregnant patients, and patients being treated for OUD will be excluded. The primary outcome will be percent of patients screened for OUD using the COMM. Secondary outcomes include number of patients identified as eligible for screening, number of positive screenings defined as COMM score of â‰¥9, number of patients referred for treatment, and identified workflow barriers.

Conclusions:â€¯
To be presented at Great Lakes Pharmacy Resident Conference.
Learning Objectives:
Identify patients at a high risk for developing OUD
Describe current CDC guideline recommendations for screening patients at risk for OUD
Self Assessment Questions:

Patients are considered to be at a high risk for developing OUD if they are prescribed how many MME/day of opioids?
A. â‰¥25
B. â‰¥50
C. â‰¥75
D. â‰¥90
At a minimum, how often does the CDC recommend screening patients for the development of OUD?
A. Monthly
B. Every 3 months
C. Every 6 months
D. Annually
Q1 Answer: B Q2 Answer: B
APCE Universal Activity Number 0121-9999-25-779-L08-P

Swag Bags or Red Flags: Comparing Toxicity Rates with FLAG vs. CLAG Chemotherapy in Patients with AML
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Outcomes in adult patients with acute myeloid leukemia (AML) are suboptimal, especially in older patients and in those with high-risk genetic features. High-dose cytarabine based regimens without anthracycline, such as FLAG (fludarabine, cytarabine, and granulocyte colony stimulating factor) are commonly used for the treatment of secondary AML, AML in older patients unfit for anthracycline, AML with high-risk genetic features, or relapsed and refractory AML. During a recent major fludarabine shortage, cladribine, cytarabine, and a granulocyte colony stimulating factor (CLAG) regimens were used as an alternative. While both fludarabine and cladribine are purine analogs and both regimens have been studied in AML, no studies have directly compared the safety and efficacy of these two treatment strategies.
This study will be a single-center retrospective propensity-score matched cohort study comparing the safety and efficacy of CLAG chemotherapy versus FLAG chemotherapy in adult patients with AML. Patients receiving FLAG chemotherapy will be propensity-score matched 3:1 to patients receiving CLAG based on age, disease status, and European LeukemiaNet (ELN) risk stratification. The primary endpoint will be the median duration of neutropenia in these regimens. Secondary endpoints include duration of thrombocytopenia, ICU admission rates, infection rates, complete remission (CR) or CR with incomplete count recovery (CRi) rates, and overall survival. Median duration of cytopenias will be assessed using the Kaplan-Meier method and a log-rank test. Categorical variables will be compared using chi-square tests or Fisherâ€™s exact tests, as appropriate. Parametric data will be compared using an unpaired Studentâ€™s t test, and non-parametric data will be compared via a Mannâ€“Whitney U test with results reported as medians with associated ranges. The results of this study will help compare toxicity rates and efficacy between FLAG and CLAG chemotherapy regimens.

Learning Objectives:
Explain FLAG chemotherapy and its uses in AML treatment
Describe the common toxicities involved in FLAG chemotherapy
Self Assessment Questions:
FLAG chemotherapy is which of the following medication regimens?
A. Fludarabine, cytarabine, and gemicitabine
B. Fludarabine, cytarabine, and granulocyte colony stimulating factor
C. Fludarabine, cladribine, and granulocyte colony stimulating factor
D. Fludarabine, capecitabine, and granulocyte colony stimulating factor
Which of the following is a common toxicity associated with FLAG chemotherapy
A. Neutropenia
B. Neurotoxicity
C. Hepatotoxicity
D. Ototoxicity
Q1 Answer: B Q2 Answer: A
APCE Universal Activity Number 0121-9999-25-540-L01-P

Evaluation of the Effectiveness of Pharmacist Follow-Up in Primary Care Clinics for Urgent Care Patients with Elevated Blood Pressure

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Hypertension is a common condition that affects nearly half of adults in the United States. Untreated hypertension increases the risk of heart attack, stroke, and other cardiovascular complications. Due to limited availability of primary care providers, there is a potential gap in the adequate management of hypertension. To bridge this gap, a pilot program began identifying patients seen in urgent care departments with elevated blood pressure. These patients, if not already scheduled with PCP or a specialist who primarily manages hypertension, were referred to the ambulatory care pharmacy team and scheduled with their primary providerâ€™s embedded pharmacist for blood pressure management. The purpose of this study was to evaluate the effectiveness of pharmacist follow-up in patients with elevated blood pressure in urgent care. This study was approved by the Institutional Review Board. This was a retrospective chart review conducted to evaluate West Central Region Indiana University Health primary care patients. Patients were included if they were 18 years or older seen in urgent care from October 1, 2023, to October 1, 2024, with blood pressure over 140/90 mm Hg documented during that visit. Patients with follow-up by a pharmacist were matched to a similar cohort of patients without follow-up by a pharmacist. Exclusion criteria included known secondary causes of hypertension, systolic blood pressure â‰¥ 200 mm Hg or diastolic blood pressure â‰¥ 130 mm Hg, and pregnancy. The primary endpoint was percent of patients with controlled blood pressure at most recent check 90 days after urgent care visit (defined by blood pressure â‰¤ 130/80 mm Hg). Secondary endpoints included the difference in the mean change from baseline in systolic and diastolic blood pressure at 90 days. Data results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Define the blood pressure goal recommended by the 2017 ACC/AHA Guidelines for the Management of High Blood Pressure in Adults.

Identify appropriate strategies to obtain an accurate blood pressure measurement.

Self Assessment Questions:

Which of the following does the 2017 ACC/AHA Guidelines for the Management of High Blood Pressure in Adultsâ€‹ recommend for a blood pressure goal?

A. < 140/80 mm Hg

B. < 130/80 mm Hg

C. < 150/90 mm Hg

D. < 140/90 mm Hg

Which of the following steps is recommended to obtain an accurate blood pressure measurement with an arm cuff?

A. Position arm so cuff is at waist level

B. Sit with legs crossed

C. Place cuff on bare arm, below elbow

D. Avoid caffeine, cigarettes and other stimulants 30 minutes before you measure your blood pressure

Q1 Answer: B Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-841-L99-P

Implementation of Clinical Pharmacist Services within an Outpatient Gastroenterology Clinic

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Purpose

In 2018, gastrointestinal (GI) symptoms were responsible for 36.8 million office visits, 17.9 million emergency department (ED) visits, and 3.9 million adult hospital admissions. Despite continued healthcare burden of GI diseases and recognition of pharmacists as integral members of the healthcare team, the clinical pharmacist role within the gastroenterology setting has not been sufficiently defined. The justification for pharmacists' positions in outpatient GI settings is driven by the need to manage medications effectively and optimize medication-related outcomes by providing education on complex medication therapies, navigating insurance processes, and assisting with monitoring requirements.
This study aimed to explore the implementation of pharmacist services in an outpatient gastroenterology clinic and the interventions performed.

Methods

This IRB-exempt quality improvement project was conducted in the outpatient gastroenterology clinic at Indiana University Health (IUH) from 9/25/24 through 2/28/2025. Patients were included if they were 18 years of age or older, seen by an IUH gastroenterology physician or advanced practice provider, and received pharmacist services. Interventions captured included patient counseling, therapy recommendations, internally filled prescription specialty medications, medications or labs ordered, drug information questions, and coordination of care. The method of referral to pharmacy included electronic medical record messaging, co-visits with providers, education consults, and self-referral based on chart review. Chronic condition(s) managed included (but were not limited to): chronic pancreatitis, irritable bowel syndrome, inflammatory bowel diseases, chronic constipation or diarrhea, gastroesophageal reflux disease, hepatitis C virus, and metabolic dysfunction-associated steatotic liver disease. Lastly, medication-related referrals were recorded, including affordability concerns, polypharmacy, high risk medications, nonadherence to medication therapies, and initiation of new medication.

Results/Conclusions

Results and conclusions will be presented at Great Lakes Pharmacy Residents Conference on Wednesday, April 30th, 2025.

Learning Objectives:

Recognize the ambulatory care pharmacists' impact on patient care and gastrointestinal disease burden
Explain the ambulatory care pharmacist's role in an outpatient gastroenterology clinic

Self Assessment Questions:

Which of the following statements are true regarding pharmacist impact on gastrointestinal disease burden?
A. Pharmacists do not help in the procurement of high-cost specialty or brand-only GI medications
B. Pharmacists have no impact on reduction of ED visits due to GI symptoms
C. Pharmacists show increased sustained virologic response (SVR) rates in hepatitis C virus (HCV) management
D. Pharmacists do not improve adherence to high-risk medications such as immunotherapy or biologics
Which of the following are pharmacist interventions made within the outpatient gastroenterology clinic at Indiana University Health (IUH)?
A. Completing prior authorizations for medications
B. Managing disease states outside of GI scope
C. Diagnosis of GI conditions
D. Internal capture of specialty medication prescriptions
Q1 Answer: C Q2 Answer: D
APCE Universal Activity Number 0121-9999-25-734-L01-P

Pharmacotherapy Decision-Making with QT Prolongation Risk

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Purpose: The risk of QT prolongation is a key consideration for healthcare providers when selecting pharmacotherapy, due to the potential development of life-threatening ventricular arrhythmias, such as Torsades de Pointes. Pharmacists play a critical role in evaluating patientsâ€™ QT prolongation risks, especially in the context of pharmacodynamic and pharmacokinetic drug interactions in the acute care setting. Their input helps providers balance these risks and optimize medication therapy. However, documentation of these decisions is often missing from readily accessible medication orders or clinical notes, making it difficult to trace the rationale behind clinical decisions and related literature is lacking. At our institution, the PharmD on-call program offers a unique database, capturing drug-related inquiries from provider teams during overnight and weekend hours when the weekday clinical pharmacists are unavailable. The objective of this study is to analyze the clinical circumstances influencing pharmacotherapy decisions in patients at risk for QT prolongation and subsequent safety outcomes of those decisions.

Methods: This single-center, retrospective, descriptive study included patients 18 years or older who were the subject of a drug information question documented in the PharmD on-call database regarding QT prolongation risk from January 2019 to September 2024. The primary outcome was the ultimate clinical decision with medication utilization, and how it related to the on-call pharmacist's recommendation. Outcome categories included therapeutic change accepted, therapeutic change rejected, commitment to initial therapeutic, and therapeutic deemed unnecessary. The secondary outcome included the incidence of ventricular arrhythmias within 48 hours of the pharmacotherapy decision.

Results/Conclusion: Data will be analyzed using descriptive statistics. Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the importance of QT interval prolongation

Discuss the risk factors associated with QT prolongation

Self Assessment Questions:

In what heart rhythm is the QT interval most reliably determined?

A. Atrial fibrillation

B. Bundle branch blocks

C. Ventricular paced rhythms

D. Normal sinus rhythm / sinus tachycardia

What is a modifiable risk factor for Torsades de Pointes?

A. Age

B. Gender

C. Comorbidities

D. Electrolyte abnormalities

Q1 Answer: D Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-505-L01-P

Impact of a Pharmacy-Led Discharge Medication Education on HCAHPS Scores

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Purpose: When discharged from the hospital, a survey titled â€œHospital Consumer Assessment of Healthcare Providers and Systemsâ€ (HCAHPS) is sent to patients to rate their overall hospital experience. The results of these surveys are publicly reported and the scores impact Medicare reimbursement for institutions. Prior studies indicate that providing transition of care services through a pharmacy-led discharge medication education process can positively impact HCAHPS scores. The purpose of this study is to demonstrate the value of a pharmacy-led discharge medication education process on HCAHPS scores and patient experiences.

Methods: This is an IRB approved quasi-experimental study at an academic medical center in Detroit, Michigan. Adult patients admitted to three designated adult general medicine units from December 2024 to March 2025 that are being discharged home are eligible to receive medication education by either a pharmacist, pharmacy resident, or student. Medication education includes counseling patients on all medications that are being continued upon discharge. Vulnerable patient populations, patients that are unwilling to participate in the education, already received education from nursing, or enrolled in hospice are excluded from the education. Patients admitted to the same designated units in the year prior will serve as the control group. The primary outcome is change in HCAHPS scores in patients receiving pharmacy-led discharge medication education. Secondary outcomes include the number of medication discrepancies identified and time spent completing the educations. This study includes 32 patients (16 in each group), calculated using an effect size of 20% to see a 3% increase in HCAHPS scores. An average institution HCAHPS survey response rate of 17% necessitates 100 patients receiving discharge medication education to reach power. Statistical analysis will be completed through either studentâ€™s T-test or Mann-Whitney U-test for continuous data. Comparision of single variable outcomes will utilize a simple linear regression.

Results/Conclusions: To be presented.

Learning Objectives:

Identify the importance of HCAHPS scores

Explain the impact of pharmacy-led transitions of care services on HCAHPS scores

Self Assessment Questions:

What do HCAHPS scores measure?

A. Patientâ€™s time spent in the hospital

B. Patientâ€™s overall hospital experience

C. Patientâ€™s quality of sleep in the hospital

D. Patientâ€™s pain score

Which HCAHPS question can be impacted through pharmacy-led transitions of care services?

A. â€œDuring this hospital stay, how often was the area around your room quiet at night?â€

B. â€œDuring this hospital stay, were you given any medicine that you had not taken before?â€

C. â€œWhen I left the hospital, I clearly understood the purpose for taking each of my medicationsâ€

D. â€œBefore giving you any new medicine, how often did hospital staff tell you what the medicine was for?â€

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-809-L99-P

Implementation of a Pharmacist in the Management of Postpartum Hypertension

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Postpartum hypertension (HTN) is defined by the American College of Obstetrics and Gynecology (ACOG) as blood pressure of greater than or equal to 140/90 mmHg that occurs through six weeks postpartum. Elevated blood pressures in the postpartum period may occur in the setting of preexisting gestational HTN, chronic HTN, or may develop de novo following a normotensive pregnancy. Previous gestational hypertension research performed at Indiana University Health Bloomington Hospital found that blood pressure medications were more commonly required during the postpartum time-period rather than during pregnancy, indicating that pharmacist intervention in the management of peripartum HTN may be most useful after delivery. The purpose of this study is to determine the impact of a pharmacist in the management of postpartum hypertension in an OB/GYN clinic.

This single center, retrospective analysis evaluated patients 18 years and older with a diagnosis postpartum hypertension who met with an ambulatory care pharmacist for blood pressure management. Patients were deemed appropriate to the see the pharmacist if they had a diagnosis of postpartum or chronic hypertension, required a magnesium infusion for preeclampsia prevention, or were discharged from a hospital encounter with antihypertensive medications. Patients who delivered in a hospital outside of Indiana University Health Bloomington Hospital or received the majority of their prenatal care outside of Indiana University Health were excluded. The primary outcome of the study was the number of interventions made by a clinical pharmacist. Secondary outcomes included number of days from hospital discharge to first blood pressure follow-up, number of visits with a pharmacist related to hypertension, and number of emergency department visits related to hypertension. This data will be used to justify further expansion of ambulatory care clinical pharmacy services into the OB/GYN space. The results and conclusions of this study will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recall the recommended time frame for blood pressure evaluation after delivery.

Discuss the role of an ambulatory care pharmacist in the management of postpartum hypertension.

Self Assessment Questions:

1. Per ACOG, within what time frame should a blood pressure check be performed in a patient WITHOUT severe range blood pressures?

A. 72 hours

B. 3 to 5 days

C. 48 hours

D. 7 to 10 days

Which of the following is a true statement?

A. Goal blood pressure in the postpartum period is less than 120/80

B. Gestational diabetes is the number one reason for emergency department visits in the postpartum time frame

C. Treatment of postpartum hypertension should be initiated when blood pressure reaches 150/110

D. Losartan is recommended by ACOG to be used for the management of postpartum hypertension

Q1 Answer: D Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-667-L01-P

Risk of Hemorrhagic Expansion after Initiation of Full Dose Anticoagulation following ICH

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Purpose: Intracranial hemorrhage (ICH) accounts for approximately 10 to 20% of all strokes. Use of an anticoagulant is, in and of itself, a risk factor for ICH. Initiating an anticoagulant in the setting of ICH may increase the risk of hemorrhagic expansion, which can lead to detrimental effects. However, resuming anticoagulation may be necessary to prevent thromboembolic events or treat a current thromboembolism. The 2022 American Heart Association (AHA) stroke guidelines state restarting an anticoagulant after an ICH is a risk-benefit decision and more evidence is needed to provide specific guidance. The aim of this study is to evaluate the risk of hemorrhagic expansion and thromboembolism in patients started on therapeutic anticoagulation after hospitalization for acute ICH. We look to demonstrate the optimal time frame when therapeutic anticoagulation should be initiated after ICH.

Methods: This is a multi-center, retrospective analysis evaluating adult patients admitted between January 1, 2018 and January 1, 2024 with an acute ICH started on a therapeutic anticoagulant during hospitalization. Patients were excluded if pregnant at the index hospitalization, were not started on therapeutic anticoagulation within 30 days after initial hemorrhage, or had a chronic subdural hemorrhage with no acute hemorrhage. Patients will be divided into two groups based on time from ICH to initiation of therapeutic anticoagulation: either greater than seven days or seven or less days. An estimated sample size of 260 patients is required to achieve 80% power with an alpha set at 0.05. The primary endpoint is incidence of hemorrhagic expansion in each study group.

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

Learning Objectives:

List the populations with no supporting evidence on timing to anticoagulation reinitiation post-ICH

Explain what the current literature has identified as a potentially safe time frame for restarting anticoagulation

Self Assessment Questions:

Which combination of anticoagulant and indication for therapeutic anticoagulation has been previously researched for when it would be appropriate to start anticoagulation after an ICH?

A. Enoxaparin and atrial fibrillation

B. Warfarin and mechanical mitral valves

C. Rivaroxaban and deep vein thrombosis

D. Bivalirudin and LVAD

Patient A is a 42 year old female with an LVAD. After 3 days of being in the hospital for an ICH, the team is discussing when to start therapeutic anticoagulation. When would it be appropriate to start per the current literature?

A. Today

B. 7 days

C. 14 days

D. Never

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-685-L01-P

Cyber Attack Preparation for an Inpatient Community Hospital Pharmacy

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Purpose:

Cyber attacks pose significant threats to healthcare operations and patient safety. Our inpatient pharmacy lacks effective downtime materials and workflows to ensure continuity during prolonged system outages. This project aims to assess vulnerabilities, evaluate current materials, and implement workflows to enhance pharmacy readiness and ensure uninterrupted patient care.

Methods:

A pre-survey assessed pharmacist's confidence in using current downtime materials and their perceived efficacy. Results showed low confidence and skepticism about material effectiveness. A gap analysis was completed to identify weaknesses in existing workflows and materials. Development of updated workflows is underway, with plans to create educational sessions and conduct a post-implementation survey to evaluate improvements in confidence and preparedness. This project was submitted to the Institutional Review Board prior to initiation and classified as quality improvement.

Results/Conclusion:

Preliminary findings reveal deficiencies in current downtime materials and workflows, alongside limited pharmacist confidence, with the gap analysis identifying specific vulnerabilities and providing a roadmap for improvement. While conclusions are ongoing, the project has already highlighted critical gaps and laid a foundation for enhancing downtime readiness. The development of new workflows and educational initiatives is expected to bolster pharmacist confidence, address identified vulnerabilities, and ensure operational continuity during a cyber attack.

Learning Objectives:

Recognize the impact of cyber attacks on healthcare systems.

Identify software systems that could be affected in a cyber attack prolonged downtime.

Self Assessment Questions:

Which software systems could be affected by a prolonged downtime caused by a cyber attack?

A. Electronic Health Record (EHR)

B. Compounding software

C. Automated medication dispensing system

D. All of the above

True or False: In recent years there has been an increase in cyber attacks and ransom requests targeting healthcare systems

A. TRUE

B. FALSE

C. n/a

D. n/a

Q1 Answer: D Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-768-L04-P

Pharmacy Informatics

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Clinical Decision Support plays a crucial role in ensuring safe and effective patient care, particularly within electronic health records and computerized physician order entry systems. Interventions by informatics pharmacists, such as order alerts, have proven to enhance medication prescribing patterns and improve health outcomes. In patients with heart failure with reduced ejection fraction, Entresto is recommended. Despite this, the historical prescribing rates for Entresto at IU Health have been low. To address this issue, this study seeks to evaluate the impact of the discern alert and its significance in influencing prescribing rates, with the ultimate goal of modifying prescribing patterns.

Learning Objectives:

Define Clinical Decision Support

Describe the importance of clinical decision support and the role of informatics pharmacist

Self Assessment Questions:

Clinical Decision Support (CDS) alerts in healthcare especially in pharmacy plays a major role in guiding healthcare provider in making _____ _____.

A. safe and effective therapeutic decision

B. regulation and protocol

C. Medication errors

D. none of these above

Entresto, a combination of two medications, Sacubitril and Valsartan, is commonly prescribed for patients with

A. heart failure

B. liver diseases

C. diabetes

D. none of these above

Q1 Answer: A Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-822-L04-P

Are we HITting the mark? Comparison of 4Tmcs, HEP, and 4Ts Scores in MCS patients

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Purpose: Optimal pre-test probability scores for heparin induced thrombocytopenia (HIT) in special populations are not well defined, including patients with mechanical circulatory support (MCS), which may lead to overestimation of HIT. This overestimation based on imprecise pre-test probability scoring often leads to treatment with alternative intravenous anticoagulant medications, which may often be clinically unnecessary. The purpose of this study was to compare the diagnostic accuracy of various pretest probability scoring tools; the Modified 4T (4Tmcs), HIT Expert Probability Score (HEP), and 4Ts scoring tools with confirmatory HIT diagnostic tests (including heparin induced platelet antibody-HIPA (HIT-ELISA), PF4-Dependent P-Selection Expression (PEAF4), and Serotonin Release Assay (SRA)) to determine the most optimal HIT pre-test probability scoring tool in MCS patients.

Methods: This is an IRB-approved, retrospective, propensity adjusted, case-control study of patients hospitalized from November 1, 2014, to November 1, 2024 who received heparin during the index encounter with HIT laboratory test results available and ordered during or after MCS device placement. Two cohorts were included in this study. The HIT negative group included patients with a negative HIT-ELISA and/or a positive HIT-ELISA alongside a negative SRA or PEAF4. The HIT positive group included patients with a positive SRA or PEAF4 or a strongly positive HIT-ELISA alone if SRA/PEAF4 was unavailable. Sensitivity, specificity, positive predictive value, and negative predictive values were calculated based on pre-test probabilities and laboratory confirmed HIT. A 1:3 ratio of cases to controls was employed to examine HIT pre-test probability scoring tool performance. Data were analyzed using measures of central tendency and variability for descriptive data, chi-square testing for categorical data, student T test or Mann-Whitney U for continuous data, and area under the receiver operating curve for diagnostic accuracy.

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

Learning Objectives:

Describe factors that complicate the assessment of HIT in a general MCS patient population

Discuss diagnostic accuracy and performance characteristics of 4Tmcs, HEP, and 4Ts scoring tools in a general MCS patient population

Self Assessment Questions:

AB is a 43 YOF who is placed on venoarterial extracorporeal membrane oxygenation (VA ECMO). After 5 days of MCS support, heparin exposure and subsequent platelet drop, a HIT ELISA was ordered and a result of 2.765 OD units was obtained. Which of the following would be an appropriate next step to take?

A. Continue heparin while functional assay (SRA or PEAF4) confirmatory results are obtained

B. Continue heparin, most likely false positive HIT

C. Discontinue heparin, obtain functional assay (SRA or PEAF4) before determining anticoagulation

D. Discontinue heparin, start alternative anticoagulation, and obtain functional assay (SRA or PEAF4) for confirmation of HIT

Which of the following is a risk factor that can confound the pre-test probability assessment of HIT?

A. Presence of MCS device

B. Chronic renal disease

C. Heart failure

D. Squamous cell carcinoma

Q1 Answer: D Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-726-L01-P

Evaluation of Risk Factors Associated with Phenobarbital Dose Escalation for the Treatment of Alcohol Withdrawal

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Purpose : Alcohol is the most misused substance in the U.S. with a reported 28.9 million people ages â‰¥ 12 (10.2%) in the past year experience alcohol use disorder (AUD). It has been reported that 16-31% of intensive care unit (ICU) patients have pre-existing AUD and are at risk for developing alcohol withdrawal syndrome (AWS) during admission. Benzodiazepine-resistant AWS is reported in the literature. Phenobarbital offers a favorable pharmacokinetic and pharmacodynamic profile and is recommended as monotherapy in those at risk for severe AWS or benzodiazepine-resistant AWS. Literature is sparse in describing phenobarbital-refractory AWS. While there are risk stratification tools for AWS, there are not well-established risk factors associated with phenobarbital failure. The primary outcome is to identify risk factors associated with the need for phenobarbital dose escalation for the management of AWS.
Methods: This was an IRB-approved, single-center, retrospective, cohort study of adult patients admitted to a surgical or medical ICU within 24 hours of the initial loading dose of phenobarbital, at a large academic medical center between January 1, 2021, and December 2, 2024. Inclusion criteria are phenobarbital use for the management of AWS with an AUD diagnosis. Exclusion criteria are pregnancy or incarceration, phenobarbital before admission, initial loading dose outside of protocol, phenobarbital discontinuation before taper completion, fulminant liver failure, pre-existing severe cognitive impairment, or admission for a primary neurologic condition. The characteristics of dose escalation and no escalation groups will be compared. Dose escalation is defined as additional loading dose(s), additional maintenance dose(s), additional PRNs, or taper extension. Secondary outcomes include dose escalation incidence, 7-day phenobarbital total, need for mechanical ventilation, ICU and hospital length of stay, and ICU and hospital mortality.
Results/Conclusions: Data collection is ongoing. Preliminary results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the incidence and prevalence of alcohol withdrawal syndrome among intensive care patients.
Identify phenobarbital utility and place in therapy for the treatment of alcohol withdrawal syndrome.

Self Assessment Questions:

What percentage of people with alcohol dependence experience withdrawal symptoms upon sudden cessation of alcohol?
A. 0.35
B. 0.65
C. 0.5
D. 0.25
What desirable pharmacokinetic properties does phenobarbital have that makes it a favorable treatment for alcohol withdrawal syndrome?
A. Short half-life
B. Slow onset
C. Low oral bioavailability
D. Long half-life
Q1 Answer: C Q2 Answer: D
APCE Universal Activity Number 0121-9999-25-605-L01-P

A Little Nudge Goes a Long Way: Assessing the impact of a microbiology nudge comment on the management of Streptococcus pneumoniae bloodstream infections

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Bacteremia occurs in 25-30% of pneumococcal disease. For nonmeningeal S. pneumoniae infections, ampicillin or penicillin are the optimal treatments but may not be commonly prescribed. Nudge comments have demonstrated significant and sustainable improvements inantibiotic stewardship practices. The study purpose was to assess the impact of a microbiology nudge comment on optimal antibiotic use in hospitalized patients with S. pneumoniae bacteremia.

This was an IRB-approved, single pre-/post-test quasi-experimental study conducted at a five-hospital health system in southeast Michigan. On September 27, 2023, a nudge comment stating: "Drugs of choice = Ampicillin IV or Penicillin IV. For meningitis, use max dose Ceftriaxone IV plus Vancomycin IV until susceptibilities known" was added to rapid blood PCR results. Hospitalized adult patients, >18 years, with microbiologically confirmed S. pneumoniae bacteremia from October 2022 to October 2024 were included. The pre-nudge group was from October 1, 2022, to September 26, 2023, while the post-nudge phase began October 1, 2023. Patients were excluded if they had a documented IgE-mediated Î²-lactam allergy, a severe cutaneous reaction to Î²-Lactam, polymicrobial infections, were receiving comfort/hospice care at the time of the PCR result, died <48 hours of culture, or had suspected/confirmed meningitis or endocarditis. The primary outcome was optimal de-escalation within 48 hours of rapid blood PCR results, defined as initiating IV penicillin or IV ampicillin. Secondary outcomes included all-cause, in-hospital mortality, duration of broad-spectrum antibiotics, and length of hospital/ICU stay. A treatment duration of < 10 days was the nonequivalent dependent variable to assess the standard of care provided. The study will include 110 patients. Statistical analysis will use Chi-square or Fisherâ€™s exact test for categorical data. Variables with P<0.2 in bivariate will be assessed for confounders with multivariable logistic regression. For all analyses, P<0.05 will be considered statistically significant.

To be presented.

Learning Objectives:

Identify the optimal drugs of choice for nonmeningeal S. pneumoniae infections

Describe risks associated with nonoptimal antibiotic use

Self Assessment Questions:

Which of the following are optimal antibiotics for treatment of nonmeningeal Streptococcus pneumoniae bloodstream infections?

A. Ceftriaxone IV or Vancomycin IV

B. Ampicillin IV or Penicillin IV

C. Meropenem IV or Linezolid IV

D. Levofloxacin IV or Daptomycin IV

Which of the following is a consequence of suboptimal antibiotic stewardship?

A. Shortened hospital stays

B. Improved antibiotic stewardship practices

C. Increased risk of superinfections

D. Decreased healthcare costs

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-665-L01-P

Local Implementation of Guidance for Managing Scarce Weight Management Medication Resources at a Single VA

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The United States Department of Veteranâ€™s Affairs (VA) estimates roughly eighty percent of Veterans are considered overweight. The growing demand for Glucagon-like peptide-1 (GLP-1) receptor agonists for weight loss has placed a financial and workforce strain on healthcare systems nationwide. The creation of an efficient process for the ethical and safe distribution of these medications is vital as facilities confront these challenges. Aiming to fulfill this mission while utilizing a local VA facilityâ€™s existing workforce, this project proposes a process for selecting, initiating, and managing patientâ€™s seeking GLP-1 therapy.

A multidisciplinary team consisting of clinical pharmacists, members of pharmacy administration, and clinical dieticians from the VA weight management program, â€œMOVE!â€was established. This team created and compiled resources to streamline the implementation of recently released VA guidance for weight management medications (WMMs). A simple framework was created by this team for clinicians to follow in the initiation, titration, monitoring and continuation of GLP-1 agonists so that demand for these medications is met with consistency across the facility. Emphasizing the dynamic role of the pharmacy profession, the facilityâ€™s patient-aligned care team (PACT) pharmacists were tasked with the initiation and monitoring of WMMs.

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

Learning Objectives:

Review the titration schedules of injectable weight management medications.

Identify which factors increase patient need for weight management medications.

Self Assessment Questions:

Which of the following semaglutide titration schedules is standard when using this medication for weight management?

A. 0.5 mg for 2 months, 1mg for 1 month, 1.7mg for 1 month, 2mg for 1 month, 2.4mg for maintenance.

B. 0.25mg for 1 month, 0.5mg for 1 month, 1mg for 1 month, 2mg for 1 month, 2mg for maintenance.

C. 0.25mg for 1 month, 0.5mg for 1 month, 1mg for 1 month, 1.7mg for 1 month, 2.4mg for maintenance.

D. 0.5mg for 1 month, 1mg for 2 months, 1.7mg for 1 month, 2mg for maintenance.

Which patient would benefit the most from initiation of a weight management medication?

A. A 44 year old patient with no comorbidities and a BMI of 42 kg/m2.

B. A 38 year old patient with three weight related conditions and a BMI of 28 kg/m2.

C. C.A 53 year old patient without diabetes but who has established cardiovascular disease and a BMI of 31 kg/m2.

D. A 50 year old patient who is in need of a heart transplant but is ineligible due to their weight.

Q1 Answer: C Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-843-L99-P

Antithymocyte Globulin Induction Dosed on Ideal Body Weight (IBW): Absolute Lymphocyte Cell (ALC) Depletion in Kidney Transplant Recipients With and Without Obesity

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Purpose: Per package insert, antithymocyte globulin (ATG) is to be dosed based on actual body weight (ABW). However, studies utilizing cumulative doses lower than what is recommended have shown similar efficacy. Dosing strategies utilizing IBW instead of ABW have also shown efficacy, though these studies mostly included patients without obesity. Optimal dosing of Thymoglobulin is unclear and varies institution to institution. The objective of this study is to evaluate the efficacy of dosing ATG with IBW in patients with and without obesity.
Methods: This is a retrospective cohort study comparing the effectiveness of dosing thymoglobulin based on IBW in obese and non-obese patients. A retrospective chart review will be conducted on adult patients who received thymoglobulin for induction immunosuppression for kidney transplantations between August 2022 â€“ August 2023.
The primary endpoint for this study is average ALC between post-operative days one to four. Secondary endpoints of this study include total thymoglobulin dose and myelosuppressive outcomes. Secondary endpoints at 3-month and 1-year include: graft survival, overall survival, eGFR, infection, rejection, and malignancy.
The primary endpoint will first be tested for normality then analyzed comparing average ALC between both groups. Secondary analysis of the primary outcome includes linear regression with average ALC as the dependent variable and BMI as the independent variable. Categorical variables as the secondary outcomes will be compared using a Ï‡2 test between both groups.
Preliminary Results: Average ALC in the obese group and non-obese group were 0.113ï‚±0.09 and 0.123ï‚±0.09, respectively with a P-value of 0.504.
Conclusions: Preliminary results of this study suggest that dosing antithymocyte globulin based on ideal body weight does not compromise efficacy in terms of lymphodepletion in both patients with and without obesity.

Learning Objectives:
Review the dosing of Antithymocyte globulin
Describe the adverse effects of Antithymocyte globulin
Self Assessment Questions:
Which of the following is true regarding the dosing of Antithymocyte globulin (ATG)?
A. ATG is always dosed using actual body weight
B. ATG is always dosed using ideal body weight
C. ATG has no consensus dosing
D. ATG is usually administered in doses that are multiples of 15 mg
Which of the following is true regarding the adverse effect profile of Antithymocyte globulin (ATG)?
A. Infusion reactions related to thymoglobulin are mitigated with premedications like antihistamines and steroids
B. ATG does not cause patients to be at higher risk of infection
C. A rare complication of ATG is lymphopenia
D. White blood cell and platelet counts never recover after a course of ATG
Q1 Answer: C Q2 Answer: A
APCE Universal Activity Number 0121-9999-25-702-L01-P

Evaluating Adherence and Efficacy of a Prophylactic Regimen for Carboplatin-Induced Hypersensitivity Reactions: A Quality Improvement Study at an Academic Medical Center

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INTRODUCTION

Carboplatin is a widely used chemotherapeutic agent in oncology, effective against various cancers. However, its use is frequently complicated by hypersensitivity reactions (HSRs), with incidence rates ranging from 7.9% to 44% in gynecologic oncology populations. HSR risk increases with cumulative exposure, exceeding lifetime doses of 3,500 mg or six to eight exposures of the medication. Management strategies for carboplatin-induced HSRs vary widely and include extended desensitization protocols. While effective, these protocols can be time-intensive, impacting patient satisfaction and resource utilization. Recent findings from Memorial Sloan Kettering (MSK) Cancer Center suggest that a prophylactic 3-hour extended infusion showed no statistical difference in HSR rates compared to standard infusion protocols, highlighting the role of premedications. In clinical practice, variability in premedication measures, particularly the use of dexamethasone, underscores the need for evidence-based strategies to manage this issue. This quality improvement project evaluates adherence to the Froedtert and Medical College of Wisconsin Carboplatin Dosing Principles and Management of Hypersensitivity Guidelines and examines the efficacy of prophylactic dexamethasone in mitigating HSRs.

METHODS

This retrospective quality improvement study examines adherence to Froedtertâ€™s carboplatin hypersensitivity prophylaxis guidelines, which include a prophylactic evening dose of dexamethasone. Data from patients treated between January 1, 2022, and September 1, 2024, will be reviewed. The primary outcome is adherence to the established regimen. Secondary outcomes include HSR incidence stratified by adherence to the evening dose of dexamethasone, severity grading per CTCAE, and subsequent clinical outcomes.

RESULTS AND CONCLUSIONS

A total of 181 patients, including 44 with documented HSRs, will be analyzed. Results from this analysis will provide insight into the efficacy of premedication adherence in mitigating carboplatin-induced HSRs and inform future updates to institutional guidelines. The findings aim to optimize the safety and effectiveness of carboplatin administration.

Learning Objectives:

Describe the factors that contribute to a higher likelihood of experiencing a hypersensitivity reaction after receiving carboplatin

Explain the role of extended infusion protocols and premedications in reducing carboplatin hypersensitivity reactions as demonstrated in the MSK Cancer Center study.

Self Assessment Questions:

What factors contribute to hypersensitivity reactions to carboplatin?

A. Lifetime dose

B. Renal dysfunction

C. Cumulative cycles

D. Both A & C

What was the reported difference in hypersensitivity reaction rates between the extended infusion arm and the standard infusion arm in the MSK Cancer Center study?

A. 3-hour extended infusion arm was superior

B. Standard infusion protocol was inferior

C. Standard infusion protocol was superior

D. No statistical difference between both arms

Q1 Answer: D Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-568-L01-P

Creating/Optimizing a Heart Failure Acuity Report

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Among all the different classifications of heart failure, treatment of heart failure with reduced ejection fraction (HFrEF) has the most robust evidence to support guideline-directed medical therapy (GDMT). Despite GDMT's potential to reduce mortality by over 70%, it is often underutilized. Froedtert & the Medical College of Wisconsin (F&MCW) utilizes an electronic health record (EHR) allowing pharmacists to conduct patient chart reviews and assist with medication optimization. Within the EHR, clinical decision support (CDS) for specific systems (i.e. anticoagulation, infectious disease) was built to ensure all relevant information, including labs, medications, and guidelines could be pulled into one place for easy reference. Currently, there is no formal method for pharmacists at F&MCW to document GDMT for HF patients, nor is there a way to document any contraindications to treatment. Standardizing documentation and its surrounding workflows can allow for convenient tracking of medications and their management across encounters. To allow pharmacists at F&MCW to have a larger impact on patients being discharged on GDMT for HFrEF, this study aims to implement heart failure CDS tools that will improve and standardize the documentation of GDMT between patient encounters.

The intervention includes building and implementing heart failure CDS tools to assist in standardizing documentation for GDMT. The intervention will be built, tested, and implemented within Froedtertâ€™s EHR. Education will be provided to clinical pharmacists. Post-implementation data and survey will be collected to assess primary and secondary outcome points.

Results are pending. The primary outcome includes comparing the number of documentation pre/post-intervention. The secondary outcomes include a post-intervention satisfaction survey of inpatient medicine/cardiology pharmacists and a report of how many patients were readmitted due to HF pre/post-implementation of intervention.

Conclusions are pending. Based on the results of the intervention, future direction includes maintenance and enhancement of the heart failure report based on pharmacist feedback.

Learning Objectives:

Define clinical decision support within the electronic health record

Describe role of clinical decision support in assessing patients with heart failure

Self Assessment Questions:

What is the most important characteristic of an effective clinical decision support tool?

A. Focuses on reducing healthcare costs

B. Provides a large amount of information regardless of relevance

C. Eliminates need for clinical judgement

D. Integrates into workflow and is actionable

How can clinical decision support tools be used in assessing a patient with heart failure?

A. Reduces the need for diagnostic tests/imaging

B. Pulls in relevant patient information to determine appropriate medication adjustments

C. Automatically adds all GDMT medications without provider input

D. Replaces need for regular patient monitoring

Q1 Answer: D Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-842-L99-P

Development and Implementation of a Treatment Algorithm to Evaluate the Probability of UTI and Guide Antimicrobial Therapy in Adult Patients Presenting with Altered Mental Status

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Urinary tract infections (UTIs) are frequently self-identified through localized symptoms including painful urination as well as increased urinary frequency and urgency. Asymptomatic bacteriuria (ASB) is characterized by the presence of bacteria in urine without the presence of symptoms of UTI; the distinction between the two can be difficult in patients presenting with an altered mental status who are unable to express or perceive those hallmark UTI symptoms.

Altered mental status can be a secondary result of a variety of conditions; while infection may not be able to be initially ruled out, other factors such as dehydration, medication-related adverse effects, neurological conditions, etc. are not uncommon and should be investigated appropriately. Initiating antibiotics without pursuing other avenues of the patientâ€™s presentation presents an increased risk of harm with antibiotic-related adverse effects, as well as delaying treatment of the inciting event.

With these considerations in mind, there is an identified need and potential benefit to the development and implementation of an algorithm designed to evaluate the probability of urinary tract infection, particularly in those that present with altered mental status and/or an inability to express or perceive symptoms of a UTI.

Patients presenting with altered mental status will be evaluated to determine the likelihood of a true UTI and if appropriate treatment was initiated utilizing said algorithm. The primary outcome will be to determine frequency of algorithm utilization through initial management or upon recommendation by a pharmacist. Comparison will be made to baseline data that was gathered before creation of the algorithm. Secondary outcomes include days of antimicrobial therapy, inpatient length of stay, and rates of complications relating to antimicrobial therapy, including acute kidney injury, CDI, and line-associated infections. Demographics including age and sex will be reviewed, and antimicrobial agent utilized will also be recorded.

Learning Objectives:

Define asymptomatic bacteriuria and asymptomatic pyuria.

Identify when treatment is indicated in patients presenting with asymptomatic bacteriuria or asymptomatic pyuria.

Self Assessment Questions:

MJ is a 70-year-old woman with a PMH of hypertension, hyperlipidemia, and diabetes mellitus. She presents to your facility after a fall from standing height. She denies dysuria or increased frequency/urgency. Her daughter states that MJ has had increasing confusion over the last several days. A urinalysis reveals 40-49 WBCs with positive nitrites and leukocyte esterase. Which of the following more closely aligns with MJâ€™s presentation and currently available information?

A. Cystitis

B. Asymptomatic pyuria

C. Complicated urinary tract infection

D. Asymptomatic bacteriuria

GS is an 84-year-old woman transferred to your facility from an outside hospital for acute ischemic stroke. On day 2 of hospitalization, a urine culture collected on admission returns growing E. Coli (CTX-M not detected). She remains NPO after failing her swallow evaluation. The attending physician would like to treat as a UTI as she is unable to assess GS for hallmark urinary symptoms. Which of the following regimens would be ideal for the patient?

A. Gentamicin 5 mg/kg as a one-time dose

B. Cefepime 1 g every 6 hours for 5 days

C. Fosfomycin 3 g as a one-time dose

D. Ciprofloxacin 400 mg every 14 hours for 3 days

Q1 Answer: B Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-631-L01-P

Evaluation of Antibiotic Prophylaxis in Penetrating Traumatic Brain Injury

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Purpose: Traumatic brain injuries (TBI) lead to approximately 2.5 million emergency department visits, 282,000 hospital admissions, and 56,000 TBI-related deaths per year. Penetrating traumatic brain injuries (pTBI) may involve introduction of foreign material, bone, or hair into the intracranial space, posing a higher risk of intracranial infection and mortality compared to non-penetrating injuries. Therefore, prophylactic antibiotics are often administered to minimize these risks. Current guidelines lack a consensus regarding the optimal agent and duration for antibiotic prophylaxis in this population. The objective of this study was to evaluate the incidence of intracranial infection among patients with pTBI based on prophylactic antibiotic regimen.

Methods: This was a retrospective study of adult pTBI patients admitted to UofL Health-UofL Hospital (ULH) between April 1, 2016-August 31, 2024. Patients with pTBI were divided into two groups: those who received broad spectrum antibiotics (cefepime + vancomycin Â± metronidazole) and those who received narrow spectrum antibiotics (cefazolin) for prophylaxis. Patients were excluded if they were transferred from an outside facility > 24 hours after injury, did not receive antibiotic prophylaxis within 24 hours, expired or had care withdrawn within 7 days, or had a history of intracranial hardware or infection. The primary outcome was the rate of intracranial infection within 30 days of the initial injury. Secondary outcomes included the rate of infection due to multidrug resistant organisms within the first 7 days of admission (defined as organisms resistant to > 3 drug classes) and 30-day readmission rate for infection-related causes.

Results/Conclusion: Final results will be presented at Great Lakes Resident Conference.

Learning Objectives:
Review central nervous system infection risk in patients with penetrating traumatic brain injury (pTBI)
Discuss current guideline recommendations regarding antibiotic prophylaxis in patients with pTBI
Self Assessment Questions:
Penetrating traumatic brain injury is often associated with:
A. Increased infection risk
B. Decreased mortality
C. Shorter length of hospital stay
D. Fewer surgical interventions
Which of the following is recommended by the Journal of Trauma guidelines for antibiotic prophylaxis in patients with pTBI?
A. Piperacillin-tazobactam x 7 days
B. Vancomycin x 5 days
C. Cefazolin x 5 days
D. Meropenem x 7 days
Q1 Answer: A Q2 Answer: C
APCE Universal Activity Number 0121-9999-25-506-L01-P

Real-world clinical outcomes for patients prescribed semaglutide or tirzepatide for weight loss by their primary care provider at a large academic medical center

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Purpose:
Obesity is a chronic condition that increases the risk of hypertension, dyslipidemia, type 2 diabetes, cardiovascular disease, metabolic dysfunction-associated steatotic liver, disease, and certain cancers. Over 40% of American live with obesity, surpassing the Healthy People target of 36%. Newer weight loss medications, such as GLP-1 receptor agonists semaglutide and tirzepatide, have shown significant weight loss in patients with obesity, both with and without type 2 diabetes, in randomized clinical trials. There is a lack of real-world data comparing semaglutide and tirzepatide for weight loss in primary care settings.

Methods:
This IRB-approved, retrospective cohort study included adults (â‰¥18 years of age) with obesity and overweight with at least one weight-related comorbidity (excluding diabetes) who were initiated on semaglutide (Wegovy) or tirzepatide (Zepbound) for weight management by a primary care physician at a University of Michigan Health internal or family medicine clinic between January 1, 2024 and June 30, 2024. Patients were excluded if they were diagnosed with diabetes mellitus, prescribed semaglutide or tirzepatide by a specialist outside of primary care, or did not initiate semaglutide or tirzepatide. Data collection at baseline and during the follow-up period included demographics; weight-related comorbidities; bodyweight; BMI; cardiometabolic risk markers (blood pressure, HbA1c, serum glucose, lipid panel); prior weight management medications; prior bariatric procedures; treatment discontinuation; reason for discontinuation (cost, side effects, switch to alternative weight loss therapy). The primary outcome was to assess weight change from baseline. Secondary outcomes included to assess changes in cardiometabolic risk markers from baseline and to assess incidences of GI adverse reactions leading to treatment discontinuation.

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

Learning Objectives:
Review the current literature for the use of semaglutide or tirzepatide in weight management.
Identify strategies pharmacists can employ to ensure the safe and effective use of GLP-1 receptor agonists in managing obesity and overweight in patients.

Self Assessment Questions:
Which of the following GLP-1 receptor agonist medications for weight management demonstrated significant risk reduction of major adverse cardiovascular events in patients with established cardiovascular disease and either obesity or overweight?
A. Liraglutide
B. Semaglutide
C. Dulaglutide
D. Tirzepatide
Which of the following is/are appropriate counseling points to mitigate GI side effects associated with GLP-1 receptor agonists for weight management?
A. Eat smaller portions of food in more frequent meals
B. Avoid high-fat and spicy foods
C. Eat slowly and stop when feeling full
D. All the above
Q1 Answer: B Q2 Answer: D
APCE Universal Activity Number 0121-9999-25-554-L01-P

Evaluation of Continuation of Anti-Psychotics for Delirium after Intensive Care Unit (ICU) Discharge

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Purpose: ICU delirium is a common condition affecting patients admitted to the ICU for prolonged periods of time characterized by acute deficits in attention, awareness, and cognition. Patients can be assessed for delirium by using the Confusion Assessment Method (CAM-ICU) tool. Agitated patients who pose a danger to themselves or others are often treated with haloperidol or atypical antipsychotics. Prolonged use of antipsychotic agents after delirium resolution and/or continuation upon discharge or transfer can pose unnecessary side effects and safety risks. The purpose of this quality assessment is to determine the rates of antipsychotic continuation upon patient discharge from the ICU.

Methods: A retrospective chart review will be performed for adult patients admitted to the Trinity Health Muskegon ICU from July 2023 to July 2024 who received at least two doses of haloperidol, olanzapine, ziprasidone, quetiapine, or risperidone for delirium. Patients will be excluded if they have any history of psychiatric disorders or were on antipsychotics 30 days prior to admission. The primary outcome of this assessment will be frequency of antipsychotic continuation upon discharge from the ICU with missing or negative CAM score. Secondary outcomes will include rates of patients given antipsychotics without a documented CAM-ICU score, number of days antipsychotic was administered, provider service discontinuing antipsychotic prior to discharge from ICU or discharge home, documented Richmond Agitation-Sedation Scale (RASS) score, mean QTc interval, and documented non-pharmacologic interventions for delirium.

Results and conclusions to be presented at GLPRC.

Learning Objectives:
Recall guideline recommendations for treatment of delirium in the intensive care unit.

Identify common medications used in the treatment of ICU delirium, and possible adverse events related to treatment.
Self Assessment Questions:
1. According to current guideline recommendations, what is the first-line treatment for ICU delirium?
A. Ziprasidone
B. Haloperidol
C. Non-pharmacologic management
D. Quetiapine
Adverse events resulting from administration of antipsychotic medications can include:
A. Excessive sedation
B. Prolonged QTc interval
C. Increased risk of death in elderly patients with dementia
D. All of the above
Q1 Answer: C Q2 Answer: D
APCE Universal Activity Number 0121-9999-25-771-L05-P

Standard vs Alternative Ferumoxytol Dosing: A Retrospective View on Iron Stores Post-Replacement Therapy
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Iron deficiency anemia is prevalent across various patient populations. Intravenous iron therapy is used when oral iron absorption is inadequate, poorly tolerated, or when rapid repletion is needed. Dosing is typically guided by manufacturer recommendations or determined using iron replacement Equations resulting in variations. A retrospective cohort study was conducted at CHI Saint Joseph Hospital outpatient infusion clinics in Lexington, Kentucky. Patients included received therapy between 10/17/2022 and 09/30/2024. Patients were divided into two groups, those who received the standard 1020mg and those who received > 1530 mg. Eligibility criteria included age 18 or older, a diagnosis of iron deficiency anemia, and follow-up lab work within four months after the first dose. Exclusion criteria included no iron function studies, chronic blood loss, iron binder use, pregnancy, active malignancy, myelodysplastic syndrome, active bleeding, Crohnâ€™s, ulcerative colitis, irritable bowel syndrome, and recent or anticipated blood transfusion. Patient data was identified through chart reviews using EPIC Slicer-Dicer. The primary outcome was the mean change in hemoglobin within four months from baseline. Secondary outcomes included the mean change in ferritin and transferrin saturation, the proportion of patients achieving a 1 g/dL hemoglobin increase, and the number of patients requiring repeat iron replacements within four months of the initial dose. This research aimed to optimize dosing strategies, exploring whether higher calculated doses of IV iron could lead to a more effective iron and hemoglobin replenishment, and to determine if this lead to a reduction in the need for additional treatments.

Learning Objectives:

Explain the rationale behind intravenous (IV) iron therapy and its role in iron deficiency anemia treatment

Discuss the applicability of iron replacement equations (Ganzoni and Schrier/Mentzer) in guiding IV iron therapy.

Self Assessment Questions:

What is the standard IV ferumoxytol dosing regimen?

A. 510 mg IV once

B. 1020 mg IV over two doses

C. 2040 mg IV in a single dose

D. 100 mg Iv weekly for 10 weeks

Why might some patients require more than 1020 mg of IV iron replacement?

A. IV iron has a short half life

B. Manufacturer guidelines suggest increasing doses for all patients

C. Iron replacement equations often estimate a higher iron requirement

D. Lower doses cause severe adverse effects

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-609-L01-P

Evaluating the impact of sulfonylurea deprescribing in high-risk patients

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Purpose: Sulfonylureas have been utilized for nearly 75 years because of their affordability and modest A1c reduction. Unfortunately, these medications are notorious for causing hypoglycemia in older patients. Reducing the dose or discontinuing the sulfonylurea may improve patient outcomes relating to hypoglycemia. The purpose of this project is to promote patient safety and guideline-directed therapy.
Methods: A list was generated of patients aged 65 or older prescribed sulfonylureas with an A1c of less than 6.5% in 2023 and 2024. This list included patient age, A1c, prescriber, and medication. The resident contacted patients from this list, conducted hypoglycemia assessments, and identified candidates for deprescribing. If the candidate was willing, interventions were made at point-of-contact and the patient was referred to a clinical pharmacist practitioner. Data was collected at baseline, 3 months, and 6 months after initial contact. Data collected includes hypoglycemic events in the last 3 months, events resulting in falls or hospital visits in the last 3 months, symptomatic events in the last 3 months, sulfonylurea dose, adherence, A1c and goal, weight, prescriber, additional diabetes medication(s), and intervention(s) made. Primary outcomes included occurrence of hypoglycemic events, injuries, and hospital visits. Secondary outcomes included changes in A1c, changes in weight, and any alternative agents used.
Results: Of the 28 patients that were called, 20 were reached. No patients reported hypoglycemic events and 6 of the 20 encounters resulted in sulfonylurea de-escalation. 4 patients reported taking their sulfonylurea on an empty stomach and were agreeable to start taking the medication with food after education was provided.
Conclusions: While no hypoglycemic events have been reported, clinical pharmacy practitioners have still been able to make guideline-supported interventions to promote patient safety. This project is still in data collection and further results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:
Identify patients at increased risk of hypoglycemic events
Review guideline-directed treatment of type 2 diabetes
Self Assessment Questions:

Your patient is a 90-year-old male with T2DM currently prescribed glipizide 10mg BID AC, insulin glargine 20 units QAM, and metformin 1000mg BID for diabetes. He used to have cinnamon sugar cereal for breakfast, but has recently switched to eggs and yogurt. He does not eat lunch, but always has a large helping at dinner. His wife has recently noticed that he is shaky and will seem â€œout of itâ€□occasionally before dinner. What should you do?
A. Instruct the patient to start taking 3-4 glucose tablets at noon daily
B. Reduce metformin dose to 500mg BID
C. Instruct the patient to go back to eating sugary cereal for breakfast
D. Decrease the AM glipizide dose to 5mg

You ask the patient from Question #1 about his A1c goal, and he tells you that a previous provider told him that it should be <7%. Which of the following approaches is most appropriate regarding his current A1c goal?
A. No changes, an A1c goal of <7% is still appropriate
B. A more relaxed A1c goal of <8% should be considered due to age and comorbidities
C. A more stringent A1c goal of <6% should be considered due to comorbidities
D. Since he is so well-controlled, he no longer requires an A1c goal
Q1 Answer: D Q2 Answer: B
APCE Universal Activity Number 0121-9999-25-770-L05-P

Evaluation of Pharmacist-Driven Statin Prescribing and Adherence Monitoring in Female Veterans

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Atherosclerotic cardiovascular disease (ASCVD) is the leading cause of death among women in the United States. Over fifty percent of female Veterans have at least one major risk factor for ASCVD. Previous studies highlight potential gender disparities in ASCVD prevention and treatment with women having a significantly lower percentage of prescribed statins compared to men. The purpose of this quality improvement project was to determine the impact of clinical pharmacist practitioners (CPPs) on prescribing statins and adherence monitoring in female Veterans with cardiovascular disease and diabetes. This quality improvement project was conducted in outpatient clinics within the Robley Rex Veterans Affairs Medical Center in Louisville, Kentucky. Female patients were selected using the provider electronic quality management dashboard. This dashboard identifies patients with cardiovascular disease or diabetes that are indicated for statin therapy or adherence monitoring. A medication review was completed using Brillians software, followed by an education and medication therapy management encounter on cardiovascular health that occurred between the CPP and Veteran. A templated progress note was entered in the Computerized Patient Record System documenting the encounter and its outcomes. Patient charts were reviewed at baseline and three months after intervention. The primary endpoint was the number of patients with a statin prescription added or intensified and adherence rates at three months following the intervention. Secondary endpoints include number of patients prescribed low, moderate, or high intensity statins, number of referrals to pharmacogenomics for gene testing, missed diagnosis codes for myalgia, myositis, myopathy, or rhabdomyolysis, and no-show appointments.

Learning Objectives:

Recognize when patients are indicated for statin-therapy or adherence monitoring.

Outline a standardized process for pharmacist-driven statin prescribing and adherence monitoring.

Self Assessment Questions:

According to the 2025 ADA Guidelines, what should be the target LDL goal for individuals with diabetes and ASCVD?

A. <100mg/dL

B. <55mg/dL

C. <80mg/dL

D. <70mg/dL

Which of the following should be evaluated prior to initiation of statin therapy?

A. Pregnancy status

B. Presence or history of myalgia, myositis, myopathy, or rhabdomyolysis

C. Lipid panel

D. All of the above

Q1 Answer: B Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-723-L01-P

Alvimopan's Impact in Colorectal Surgery and Radical Cystectomy Patients

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Purpose: Postoperative ileus (POI) is a common and costly complication following major surgeries such as colorectal surgery (CRS) and radical cystectomy (RC). It significantly contributes to delayed gastrointestinal recovery, prolonged hospital stays, and increased healthcare costs. Alvimopan, a peripherally acting Âμ-opioid receptor antagonist, mitigates the gastrointestinal effects of opioids without affecting their central analgesic effects. Due to an increased risk of myocardial infarction, alvimopan is limited to a maximum of 15 postoperative doses, as regulated by an FDA Risk Evaluation and Mitigation Strategy (REMS). By selectively blocking opioid receptors in the gastrointestinal tract, alvimopan has been shown to enhance the return of bowel function (ROBF) and reduce POI in patients undergoing bowel resection. Alvimopanâ€™s potential to enhance recovery and reduce complications in CRS and RC is promising. However, the extent to which it consistently improves outcomes across different surgical approaches, such as open versus minimally invasive techniques, requires further exploration. Methods: This retrospective cohort study includes patients who underwent either RC or CRS at our institution. CRS patients were included if they received primary anastomosis as part of a sigmoidectomy, hemicolectomy, or colostomy takedown. Patients who underwent RC in 2016 or CRS in 2018 did not receive alvimopan and serve as a control group, compared to those who underwent RC or CRS in 2023 and received alvimopan. Patients were excluded if they had opioid use within 7 days prior to surgery, were receiving concomitant opioid antagonist therapy, or had a bowel obstruction within 90 days before surgery. The primary outcome is length of hospital stay, defined as the time from procedure to discharge. Secondary outcomes include the length of time from procedure to ROBF and the incidence of POI. Conclusion: Results and conclusions will be presented at the 2025 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the impact alvimopan has on length of hospital stay in those undergoing colorectal surgery or radical cystectomies.

Discuss whether postoperative use of alvimopan influences time until return of bowel function and rate of postoperative ileus.

Self Assessment Questions:

Which of the following could be an appropriate indication for the use of alvimopan?

A. Preventing constipation while undergoing methadone treatment for opioid use disorder

B. Preventing postoperative ileus in a post-hemicolectomy patient

C. Serving as a gastrointestinal analgesic in a patient undergoing a colonoscopy

D. Treating acute constipation that is refractory to stimulant and osmotic laxatives

Which of the following statements regarding alvimopan use is correct?

A. Since alvimopan is an opioid antagonist, its use should be limited in those who are in pain to avoid counteracting the analgesic effects of opioids

B. Since alvimopan is a peripherally acting opioid, it may impact pain control at peripheral surgical sites

C. Alvimopan only acts peripherally and does not impact the analgesic effects opioids at any surgical site, including peripheral surgical sites

D. Alvimopan has not been studied in patients actively taking opioids and should therefore be avoided in the postoperative setting

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-614-L01-P

Vancomycin Pharmacokinetics in Patients with Stroke

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Purpose: The incidence of infection in stroke patients is approximately 30% and is associated with a 20% mortality rate. Acute stroke patients can demonstrate either augmented renal clearance (ARC) or acute/chronic kidney injury, affecting their clearance of vancomycin. Currently, there are no formal pharmacokinetic analyses of vancomycin in stroke patients, nor are there personalized dosing regimens for this population. This study aims to assess the pharmacokinetic parameters of vancomycin in stroke patients, comparing them to population parameters and between different types of strokes.
Methods: A single-center retrospective, observational, cohort study was conducted to assess pharmacokinetic parameters in stroke patients. Comparisons of area-under-the-curve (AUC) monitoring and clearance in stroke patients versus population parameters were done utilizing Lixoft Monolix Suite (2024R1). A subgroup analysis of pharmacokinetic parameters among different stroke types was performed. Additionally, Monte-Carlo simulation was conducted to evaluate the likelihood of AUC target attainment in the population. Subjects were included if they were adult patients aged 18 years or older, admitted for stroke diagnosis (subarachnoid hemorrhage, intracerebral hemorrhage, or ischemic stroke) and received vancomycin with two concentrations evaluable for AUC calculation. Patients were excluded if they had incomplete or absent vancomycin AUC monitoring, a history of nephrectomy or renal transplant, or a body mass index less than 18 kg/m2.
Results/Conclusions: There were 112 patients included in this study. The mean age was 58.8 Â± 13.7, and 67 patients (59.8%) were male. Forty-seven patients (42.0%) presented with acute ischemic stroke and 65 (58.0%) presented with hemorrhagic stroke, most commonly intracerebral or subarachnoid hemorrhage. Total daily dose of vancomycin was 27.9 Â± 9.3 mg/kg/day. Sixty patients (53.6%) had an ARCTIC score of six or higher. The mean estimated glomerular filtration rate (eGFR) was 96.1 Â± 24.0 mL/min/1.73m2 utilizing the 2021 CKD-EPI equation. All other results and conclusions are in progress.

Learning Objectives:
Identify the likelihood of vancomycin AUC target attainment in stroke patients
Describe the differences of vancomycin pharmacokinetics between stroke patients and population parameters.
Self Assessment Questions:
What is the common definition of augmented renal clearance?
A. CrCl >130 mL/min
B. CrCl <60 mL/min
C. CrCl >90 mL/min
D. CrCl <15 mL/min
Which of the following contributes to the development of acute kidney injury in acute stroke?
A. Activation of RAAS
B. Activation of parasympathetic nervous system
C. Release of nitric oxide
D. Fluid resuscitation
Q1 Answer: A Q2 Answer: A
APCE Universal Activity Number 0121-9999-25-828-L01-P

Evaluation of Fludrocortisone Dosing in Neurologic Emergencies (SALT-TID): A Single Health System, Retrospective, Cohort Study

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Sodium and fluid imbalances are common occurrences in patients who present with neurologic emergencies. Mineralocorticoids are suggested to reduce hyponatremia and natriuresis while decreasing sodium and fluid replacement in patients with aneurysmal subarachnoid hemorrhage. There is a lack of evidence describing mineralocorticoid use in patients with other neurologic emergencies such as intracranial hemorrhage, traumatic brain injury, meningitis, or CNS malignancy. In addition, studies are also needed to determine the effects of different dosing strategies on serum sodium levels. This study aims to evaluate the use and efficacy of different doses of fludrocortisone for hyponatremia in neurologic emergencies.

This single-health system, retrospective, cohort study was conducted at UC Health located in Cincinnati, Ohio. Adult patients admitted to either a neurocritical care or neurosurgery unit who received high dose (> 0.3 mg/day, HD) or low dose (â‰¤ 0.3 mg/day, LD) fludrocortisone for hyponatremia due to a neurologic emergency were included. Patients with post-pituitary resection, patients on fludrocortisone at home, patients on steroids at home for adrenal insufficiency, pregnant patients, and prisoners were excluded.

The primary outcome compared the change in sodium levels with LD versus HD fludrocortisone within 24 hours after reaching target dose. Secondary outcomes included fluid balance, urine osmolality, and rates of hypokalemia 24 hours surrounding the maximum fludrocortisone dose, serum sodium levels throughout the entire fludrocortisone treatment, and the dose and duration of other therapies targeting hyponatremia including hypertonic saline, salt tablets, and sodium chloride. Morbidity and mortality outcomes, including ICU length of stay, hospital length of stay, and hospital disposition, were also compared between groups. A multivariate logistic regression was done to identify predictors of response to fludrocortisone as well.

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 current literature and guideline recommendations for treatment options in patients with neurologic emergencies presenting with hyponatremia.

Describe the differences in efficacy and dosing of fludrocortisone when used in neurologic emergencies.

Self Assessment Questions:

1. Which of the following is TRUE regarding current literature describing the use of fludrocortisone for hyponatremia in the setting of SAH?

A. Fludrocortisone improves neurological outcomes in patients with SAH

B. Fludrocortisone increases natriuresis and increases the sodium and water intake required in patients with SAH

C. Fludrocortisone helps to maintain euvolemia in patients with SAH

D. None of the above

2. What neurologic emergencies causing CSW will be included in this study if patients receive fludrocortisone as treatment?

A. Subarachnoid hemorrhage

B. Traumatic brain injury

C. Meningitis or Malignancy

D. All of the above

Q1 Answer: C Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-613-L01-P

Overcoming Barriers to Pharmacists Prescribing Naloxone

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Purpose: In a prior study, VA pharmacists were surveyed on their perspectives of naloxone and naloxone prescribing assessing five respective themes: attitudes/beliefs, comfort, lack of knowledge, fear of consequences, and time/resources. This study found that pharmacists who self-reported having received formal naloxone training prior to the survey had statistically significantly higher self-reported comfort, knowledge, and lack of fear of consequences with naloxone and naloxone prescribing. Further exploration is necessary to assess whether training impacts pharmacist naloxone prescribing. This study aims to evaluate pharmacist naloxone prescribing trends before and after implementing an institutional pharmacist training initiative targeting those identified barriers. Methods: This is a single center, experimental design, and mixed research study. Data was collected utilizing pre-and post-survey results from the 10-minute, in person naloxone training that was presented to VHI pharmacists. Additional data will be collected to assess the number of naloxone prescriptions ordered by pharmacists two months before and two months after the trainings were completed. The primary outcome is the total number of unique pharmacists prescribing naloxone at Veteran Health Indiana (2-months pre vs. 2-months post education). Secondary outcomes assessed at 2-month pre, and 2-month post education are the total number of naloxone prescriptions written by pharmacists, comfort, knowledge, fear of consequences, time/resources, and total number of unique pharmacists prescribing naloxone by modality of patient care delivery. Data will be expressed using basic descriptive statistics, including percentages, standard deviations, and confidence intervals. Analytical statistics were used for survey responses and naloxone prescribing data. Survey results were analyzed using paired t tests for individual survey questions. For the comparison of unique number of pharmacists and total number of naloxone prescriptions during the before and after education period, analysis will be done using Poisson regression. Results/Conclusions: Will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the role that pharmacists may provide in opioid overdose education and naloxone distribution.

Describe the impact of institutional educational trainings on overcoming barriers to pharmacists prescribing naloxone at Veteran Health Indiana.

Self Assessment Questions:

Which of the following is found to decrease emergency room-related visits and opioid-involved overdose deaths?

A. Increased time spent counseling on naloxone

B. Decreased time spent counseling on naloxone

C. Decreased naloxone prescribing

D. Increased naloxone prescribing

In this study, which of the following barrier(s) to naloxone prescribing was found to be unchanged by educational trainings?

A. Time/Resources

B. Knowledge

C. Comfort

D. Fear of Consequences

Q1 Answer: D Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-810-L99-P

Evaluation of Actinomyces Species Infection in a Surgical Population

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The purpose of this study is to describe current practices in management of Actinomyces spp. infection, evaluate if current practices are adequate for eradication of Actinomyces spp. infection, and identify risk factors associated with infection in a surgical population. Clinical failure was defined as a composite of readmission for recurrence, operative intervention, or antimicrobial intervention within 90 days of index discharge.

This is a retrospective, single-center study at a tertiary academic medical center. Data collection consisted of enterprise data warehouse and manual chart review from the electronic medical record. Data collected include patient demographics, ICU and hospital length of stay, service line, operative intervention, laboratory data, and inpatient medications. Patients were included if 18 years of age or older and had an interventional culture positive for Actinomyces spp. between June 2021 and April 2024. Patients admitted without a primary or consult surgical service were excluded.

To date, 42 patients have been included. Patients had a median age of 56 years [IQR 44-64], with a median length of stay of 9.5 days [IQR 5-21]. A total of 13 patients (31%) experienced a 90-day readmission. All patients received antimicrobial agents active against Actinomyces spp. during the index admission, however, only 22 (52%) received effective antimicrobial therapy at discharge. Infectious diseases consultation for outpatient follow up was scheduled for 14 patients (33%), and only 6 patients (48%) attended the appointment as scheduled.

Conclusion pending completion of results.

Learning Objectives:
Recognize antimicrobials used in the treatment of Actinomyces spp.
Identify appropriate therapy duration considerations for Actinomyces spp.
Self Assessment Questions:

A 55-year-old male presents to the emergency department with a soft tissue infection after a recent dental procedure. His clinical presentation includes painful, draining masses. The gram stain of the drainage shows branching Gram-positive filaments. Blood cultures confirm Actinomyces spp. infection. The patient is started on penicillin for treatment. Which of the following is the most appropriate next step in managing this patientâ€™s infection?
A. Start a combination therapy of penicillin and rifampin
B. Recommend a switch to clindamycin due to penicillin resistance
C. Continue with intravenous penicillin therapy for 4-6 weeks, considering potential surgical drainage
D. Discontinue antibiotics and observe as the infection will resolve without intervention
The patient above is receiving penicillin G and is responding well after 2 weeks of treatment. The infectious disease team recommends transitioning the patient to oral therapy. Which of the following oral antibiotics is the most appropriate for continued treatment of Actinomyces spp. infection after IV penicillin therapy?
A. Azithromycin
B. Amoxicillin
C. Vancomycin
D. Ciprofloxacin
Q1 Answer: C Q2 Answer: B
APCE Universal Activity Number 0121-9999-25-642-L01-P

Impact of prescribing Ertapenem thrice weekly over daily in patients on Hemodialysis

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Purpose: Ertapenem is an intravenous (IV) carbapenem used for treating extended-spectrum beta-lactamases (ESBLs) and AmpC -producing Gram-negative infections. In hemodialysis (HD) patients it can be dosed as either 500 mg daily or 1 gram thrice weekly (TIW). While 0.5 grams daily is the FDA approved dosing, there is growing data that 1 gram TIW offers a convenient and potentially safer dosing alternative to daily dosing. This method supports vein preservation which is crucial for facilitating outpatient parenteral antimicrobial therapy (OPAT) in HD patients who have limited venous access. The purpose of this study is to describe the usage, outcomes, and transitions of care associated with ertapenem 1 gram (TIW) and ertapenem 0.5 grams daily in HD patients.

Method: This is an IRB approved retrospective cohort study at Henry Ford health system. Adult patients admitted from 7/1/2019- 10/1/2024 who were discharged on ertapenem were included in the study. Patients infected with ertapenem-resistant organisms; pregnant, incarcerated, or cognitively disabled were excluded from the study. The primary endpoint is a composite of treatment failure: PICC/midline complications, change in ertapenem due to worsening infection or adverse drug reactions, or healthcare utilization, all within 60 days of being discharged. Secondary endpoints include all-cause mortality, IV line insertions, and incidence of drug related events. With an effect size of 20%, a sample size of 108 was calculated. For our statistical plan: nominal, categorical variables will be compared using a Chi-square test. Nominal, continuous variables will be compared using Mann Whitney U.

Results and Conclusions: To be presented

Learning Objectives:

Describe the differences between dosing ertapenem daily vs three times a week in hemodialysis patients on OPAT

Discuss evidence-based data to improve antibiotic dosing in HD, OPAT patients

Self Assessment Questions:

What is the creatinine clearance cutoff where we adjust the ertapenem dose to 500 mg daily?

A. 60 mL/min

B. 30 mL/min

C. 20 mL/min

D. Hemodialysis

Which of the following is a reason for why three-times-a-week dosing of ertapenem is important for dialysis patients?

A. It avoids PICC line insertion, preserving vascular access sites, and potentially reducing complications

B. It ensures high drug levels throughout the week to prevent resistance

C. It demonstrates superior clinical efficacy

D. It reduces the frequency of dialysis sessions needed for the patient

Q1 Answer: B Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-549-L01-P

Impact of MRSA Nasal Swab Screening on Vancomycin Usage and Clinical Outcomes in Pediatric Patients

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Vancomycin is a commonly used antibiotic in both the empirical and definitive treatment of methicillin-resistant Staphylococcus aureus (MRSA) infections in hospitalized children. Healthcare providers should limit the unnecessary use of vancomycin due to potential adverse effects associated with vancomycin use, such as nephrotoxicity, and the workload burden of therapeutic drug monitoring. One strategy to limit the amount of empiric vancomycin used is screening patients with MRSA nasal swabs. MRSA nasal swabs have a very high negative predictive value for MRSA pneumonia infection and can be used to indicate when the patient does not need MRSA coverage and the vancomycin can be discontinued. The aim of this study is to assess if utilizing the MRSA nasal culture in pediatric patients decreases the duration of vancomycin.
This single-center, retrospective cohort study will include all patients admitted to C.S. Mott Childrenâ€™s Hospital that received empiric intravenous vancomycin for the treatment of a suspected or documented infection and received an infection-specific culture. The study will compare patients that received a MRSA nasal culture within 12 hours before or after the start of vancomycin to patients that did not. The primary outcome will be duration of vancomycin. The secondary outcomes will be positive predictive value of the MRSA nasal swab, the negative predictive value of the MRSA nasal swab, mortality within 3 months after stopping the index vancomycin, length of hospital stay, length of intensive care unit stay, acute kidney injury, and prescription of anti-MRSA agent within 30 days of stopping index vancomycin.
Data analysis is currently in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the literature and guidance on when it is safe to use MRSA nasal swabs to deescalate vancomycin

Outline the gaps in literature in the use of MRSA nasal swabs in pediatric patients.

Self Assessment Questions:

Which of the following is true regarding the predictive value of MRSA nasal swabs for pneumonia?

A. Negative predictive value is greater than positive predictive value

B. Negative predictive value is comparable to the positive predictive value

C. Negative predictive value is lower than positive predictive value

D. There is no data regarding negative or positive predictive value

According to literature, which of the following is a potential benefit of MRSA nasal swabs?

A. Reduced duration of vancomycin

B. Increased risk of drug-induced kidney injury

C. Reduced duration of antibiotics other than vancomycin

D. Increased risk of vancomycin infusion syndrome

Q1 Answer: A Q2 Answer: A

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Impact of Hypogammaglobulinemia on Infection Incidence Following CAR T-Cell Therapy

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Currently FDA approved chimeric antigen receptor (CAR) T-cell therapy involves engineering T-cells to target specific surface antigens in aggressive relapsed or refractory hematologic malignancies. While current literature has largely focused on adverse effects such as cytokine release syndrome (CRS) and neurologic toxicities, there is increasing recognition of â€œon-target, off-tumorâ€□effects including B-cell aplasia and hypogammaglobulinemia. Although hypogammaglobulinemia is acknowledged as an adverse effect, its incidence varies due to differing definitions, management approaches, and follow-up durations, limiting our understanding of its clinical implications. Given the established use of intravenous immunoglobulin (IVIG) for managing primary immunodeficiencies, the need for immunoglobulin replacement in CAR T-cell therapy patients with secondary immune deficiencies as infection prophylaxis warrants further exploration. This retrospective, single-center observational study aimed to evaluate the impact of hypogammaglobulinemia on infection incidence following CAR T-cell therapy and examine management strategies for hypogammaglobulinemia at this institution. Adult patients who received CD19-targeted CAR T-cell therapy between June 2020 and July 2024 were included, with exclusion criteria comprising patients lost to follow up or without IgG levels post therapy. Patients were stratified into two groups: those with hypogammaglobulinemia (IgG â‰¤ 400 mg/dL) and those without (IgG > 400 mg/dL). Our primary outcome was infection incidence following CAR T-cell therapy. Secondary outcomes include the association between the incidence of infection following CAR T-cell therapy and the following factors: diagnosis, IgG level prior to CAR-T, previous lines of therapy, incidence of CRS and/or ICANS, and incidence of immunoglobulin replacement therapy. Data collection was conducted via manual chart review. Planned statistical analysis includes Pearsonâ€™s Chi Squared test and Fischerâ€™s exact test. Results and conclusions will be presented at the 2025 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Define the mechanism of action of CAR T-cell therapy and its associated adverse effects.

Discuss the impact of hypogammaglobulinemia on infection incidence following CAR T-cell therapy.

Self Assessment Questions:

How does CAR T-cell therapy lead to hypogammaglobulinemia?

A. CAR T-cell therapy causes B-cell depletion, leading to a reduction in immunoglobulin production

B. CAR T-cells directly inhibit the production of IgG in the bone marrow

C. CAR T-cells target and suppress T-cell function, leading to a secondary decrease in IgG levels

D. CAR T-cell therapy stimulates the production of autoantibodies that degrade IgG

Which of the following is used as a management strategy for hypogammaglobulinemia?

A. G-CSF

B. IVIG

C. Rituximab

D. Plasmapheresis

Q1 Answer: A Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-708-L01-P

Efficacy and Safety Comparison of Letermovir Versus Valganciclovir for Use in Cytomegalovirus Prophylaxis in Adult Kidney Transplant Recipients

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Purpose: Cytomegalovirus (CMV) is a widespread virus that causes significant morbidity and mortality in kidney transplant recipients (KTR). Valganciclovir (VGC) is standard of care for CMV prophylaxis but is associated with myelosuppression. Letermovir (LTV) is noninferior to VGC in preventing CMV disease in high risk KTR and is associated with less myelosuppression than VGC. In June 2023, LTV was FDA approved for CMV prophylaxis in high CMV risk KTR. LTV is also a strong CYP3A4 inhibitor requiring significant dose adjustments to calcineurin inhibitors. Further efficacy and safety data is needed in CMV high and intermediate risk KTR who were converted from VCG to LTV under novel immunosuppression regimens.

Methods: This is a retrospective review of KTR who received VGC from 2/1/2021 to 12/31/2022 or VGC to LTV conversion from 12/1/2021 to 12/31/2023 at UI Health. Low CMV serostatus, de novo LTV use, multi-organ transplant, prior transplant other than kidney, and use of LTV < 28 days were excluded. The primary endpoint of this study is incidence of CMV viremia. Secondary endpoints include incidence of CMV disease, time to CMV viremia or disease, graft survival, patient survival, incidence of rejection, incidence of resistant CMV viremia or disease, incidence of breakthrough CMV viremia or disease, incidence of tacrolimus toxicity, incidence of myelosuppression (neutropenia and leukopenia), incidence of G-CSF use, herpes simplex virus (HSV)/ herpes zoster virus (HZV) infection, and treatment discontinuation. All outcomes collected will include data through 12 months post-transplant.

Preliminary Results: To identify the list of patients who received LTV, a patient list was generated using SlicerDicer for any kidney transplant with an LTV prescription at any period post-transplant. Data collection is currently in process.

Conclusion: Results will be presented at the Great Lakes conference.

Learning Objectives:

Review the role of CMV prophylaxis in kidney transplant recipients

Describe the adverse effects of valganciclovir versus letermovir

Self Assessment Questions:

Which kidney transplant patients is CMV prophylaxis indicated for?

A. High risk kidney transplant recipients (D+/R-), Intermediate risk kidney transplant recipients (D+/R+), and Intermediate risk kidney transplant recipients (D-/R+)

B. Intermediate risk kidney transplant recipients (D+/R+), Intermediate risk kidney transplant recipients (D-/R+), and Low risk kidney transplant recipients (D-/R-)

C. Low risk kidney transplant recipients (D-/R-), Intermediate risk kidney transplant recipients (D+/R+), High risk kidney transplant recipients (D+/R-)

D. High risk kidney transplant recipients (D+/R-), Intermediate risk kidney transplant recipients (D-/R+), and Low risk kidney transplant recipients (D-/R-)

What is the main difference in adverse effects between valganciclovir and letermovir?

A. Valganciclovir is not associated with increased myelosuppression when compared to letermovir and does not inhibit CYP3A4 metabolism

B. Valganciclovir is associated with increased myelosuppression when compared to letermovir and does not inhibit CYP3A4 metabolism

C. Letermovir is associated with increased myelosuppression when compared to valganciclovir and inhibits CYP3A4

D. Letermovir is not associated with increased myelosuppression when compared to valganciclovir and does not inhibit CYP3A4 metabolism

Q1 Answer: A Q2 Answer: B

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Evaluation of Patient Risk Factors for Diagnosis and Treatment of Gonorrhea and Chlamydia in a Community Emergency Department

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The purpose of this study was to evaluate and identify specific risk factors associated with Neisseria gonorrhea and Chlamydia trachomatis (GC) infections in patients presenting to the emergency department (ED). This research sought to address current limitations in the emergency department's ability to accurately identify and empirically treat patients at risk for GC infections. This study aimed to identify risk factors for positive GC assays to aid clinicians in selecting appropriate empiric treatment.

Methods: A retrospective and prospective cohort study was conducted to evaluate the incidence of positive GC assays in a large community emergency department (ED). Patients were included if at least 16 years old and screened for GC between January 1, 2023 and December 31, 2024. Patients were excluded if they were a sexual assault victim, left against medical advice, had multiple GC assays sent during the study period, or had a failed test. Data collection included patient demographics, possible risk factors for a positive GC assay, historical questions, and laboratory data. If treated empirically for GC, the antibiotics received were recorded.

Summary of Preliminary Data/ Conclusions Reached: Data collection is in progress. Results and conclusions will be presented at GLRC.

Learning Objectives:
Identify signs and symptoms associated with chlamydia or gonorrhea
Describe risk factors associated with presence of STIs that may warrant the need for empiric treatment
Self Assessment Questions:
What are common symptoms of Chlamydia in women?
A. Abdominal pain and abnormal vaginal discharge
B. Sore throat and cough
C. Headache and fever
D. Pain with urination
Why is it important to accurately identify and treat STIs like Gonorrhea and Chlamydia in the ED?
A. To increase the number of patients visiting the ED
B. To develop new antibiotics
C. To reduce the spread of infections and optimize antimicrobial stewardship
D. To make more money
Q1 Answer: A Q2 Answer: C
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Dexamethasone Versus Methylprednisolone for the Treatment of COPD Exacerbations Following Institutional Formulary Change

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Purpose: Corticosteroids improve lung function, oxygenation, and reduce hospital stays in patients admitted for chronic obstructive pulmonary disease (COPD) exacerbations. Dosing strategies recommended by the 2024 Global Initiative for Chronic Obstructive Lung Disease guidelines place no preference for a single corticosteroid agent or administration route. This study aimed to evaluate the difference in COPD outcomes after changing from methylprednisolone to dexamethasone as the preferred formulary selection for COPD exacerbations.
Methods: This was a retrospective, observational study of adult patients admitted for a COPD exacerbation and received either IV methylprednisolone or dexamethasone for > 24 hours. Patients with asthma, pneumonia, or COVID diagnosis; systemic steroid use within the previous 30 days; or ICU admission were excluded. The primary outcome was the length of hospitalization. Secondary outcomes included comparison of IV prednisone equivalent (PE) dose and therapy duration, 30-day readmission rates, and frequency of IV to oral corticosteroid transition. When applicable, time to oral transition, oral PE dose, and total corticosteroid treatment duration were evaluated. All data was analyzed via descriptive statistics.
Results: Of the 688 patients screened, 28 patients met inclusion criteria. The median length of stay was 3 days for methylprednisolone group (n=21) and 4 days for dexamethasone group (n=7). The median IV daily dose and treatment duration was 100 mg for 1.92 days for methylprednisolone patients and 26.68 mg for 2.79 days for dexamethasone patients. Conversion to oral corticosteroids occurred in 47.6% of methylprednisolone patients and 42.9% of dexamethasone patients. The median treatment duration was 4 days with methylprednisolone versus 5 days with dexamethasone. There were no 30-day readmissions.
Conclusions: The length of stay and duration of corticosteroid therapy for patients admitted for a COPD exacerbation was similar across groups. Deviation in doses prescribed from guideline recommendations was observed.

Learning Objectives:

Discuss the utility of and adverse effects associated with corticosteroids in the treatment of COPD exacerbations
Describe the 2024 GOLD guidelines' corticosteroid treatment recommendations for COPD exacerbations

Self Assessment Questions:

Which of the following is a benefit of corticosteroid treatment during a COPD exacerbation?
A. Decreased risk of hospitalization
B. Decreased hospital length of stay
C. Decreased risk of ICU admission
D. Decreased risk of 60-day readmission after discharge

Which of the following corticosteroid regimens for the treatment of a COPD exacerbation aligns with the 2024 GOLD guidelines?
A. Methylprednisolone 40 mg intravenous daily for 5 days
B. Methylprednisolone 60 mg intravenous daily for 3 days, then prednisone 40 mg oral daily for 2 days
C. Dexamethasone 12 mg oral daily for 5 days
D. Dexamethasone 6 mg intravenous daily for 2 days, then prednisone 40 mg oral daily for 3 days

Q1 Answer: B Q2 Answer: D
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Fluoroquinolone vs. Aminoglycoside based Oral Antibiotic Bowel Preparation for Elective Colon Surgery

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BACKGROUND:
Mechanical and oral antibiotic bowel preparation (MOABP) is often used to prevent surgical site infections (SSIs) following colon surgery. The optimal antibiotic regimen for MOABP is unknown. The purpose of this study was to describe outcomes in patients receiving neomycin/metronidazole or ciprofloxacin/metronidazole for oral antibiotic bowel preparation prior to elective colon resection.

METHODS:
This was a multicenter, retrospective cohort study of adult patients who underwent elective colon surgery between May 1, 2022 and March 31, 2024 and confirmed taking oral antibiotic preparation the night before surgery. Exclusion criteria were non-elective surgery or receipt of therapeutic antibiotics within 48 hours of surgery. The primary outcome was a composite of superficial, deep incisional, or organ space SSI rate within 30 days of procedure. Secondary outcomes included rates of superficial, deep incisional, and organ space SSIs, 30-day Clostridioides difficile infection, 30-day all-cause mortality, and 30-day all-cause hospital readmission. SSI development between groups was further analyzed using inverse propensity score weight adjusted logistic regression.

RESULTS:
A total of 438 patients were screened for enrollment and 277 were included. 250 patients received neomycin/metronidazole and 27 patients received ciprofloxacin/metronidazole. Rates of SSI were 6% (15/250) in the neomycin/metronidazole group and 3.7% (1/27) in the ciprofloxacin/metronidazole group (p = 0.603). There was no association between ciprofloxacin/metronidazole and the odds of SSI development after inverse propensity score weighting (IPSWOR = 0.58, 95% CI: 0.08 â€“ 4.43). Rates of 30-day all-cause mortality were 1.2% and 0% (p > 0.999) and 30-day readmission rates were 13.2% and 3.7% (p = 0.221) in the neomycin/metronidazole group and ciprofloxacin/metronidazole group, respectively.

CONCLUSIONS:
SSI, readmission, and mortality rates were similar between patients receiving neomycin/metronidazole or ciprofloxacin/metronidazole. The use of either regimen appears to be appropriate for oral antibiotic bowel preparation. Future studies are needed to further investigate differences between these regimens.

Learning Objectives:

Identify best practices for use of antimicrobial agents in surgical site infection prevention for colon procedures according to the 2022 SHEA/IDSA/APIC Guidelines for Antimicrobial Prophylaxis in Surgery.

Review differences between available agents for oral antibiotic bowel preparation.

Self Assessment Questions:

Which of the following infection prevention strategies are recommended by the 2022 SHEA/IDSA/APIC Guidelines for Antimicrobial Prophylaxis in Surgery?

A. IV antibiotics within 60 minutes of incision

B. Mechanical bowel preparation

C. Oral antibiotic bowel preparation

D. All of the above

Which of the following may be a benefit of aminoglycosides when compared to fluoroquinolones for oral antibiotic bowel preparation?

A. Increased spectrum of activity

B. Less frequent dosing

C. Preservation of antimicrobials commonly used for other indications

D. Increased efficacy

Q1 Answer: D Q2 Answer: C

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Comparison of the ARC Score Versus the ARCTIC Score to Confirm Augmented Renal Clearance

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Purpose:

Augmented renal clearance (ARC) is a phenomenon of increased renal function resulting in an increased clearance of renally eliminated medications. Usual medication doses utilized in patients with normal renal function can result in subtherapeutic levels and decreased efficacy in those with confirmed ARC. Scoring tools including the ARC Predictor and Augmented Renal Clearance in Trauma Intensive Care (ARCTIC) scores have been developed to identify patients at risk for exhibiting augmented renal clearance. The objective of this study is to compare the sensitivity and specificity of the ARC Predictor scoring tool and the ARCTIC scoring tool to screen patients for ARC.

Methods:

This single-center, retrospective cohort study included patients 18-89 years old with an 8-hour urine collection from June 1, 2017 to January 1, 2024. Patients were excluded if they were pregnant, incarcerated, had a baseline serum creatinine >1.3 mg/dL, rhabdomyolysis, ileal conduit, missed urine collection, incontinence, anuria, or diuretic use within 12 hours of 8-hour urine collection. Patients were also excluded if they required renal replacement therapy (intermittent hemodialysis, prolonged intermittent renal replacement therapy or continuous renal replacement therapy). The primary outcome of this study was to compare the sensitivity and specificity of the ARC scoring tool and the ARCTIC scoring tool. Secondary outcomes were to calculate the positive and negative predictive values of the scoring tools, the incidence of ARC in the study population and in the intensive care unit (ICU) and non-ICU subsets of the population.

Results, Conclusions: Data analysis is ongoing, and results will be presented and publication will be pursued

Learning Objectives:

Describe the effects augmented renal clearance may have on medication clearance

Identify the differences between the proposed ARCTIC and ARC Predictor scoring tools

Self Assessment Questions:

Generally, how should the dose of a renally eliminated medication be adjusted for a patient with confirmed augmented renal clearance? Medication doses should be:

A. Held until ARC resolves

B. Unchanged

C. Increased

D. Reduced by 20%

Which of the following describes the difference in risk factors utilized by the ARCTIC and ARC Predictor scoring tools?

A. The ARC Predictor scoring tool takes age into account, while the ARCTIC scoring tool does not.

B. The ARCTIC scoring tool considers male sex to be a risk factor while the ARC scoring tool does not.

C. The ARC Predictor scoring tool assigns points for ages >50 years old

D. The ARCTIC scoring tool assigns points for patients with a trauma admission

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-589-L01-P

Effect of Pharmacist-Led Education on Optimized Antibiotic Use in Uncomplicated Gram-Negative Bloodstream Infections

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Purpose: There is a recent consensus guidance that gives recommendations for treatment of uncomplicated gram-negative bloodstream infection (GN-BSI), suggesting that only 7 days of antibiotic therapy is sufficient, repeat blood cultures to confirm clearance of the infection is not necessary, and conversion to certain oral medications with adequate pharmacokineticâ€“pharmacodynamic target attainment can be used. This quality improvement project aims to increase the percentage of cases that meet expert guidance for definitive antibiotic treatment of GN-BSIs at Lutheran Health Network by providing pharmacist-led education to providers.
Methods: The pharmacist-led education is a reinforcement of the current consensus guidance for management of GN-BSIs with an emphasis on optimal antibiotic choice and duration. Provider-specific feedback was also given as opportunities were identified in initial data collection. To compare the rates of optimal definitive antibiotic choice, dose, route, and days of therapy, chart reviews on patients with positive blood cultures for gram-negative organisms were performed on the pre-intervention and post-intervention groups. Patient charts were retrospectively reviewed to collect necessary clinical information and antibiotic details. Patients were included if they met the definition of uncomplicated bloodstream infection in the consensus guidance and received antibiotic treatment at one of the Lutheran Health Network hospitals. Uncomplicated bloodstream infections are defined as bloodstream infections confirmed to be secondary to either a urinary tract infection, intra-abdominal infection, catheter-related infection, pneumonia, or a skin and soft tissue infection, source control achieved, immunocompetent, and defervescence achieved and hemodynamic stability within 72 hours. The primary objectives are to compare the rates of uncomplicated GN-BSI cases that meet the expert panel's guidance for optimal antibiotic selection, dose, and total days of antibiotic therapy pre- and post-educational intervention.
Results/Conclusions: This study is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe appropriate treatment of uncomplicated gram-negative bacteremia as recommended by the consensus guidance.
Identify areas of opportunity to improve the treatment of uncomplicated gram-negative bacteremia.

Self Assessment Questions:

Which of the following statements about the consensus guidance is true?
A. Patients with uncomplicated GN-BSIs can not be adequately treated with a 7-day course of effective therapy
B. Repeat blood cultures to document clearance are usually necessary in uncomplicated GN-BSIs
C. The oral antibiotics with adequate PK-PD target attainment that can be used for IV-to-PO transitions for treatment of uncomplicated GN-BSIs include fluoroquinolones and trimethoprim-sulfamethoxazole
D. IV antibiotics can not be used for the full course of therapy
What was the most common reason for unappropriated therapy compared to consensus guidance?
A. Total antibiotic duration
B. Oral antibiotic dose
C. Oral antibiotic choice
D. IV antibiotic choice
Q1 Answer: C Q2 Answer: A
APCE Universal Activity Number 0121-9999-25-610-L01-P

Effectiveness of Ceftriaxone MIC Suppression on Reducing Ceftriaxone Use for AmpC Beta-lactamase (AmpC) Producing Bacterial Infection

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Purpose: AmpC is a chromosomally encoded enzyme produced by certain bacteria (e.g. Enterobacter cloacae, Klebsiella aerogenes, and Citrobacter freundii), capable of degrading antibiotics like ceftriaxone, causing resistance. Although ceftriaxone initially appears effective, it induces AmpC production, worsening resistance. Consequently, the Infectious Diseases Society of America (IDSA) recommends avoiding the use of ceftriaxone in specific serious infections. In line with this, the DMC Antimicrobial Stewardship Committee aimed to reduce ceftriaxone prescribing through suppression of ceftriaxone Minimum Inhibitory Concentration (MIC) values in microbiology reports. The goal of this study is to evaluate the impact of a microbiology laboratory MIC suppression initiative on ceftriaxone prescribing patterns, specifically targeting the use of ceftriaxone for infections caused by AmpC-producing organisms such as Enterobacter cloacae, Klebsiella aerogenes, and Citrobacter freundii.

Methods: This retrospective, multi-center chart review included patients aged 18 years or older who presented to Sinai-Grace Hospital, Detroit Receiving Hospital, Harper Hutzel Hospital, or Huron Valley-Sinai Hospital between January 1, 2022 and December 31, 2024. All included patients had available microbiology results growing either Enterobacter cloacae complex, Klebsiella aerogenes, or Citrobacter freundii, and presented with serious infections such as bacteremia, pneumonia, complicated urinary tract infection (UTI), or pyelonephritis. Exclusion criteria included patients under 18 years of age, those without evidence of clinical infection, uncomplicated UTIs, and cases where antibiotics were discontinued within 48 hours. Patients were grouped based on infection characteristics, microbiological findings, choice of empiric and definitive therapies, and the appropriateness of definitive treatment. The primary outcome was the difference in the rates of prescribing ceftriaxone for serious infections caused by AmpC-producing bacteria pre and post lab suppression of ceftriaxone MIC values.

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

Learning Objectives:

Recognize the impact of suppressing ceftriaxone Minimum Inhibitory Concentration (MIC) values in laboratory reports on prescribing practices for AmpC-producing organisms in serious infections.

Identify the clinical scenarios where ceftriaxone may be appropriate for use in infections caused by high-risk AmpC-producing organisms.

Self Assessment Questions:

How might suppressing ceftriaxone MIC values in laboratory reports theoretically influence clinical decision-making for AmpC-producing infections?

A. It encourages the use of ceftriaxone as the first-line therapy for all infections caused by AmpC-producing organisms.

B. It increases the MIC threshold for ceftriaxone, making it more likely to be effective against AmpC-producing organisms.

C. It has no impact on clinical decision-making, as clinicians rely solely on patient symptoms to determine antibiotic choice.

D. It reduces the likelihood of inappropriate ceftriaxone use, promoting the selection of alternative antibiotics.

In which of the following clinical cases is it acceptable to use ceftriaxone?

A. 60 year old female presenting with bacteremia. Blood culture growing Citrobacter freundii.

B. 42 year old male presenting with uncomplicated cystitis. Urine culture growing Klebsiella aerogenes.

C. 35 year old female presenting with community acquired pneumonia. Sputum culture growing Enterobacter cloacae.

D. 40 year old male presenting with complicated cystitis. Urine culture growing Citrobacter freundii.

Q1 Answer: D Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-818-L01-P

Impact of Intravenous Lorazepam Shortage on patients receiving CIWA in the GPU

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Alcohol is the most used substance in the United States, with 75% of individuals aged 12 and older reporting lifetime consumption. According to the National Survey on Drug Use and Health (NSDUH), 28.1 million adults reported having an alcohol use disorder in 2023. Lorazepam is a benzodiazepine frequently used for inpatient management of alcohol withdrawal with dosing based upon initial Clinical Institute Withdrawal Assessment scale for Alcohol- Revise (CIWA-Ar) scores. Intravenous (IV) lorazepam shortages are frequent, most recently from November 2023 to April 2024 restricting use to oral lorazepam and other alternatives. Two alternative agents for treatment of alcohol withdrawal, phenobarbital and chlordiazepoxide, have been studied. research regarding the clinical outcomes in the setting of IV lorazepam in drug shortages. The purpose of this study is to evaluate clinical outcomes, safety, and costs associated with IV lorazepam use during a critical drug shortage for patients in the general practice units (GPU) receiving treatment for alcohol withdrawal at Henry Ford Health System (HFHS). This quasi-experimental study will compare the outcomes of CIWA management during the most recent drug shortage at HFHS during November 2023 to April 2024 to the non-shortage period in November 2023 to April 2023. Primary outcome is time to CIWA score reduction of less than 8 within a 24-hour period. Secondary outcomes include total benzodiazepine doses required, hospital length of stay, total time on CIWA protocol, medication cost, adverse effects, use of other intravenous or oral medication for alcohol withdrawal syndrome, use of intravenous lorazepam outside of protocol, rapid response encounter for management of alcohol withdrawal, and ICU transfer for management of alcohol withdrawal symptoms. Data will be analyzed to measure central tendency using mean, median, and mode where applicable and variability in the data using range, IQR, and standard deviation, where appropriate.

Learning Objectives:

Describe appropriate alternatives for management of alcohol withdrawal in the setting of IV lorazepam shortages

Identify the role of CIWA-Ar scores in assessing alcohol withdrawal management

Self Assessment Questions:

Which of the following is first line therapy in the setting of acute alcohol withdrawal?

A. Beta-blockers (e.g., propranolol)

B. Antipsychotics (e.g., haloperidol)

C. Benzodiazepines (e.g., lorazepam, diazepam)

D. Anticonvulsants (e.g., levetiracetam)

In alcohol withdrawal management, what is the target CIWA-Ar score within 24 hours?

A. 0â€“3

B. Below 8

C. 8â€“10

D. Above 12

Q1 Answer: C Q2 Answer: B

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Impact of perioperative intravenous methadone administration for total hip or knee arthroplasty on total opioid utilization during inpatient admission

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Post-operative pain control following orthopedic procedures is a focus of many pharmacists and providers. Given the opioid epidemic, there has been a major focus on multimodal approaches to pain management in the perioperative period. Due to its unique pharmacokinetic profile, intravenous (IV) methadone has been postulated as an alternative method to acute pain. The purpose of this study is to determine if IV methadone administration in the perioperative period reduces the total amount of opioids received postoperatively following total hip arthroplasty (THA) or total knee arthroplasty (TKA).

This is a retrospective observational cohort study of individuals undergoing TKA or THA admitted to UofL Health - Jewish Hospital from January 2023 to June 2023 (did not receive methadone) and January 2024 to June 2024 (did receive methadone). IV methadone was administered in the perioperative period for all patients in the group that received methadone. Patients are included if they are â‰¥ 18 years of age, underwent TKA or THA, and received IV methadone as part of their pre-operative anesthesia. Patients are excluded if they have an active outpatient prescription for methadone, received methadone for opioid use disorder or buprenorphine/naloxone prior to admission, had a documented methadone allergy, discharged â‰¤ 24 hours following procedure, incarcerated or pregnant. The primary outcome compares total morphine milligram equivalents (MME) received in the first 24 hours for each group. Secondary endpoints include length of stay and receipt of reversal agent during duration of inpatient stay.

The following results are preliminary. Total MME administered for those who did and did not receive methadone were 49.8Â±28.03 and 68.9Â±28.8, respectively. The length of stay for those who did not receive methadone was 3.76Â±3.34 days and for those who did receive methadone was 2.6Â±1.89 days. No patients in either group required rapid response activation or naloxone for emergent opioid reversal.

Learning Objectives:

Describe the pharmacokinetic properties that make methadone a potential advantageous option for acute pain management following orthopedic procedures.

Review current guideline recommendations for acute pain management following total hip and total knee arthroplasty.

Self Assessment Questions:

Which of the following is a potential advantage of methadone for pain management?

A. QTc prolongation

B. Prolonged analgesia

C. Hyperactivity

D. Cardiac arrhythmias

Which of the following is a recognized consequence of adequately controlled post-operative pain?

A. Increased risk of developing chronic pain

B. Physiological alterations leading to decreased wound healing

C. Improved mobility and faster recovery post-surgery

D. Psychological manifestations, including anxiety and depression

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-793-L08-P

Evaluation of Oral Antibiotics in Patients that had Gram-Negative Bacteremia

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Purpose:
Bacteremia frequently originates from other infections, such as urinary or intra-abdominal infections, enabling bacteria to enter the bloodstream. Recent clinical trials have demonstrated that shorter durations of antibiotic are as effective as longer durations for the treatment of uncomplicated gram-negative bacteremia; potentially reducing antibiotic use, healthcare costs, and side effects. Additionally, emerging evidence supports transitioning patients from intravenous (IV) to oral antibiotics when appropriate. While organizations such as the Infectious Disease Society of America (IDSA) provide some guidance, comprehensive management guidelines for gram-negative bacteremia are lacking. Recent guidance from Emily Heil et al. (2021) provided appropriate oral antibiotic dosing and treatment duration recommendations. However, it is unknown whether these recommendations are being implemented correctly. The purpose of this study is to determine whether patients are being dosed appropriately with oral antibiotics following IV treatment for gram-negative bacteremia. The primary outcome is a composite of 90-day readmission and all-cause mortality between the two treatment groups. The secondary outcomes will be evaluating safety risks with incidence of C. difficile infection, acute kidney injury, differences in 30-day readmission, and all-cause mortality between the two groups.

Methods:
A retrospective chart review will be conducted with data collected from the EPIC health records of patients at Bronson Healthcare Group. Patients will be considered for inclusion if they had gram-negative bacteremia, received IV and oral antibiotic treatment, and were greater than or equal to 18 years old. Patients were excluded if they were treated for greater than 14 days, or if they received IV antibiotics following the initiation of oral antibiotics. The two treatment groups will be stratified based on recommended dosing strategies according to published and local guideline recommendations.

Results and Conclusions:
Data collection and analysis are currently being performed. Results and conclusions will be presented at the 2025 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review recent oral dosing recommendations for patients that have gram-negative bacteremia

Define the criteria that makes an antibiotic an appropriate choice for gram-negative bacteremia

Self Assessment Questions:

Which of the following patients are considered to be appropriately treated for their bacteremia?

A. A patient is prescribed Augmentin 875 mg 3 times a day for 10 days following 5 days of treatment with intravenous antibiotics

B. A patient that has completed a 10-day course of antibiotics with 750 mg of oral levofloxacin every 48 hours

C. A patient is discharged on cefdinir 300 mg twice a day for 5 days following a 4-day admission

D. A patient that has completed a 3-day course of cephalexin 1000 mg four times a day following 4 days of intravenous antibiotic treatment

Which characteristics should be considered when selecting an antibiotic for oral gram-negative bacteremia treatment; select all that apply: (1.) Bioavailability (2.) Side Effect Profile (3.) Pharmacokinetic Attainment (4.) Prior Intravenous Antibiotic Treatment

A. 1, 2, and 4

B. 1, 2, and 3

C. 1 and 2

D. 1, 3, and 4

Q1 Answer: D Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-738-L01-P

Evaluating Drug-Drug-Gene Interactions for Azole Antifungals and Tacrolimus

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Background: Tacrolimus is a key immunosuppressive agent used in transplant recipients to prevent rejection and graft-versus-host-disease. Tacrolimus undergoes extensive metabolism via CYP3A4 and CYP3A5. When tacrolimus is co-administered with a strong CYP3A inhibitor, such as posaconazole/voriconazole, the manufacturer recommends a dose reduction of 33%. Independently, the Clinical Pharmacogenetics Implementation Consortium, recommends an empiric tacrolimus dose increase for CYP3A5 expressers of 1.5-2 times the standard dose. Currently, it is not known how to personalize tacrolimus dosing when considering both the drug-drug and the drug-gene interactions together. Previous small studies observed that the effect of CYP3A inhibitors on tacrolimus exposure was diminished in CYP3A5 expressers compared to non-expressers. The objective of this study is to determine if the magnitude of the interaction between posaconazole/voriconazole and tacrolimus differs by CYP3A5 expression.
Methods: This single-center, retrospective, chart-review study will include patients â‰¥ 18 years who had concomitant use of tacrolimus and posaconazole/voriconazole with CYP3A5 genotype data from the Michigan Genomics Initiative. The median steady-state tacrolimus dose-controlled trough concentration(C/D) will be calculated with and without an azole. The dose-controlled troughs will be collected for a 4-week period from steady state, or the duration of the azole, whichever is longer. The tacrolimus [C/D with an azole]/[C/D without an azole] ratio will be determined for each patient and compared between CYP3A5 expressers and non-expressers. Secondary endpoints include the difference in tacrolimus C/D ratio among intermediate and normal CYP3A5 metabolizers, and the difference in tacrolimus C/D ratio among CYP3A5 phenotypes for voriconazole and posaconazole, respectively. The results of this study will contribute to the current limited literature and help develop empiric dosing recommendations for tacrolimus and azole drug-drug-gene interactions.
Anticipated Results: CYP3A5 expressers will require a smaller empiric tacrolimus dose reduction than the manufacturersâ€™ current recommendation, which doesnâ€™t account for CYP3A5 phenotypes.
Anticipated Conclusions: Data analysis is ongoing.

Learning Objectives:

Explain the primary metabolic pathway of tacrolimus

Describe the differential effects of posaconazole/voriconazole on tacrolimus exposure by CYP3A5 genotype

Self Assessment Questions:

What is the primary metabolic pathway of tacrolimus?

A. CYP2C9

B. CYP2C19

C. CYP2D6

D. CYP3A

Which CYP3A5 phenotype is most likely to have the highest tacrolimus exposure with concurrent use of a strong CYP3A4 inhibitor?

A. CYP3A5 expresser

B. CYP3A5 non-expresser

C.

D.

Q1 Answer: D Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-659-L01-P

Incidence and Screening of Sexually Transmitted Infections (STIs) among Persons with HIV (PWH) in the Illinois Department of Corrections (IDOC)

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Individuals in custody face disproportionately high rates of sexually transmitted infections (STIs), and people with HIV (PWH) are particularly vulnerable to infection and transmission. This study evaluated STI screening and positivity rates among PWH in custody in the Illinois Department of Corrections (IDOC) to identify gaps in current practices and inform improvements in screening and treatment. A multidisciplinary HIV care team provided interventions to enhance outcomes.
We conducted a retrospective cohort study of adult PWH in IDOC between January 1, 2021, and June 30, 2024. The study assessed whether patients were screened for gonorrhea, chlamydia, and syphilis at intake, between intake and their first University of Illinois- IDOC HIV telemedicine appointment, and between their first and second appointments. Positive cases were reviewed to determine if guideline-based treatment was administered within three months.
Additional data collection included demographics, reincarceration status, documented STI symptoms, HIV viral load at STI positivity, and risk factors such as housing status, substance use, prior STIs, and mental health history. Descriptive and quantitative analyses, including student t-tests, evaluated associations between STI screening, treatment, and risk factors, with statistical significance set at p â‰¤ 0.05. Analyses were conducted using SPSSÂ® Version 24.
Data collection is ongoing at this time. Preliminary findings have indicated that the majority of patients were Black, non-Hispanic cisgender males with high rates of screening for syphilis and fewer rates of screening for gonorrhea and chlamydia. Of those screened, the majority were screened following an index appointment with the multidisciplinary HIV care team.
The findings of this study aim to have a significant impact on public health through addressing gaps in current STI practices in a disproportionately affected patient population. The study design and results of this study can be modeled and interpreted, respectively, for other state and federal prison systems.

Learning Objectives:

Explain the disproportionate rates of STI transmission and incidence among individuals living with HIV in custody, emphasizing the role of intersectionality in this population

Identify gaps in current STI practices in carceral settings and the related impact of a multidisciplinary care team in closing such gaps

Self Assessment Questions:

What are risk factors for increased STI incidence in carceral settings?

A. Overcrowding, congregate living, and high turnover rates

B. Limited medical screenings and vaccinations

C. Low rates of substance use and mental health issues

D. Limited access to healthcare and recreational activities

Why are individuals in custody considered a key population for STI intervention in public health?

A. Time in custody provides individuals with free access to legal representation.

B. Time in custody allows healthcare teams to educate individuals about diet and exercise.

C. Time in custody offers a critical access point for STI screening, treatment, and education, improving patient outcomes upon release.

D. Time in custody reduces substance abuse and mental health issues among incarcerated individuals.

Q1 Answer: A Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-743-L02-P

Early Graft Dysfunction, CYP3A5 Genotype, and Tacrolimus Exposure Post-Kidney Transplant

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Purpose: Achieving therapeutic trough concentrations of tacrolimus is challenging due to interpatient pharmacokinetic variability caused by differences in the CYP3A5 genotype.â€¯Under uniform dosing protocols, CYP3A5 expressers have lower tacrolimus exposure than CYP3A5 non-expressers. Reno-hepatic crosstalk in the setting of kidney dysfunction may also alter tacrolimus pharmacokinetics. The primary objective of this study is to evaluate the interplay of early graft dysfunction, CYP3A5 expression, and tacrolimus exposure in kidney transplant recipients.

Study design: Single-center, retrospective cohort study.

Methods: Patients â‰¥18 years old who received a kidney transplant at the University of Michigan Health between July 1, 2014 and October 9, 2024, initiated immediate-release oral tacrolimus as part of their immunosuppression, had clinical tacrolimus troughs collected on post-op day (POD) 2, and have a clinical or research CYP3A5 genotype result were included in this study. Patients who received a previous liver transplant, underwent combined or multiple organ transplants, had tacrolimus exposure prior to transplant, orâ€¯took medications known to have strong drug-drug interactions with tacrolimus were excluded. Data collected will include CYP3A5 genotype, tacrolimus dosing and blood levels, andâ€¯early allograft function. Patients carrying at least one allele of CYP3A5*1 will be categorized as CYP3A5 expressers.â€¯ Patients will be divided into immediate graft function (IGF) and non-IGF groups. The primary outcome will be tacrolimus dose-normalized trough concentration (C0/D) on POD 2. Independent t-tests and multivariable regression models will be utilized to compare the primary outcome between IGF and non-IGF groups, stratified by CYP3A5 expression. This project is approved by the University of Michigan IRB.

Anticipated result: We anticipate that both early graft dysfunction and CYP3A5 expression will impact tacrolimus C0/D; patients who experience early graft dysfunction and are CYP3A5 non-expressers will have the highest tacrolimus C0/D.

Results/Conclusion: Data analysis in progress. Results and conclusions will be presented at GLPRC.

Learning Objectives:

Discuss the relationship between CYP3A5 expression and tacrolimus exposure.

Review the results of tacrolimus exposure and how it relates to graft dysfunction and CYP3A5 genotype.

Self Assessment Questions:

Which of the following describes the relationship between CYP3A5 genotype and tacrolimus exposure?

A. CYP3A5 expressers have higher tacrolimus concentrations under standardized dosing protocols

B. CYP3A5 expressers have lower tacrolimus concentrations under standardized dosing protocols.

C. CYP3A5 expression does not affect tacrolimus concentrations, regardless of dosing protocol.

D. The relationship between CYP3A5 expression and tacrolimus exposure has not been studied.

What is the term used to describe the possible effect between acute kidney dysfunction and hepatic metabolism

A. Renohepatic crosstalk

B. Renal-liver dysfunction

C. Kidney-induced liver injury

D. Hepatorenal syndrome

Q1 Answer: B Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-712-L01-P

Clinical outcomes associated with EBV-based VTE prophylaxis in trauma patients

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Deep vein thrombosis (DVT) and pulmonary embolism (PE) are preventable complications following trauma. Enoxaparin has become the standard of care for venous thromboembolism (VTE) prophylaxis in trauma patients. Several dosing strategies have been proposed, but an optimal approach remains uncertain. Studies indicate that body mass index (BMI)-based regimens increase the proportion of target anti-Xa level attainment for prophylaxis. However, BMI may not be the best parameter for guiding dosing, as heparins largely remain within the intravascular space. The volume of distribution of enoxaparin closely corresponds to whole blood volume. Therefore, estimated blood volume (EBV) may be a more logical parameter for determining prophylactic enoxaparin dosing, promoting attainment of goal anti-Xa levels while minimizing adverse events. A previous study compared an EBV-based regimen to a BMI-based regimen and concluded that trauma patients receiving an EBV-based regimen had significantly higher rates of target anti-Xa level attainment compared to those on a BMI-based regimen.

This pre-post cohort study aims to assess clinical outcomes following implementation of an EBV-based VTE prophylaxis guideline in trauma patients at academic level I trauma center. The pre- and post-intervention groups span over 3.5 years (Jan 2017-Jul 2020 and Jan 2021-Jul 2024, respectively). It is projected that 2870 patients will be needed for data analysis. Per institutional guidelines, patients with an EBV of 3-4.9L receive enoxaparin 30mg twice daily, an EBV of 5-6.9L receive enoxaparin 40mg twice daily, and an EBV of 7L or greater receive enoxaparin 60mg twice daily. The primary outcome is to compare VTE events between the pre- and post-intervention groups. Secondary outcomes include comparison of DVT, PE, clinically relevant bleeding, 30- and 90-day readmission rates between the two groups. This data will be used for validation for the continued use of EBV-based enoxaparin dosing to guide clinical decision making for VTE prophylaxis in trauma patients.

Learning Objectives:

Describe the current guideline recommendations for prophylactic enoxaparin dosing in trauma patients

Discuss the rationale and methodology for using an EBV-based dosing strategy for enoxaparin VTE prophylaxis in trauma patients

Self Assessment Questions:

Which of the following patient populations do the 2020 Western Trauma Association Guidelines recommend starting enoxaparin 30 mg twice daily for initial prophylactic dose?

A. CrCl >90mL/min

B. Long bone fractures

C. Age 18-65 years old

D. Spinal cord injury

What is the primary rationale for using EBV-based dosing of enoxaparin instead of BMI-based dosing in trauma patients?

A. BMI is not a reliable predictor of bleeding risk

B. The volume of distribution of enoxaparin closely corresponds to whole blood volume

C. EBV-based dosing reduces hospital costs

D. BMI does not account for variations in patient height

Q1 Answer: D Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-707-L01-P

Validity and Clinical Utility of Nasal MRSA PCR for Pediatric Necrotizing Pneumonia

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Statement of purpose: The utility of a nasal MRSA PCR swab can stratify the risk that the patientâ€™s pneumonia is caused by MRSA and helps guide antimicrobial therapy regimens in pediatric and adult patients. Several studies show a high negative predictive value for pneumonia in pediatric patients, but there is limited data that suggests a high negative predictive value for necrotizing pneumonia, especially in the setting of empyema, in this population.â€¯Therefore, there is a need for continued evaluation of the validity and clinical utility of MRSA PCR in pediatric patients with NP.â€¯â€¯
Statement of methods used: This is a retrospective study comparing pediatric patients who have a diagnosis of necrotizing pneumonia that received anti-MRSA coverage at discharge to pediatric patients who did not receive anti-MRSA coverage at discharge. A list of pediatric patients diagnosed with necrotizing pneumonia was generated from Cerner from July 2015 to July 2024. We anticipate 28 patients will need to be included for the primary analysis to be adequately powered, assuming a desired alpha and power of 0.05 and 80% respectively. Additionally, in order to best describe the diagnostic accuracy of the MRSA PCR for this indication, all patients from the Cerner-generated report meeting inclusion criteria for the primary and secondary analysis were included. Chi Square Analysis or Fisher Exact Test were utilized for categorical variables, as appropriate. Continuous variables were analyzed via Studentâ€™s T Test or Mann-Whitney U Test, as appropriate.

Learning Objectives:

Discuss the sensitivity, specificity, positive predictive value, and negative predictive value of nasal MRSA PCR swabs related to the findings of this study.

Describe the epidemiology, prevalence, and pathophysiology of necrotizing pneumonia in pediatric patients.

Self Assessment Questions:

Which of the following is the correct equation for negative predictive value?

A. True Negative / (False Positive + False negative)

B. True Negative / (True Negative + False Negative)

C. False Negative / (True Negative + False Negative)

D. True Negative / (True Negative â€“ False Negative)

Of the following, which are the most common causative pathogens in pediatric patients with necrotizing pneumonia?

A. Streptococcus pneumoniae, Staphylococcus aureus, and Mycoplasma pneumoniae

B. Escherichia coli, listeria monocytogenes, Streptococcus pneumoniae

C. Staphylococcus aureus, Streptococcus pneumoniae, Escherichia coliÂ

D. Mycoplasma pneumonia. Listeria monocytogenes, Streptococcus pneumoniae

Q1 Answer: B Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-831-L01-P

Optimal Aminoglycoside Dosing in Critically Ill Patients Receiving CKRT: A Single Health System, Retrospective, Cohort Study

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Statement of Purpose
Aminoglycosides (AG) exhibit primarily concentration-dependent, bactericidal activity and are commonly used for empiric coverage of multidrug resistant Gram-negative infections in critically ill patients. Early and effective antimicrobial therapy is crucial in critical illness. Effective dosing of AG optimally achieves a target ratio of maximum concentration in plasma (Cmax) to minimum inhibitory concentration of â‰¥8-10. Several AG properties make them susceptible to altered pharmacokinetics (PK) in critically ill patients receiving continuous kidney replacement therapy (CKRT). There are limited data describing AG PK in this population and optimal dosing is unclear.
Statement of Methods Used
This single health system, retrospective cohort study will evaluate Cmax target attainment between high- and low-dose intravenous (IV) tobramycin and gentamicin in critically ill patients receiving CKRT. High and low-dose therapy will be defined as â‰¥5 mg/kg and <5 mg/kg based on ideal body weight, respectively. Inclusion criteria are admission to any intensive care unit while receiving concurrent continuous venovenous hemofiltration (CVVH) or continuous venovenous hemodialysis (CVVHD) and IV tobramycin or gentamicin with â‰¥2 detectable (>0.6 mg/L) serum concentrations obtained. Doses will be included if the first serum concentration is collected between 1 and 9 hours after administration and the second concentration â‰¥2 hours after the first concentration. Doses will be excluded if there is â‰¥6 hours of CKRT interruption between doses or if the indication for AG therapy is Gram-positive synergy. The primary outcome is attainment of target Cmax. Secondary aims are to describe AG elimination half-life, volume of distribution, and clearance for patients receiving CKRT. Subgroup analyses will be performed between patients receiving CVVH and CVVHD.
Summary of preliminary results
Data analysis is ongoing. Results will be presented at the 2025 Great Lakes Pharmacy Resident Conference.

The results of this study can guide AG dosing recommendations for patients receiving CKRT.

Learning Objectives:

Explain current aminoglycoside dosing recommendations for critically ill patients receiving continuous kidney replacement therapy

Describe pharmacodynamic and pharmacokinetic properties of aminoglycosides

Self Assessment Questions:

Which property of aminoglycosides make them susceptible to effective removal through CKRT?

A. Low molecular weight

B. High protein bound percentage

C. High molecular weight

D. Extensive volume of distribution

What is the pharmacokinetic target for tobramycin and gentamicin when the MIC is known?

A. AUC 400-600 mg*h/L

B. Cmax to MIC ratio of 8-10

C. Cmax 40-80 mg/L

D. Trough concentration 10-15 mg/L

Q1 Answer: A Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-673-L01-P

Evaluation of Insulin After Initiation of Once-Weekly GLP-1 or GLP-1/GIP Receptor Agonists in Type-2 Diabetes Mellitus

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Purpose: Glucagon-like peptide-1 (GLP-1) or GLP-1/glucose-dependent insulinotropic polypeptide (GIP) receptor agonists (RA)s are recommended to be initiated before insulin in type-2 diabetes mellitus (T2DM) due to distinguished glycemic control. However, the use of GLP-1 or GLP-1/GIP RAs is often cost prohibitive, preventing widespread use before insulin. Despite this, semaglutide has been shown to reduce daily insulin requirements after initiation. This study will evaluate the variations in insulin requirements when adding on a once weekly GLP-1 or GLP-1/GIP RA to pre-existing insulin regimens. Methods: This is a multicenter, retrospective, cohort study analyzing adult patients with T2DM who were utilizing insulin for blood sugar control at time of GLP-1 or GLP-1/GIP RA initiation (baseline. Patients were included if they were seen at Indiana University Health (IUH) Southern Indiana Physicians (SIP) clinics by an ambulatory care pharmacist at least once from between 1, 2022 and June 30, 2024, and used dulaglutide, semaglutide, and/or tirzepatide for 12 months. The primary outcome is change in insulin total daily dose (TDD) from baseline to 12 months. The secondary outcome will include change in insulin TDD from baseline to 6 months. Exploratory endpoints analyzed at 6 and 12 months will include A1c change, GLP-1 or GLP-1/GIP RA dose, weight change, and insulin discontinuation rates at 12 months, specifically. Differences between GLP-1 or GLP-1/GIP RAs will be compared with a Chi Square or Fischer Exact test for nominal data, analysis of variance test for parametrically distributed continuous data, and Kruskal-Wallis H test for non-parametrically distributed continuous data. For all endpoints probability values less than 0.05 will be considered significant and 95% confidence intervals will be utilized. Summary of (preliminary) results to support conclusion: Data collection is ongoing with completed results and analysis to be presented at the 2025 Great Lakes Pharmacy Residency Conference. Conclusions Reached: in progress.

Learning Objectives:

Indicate when insulin should be utilized prior to GLP-1 or GLP-1/GIP RA based on the 2025 American Diabetes Association guidelines.

Identify GLP-1 or GLP-1/GIP RAs that may lower insulin dose requirements in patients with T2DM.

Self Assessment Questions:

When should insulin be considered over a GLP-1 or GLP-1/GIP RA in patients refractory to oral antihyperglycemics?

A. A1c 9.8%

B. Average home blood glucose readings of 285 mg/dL

C. Persistent polydipsia

D. BMI of 24.2 kg/m2 in an Asian American

Which of the following GLP-1 or GLP-1/GIP RAs should be used for insulin-treated T2DM patients who are controlled or uncontrolled to decrease insulin dosage requirements?

A. Dulaglutide

B. Semaglutide

C. Tirzepatide

D. All of the above

Q1 Answer: C Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-597-L01-P

Impact of Pharmacogenomics Testing on Medications for Veterans with Depression

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Purpose: The use of pharmacogenomics has become more prevalent in recent years within the Veterans Affairs (VA) health system since the implementation of the Pharmacogenomics Testing for Veterans (PHASER) program. The Food and Drug Administration (FDA) and The Clinical Pharmacogenetics Implementation Consortium (CPIC) have evaluated relevant literature and provided guidelines on medications that are impacted by genetic variabilities. In patients with depression, achieving adequate response and remission, as well as drug tolerability presents a challenge. The purpose of this study is to evaluate patients with depression to determine if a change was made in antidepressant therapy based on results from PHASER testing. Methods: This is a retrospective study at a single Veterans Affairs health care site. Patients included in the study had a diagnosis of depression, had trialed at least one antidepressant, and had pharmacogenomic testing from July 1st, 2023, to September 1st, 2024. A retrospective chart review was performed using the electronic health record to be collected in VA RedCap. This study excluded patients with a diagnosis of schizophrenia or psychotic disorders, bipolar disorder, substance use disorder, and pregnancy. The primary outcome of this study is to assess whether a change was made in antidepressant therapy based on pharmacogenomic testing results. Secondary outcomes include change from baseline in PHQ-9 score and change in antidepressant treatment correlating with CPIC guidelines. Results and Conclusions: Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review the role of pharmacogenomics in the treatment of patients with depression.

Describe the clinical impact of utilizing pharmacogenomic data to optimize treatment options.

Self Assessment Questions:

Which antidepressant currently has strong recommendations from The Clinical Pharmacogenetics Implementation Consortium (CPIC) guidelines to support a change in therapy in a patient with pharmacogenomic variations?

A. Mirtazapine

B. Citalopram

C. Fluoxetine

D. Bupropion

What is a limitation to incorporating pharmacogenomic testing into clinical practice?

A. Provider lack of pharmacogenomic knowledge and how to interpret and apply results

B. It may help explain prior adverse effects and tolerability issues to medication trials

C. It does not warrant further testing or monitoring of genetic data

D. It may decrease the time to achieve reduction in depression symptoms

Q1 Answer: B Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-636-L01-P

Optimizing Antihypertensive Continuous Infusion Titrations with Order Question Utilization

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The Joint Commission (TJC) standard for Medication Management details required elements for safe administration of titrated medications. Successful incorporation of these elements can be measured by ensuring the patient response is reached, as well as consistent documentation reflecting order changes and patient assessments. Current practice for computerized physician order entry (CPOE) within this institution, the electronic health record (EHR) offers titration parameters as free text that can be edited or deleted, resulting in TJC standard non-compliance. This study aims to evaluate the impact of implementing structured order questions for CPOE within an EHR on compliance of antihypertensive infusion titration instructions.

This is an ongoing retrospective, single-center study at a tertiary academic medical center comparing titration compliance rates before and after the implementation of standardized order questions. Data were extracted from the enterprise data warehouse and supplemented with manual chart reviewing in the EHR. Collected data included patient location at the time of infusion order, infusion administration instructions (starting dose and titration parameters based on patient assessment), vital signs, and nursing medication administration record (MAR) documentation while the infusion order was active. Patients aged â‰¥18 years, admitted to an intensive care unit (ICU), and receiving titratable antihypertensive infusionsâ€”diltiazem, esmolol, labetalol, nicardipine, nitroglycerin, or nitroprussideâ€”were included. The primary outcome is compliance with medication titration to patient assessment, as specified by order question titration instructions.

Among 2,124 pre-implementation orders analyzed, nicardipine was the most common infusion (71.6%), followed by nitroglycerin (19.3%), diltiazem (8.0%), and nitroprusside (1.0%). Esmolol and labetalol orders are under review for inclusion in pre-implementation analysis. The median active order duration was 9.8 hours (IQR 2.6-21.2). The most frequently missing order elements were max dose, titration frequency, titration increment, and starting dose.

Results and conclusions on pre- versus post-implementation compliance rates are pending as post-implementation data is in progress.

Learning Objectives:

Define the essential components of The Joint Commission (TJC) standards for safe administration and documentation of titrated medications.

Describe how implementing structured order questions within an electronic health record (EHR) may improve compliance with antihypertensive titration instructions.

Self Assessment Questions:

Which of the following is a key component of TJC standards for safe administration of titrated medications?

A. Utilizing a standardized approach to ensure all order elements are present

B. Allowing unrestricted editing of titration parameters

C. Mandating hourly titration adjustments for all titratable medicationsÂ

D. Prioritizing free-text order entries for individualized care plans

How does implementing structured CPOE order questions improve compliance with TJC standards?

A. By increasing the number of medications available for titration

B. By minimizing variability in titration instructions and documentation

C. By replacing patient assessments with automated adjustments

D. By limited access to order parameters for physicians

Q1 Answer: A Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-789-L05-P

Fosfomycin for Catheter-Associated Urinary Tract Infection Prevention in the Intensive Care Unit

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Purpose: Critically ill patients are especially vulnerable to catheter-associated UTIs (CAUTIs) due to various risk factors in this population. According to guidelines, last updated in 2009, the use of systemic antibiotics for prophylaxis are discouraged due to concerns about antibiotic resistance. Since then, fosfomycin has been increasingly used to treat multidrug-resistant organisms. The purpose of this study is to determine if a single dose of fosfomycin in patients who have a urinary catheter, decreases the incidence of urinary tract infections in the intensive care unit.

Methods: This retrospective study includes patients at least 18 years of age, who were admitted to the intensive care unit (ICU) at Memorial Hospital South Bend, between December 01, 2022 through January 29, 2025 and had an indwelling catheter documented in the electronic health record. Patient baseline characteristics collected included age, sex, race, comorbidities, height, weight, BMI, date and time of ICU admission as well as discharge date and time, reason for admission, vital signs, indwelling catheter placement, antibiotics administered in the ICU, and any reported adverse effects during ICU stay. Reported adverse effects included nausea and vomiting, incidence of Clostridioides Difficile infections, and hypersensitivity. The primary endpoint of the study is the incidence of CAUTI in patients exposed to a single dose of fosfomycin versus those without fosfomycin exposure. Secondary endpoints of the study include; overall length of stay in the ICU, inpatient length of stay and mortality and incidence rates of non-UTI related infections.

Results: Preliminary results have found zero incidence of CAUTI in the fosfomycin group (n=10) and two incidences of CAUTI in the matched cohort control group (n=10).

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

Learning Objectives:

Define catheter-associated urinary tract infection according to the National Healthcare Safety Network (NHSN)

Explain the potential role of fosfomycin in the prevention of catheter-associated urinary tract infections

Self Assessment Questions:

Which of the following are incorporated into the NHSN definition of catheter-associated urinary tract infections definition?

A. A UTI where an indwelling urinary catheter (IUC) was in place for more than two consecutive days.

B. A UTI where an indwelling urinary catheter (IUC) was in place for more than one day.

C. A UTI where an indwelling urinary catheter (IUC) was in place for more than three consecutive days.

D. A UTI where an indwelling urinary catheter (IUC) was NOT in place for more than two consecutive days.

Why can fosfomycin be valuable for the prevention of catheter-associated urinary tract infections?

A. It is a one-time dose

B. It can cover some multi-drug resistant organisms

C. It is labor effective

D. All the above

Q1 Answer: A Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-560-L01-P

Impact of Venous Thromboembolism Hospitalizations Before and After the Implementation of Discharge Medication Cost Inquiries in the Emergency Department

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Purpose: Venous thromboembolism (VTE) is a major global health concern due to its significant impact on morbidity and healthcare costs. VTE includes deep vein thrombosis and pulmonary embolism both of which can be life-threatening. Anticoagulation medications play a crucial role in the treatment of VTE. However, cost can be a barrier to adherence, which may affect patient outcomes and the likelihood of VTE recurrence or complications. The purpose of this study was to evaluate the impact of a hospital-initiated discharge medication cost inquiry (DMCI) on emergency department (ED) visits and hospital admissions for acute VTE's. Methods: This was an IRB approved, retrospective quasi-experimental study evaluating acute VTE hospitalizations and ED revisits in adult patients before and after DMCI initiation in the ED. The pre-group included patients prior to DMCI availability in the ED (1/1/2017-8/31/2020) and the post-group was after DMCI availability (1/1/2021-8/31/2024). Patients were included if they were 18 years or older and had a first ED encounter during the study period for an acute VTE. Patients were excluded if they were incarcerated, pregnant, cognitively impaired, or on a direct oral anticoagulant within the past year prior to initial ED visit. The primary outcome was 30-day ED revisits and hospitalizations for an acute VTE. Secondary outcomes include social determinants of health, ED and hospital length of stay, comorbidities, 60-day ED revisits and hospital readmission along with a non-equivalent dependent variable of blood glucose reading. To achieve 80% power, with an assumed 20% reduction in the primary outcome, this study included 192 patients. Descriptive data was evaluated using measures of central tendency or variability, nominal data using chi-squared or Fisherâ€™s exact test, and continuous data using the Mann Whitney U test, as appropriate. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify the risks associated with VTE

Explain the purpose of the DMCI tool

Self Assessment Questions:

Which of the following best describes some of the risks associated with VTE?

A. Temporary skin irritation and mild allergic reactions

B. Post-thrombotic syndrome, recurrence, pulmonary hypertension, chronic pain and swelling in the affected limb

C. Short-term respiratory infections that resolve on their own

D. Increased bone density

What is the purpose of the DMCI tool?

A. Delay medication access to reduce costs for patients

B. Subsidize the cost of medications for all patients

C. Track the effectiveness of medications prescribed to patients

D. Provide information to healthcare providers about the costs of medications before patient discharge, helping to address cost-related barriers and promote medication adherence

Q1 Answer: B Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-582-L01-P

Developing and Implementing a Protocol for Converting Standard to Rapid Infliximab Infusions

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Infliximab is a monoclonal antibody administered intravenously or subcutaneously to treat inflammatory conditions. Several studies have been done evaluating the efficacy of converting patients from the standard to rapid infusion and showed no significant difference in the rates of infusion reactions between the standard two hours infusion duration versus the 60- or 90-minute infusion duration. Froedtert & the Medical College of Wisconsin (F&MCW) created a guideline to allow patients to be transitioned to the rapid infusion based on inclusion and exclusion criteria. Currently at F&MCW, providers are initiating the conversion of standard to rapid infliximab infusions. The purpose of this project is to implement a protocol at F&MCW to allow pharmacists to convert patients to the rapid infusion.

A retrospective chart review will be conducted within a one-year timeframe from September 1, 2023 â€“ September 1, 2024, for any patient who had received a dose of infliximab at Froedtert Hospital outpatient infusion center. The primary objective is to evaluate the current utilization of the rapid infusion guideline for infliximab. Patients were excluded if they had a history of intolerable infusion, received their last dose greater than six months ago, had known anti-drug antibodies, or were initiated while pregnant. This will provide an estimate on the impact of the protocol when implemented. The secondary objectives are estimating the amount of chair time saved by converting patients and the severity of infusion-related reactions for patients on standard and rapid infusions.

Data collection is still in process, and the results are pending the completion of it. The pre-implementation data will give us an estimate of how many patients could be converted by pharmacists.

The goal of the project is to standardize the process to convert more patients to rapid infusions without delaying care or causing additional work for providers.

Learning Objectives:

List the criteria patients must meet to be eligible for a rapid infusion of infliximab

Identify the benefits of allowing the pharmacist to convert patients to rapid infusions per protocol

Self Assessment Questions:

Which of the following adverse effect limits rapid infliximab infusions from being administered?

A. Abdominal Pain

B. Increased ALT

C. Infusion-related reaction

D. Anemia

Which one of these is a benefit of converting patients from standard to rapid infliximab infusions?

A. Decreased patient safety

B. Increased cost for the infusion center

C. Decreased patient satisfaction

D. Decreased chair time

Q1 Answer: C Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-602-L01-P

Surgical Site Infection Prophylaxis in Cesarean Section: Analysis of Antibiotic Variables and Impact on Outcomes

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Purpose: Administration of antibiotics prior to procedures with higher associated infection risk is standard practice to limit the risk of surgical site infections (SSI). For cesarean sections specifically, clinical practice guidelines recommend the use of gentamicin plus clindamycin in the setting of an allergy precluding use of first line cefazolin. At our institution, there have been numerous changes to antibiotic dosing and administration strategies over the past several years for cesarean section prophylaxis. The aim of this study is to relate different preoperative antibiotic administration strategies to SSI rates to determine if any opportunities for further optimization may exist.

Methods: A retrospective chart review will be performed on pregnant patients 18 years and older who underwent a cesarean section delivery at Carle Foundation Hospital and received the applicable preoperative prophylactic antibiotics from October 1st, 2017 to July 30th, 2024. The primary outcomes will include the SSI rate in cesarean sections following antibiotic prophylaxis according to internal protocolized dosing of cefazolin and gentamicin plus clindamycin with or without the addition of azithromycin and the SSI rate based on predefined weight strata for both antibiotic choices. The secondary outcomes will include time from prophylactic antibiotic orders to time of infusion, and SSI rate based on timing of administration within 1 hour pre-incision.

Results: In process

Conclusion: In process

Learning Objectives:
Review antibiotic options for surgical site prophylaxis in cesarean section procedures.
Discuss optimal dosing and time frame of antibiotics prior to procedure.
Self Assessment Questions:
If a patient has a beta lactam allergy, what is the second line antibiotic option for surgical site prophylaxis according to the American College of Gynecology (ACOG)?
A. Vancomycin
B. Aminoglycoside + clindamycin
C. Doxycycline + metronidazole
D. Azithromycin

At what point should Aminoglycoside + Clindamycin prophylaxis be initiated prior to first incision for a cesarean section?
A. Within 15 minutes
B. Within 30 minutes
C. Within 60 minutes
D. Within 120 minutes
Q1 Answer: B Q2 Answer: C
APCE Universal Activity Number 0121-9999-25-539-L01-P

Impact of Dexmedetomidine Starting Dose on Sedation Outcomes and Hemodynamics
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Objective
To compare patient outcomes before and after the default starting dose of dexmedetomidine was increased from 0.2 mcg/kg/hr to 0.4 mcg/kg/hr.

Methods
All patients included in this multi-center, retrospective chart review received dexmedetomidine during admission. Norton Healthcare increased the default starting dose of dexmedetomidine from 0.2 mcg/kg/hr to 0.4 mcg/kg/hr in June 2022. A pre vs. post implementation analysis was conducted assessing patient outcomes 2 years before and after this change. Patients with age <18 years, positive COVID test within 30 days of admission, pregnancy, and prisoners were excluded. This study included 4 indications for utilizing dexmedetomidine: transitioning off propofol to wean mechanical ventilation, initial continuous sedative for intubated or non-intubated patients, and alcohol withdrawal. Efficacy outcomes for each indication were assessed, including time from initiation of dexmedetomidine to extubation, time from initiation to RASS goal (intubated & non-intubated patients), and time from initiation to lower mMINDS severity. The safety outcomes assessed in this study were incidence of bradycardia (HR <50), severe bradycardia (HR <30), and hypotension (MAP <65).

Results
Out of 296 patients reviewed, 102 patients were included in each group. No statistically significant difference was identified between groups regarding time from dexmedetomidine initiation to extubation in those transitioning off propofol (20 vs. 40 hours, p=0.064), time from initiation to RASS goal (intubated [3 vs. 3.5 hours, p=0.183] & non-intubated (2 vs. 1.5 hours, p=0.734]), and time from initiation to lower mMINDs severity (2 vs. 4 hours, p=0.076). There was no significant difference between groups regarding incidence of bradycardia (6 vs. 5 patients), severe bradycardia (1 vs. 0 patients) and hypotension (41 vs. 53 patients, p=0.092).

Conclusions
Increasing the default starting dose of dexmedetomidine had an unclear effect on efficacy outcomes and was not associated with a significant increase in bradycardia or hypotension.

Learning Objectives:
Recognize dexmedetomidine adverse effects.
Identify how the starting dose of dexmedetomidine is described in the package insert, clinical guidelines, and primary literature.
Self Assessment Questions:
Which of the following adverse drug effects are associated with dexmedetomidine?
A. Hypertension
B. Bradycardia
C. Hypotension
D. B & C
Which of the following is TRUE about the starting dose of dexmedetomidine?
A. Package insert recommends starting at 0.7 mcg/kg/hr following a 1 mcg/kg bolus dose
B. PADIS guidelines recommend starting at 0.5 mcg/kg/hr
C. All prior studies describe starting at 0.2 mcg/kg/hr
D. There is not a clear consensus between the package insert, guidelines, and primary literature regarding the starting dose
Q1 Answer: D Q2 Answer: D
APCE Universal Activity Number 0121-9999-25-775-L05-P

The Effect of Digoxin on Mortality and Hospitalizations in Patients with Heart Failure and Reduced Ejection Fraction receiving Guideline-Directed Medical Therapy (DigiHeart)

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In patients with symptomatic heart failure with reduced ejection fraction (HFrEF) on maximally tolerated guideline-directed medical therapy (GDMT), digoxin may be considered to decrease heart failure related hospitalizations. A 1997 study evaluating the effects of digoxin on mortality and morbidity in patients with heart failure found a 28% relative risk reduction in hospitalizations due to worsening heart failure in patients treated with digoxin compared to placebo, however, there was no significant difference in all-cause mortality between groups. In this early study, novel pillars of GDMT including the use of angiotensin receptor-neprilysin inhibitors (ARNis) and sodium-glucose co-transporter-2 (SGLT-2) inhibitors, were not yet approved or utilized. This retrospective chart review aims to evaluate the effect of digoxin on mortality and heart failure hospitalizations in patients on an ARNi and/or SGLT-2 inhibitor.

This retrospective, single center, cohort study conducted at the University of Cincinnati Medical Center and West Chester Hospital will include adult patients with HFrEF (EF â‰¤40%) hospitalized due to a heart failure exacerbation and discharged on GDMT with or without digoxin.â€¯Patients will be grouped into one of two cohorts, (1) those who are discharged from their heart failure exacerbation admission with ARNi and/or SGLT-2 inhibitor with digoxin and (2) those discharged on ARNi and/or SGLT-2 inhibitor without digoxin. Patients will be excluded if they are pregnant or breastfeeding or have received a left ventricular assist device or heart transplantation.

Data collection and analysis are on-going. Results and conclusions will be presented at Great Lakes Pharmacy Residents Conference in April 2025.

Learning Objectives:

Describe the 2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure regarding the use of digoxin in those with heart failure and reduced ejection fraction (HFrEF).

Discuss the methods and findings of a PGY1 research project that examined the rate of all-cause mortality or heart failure related hospitalizations at 1 year in patients receiving ARNI and/or SGLT2i with digoxin compared to receiving ARNI and/or SGLT2i without digoxin.

Self Assessment Questions:

Which of the following is true according to the 2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure? (Select all that apply)

A. In patients with symptomatic HFrEF despite GDMT (or unable to tolerate GDMT), digoxin might be considered to decrease all-cause mortality

B. In patients with symptomatic HFrEF despite GDMT (or unable to tolerate GDMT), digoxin might be considered to decrease hospitalizations for HF

C. Digoxin requires careful monitoring for potential toxicity due to its narrow therapeutic index

D. B & C

What is the primary endpoint of the PGY1 pharmacy resident research project?

A. Hospital length of stay

B. Time to heart failure related hospitalization and all-cause mortality

C. Heart failure related hospitalization and all-cause mortality at 6 months and 1 year

D. Duration of digoxin therapy

Q1 Answer: D Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-541-L01-P

Evaluation of Newly Diagnosed Heart Failure with Reduced Ejection Fraction Treatment and Outcomes Over 12 Months After Discharge

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Statement of purpose:
Early and rapid optimization of four pillar guideline-directed medical therapy (GDMT) including renin-angiotensin system inhibitors, beta-blockers, mineralocorticoid inhibitors, and sodium glucose cotransport 2 inhibitors is recommended in patients with heart failure with reduced ejection fraction (HFrEF) to reduce mortality and morbidity. Despite the well-established cardiovascular benefit of these medications, it has been shown they are often underutilized in patients. This study aims to evaluate GDMT prescribed at hospital discharge and within two months post-discharge for patients newly diagnosed with HFrEF, and its impact on clinical outcomes.

Statement of methods used:
This retrospective cohort study will be conducted at UC Health, including patients at the University of Cincinnati Medical Center and West Chester Hospital. To be included, participants must be at least 18 years old, admitted to the hospital for an acute heart failure exacerbation with newly diagnosed HFrEF, and hemodynamically stable at discharge. Exclusion criteria include those who are pregnant or nursing, have a history of heart transplant or on a transplant list, or using or planned to be implanted with a permanent left ventricular assist device. The primary outcome is heart failure hospitalizations and death at six and twelve months in patients prescribed all four pillars of GDMT compared to those who were not prescribed all four pillars of GDMT within two months from discharge. Additional aims include describing doses of GDMT at discharge, within ten days, and within two months, and identifying independent risk factors for heart failure rehospitalization and adverse drug reactions requiring hospitalization within six months and twelve months.â€¯

Results and Conclusions:
Data collection and analysis are on-going. Results and conclusions will be presented at Great Lakes Pharmacy Residents Conference in April 2025

Learning Objectives:

Discuss the 2022 AHA/ACC/HFSA heart failure guideline recommendations regarding the four pillars of guideline directed medical therapy (GDMT) in patients with heart failure with reduced ejection fraction (HFrEF)â€¯
Review current literature supporting dose optimization and rapid up-titration of GDMT in patients with HFrEF

Self Assessment Questions:

2022 ACC/AHA/HFSA Heart Failure guidelines recommend which of the following?

A. Doses of all 4 pillars of GDMT should be titrated to achieveâ€¯target doses, as long as the patient can afford themâ€‹
B. Doses of all 4 pillars of GDMT should be titrated to achieve target doses, as long as the patient is toleratingâ€¯them wellâ€‹
C. Dose optimization of GDMT can occur asâ€¯frequently as every 3-4 weeks â€‹
D. If a patient has reached target doses of 2 pillars of GDMT that is enough, and all up-titration should stopâ€‹

According to current literature, which of the following is true?
A. All pillars of GDMT decrease morbidity, but not mortality
B. Goal doses of GDMT are recommended only in patients with HFrEF and NYHA class III-IV
C. Titration of GDMT should stop once patient reaches a blood pressure of < 130/80
D. Rapid up-titration and dose optimization of all 4 pillars of GDMT is safe and effective at decreasing HF hospitalizations and mortality in patients with HFrEF

Q1 Answer: B Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-570-L01-P

Evaluation and Assessment of the Time to Therapeutic Activated Partial Thromboplastin Level From a Nursing Driven Heparin Protocol

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Statement of Purpose: Heparin is an anticoagulant that potentiates the action of antithrombin III and inactivates thrombin, preventing the conversion of fibrinogen to fibrin. Therapeutic monitoring for heparin involves measuring activated partial thromboplastin time (aPTT). The purpose of this study was to evaluate the time to first therapeutic aPTT using a nurse driven heparin protocol.
Methods: A retrospective chart review was conducted. Patients admitted to McLaren Oakland Hospital from May 01, 2024, to July 31, 2024, who were 18 years of age or older and received a heparin weight-based protocol order set were included. The primary endpoint was to evaluate the average time to first therapeutic aPTT. Secondary endpoints included evaluating the time an aPTT level was collected to reviewed, the time an aPTT level was reviewed to heparin adjusted, heparin correctly adjusted based on aPTT level, and adverse events of bleeding according to Thrombolysis in Myocardial Infarction (TIMI) bleed classification.
Results: A total of 104 patients were included in the study. The time to first therapeutic aPTT was 25 hours. On average, nurses took 80 minutes to adjust heparin after reviewing aPTT results. The average time between aPTT level collection to review was 127 minutes. The infusion rate for 57% of patients was not adjusted appropriately. 16% of patients with a subtherapeutic aPTT were not administered an as needed heparin bolus. Four patients experienced a minimal bleed, six patients experienced a minor bleed, and zero patients experienced a major bleed.
Conclusion: The results in this study suggest that there are opportunities to improve the time to first therapeutic aPTT. Education will be provided to nurses on the importance of responding to critical medications. Future studies are needed to evaluate the effectiveness of a pharmacist vs. nursing driven heparin protocol.

Learning Objectives:

Explain the significance of maintaining and monitoring a therapeutic aPTT range during heparin therapy

Describe the Thrombolysis in Myocardial Infarction (TIMI) bleeding criteria categorized as minor, minimal, and major

Self Assessment Questions:

What is the most widely used laboratory assay for monitoring unfractionated heparin therapy

A. Activated partial thromboplastin time (aPTT)

B. International normalized ratio (INR)

C. Activated clotting time (ACT)

D. Prothrombin time (PT)

What is considered a minimal bleed according to Thrombolysis in Myocardial Infarction (TIMI) bleeding criteria?

A. Decrease in hemoglobin less than 3g/dL with a decrease in hematocrit less than 9%

B. Any clinically overt sign of hemorrhage associated with a <3 g/dL decrease in haemoglobin concentration or <9% decrease in hematocrit

C. Decrease in hemoglobin more than 3g/dL with a decrease in hematocrit less than 5%

D. No Observed blood loss with greater than 4g/dL decrease in hemoglobin

Q1 Answer: A Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-530-L01-P

Retrospective Analysis of the Impact of Pharmacist Phone Appointments versus Face-to-Face Appointments on Veterans Reaching Glycemic Goals

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Telemedicine appointments are increasingly utilized and effective for diabetes management. Within the Veterans Affairs healthcare system, pharmacists are able to meet with patients face-to-face, via virtual video conferencing (VVC), or via phone call. However, phone appointments may not be perceived as effective as face-to-face or VVC appointments. Notably, in the private sector, pharmacists are not able to bill for phone appointments. The objective of this study is to determine the effectiveness of the various methods of patient appointments, which hopefully can serve as justification for pharmacists receiving more appropriate credit for their services across all appointment types.

This was a retrospective electronic chart review of patients with a new primary care pharmacist visit between August 2022 and December 2023. The primary objective is to determine the mean A1C reduction over six months of follow-up with a primary care pharmacist. Secondary objectives include evaluating the percentage of patients achieving A1c goal or Time in Range (TIR) goal using continuous glucose monitoring, absolute change in mean A1C reduction over one year of following with a pharmacist, the number of visits needed to reach the target A1C, the total days between the first pharmacist visit and achieving the A1C goal, the total number of interventions made by the pharmacist, and the number of patients started on continuous glucose monitoring. These outcomes were compared between the two modalities. The study excluded patients with type 1 diabetes, A1C < 8% before initial pharmacist visit for diabetes management, more than two missed pharmacist appointments, documented non-adherence to diabetic medication regimen, death within one year of the first pharmacist visit, lack of A1C documentation within six months before the study, and patients currently being seen by endocrinology or pharmacist during the study period. Results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the benefits of telemedicine appointments for diabetes managementÂ

Recognize the characteristics of patients who should be considered for a less stringent A1c goal

Self Assessment Questions:

What are potential reasons patients may choose to have pharmacy appointments via telemedicine for diabetes management?

A. Convenience and reduced travel burden

B. Preference for face-to-face interactions

C. Improved access to care, especially in rural areas

D. A and C

Which patient characteristic(s) should be considered for a less stringent A1c goal?

A. Cognitive and/or functional limitations

B. Frailty

C. Severe comorbidities

D. All of the above

Q1 Answer: D Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-827-L99-P

Evaluating Guideline-Directed Medical Therapy Compliance and Its Effect on Readmission Rates in Patients with Heart Failure with Reduced Ejection Fraction

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Purpose: This study aims to investigate the relationship between guideline-directed medical therapy (GDMT) compliance and 30-day heart failure readmission rates in patients with heart failure with reduced ejection fraction (HFrEF). It will assess the frequency of GDMT optimization at discharge and explore factors influencing patient adherence to GDMT. The study's ultimate goal is to identify opportunities to improve patient outcomes and reduce readmissions, thus enhancing Union Hospital's performance on CMS quality measures.

Methods: This single-center, retrospective cohort study was conducted at Union Hospital in Terre Haute, Indiana, analyzing patients discharged between June 1, 2023, and May 31, 2024. Adult patients aged 18 and older with a diagnosis of HFrEF (ejection fraction â‰¤ 40%) confirmed by echocardiogram or catheterization within 6 months were included. Patients with a diagnosis of HFpEF, cancer, ESRD, in hospice, pregnancy, or prisoner status were excluded. Patients were categorized into three groups based on GDMT status: no GDMT (control), 1-2 GDMT drugs, and 3-4 GDMT drugs. Data was collected using manual chart review in the electronic medical record system. A maximum of 200 patients were to be analyzed.

The primary endpoint is 30-day all-cause readmission. Key secondary endpoints include: 90-day all-cause readmission, 1-year all-cause in-hospital mortality, time to readmission, and GDMT optimization during the inpatient stay.

Results and conclusions will be presented at the 2025 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recall the four components of guideline-directed medical therapy (GDMT) for heart failure with reduced ejection fraction (HFrEF).

Identify potential reasons for patient non-compliance with all 4 GDMT classes for HFrEF.

Self Assessment Questions:

Which of the following medication regimens include all 4 HFrEF GDMT medication classes?

A. Furosemide, lisinopril, labetalol, and apixaban

B. Lisinopril, metoprolol succinate, spironolactone, and empagliflozin

C. Amlodipine, atorvastatin, isosorbide mononitrate, and digoxin

D. Furosemide, amlodipine, losartan, and cholecalciferol

Which of the following is a potential reason for GDMT non-adherence in a patient with HFrEF?

A. The patient has trouble affording the medication or has a lack of insurance

B. The patient has trouble managing complex medication regimens due to cognitive impairment or physical limitations

C. The patient believes the medications are unnecessary because they feel better

D. All of the above

Q1 Answer: B Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-531-L01-P

Impact of ED MRSA nasal PCR on anti-MRSA therapy duration for pneumonia

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PURPOSE

Methicillin-resistant Staphylococcus aureus (MRSA) is a leading cause of nosocomial pneumonia, often resulting in empirical anti-MRSA therapy despite its low prevalence in emergency department (ED) presentations. MRSA nasal polymerase chain reaction (PCR) has a high negative predictive value (>94%) and offers a rapid, non-invasive method for de-escalating MRSA-targeted therapy. Several studies suggest that implementing MRSA nasal PCR ordering reduces the duration of unnecessary antibiotic use by up to 46.6 hours. Pharmacist involvement in ordering and interpreting these tests in the ED has shown promising results in improving antimicrobial stewardship and decreasing therapy duration. This study aims to evaluate the impact of pharmacist-driven MRSA nasal PCR ordering in the ED on the duration of anti-MRSA therapy to prevent inappropriate antibiotic continuation.

METHODS

This is a quasi-experimental non-equivalent control study completed at a single academic center using data from an electronic health record. Adult patients presenting to the Froedtert Hospital ED with pneumonia, who received anti-MRSA therapy in the ED, and were subsequently admitted inpatient were included in this study. Patients were excluded if MRSA nasal PCR was collected from a respiratory specimen other than the nares, the patient received anti-MRSA therapy at any outside hospital in the previous 24 hours, or was continued on anti-MRSA therapy for indications other than pneumonia. ED pharmacists were responsible for ordering MRSA nasal PCR in compliance with a pre-existing hospital protocol. ED nurses facilitated MRSA nasal PCR collection in the proper setting. Education was provided through email communication and a presentation at monthly meetings with department staff. Pre-intervention and post-intervention data were collected for the same time period in two consecutive years.

RESULTS

Results are pending and will be presented at Great Lakes Pharmacy Residency Conference.

CONCLUSIONS

Conclusions are pending and will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the role of MRSA nasal polymerase chain reaction (PCR) testing in the management of pneumonia and anti-MRSA therapy.

Explain the benefits of pharmacist involvement in ordering and interpreting MRSA nasal PCR tests in the emergency department.

Self Assessment Questions:

What is the primary benefit of using MRSA nasal PCR testing in the management of pneumonia in the emergency department (ED)?

A. It confirms the presence of MRSA in every pneumonia case

B. It provides a rapid, non-invasive method for de-escalating MRSA-targeted therapy

C. It allows for the immediate initiation of MRSA-targeted therapy in all pneumonia cases

D. It is used to diagnose any bacterial causes of pneumonia, not just MRSA

How does pharmacist involvement in ordering and interpreting MRSA nasal PCR tests in the emergency department (ED) best improve antimicrobial stewardship?

A. By ensuring MRSA therapy is started more quickly for all pneumonia patients

B. By limiting the use of MRSA nasal PCR tests only to ICU patients

C. By reducing the duration of unnecessary anti-MRSA therapy and optimizing antibiotic use

D. By increasing the frequency of MRSA testing in all ED patients with pneumonia

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-625-L01-P

Impact of Implementing an Order Panel for Insulin and Dextrose Dosing for the Management of Hyperkalemia in Emergency Department Patients

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Purpose: In May 2023, Baptist Health Louisville implemented an insulin and dextrose order panel for hyperkalemia treatment to lower serum potassium while minimizing hypoglycemia. This study compares the incidence of hypoglycemia before and after the order panel's implementation in emergency department patients.
Methods: This single-center, retrospective pre-post intervention cohort study will evaluate the incidence of hypoglycemia in patients receiving IV insulin for hyperkalemia before and after implementation of an insulin/dextrose order panel. Secondary endpoints include reduction in serum potassium and incidence of severe hypoglycemia. The study includes patients who received IV insulin at Baptist Health Louisville Emergency Department between 11/1/2021 and 9/30/2024. Exclusion criteria were patients less than 18 years old, pregnant, received insulin for an indication other than hyperkalemia, received dialysis within 8 hours after IV insulin, did not have repeat blood glucose or serum potassium levels, received additional insulin doses within 8 hours of initial IV insulin administration, encounter was during May 2023, or received a dose other than 5 or 10 units of IV insulin. A sample size of 152 patients per group (80% power, Î±=0.05) was determined, and continuous endpoints will be analyzed using an independent t-test, while nominal endpoints will use a Chi-Square test.
Results/Conclusions: Data collection and analysis are ongoing. Results will be presented at the 2025 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify patient populations susceptible to hypoglycemia after administration of IV insulin for hyperkalemia
Describe strategies to prevent hypoglycemia when administering insulin for the treatment of hyperkalemia

Self Assessment Questions:

Which of the following is a risk factor for hypoglycemia following the administration of IV insulin?
A. Male sex
B. History of diabetes mellitus
C. Abnormal renal function
D. Obesity
Which of the following options is most appropriate for a 72-year-old patient with a creatinine clearance of 24 ml/min and a glucose of 188 mg/dl?
A. 25 grams IV dextrose followed by 10 units IV insulin
B. 5 units IV insulin followed by 25 grams IV dextrose
C. 10 units IV insulin followed by 25 grams IV dextrose
D. 25 grams IV dextrose followed by 5 units IV insulin
Q1 Answer: C Q2 Answer: D
APCE Universal Activity Number 0121-9999-25-735-L01-P

Breaking the Hog Tie: Evaluating the Necessity of Heparin

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Purpose: Heparin is a commonly used anticoagulant in hospitalized patients due to its short half-life, rapid onset, and quick reversibility. Despite its benefits, heparin requires close, routine monitoring of activated partial thromboplastin time (aPTT) or Anti-Xa levels with subsequential therapy adjustments. Improper management can lead to risks associated with overuse, including monitoring errors, adverse effects, and increased healthcare costs. While this study poses no directed benefit to patients, it aims to improve future anticoagulation practices and patient outcomes throughout Munson Healthcare.

Methods: This retrospective study, conducted at Munson Medical Center, aims to evaluate the appropriateness of intravenous (IV) heparin therapy in 100 patients hospitalized at Munson Medical Center, Kalkaska Memorial Health Center, Grayling Hospital, Cadillac Hospital, and Charlevoix Hospital between August 1st, 2024 and December 1st, 2024. The primary objectives are to assess the clinical necessity of heparin, identify cases where alternative anticoagulants may be safely utilized, and evaluate the incidence of adverse events. Secondary objectives focus on a cost analysis of unnecessary heparin use, including associated monitoring, phlebotomy, and staff time.

Learning Objectives:

Identify alternative appropriate anticoagulants

Indicate reasons why heparin therapy is the only appropriate option

Self Assessment Questions:

Which hospitalized patient would be best cared for using a heparin drip?

A. A 45 year old female with a bilateral Pulmonary Embolism

B. A 78 year old male with a CrCl of 13

C. A 39 year old female with a DVT

D. A 94 year old male with a history of Atrial Fibrillation

A 62 year old male presents to the emergency department with a pulmonary embolism. No significant past medical history and is otherwise a healthy man. Identify the best treatment option for him.

A. Rivaroxaban 20 mg twice a day for 21 days followed by 15 mg once a day

B. Weight-based heparin bolus followed by a weight-based drip. Apixaban starter pack upon discharge

C. Apixaban 10 mg twice a day for 7 days followed by 5 mg twice a day

D. Dabigatran 180 mg twice a day

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-522-L01-P

Impact of an Ambulatory Pharmacist at Outpatient Heart Failure Clinic

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Purpose: According to the Heart Failure Society of America, almost 6.5 million Americans over the age of 20 have been diagnosed with heart failure. With many of these patients requiring chronic medication management, pharmacists in the ambulatory care setting are well equipped to provide care. Since 2023, an ambulatory pharmacist has been embedded into the Trinity Health Muskegon Congestive Heart Failure Clinic to help increase access to care. To date, a comprehensive review of patient outcomes related to these pharmacist interventions has not been performed. The purpose of this quality assessment is to determine the percent utilization of triple and quadruple Guideline Directed Medical Therapy (GDMT) in patients with heart failure with reduced ejection fraction (HFrEF) before and after pharmacist integration in the heart failure clinic.

Methods: A retrospective chart review will be performed on patients with at least one encounter with the ambulatory pharmacist at the Trinity Health Muskegon Congestive Heart Failure Clinic between August 2023 - August 2024. The primary endpoint will be percent utilization of GDMT in patients with HFrEF before and after pharmacist intervention. GDMT medication classes, target medication doses, and definitions of triple and quadruple therapy are based on the 2022 American College of Cardiology Foundation/American Heart Association/Heart Failure Society of America Joint Committee (ACC/AHA/HFSA) Guidelines for the Management of Heart Failure.

Optimization of GDMT is classified as patients taking the highest tolerated dose of each medication class. Secondary endpoints will include encounters for electrolyte management and diuretic adjustments, reason for intolerance if not on complete triple or quadruple GDMT, and occurrence of heart failure-related hospital admissions and emergency department visits within 90 days of visit with pharmacist.

Results and conclusions are in progress and will be presented at the 2025 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize Guideline Directed Medical Therapy regimens for patients with HFrEF.

List potential ambulatory pharmacist interventions for patients in an outpatient heart failure clinic.

Self Assessment Questions:

Which of the following medication regimens would be considered quadruple GDMT?

A. Amlodipine, losartan, semaglutide, bumetanide

B. Lisinopril, diltiazem, metoprolol, hydrochlorothiazide

C. Carvedilol, spironolactone, valsartan, dapagliflozin

D. Sacubitril/valsartan, furosemide, bisoprolol, triamterene

Ambulatory pharmacist interventions in outpatient heart failure management include

A. Medication titration to target doses

B. Electrolyte replacement and management

C. Patient education and medication reconciliation

D. All of the above

Q1 Answer: C Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-565-L01-P

The Impact of Limiting Milrinone Use in Critically Ill Patients with Renal Impairment

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Purpose: Milrinone is a phosphodiesterase-3 inhibitor that is often used in critically ill patients with cardiogenic shock. Milrinone is highly protein bound, primarily renally excreted, and the majority is excreted unchanged in the urine. Because itâ€™s renally eliminated, milrinone requires dose adjustment based on creatinine clearance. However, dosing guidelines in patients with renal impairment are not well established and patients may be at increased risk of adverse events like hypotension, arrhythmias, and cardiac arrest. Previous Detroit Medical Center (DMC) research found patients who received milrinone were at significantly higher risk of new-onset arrhythmias, cardiac arrest, hypotension, and mortality in those with impaired renal function. There is evidence to suggest that dobutamine is clinically favored in patients with acute kidney injury. The purpose of this study is to assess the impact of limiting milrinone use and/or exposure in patients with impaired renal function.
Methods: Previous DMC data will be use as the comparator group. The intervention phase is a DMC approved guideline for early pharmacist intervention to minimize milrinone exposure in patients with reduced kidney function. The post-intervention phase will be a retrospective chart review of patients admitted to DMC, with minimized milrinone exposure, and grouped by renal function. Inclusion criteria: patients 18 years and older who are in cardiogenic shock with milrinone ordered. Exclusion criteria: age <18 years old, pregnant patients, prisoners, concurrent dobutamine administration, and milrinone infusion under 6 hours. The primary outcome of this study is new onset arrhythmia lasting over 30 seconds or requiring intervention. Secondary outcomes evaluated include hospital length of stay, intensive care unit (ICU) length of stay, number of patients alive at day 28, ICU-free days at day 28, incidence of cardiac arrest, hypotension, mortality, and intervention made to minimize milrinone.
Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Discuss current literature and dosing recommendations for milrinone.
Identify patients who are at increased risk of adverse effects of milrinone.

Self Assessment Questions:

Based on literature and dosing recommendations for milrinone, which of the following is false?
A. Milrinone dosing recommendations are not well established
B. There is literature to support limiting milrinone exposure in patients with impaired renal function
C. Milrinone is preferred over dobutamine in patients with impaired renal function
D. Milrinone is renally excreted and majority is excreted unchanged in the urine
A 78 year old male who has a history of CKD stage 3, SCr = 4.5 (baseline ~ 2), CrCl = 17 mL/min, is being started milrinone for cardiogenic shock. What adverse event(s) is he at an increased risk for?
A. Hypotension
B. Arrhythmia
C. Cardiac arrest
D. All of the above
Q1 Answer: C Q2 Answer: D
APCE Universal Activity Number 0121-9999-25-567-L01-P

Early Targeted Control of Hyperglycemia in Critically Ill Patients with Trauma

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The metabolic stress response following critical illness is an underlying survival mechanism to external and internal inflammation in patients that results in a rise in serum blood glucose. The Society of Critical Care Medicine (SCCM) guidelines emphasize that while overt hyperglycemia is predictive of worse outcomes, overly aggressive glucose control can increase the risk of hypoglycemia, particularly as the stress response resolves. Current evidence recommending ideal target blood glucose concentrations in critically ill trauma patients is inconclusive. This is a single-center, retrospective, case-matched cohort study including adult patients admitted to an ICU at the University of Cincinnati Medical Center with acute trauma. The primary objective of this project is to determine if there is a difference between incidence of nosocomial infection in critically ill trauma patients who achieve a mean BG of < 150mg/dL versus those with a mean BG of < 150mg/dL within 7 days of admission.â€¯ Secondary outcomes include incidence of hypoglycemic events, ICU length of stay, in-hospital mortality, and duration of mechanical ventilation. Multivariate logistic regression will be performed to identify risk factors for nosocomial infection in critically ill patients following acute trauma. Patients will be case-matched based on admission HbA1c, age, and injury severity score.â€¯ A power analysis determined the population size to include 128 patients to detect a 20% difference with an 80% power, and the alpha is set at 0.05. Data collection and analysis are ongoing. Results will be presented at Great Lakes Pharmacy Residency Conference in April 2025. A conclusion will be forthcoming based upon the complete results.

Learning Objectives:

Review the current guidelines and outlining target blood glucose goals for critically ill patients with trauma.

Describe the methods and findings of a PGY1 research project that evaluated early targeted control of hyperglycemia in critically ill patients with trauma.

Self Assessment Questions:

Which of the following statement(s) are true regarding the effects of hyperglycemia on critically ill trauma patient outcomes? (select all that apply)

A. Hyperglycemia is associated with decreased mortality in the trauma ICU population

B. Hyperglycemia is linked to lower risk of infectious complications â€‹

C. Early normoglycemia is associated with decreased hospital and ICU length of stayâ€‹

D. Hyperglycemia is associated with an increased incidence of acute kidney injury

Which of the following blood glucose targets is the ideal BG target that has been shown to decrease the rate of nosocomial infections in ICU trauma patients?

A. 80-108 mg/dL

B. <150 mg/dL

C. <180 mg/dL

D. There is a lack of evidence currently available to answer this question.

Q1 Answer: C Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-592-L01-P

Patient Education Video Development and Implementation

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Purpose
The creation and implementation of standardized patient education videos has been a long-standing goal for the Froedtert & Medical College of Wisconsin health network. Currently, there is one pharmacy medication discharge video regarding bariatric surgery that has been successfully implemented into practice. However, due to the high cost of outsourcing, the inability to produce videos in-house, and the absence of a streamlined process for patient education video development, this video took two years to implement.

Creating standardized videos offers numerous benefits for conveying health information to patients. Recent research has demonstrated that multimedia tools, including educational videos, significantly enhance patient knowledge retention and engagement, leading to better health outcomes and increased patient satisfaction. Another benefit of patient-education videos is that they enable clinical pharmacists to better allocate the time they would typically spend on patient counseling. Standardized video education ensures that all patients receive proper counseling while freeing up pharmacistsâ€™ time for other essential patient-care tasks.

Methods
The primary objective of this multicenter quality improvement project is to create and utilize a standardized protocol to develop one warfarin patient education video for use at time of discharge at Froedtert & the Medical College of Wisconsin locations. A QR code and URL link to the warfarin education video will be included in the patientsâ€™ After Visit Summary (AVS) and the Froedtert & the Medical College of Wisconsin â€œThings to Know When Taking Warfarin (Coumadin)â€ education booklet. After patients have watched the video, an anonymous survey will be utilized to assess patient-understanding of key warfarin counselling points. Pharmacists will also complete pre- and post-video implementation surveys to assess changes in the time spent counseling patients on warfarin and in their overall evaluation of the discharge process efficiency.

Results â€“ NA
Conclusions â€“ NA
Learning Objectives:
Discuss the effectiveness of patient-education videos in providing medication counseling based on results from patient post-video education surveys.
Identify the impact of standardized patient-education videos on pharmacist time management and resource allocation based on results from pharmacist pre- and post- video implementation surveys.
Self Assessment Questions:
Based on recent literature, creating standardized patient-education videos improves all the following except:
A. Knowledge retention and engagement
B. Health outcomes
C. Healthcare costs
D. Patient satisfaction
In evaluating the impact of patient-education videos on pharmacist time allocation, what secondary benefit could be observed within the pharmacy team, aside from time savings in counseling?
A. Improved medication compliance across all patients in the hospital
B. More focused clinical discussions and increased capacity for reviewing complex patient cases
C. Reduced pharmacist turnover due to less direct patient interaction
D. Decreased need for ongoing education on warfarin for pharmacy staff
Q1 Answer: C Q2 Answer: B
APCE Universal Activity Number 0121-9999-25-812-L99-P

Assessing the Impact of a Resident-led Naloxone Outreach Service at the VA Illiana Health Care System
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Purpose: Hundreds of thousands of deaths occur in the United States each year due to prescription and non-prescription drug-related overdoses. Naloxone is an opioid antagonist that any trained member of the public can administer for the treatment of an opioid overdose. To help reduce overdose harm, the U.S Department of Veterans Affairs created the Opioid Overdose Education and Naloxone Distribution (OEND) program to provide education on overdose prevention and identify at-risk veterans who may benefit from naloxone education and distribution. This assessment of resident-led naloxone education for veterans will guide future education on opioid overdose and administration of naloxone. Methods: The pharmacy resident utilized the OEND dashboard to identify and call high-risk veterans, employing a standardized naloxone education script. The calls allowed the resident to provide education and offer the veteran a naloxone prescription. Data was collected through the dashboard by measuring successful interventions (the patient receiving naloxone). The information collected included patient baseline characteristics (age, sex, and race), indication, number of call attempts, time of call, outcome of the calls (accepts, declines, or veteran already has naloxone), and reasons for declining. The project results will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify patients who are at risk of an opioid overdose

Outline the goals and use of the Opioid Overdose Education and Naloxone Distribution (OEND) program

Self Assessment Questions:

A patient with which characteristic below would not be identified by the OEND dashboard as at risk for an opioid overdose?

A. Prescribed oxycodone for pain

B. History of a stimulant use disorder

C. History of opioid overdose

D. Prescribed alprazolam for anxiety

Which of the following statements about naloxone is correct?

A. It is an opioid agonist

B. It is available as a sublingual tablet

C. It often includes two doses of nasal spray

D. It is a prescription only medication

Q1 Answer: D Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-555-L08-P

Performance of ChatGPT in the Empiric Management of Gram-Negative Bacteremia

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Purpose: The use of artificial intelligence (AI) in healthcare is expanding rapidly, particularly in diagnostic and clinical decision support. Chatbot AI systems like ChatGPT have the potential to assist clinicians by offering diagnostic and treatment recommendations. However, there are significant gaps in understanding the safety and appropriateness of their use in real-world clinical practice, especially for managing complex infectious diseases. Studies have shown that while AI can produce guideline-adherent recommendations in simple cases, it struggles in scenarios requiring expert judgment, such as source control and de-escalation of antibiotics. Our study aims to explore the potential role of ChatGPT in the management of Gram-negative bacteremia, comparing the accuracy of empiric antibiotic recommendations to the current institutional standard of care in real-world clinical scenarios. Secondary objectives include evaluating the appropriateness of empiric recommendations based on the subsequent culture speciation, susceptibility testing, and patient clinical status. Methods: This is a retrospective, observational study conducted at the University of Kentucky HealthCare from July 2022 to June 2024. Adult patients with Gram-negative bacteremia, confirmed by ePlexÂ® rapid diagnostic testing during off-hours, were included. Data were collected through electronic health records and manual chart review. Empiric antibiotic recommendations generated by ChatGPT will be compared to those made by on-call pharmacy residents. The overall composite of appropriateness of both sets of recommendations will be evaluated by a panel of independent infectious diseases-trained pharmacists based on factors including institution guideline adherence and antimicrobial selection, dosing. A Desirability of Outcomes Ranking (DOOR) analysis will be used to measure the composite outcome, providing a comprehensive framework for scaled ranking of each recommendation. The comparison of these distributions will allow for a non-dichotomous assessment for the probability that one group will have a more optimal recommendation. Results/Conclusions: Data results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Explain the process of evaluating the appropriateness of empiric antibiotic recommendations, including the use of institutional guidelines, antimicrobial selection and dosing, and the Desirability of Outcome Ranking (DOOR) analysis.

Discuss the potential roles and limitations of ChatGPT in assisting with clinical decision-making for the management of infectious diseases.

Self Assessment Questions:

Which of the following is incorrect regarding the evaluation of empiric antibiotic recommendations?

A. Appropriateness of dosing and frequency will be evaluated.

B. When generating empiric recommendations, ChatGPT will be provided with a standardized prompt that includes patient information, vitals, Gram-Stain and rapid diagnostic testing results.

C. The provided recommendations will be compared to those generated by a previous model of ChatGPT.

D. The evaluation will include the accuracy of recommendations from ChatGPT both with and without access to institutional guideline documents.

Which of the following accurately describes the roles/limitations of ChatGPT in assisting with clinical decision-making?

A. ChatGPT always uses the most up to date information and only searches reliable sources when gathering information to provide a response.

B. In the management of infectious diseases, ChatGPT generated treatment recommendations have been shown to be consistent and as effective as ID specialist consultation.

C. Variations in the quality of responses from ChatGPT are very sensitive to the prompt, information provided, and documents provided/accessible to the chatbot.

D. All of the above.

Q1 Answer: C Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-853-L99-P

Implementation of a Pharmacist-Driven Workflow for the Management of Human Immunodeficiency Virus Pre-Exposure Prophylaxis in a Clinic Setting

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Purpose: It is estimated that human immunodeficiency virus (HIV) infections in the United States have decreased by 12% from 2018 to 2022, but it still remains a persistent problem. There were 31,800 estimated new HIV infections in the United States in 2022. The South, including Kentucky, accounted for nearly half of these new infections. Other disproportionally impacted populations include men who have sex with men, Black Americans, Latinx communities, transgender people, young people, people who use drugs, and rural residents. Pre-exposure prophylaxis (PrEP) medications remain a primary tool to help reduce the number of new infections by preventing the transmission of HIV. Despite the high efficacy rates, fewer than 36% of those who are indicated for PrEP in the United States are using these medications. As the medication experts, pharmacists are excellent resources to help manage HIV PrEP patients through their expertise in managing drug-drug interactions, medication counseling, and monitoring for safety and efficacy. Studies show that pharmacist involvement in a patientâ€™s care increases medication adherence, which is vital for the prevention of HIV in patients on PrEP therapy. This study aims to expand capacity and access to PrEP through creating and implementing a workflow for the management of therapy in a clinic setting, as well as assess the impact on patient outcomes.

Methods: This process improvement project with retrospective review of results was conducted from September 1, 2024 through December 31, 2024 at two infectious disease clinics in Louisville, KY. The study included patients who are prescribed PrEP therapy. Exclusion criteria included age less than 18 years, pregnancy, and incarceration. The primary outcome was compliance with HIV screening. Secondary outcomes included medication adherence and appropriate day supply of prescriptions.

Results and Conclusions: To be presented at the 2025 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the benefits of a collaborative practice agreement for HIV PrEP

Recognize the role of pharmacists in HIV prevention

Self Assessment Questions:

1. Implementation of a collaborative practice agreement for HIV PrEP in the primary care setting is associated with which of the following outcomes?

A. Improvement in appropriate prescribing practices

B. Increased adherence to HIV PrEP medication

C. Decreased number of patients with overdue HIV testing

D. Both A and C

According to the National HIV/AIDS Strategy 2022â€“2025, what is the role of the pharmacist in HIV prevention?

A. Pharmacists are trusted healthcare professionals and can develop strong rapport with patients

B. Pharmacists can act as a liaison between patients and other members of the team

C. Pharmacists as part of a care team can increase retention in care and adherence

D. All of the above

Q1 Answer: D Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-550-L02-P

Incidence of Mycobacterium tuberculosis Screening and Detection in People Living with Human Immunodeficiency Virus in Custody Within the Illinois Department of Corrections

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Purpose: Mycobacterium tuberculosis (TB) is not endemic to the United States of America (USA) but is endemic to the USA's department of corrections and disproportionally affects individuals with human immunodeficiency virus (HIV). In Illinois, the incidence of active TB was 0.0024% (298 cases) in 2022, but incidence in persons with HIV within Illinoisâ€™s department of corrections (IDOC) is unknown. Upon intake into IDOC, people undergo a comprehensive health screening. Then, people living with HIV are scheduled for a telemedicine appointment with IDOCâ€™s HIV telemedicine clinic involving clinical pharmacists, physicians, social workers, outreach workers, and on-site nurses. The purpose of this study is to evaluate the incidence of TB screening in people living with HIV in custody within IDOC, along with the rates of positivity for active and latent TB.
Methods: This retrospective chart review conducted at the University of Illinois Hospital and Health Sciences System (UIH) evaluated data of adult patients living with HIV and in custody within IDOC between January 1st, 2021, and June 30th, 2024. If a positive result for TB occurred, HIV and TB treatments were evaluated for drug interactions and adherence to guideline recommendations. Patient charts will be reviewed for 9 months post index visit (or until TB treatment completion, whichever comes first) to record data related to TB and HIV outcomes. Data includes demographics, immunocompromisation, inhaled substances, HIV data & regimen. Data will be stored securely in REDCap for 1 year.
Data: <In progress>.
Conclusions: <TBD>.

Learning Objectives:

State why testing persons in custody is more crucial, compared to persons who are not in custody
Identify persons at risk for active and latent tuberculosis in individuals living with HIV

Self Assessment Questions:

Which of the following is TRUE of Tuberculosis (TB) in persons living in custody?
A. There are no insurance-covered treatments for TB in custody
B. Persons in custody cannot refuse a TB test
C. The close-quarters living of custody increase the risk of contracting/spreading TB
D. Persons with TB will be denied proper care or trial due to the infection

Which of the following is TRUE of Tuberculosis (TB) for persons living with human immunodeficiency virus (HIV) in custody
A. HIV provides paradoxical immunity to TB
B. People living with HIV have an increased incidence of aquiring TB
C. People living with HIV have an increased incidence of morbidity with TB
D. Persons with HIV will be denied proper TB testing and care
Q1 Answer: C Q2 Answer: C
APCE Universal Activity Number 0121-9999-25-742-L02-P

Creating Standardized Safety Verification Criteria within Oncology Clinical Practice

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Antineoplastic medications are considered high-alert medications by the Institute for Safe Medication Practices (ISMP) and some institutions require second pharmacist verification or dual nurse verification to reduce errors associated with these medications. Antineoplastic medications that require these additional safeguards vary from institution to institution and it is suggested by ISMP that second verifications be used selectively and not on all high-alert medications. Froedtert Health is an academic health network located in southeastern Wisconsin that utilizes pharmacist and nurse second verification for various antineoplastic medications. The health system currently has a High-Alert Medications Policy that details that medications that are considered â€œchemotherapyâ€ should be dual-verified; however, this term was noted to be vague and has made it difficult to discern which antineoplastics should be dual-verified. A review of the systemâ€™s dual-verify medications was completed and noted inconsistencies between the policy and how second-verify medications are currently programmed in the electronic health system. The purpose of this project is to create criteria that help distinguish which antineoplastic medications should require a second verification by a pharmacist and/or a second check by a nurse based on the characteristics and risks of the medication.

A team of pharmacists and nurses are developing criteria to delineate which antineoplastic medications should require pharmacist and nurse second verification. These criteria will be used to update the High Alert Medications Policy, re-categorize any current formulary medications that require updating in the electronic health system, and make categorizing simpler for any new medications. The primary outcome will be the number of medications re-categorized from second verified to non-second verified and vice versa. To date, a determination for nursing dual-verify has been made to make all medications that fall into the Quality Oncology Practice Initiative (QOPI) definition of chemotherapy dual-verified. Pharmacy dual-verify may or may not align with this practice.

Learning Objectives:

Recall the Institute for Safe Medication Practices' (ISMP) recommendation for which medications should be dual-verified.

Recognize the Quality Oncology Practice Initiative (QOPI) recommendations for nursing second verification and the classes of medications that would fall into this recommendation.

Self Assessment Questions:

1. Which of the following is the Institute for Safe Medication Practices (ISMP) recommendation regarding dual verifications?

A. Second verifications should be used on all high-alert medications.

B. Second verifications should be used on all high-alert medications given parentally or subcutaneously.

C. Second verifications should be used on some but not all high-alert medications.

D. Second verifications should not be used on high-alert medications.

Which summarizes the Quality Oncology Practice Initiative (QOPI) recommendations for nursing second verification?

A. All non-oral chemotherapy agents should be dual-verified including targeted therapies, hormonal therapies, and monoclonal antibodies.

B. Dual verification should be used on some but not all chemotherapy medications.

C. All chemotherapy medications should be dual-verified regardless of route including targeted therapies, and hormonal therapies. Monoclonal antibodies do not have to be dual-verified.

D. All chemotherapy medications should be dual-verified regardless of route including targeted therapies and monoclonal antibodies. Hormonal therapies do not have to be dual-verified.

Q1 Answer: C Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-752-L04-P

Pharmacist-driven Allergy to Beta Lactam Evaluation (ABLE) in the Emergency Department

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Penicillin (PCN) is the most common drug allergy identified in patient medical records. Notably, documented PCN allergies have been linked to suboptimal antibiotic treatment and negative externalities such as increased healthcare costs. Pharmacists positioned in the emergency department (ED) often are an underutilized resource for the evaluation of PCN allergies. At this time, published studies examining the implementation of a pharmacist driven allergy de-labeling protocol is lacking. The objective of this study is to evaluate the de-labeling of PCN allergies following the implementation of a pharmacist-driven PCN de-labeling protocol in an ED setting.

This IRB approved, single-center, retrospective, proof-of-concept study included patients who presented to the Veteran Health Indiana ED between May 15, 2024 - October 31, 2024 and had an allergy to Beta-Lactam protocol completed by an ER pharmacist. Retrospective chart reviews were performed for each patient using electronic medical records.

The primary outcome was the percentage of patients whose PCN allergy was de-labeled vs total patients screened. Pertinent secondary outcomes encompassed percentage of patients presenting to the ED with a PCN allergy compared to the number of patients de-labeled, percentage of patients de-labeled within the ED contrasted to a follow-up phone call, and the number of patients who received Beta-lactam antibiotics immediately following pharmacist assessment. Exclusion criteria included all patients identified outside of an ED setting.

Eligible Veterans had 64% (28/44) of their PCN allergy de-labeled with 75% (21/28) of those coming from a direct PCN antibiotic challenge. Importantly, 36% (10/28) of Veterans received PCN antibiotics during the same visit following successful de-labeling. The results of this study indicate that a pharmacist led PCN de-labeling protocol within the ED is both feasible and has a positive impact on patient care. Pharmacists are well positioned to deliver this key intervention independently within the ED.

Learning Objectives:

Identify the negative consequences associated with inaccurate penicillin allergies on electronic medical records.

Discuss the advantages of pharmacist led de-labeling protocols within the emergency department.

Self Assessment Questions:

Which of the following is NOT a negative consequence of inaccurate penicillin allergies on a patientâ€™s electronic health record?

A. Increased healthcare costs

B. Suboptimal antibiotic treatment regimens

C. Increased antibiotic resistance

D. Increased rate of allergic reaction

Which of the answer choices represents an advantage of pharmacist led de-labeling protocols conducted in an emergency department setting?

A. Lower patient exposure compared to other healthcare settings

B. Shorter wait times for labs to return

C. Resources to treat allergic reactions

D. Difficult to implement during normal workflow

Q1 Answer: D Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-695-L01-P

Evaluation of the Safety and Efficacy of Apixaban Lead-In Dosing at a Community Health System

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Purpose: Apixaban is a direct oral anticoagulant that has FDA approval for the treatment of acute venous thromboembolism (VTE). According to the 2020 American Society of Hematology guidelines, VTE treatment does not necessitate parenteral anticoagulation prior to initiating apixaban. Currently, there is no formal guidance for modifying the duration of 10mg apixaban lead-in dosing if parenteral anticoagulation is initiated. The purpose of this study is to evaluate the safety and efficacy of two different lead-in strategies for VTE treatment with apixaban.

Methods: A retrospective chart review of 100 patients from August 1st, 2018 to August 1st, 2024 will be conducted. Patients will be divided into two groups based on the length of parenteral anticoagulation and the number of 10mg apixaban doses administered. Patients included must be â‰¥18 years old and have received â‰¥48 hours of a parenteral anticoagulant for acute VTE prior to transitioning to apixaban 10mg. Patients will be excluded if apixaban was given for a non-VTE indication, no therapeutic parenteral anticoagulation was administered prior to apixaban, were already on anticoagulation prior to admission or received any oral anticoagulant other than apixaban. The primary endpoints will be bleeding and recurrent VTE events from the VTE index date. Demographic information, including age, gender, body mass index, race, and co-morbid conditions will be collected. Other data points will include which parenteral anticoagulant was administered, the duration of the parenteral anticoagulation, and number of doses of apixaban 10mg prescribed. Chi square tests will be used to analyze the data.

Results/Conclusion: Data collection and analysis are ongoing. Results and conclusions will be presented at the 2025 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review apixaban dosing for the indication of venous thromboembolism

Identify if there is a significant difference in outcomes between a shorter versus longer lead-in duration

Self Assessment Questions:

How many days should a patient initiated on apixaban 10mg twice daily for venous thromboembolism receive?

A. 5

B. 7

C. 10

D. 21

Which of the following is not an appropriate option for initial anticoagulant treatment after diagnosis of a venous thromboembolism?

A. Enoxaparin 1 mg/kg every 12 hours

B. Apixaban 10 mg twice daily

C. Rivaroxaban 20 mg daily

D. Heparin 80 units/kg, followed by 18 units/kg/hr

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-740-L01-P

Impact of an intra-dialytic hypotension treatment practice change on the usage and cost of albumin in an inpatient dialysis unit

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Intradialytic hypotension (IDH) is defined by the Kidney Disease Outcomes Quality Initiative as a decrease in systolic blood pressure by >20 mmHg or a decrease in mean arterial pressure of 10 mmHg associated with hypotensive symptoms. During dialysis, ultrafiltration causes a reduction in total blood volume, contributing to IDH and may be treated with intravenous (IV) fluid boluses. Normal saline is the preferred IV fluid for IDH treatment. At the UW Health inpatient dialysis unit, current IDH treatment includes albumin as a second-line agent after normal saline boluses, however albumin is not used for IDH at outpatient dialysis clinics.

The purpose of this quality improvement project is to reduce the cost of treating IDH by reducing albumin use while promoting more cost-effective alternative treatments in the inpatient dialysis unit. An IRB approved, retrospective chart review was performed to assess the incidence of intravenous albumin boluses compared to normal saline boluses administered to patients with end-stage renal disease who developed IDH during dialysis treatment at UW Health University Hospital between January 1, 2021 through December 31, 2023. The preliminary data collection found that 19.6% of patients given IV fluid boluses to treat IDH received albumin, costing $22,034.49. An institutional clinical tool was developed and the standard dialysis order set was changed to provide decision making support during dialysis medication selection. The clinical tool provides guidance for the prevention and treatment of IDH. Order set changes included the addition of alternative treatments to albumin for the prevention and treatment of IDH and deprioritizing albumin as a treatment option. Education was also provided to the health care team. We will review the impact of this intervention by comparing the rate of albumin use before the clinical tool was developed and after. Preliminary data will be presented at the Great Lakes Residency Conference.

Learning Objectives:

Describe preventative measures that can reduce the occurrence of intradialytic hypotension

Identify the preferred volume-repletion therapy for treating intradialytic hypotension

Self Assessment Questions:

Which of the following medications may be given prior to dialysis to prevent intradialytic hypotension?

A. Midodrine

B. Lisinopril

C. Albumin

D. Fludrocortisone

What is the most cost-effective, preferred volume repletion agent used for intradialytic hypotension?

A. 5% Dextrose boluses

B. Albumin boluses

C. 0.9% normal saline boluses

D. Midodrine

Q1 Answer: A Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-652-L01-P

Venous Thromboembolism Throughput

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Purpose: The purpose of this study was to evaluate treatment patterns and transition of care for patients diagnosed with a venous thromboembolism in the emergency department.
Methods: This was a retrospective chart review study including patients with a primary diagnosis of venous thromboembolism (VTE) in the emergency department (ED) from November 2021 to November 2023. Patients were excluded if they were <18 years of age, required hospitalization for other medical conditions, or had a history of VTE, cancer, or liver disease. The primary endpoint was to analyze characteristics of patients diagnosed with Deep vein thrombosis (DVT) or pulmonary embolism (PE) in the ED. Secondary outcomes included readmission for VTE, social determinants of health (SDOH), and time to clinic follow-up visit.
Results: 279 patients met criteria of a primary diagnosis of DVT or PE diagnosed in the ED. Overall, 50% of patients were discharged from the ED for home treatment of their VTE. 149 patients had a primary diagnosis of DVT (53%) and the median (IQR) length of stay was 3 (1,6) days. The primary anticoagulant received in hospital was a direct oral anticoagulant (DOAC) (45%) and DOACs were the main anticoagulant received on discharge (85%). Problems related to housing and economic circumstances were reported the most among the SDOH domains (19%). Readmission within 30 days of discharge for any reason occurred in 40 patients (14%) with a median (IQR) readmission of 1 (1, 2) visits. The median (IQR) days to follow-up was 153 (59,310) days. In total, 120 patients (43%) had a follow-up visit of any type (43%).
Conclusions: DOACs are utilized frequently for home treatment of VTE. Housing and economic circumstances pose a barrier to access to care. These results support the feasibility of increased outpatient treatment of VTE in a safety-net health system.

Learning Objectives:

State recommendations for home treatment of venous thromboembolism

Recognize potential barriers to care upon discharge from the emergency department

Self Assessment Questions:

According to the American Society of Hematology, which of the following recommendations is correct?

A. Apixaban is the recommended DOAC for treatment of VTE

B. Initial management of VTE is from diagnosis through week 5 of treatment

C. Home treatment should be offered to patients with an uncomplicated DVT

D. Primary treatment is given without a definitive end date of treatment

Which of the following social determinants of health domains is a primary concern for home treatment according to the MATH VTE trial?

A. Problems related to education and literacy

B. Problems related to economic circumstances

C. Problems related to physical environment

D. Problems related to social environment

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-739-L01-P

Maintenance versus Intermittent Optimal Pancreatic Cancer Treatment Schedule

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Pancreatic adenocarcinoma is the most common type of pancreatic cancer (PC). Most patients present with locally advanced or metastatic disease. For patients with metastatic pancreatic cancer (mPC) and good performance status, mainstays of treatment include FOLFIRINOX, NALIRIFOX and gemcitabine plus nab-paclitaxel. Due to the high incidence of toxicity from these regimens, various strategies to improve tolerance have been considered. The PANOPTIMOX-PRODIGE 35 phase 2 randomized trial compared 6-months FOLFIRINOX with 4-months FOLFIRINOX followed by leucovorin plus fluorouracil maintenance in patients with newly diagnosed mPC. They reported no statistical difference in median overall survival (OS) or progression-free survival (PFS) between these two groups, supporting that either a treatment holiday or maintenance chemotherapy may be appropriate for mPC patients. The primary outcome of this study is to assess the impact of intermittent chemotherapy vs continuous or maintenance chemotherapy on OS for patients with mPC. Secondary outcomes include PFS and incidence of adverse effects. This is a retrospective, single-center cohort study that will include adult patients with a diagnosis of metastatic pancreatic ductal adenocarcinoma treated with mFOLFIRINOX or gemcitabine plus nab-paclitaxel for at least 4 months. Patients will be excluded if they received previous treatment in the metastatic setting. The intermittent treatment arm will contain patients on mFOLFIRINOX or gemcitabine plus nab-paclitaxel for at least 4 months followed by a chemotherapy break (minimum 6 weeks) with the intent to resume the original chemotherapy regimen. The control arm will contain patients on mFOLFIRINOX or gemcitabine plus nab-paclitaxel for at least 4 months followed by either continuous or maintenance therapy. This project was approved by the Michigan Medicine Internal Review Board. Currently, the benefit of continued chemotherapy compared to intermittent dosing in mPC is unclear. This study will clarify the impact of intermittent dosing on survival and toxicity outcomes.

Learning Objectives:

Identify common side effects associated with mFOLFIRINOX and gemcitabine plus nab-paclitaxel therapies

Describe methods used to reduce mPC treatment related side effects

Self Assessment Questions:

Which of the following is commonly associated with cumulative dose related neuropathy?

A. Leucovorin

B. 5-FU

C. Oxaliplatin

D. Pembrolizumab

Which of the following methods are used to reduce mPC treatment related side effects?

A. Modified treatment scheduling

B. Modified dosing

C. Maintenance chemotherapy

D. All of the above

Q1 Answer: C Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-697-L01-P

Assessment of VTE Prophylaxis Timing in Patients with Intracranial Bleeding

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Purpose: This study aims to evaluate the incidence of major bleeding events in patients receiving venous thromboembolism (VTE) chemoprophylaxis at different time points after a stable CT head scan. Current guidelines recommend initiating prophylaxis with subcutaneous unfractionated heparin or low molecular weight heparin within 48 hours for patients diagnosed with intracranial hemorrhage (ICH) to minimize VTE risk, provided there is no evidence of bleed progression on CT. However, the impact of prophylaxis timing on ICH progression remains unclear. This study will assess how the timing of VTE prophylaxis influences bleeding outcomes to identify an optimal strategy for this population. Methods: This retrospective observational study will include patients aged 18 or older admitted to Ascension Borgess between January 1, 2015, and January 31, 2024, with diagnoses of intraparenchymal hemorrhage (IPH), subarachnoid hemorrhage (SAH), subdural hematoma (SDH), epidural hematoma (EDH), or intraventricular hemorrhage (IVH). Eligible patients must have received at least one dose of VTE prophylaxis (either subcutaneous heparin or low molecular weight heparin) during their admission. Patients will be grouped into five cohorts based on the timing of VTE prophylaxis relative to a stable CT scan: between admission and stable scan, 0-24 hours after the stable scan, 24-48 hours after the stable scan, 48-72 hours after the stable scan, and greater than 72 hours after the stable scan. Each cohort will be assessed for ICH progression post-anticoagulation (requiring cessation of therapy) or stability. The groups will be compared to determine whether the timing of VTE prophylaxis affects ICH progression rates. Results/Conclusions: Data analysis is ongoing, with results to be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review the value of VTE prophylaxis in in intracranial hemorrhage populations

Discuss how timing of VTE prophylaxis impacted outcomes in these patients

Self Assessment Questions:

What do current guidelines recommend the timing of VTE prophylaxis should be in patients who experience and intracranial hemorrhage after a stable head CT scan

A. <24 hours

B. <48 hours

C. <72 hours

D. >72 hours

Which of the following VTE prophylactic medication(s) did patients need to have received to be eligible for analysis in this study

A. Subcutaneous unfractionated heparin

B. Subcutaneous low molecular weight heparin

C. Intravenous unfractionated heparin

D. a + b

Q1 Answer: B Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-662-L01-P

Risk Factors for Treatment Failure in Step-Down Oral Antibiotic Therapy for Uncomplicated Bacteremia Secondary to a Urinary Sourceâ€¯

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Purpose: To compare the risk factors for treatment failure between oral beta-lactams versus fluoroquinolones versus trimethoprim-sulfamethoxazole in the treatment of uncomplicated gram-negative bloodstream infections secondary to a urinary source.â€¯Methods: This retrospective, nested case-control study evaluated patients treated for uncomplicated Enterobacterales bacteremia originating from a urinary source. Patients admitted to Parkview Health System between October 1, 2023, and September 30, 2024, were eligible if they had concurrent blood and urine cultures resulting within 72 hours of one another and yielding a matching Enterobacterales organism. Patients were included if they received an intravenous (IV) antibiotic and then transitioned to an oral antibiotic for completion of therapy. The oral antibiotics of interest included beta-lactams, fluoroquinolones and trimethoprim-sulfamethoxazole. Exclusion criteria included immunocompromised status, fever within 24 hours of switching to oral therapy, and pressor use within 24 hours of or after starting oral therapy. Data were collected using the electronic medical record (EMR), with manual chart review performed for data points not automatically extractable. Automated data collection encompassed demographic and clinical variables such as patient age, sex, identified organisms in blood and urine cultures, and the intravenous and oral antibiotics administered. Additional automated data points included metrics to assess treatment failure risks, such as antibiotic start and end dates, placement of an infectious disease (ID) consult during admission, admission to the intensive care unit (ICU), and the presence of kidney stones or urethral stents. Manual chart review was used to determine the duration of IV antibiotics and the start date of effective oral antibiotic therapy based on culture susceptibilities. The accuracy of all automated data points was validated by manually reviewing 10% of the included patient records. Results/Conclusions: Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Define uncomplicated bacteremia and appropriate oral step-down dosing strategies.

Discuss risk factors associated with oral treatment failure in uncomplicated gram-negative bacteremia.

Self Assessment Questions:

A patient is currently being treated for a pan-susceptible, uncomplicated, E. coli bacteremia secondary to a urinary source. The provider would like to step down from an intravenous antibiotic to an oral option. Which of the following antibiotics is dosed in accordance with Delphi expert consensus recommendations AND would be a viable option for step-down therapy?

A. Amoxicillin 1G Q8h

B. Cephalexin 500 mg Q6h

C. Trimethoprim-sulfamethoxazole 5 mg/kg Q24h

D. Levofloxacin 750 mg Q12h

Which of the following is a risk factor for treatment failure when transitioning to oral antibiotics in the management of gram-negative bacteremia?

A. Delayed initiation of oral therapy

B. Having a temperature of 99.8Â°F within 24 hours prior to transitioning

C. The use of pressors 12 hours prior to initiation of oral therapy

D. Lack of comorbid conditions

Q1 Answer: A Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-737-L01-P

Hemodynamic Effects from Push-Dose Epinephrine Administration

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Statement of Purpose
Push-dose epinephrine (PDE) is a resuscitation technique purposed to restore perfusion in patients affected by hypotension. Though it offers rapid hemodynamic support, adverse events have been reported. Despite continued widespread use, clear evidence on PDEâ€™s efficacy and safety remains limited. This study aims to quantify the hemodynamic effects of PDE and inform its use in critically-ill patients.

Statement of Methods Used
This retrospective cohort study reviewed anesthesia records from August 2023 to August 2024. Adult patients (â‰¥18 years) who received â‰¥1 intravenous epinephrine bolus were included. Patients who were pregnant, incarcerated, or undergoing high blood loss procedures were excluded. Primary outcomes included maximum changes in mean arterial pressure (MAP) and adverse hemodynamic events. Secondary outcomes were changes in heart rate (HR), high-dose epinephrine use (>100 mcg), additional vasoactive support, rescue interventions, and patient disposition. Statistical analysis used descriptive statistics, paired t-tests, and multivariate regression. A sample size of 357 was calculated to detect a 50% adverse event rate with 95% confidence.

Summary of Preliminary Results
Preliminary analysis of 62 patients (mean age 58.8 years, BMI 32 kg/m2, 50% with hypertension) showed baseline blood pressure (BP) 93/52 mmHg, HR 65 bpm, and MAP 65 mmHg. The initial PDE dose averaged 8.7 mcg (range 2â€“20 mcg). Patients on average had peak vitals at 4 minutes post-administration, achieving a BP 108/59 mmHg and MAP 74 mmHg. Additional epinephrine was given 24 times within 10 minutes.
Alternative vasoactive agents were used in 22 patients, primarily phenylephrine (13) and norepinephrine (11). Propofol was administered twice (mean dose 525 mg) for presumed hypertension, and atropine once for a bradycardic event.

Conclusions Reached
PDE was shown to increase BP, peaking at 4 minutes, but often received PDE re-dosing and supplemental vasoactive agents with few episodes of hemodynamic excursions.

Learning Objectives:

Discuss the durability of PDE's effect on blood pressure, heart rate, and mean arterial pressure, including the time to peak effect and the frequency of additional dosing or adjunctive vasoactive agents

Report the expected frequency of adverse hemodynamic events and additional interventions required, to inform evidence-based use of PDE in emergency and critical care settings.

Self Assessment Questions:

What was the primary hemodynamic effect observed after the administration of push-dose epinephrine (PDE) in the study?

A. Significant decrease in heart rate

B. Improvement in blood pressure, peaking at 4 minutes

C. Stabilization of blood pressure for over 30 minutes

D. Frequent hypotensive events after administration

What percentage of patients required additional epinephrine or vasoactive agents within 10 minutes of initial PDE administration?

A. 0.1

B. 0.75

C. 0.38

D. 0.5

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-700-L01-P

Impact of Pharmacist Intervention in Patients with Beta-Lactam Allergies at a Community Hospital

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Statement of purpose:
The objective of this study was to determine the impact of pharmacist intervention on patients with a documented beta-lactam allergy who are receiving antibiotic treatment at a resource-limited community hospital.
Statement of methods used:
A pharmacist was dedicated to assessing and intervening on beta-lactam allergies during a 4-week period. Patients aged 18 years or older with a documented beta-lactam allergy receiving antibiotics were included. Exclusion criteria consisted of surgical patients, unverified or anaphylactic cephalosporin allergies, severe beta-lactam induced adverse drug reactions, antibiotic orders started 72 hours or more before intervention, sedated patients, or combative patients. The pharmacist conducted a thorough chart review of past antibiotic use; then performed an interview with a standardized questionnaire. After analysis of information, possible interventions included: optimization of antibiotic therapy, de-labeling of allergy, allergy clarification (de-escalation or escalation), recommended outpatient allergist consult, documented previous tolerance(s) in the medical chart, patient education, or other. Time analysis was conducted to evaluate mean and median time spent assessing and intervening on each patient.
Summary of results to support conclusion:
Forty patients were included in the study receiving one or more interventions. The most common infections being treated were skin/soft tissue infections (24.4%) and genitourinary infections (17.8%). The severity of allergic reactions was non-anaphylactic (53.3%) vs anaphylactic (13.3%). A total of 90 interventions were performed. The most common interventions performed amongst the study population included: patient education (95%), documented previous tolerance(s) (75%), and de-labeling of allergy (22.5%). The mean and median amount of time spent per patient was 42 minutes and 40 minutes, respectively.
Conclusions:
The findings of this study demonstrated the impact of a pharmacist assessing and intervening on patients with documented beta-lactam allergies. The future goal of this study is to determine resources needed and develop a beta-lactam allergy management guidance document for the antimicrobial stewardship program.

Learning Objectives:

Identify the impact of pharmacist intervention on patients with documented beta-lactam allergy who are receiving antibiotic treatment

Describe interventions that can be made to improve outcomes in patients with beta-lactam allergies

Self Assessment Questions:

What actions can a pharmacist take to improve outcomes in patients with a documented beta-lactam allergy in a resource-limited community hospital?

A. Document previous toleration of antibiotic use on documented allergies in the medical chart
B. Provide patient education on the repercussions of allergies in future antibiotic decisions
C. Reclassify documented allergies on file to accurately represent the reported reaction
D. All of the above

What are key considerations to standardizing the approach to assessing beta-lactam allergies?

A. Execute standardized questionnaire
B. Review the medical chart for previous antibiotic administration and tolerance
C. Utilize a cross-reactivity chart
D. All of the above

Q1 Answer: D Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-619-L01-P

Safety and Efficacy of Oxandrolone vs Somatropin/Testosterone in Adult Patients with Severe Burns

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Purpose: Historically oxandrolone, a testosterone analogue, was used to prevent muscle breakdown in severe burn patients and was shown to reduce length of stay (LOS) and increase weight gain. However, the Food and Drug Administration (FDA) removed this agent from the market in June 2023. Alternative therapies include testosterone, an anabolic steroid, and somatropin, a recombinant human growth hormone (rhGH). The purpose of this study was to compare the safety and efficacy of oxandrolone vs somatropin/testosterone in adult patients with severe burns.

Methods: A single-center, retrospective, observational, cohort, non-inferiority study conducted at an American Burn Association (ABA)-accredited burn center. This study consisted of two treatment arms, oxandrolone and somatropin/testosterone. Data was collected from 11/28/2022-11/27/2023 in the oxandrolone group and 11/28/2023-11/30/2024 in the somatropin/testosterone group. The primary outcome was LOS and safety outcomes included incidence of hepatic dysfunction in patients who received oxandrolone or testosterone and hyperglycemia in patients who received somatropin.

Results: The oxandrolone group (n = 20) and somatropin/testosterone group (n = 16) were well-matched with respect to age, total body surface area (TBSA), and type of burn. There was not a statistically significant difference in LOS for oxandrolone versus somatropin/testosterone (35 days versus 25 days, p = 0.594). Four (20%) of the oxandrolone patients required dose adjustments due to hepatic dysfunction versus zero in the somatropin/testosterone group and hyperglycemia was reported in zero somatropin patients. Additionally, there was not a statistically significant difference between oxandrolone and somatropin/testosterone in secondary outcomes including mortality rate (15% versus 25%, p = 0.675), infection rate (70% versus 50%, p = 0.367), and change in weight (-2.6 pounds [lbs] versus -1.9 lbs, p = 0.857).

Conclusion: Preliminary results support noninferiority of somatropin/testosterone to oxandrolone when assessing mortality rate, infection rate, weight loss, and LOS with no significant increase in safety concerns.

Learning Objectives:

Describe the necessity of oxandrolone, somatropin, and testosterone in patients with severe burns

Discuss findings from study results

Self Assessment Questions:

What benefits have been shown in the literature for oxandrolone, somatropin, and testosterone in patients with severe burns?

A. These agents have been shown to reduce mortality in this patient population.

B. These agents have been shown to reduce muscle breakdown and improve wound healing.

C. These agents prevent the formation of scar tissue by inhibiting the production of collagen, thus healing skin without any noticeable marks.

D. These agents have not been shown to have any benefit in this patient population.

Which is correct based on the results of this study?

A. Somatropin/testosterone is superior to oxandrolone but has no significant increase in safety concerns.

B. Somatropin/testosterone is non-inferior to oxandrolone but has a significant increase in safety concerns.

C. Somatropin/testosterone is superior to oxandrolone and has a significant increase in safety concerns.

D. Somatropin/testosterone is non-inferior to oxandrolone and have no significant increase in safety concerns

Q1 Answer: B Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-719-L01-P

Utilization of an EHR Dashboard to Improve Documentation of Unreconciled Controlled Substance Dispenses

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A medication is considered unreconciled when there is no documented administration or the dispensed amount does not match the amount administered, wasted, or returned. Unreconciled dispenses pose several issues, including inaccurate accounting of controlled substances, potential financial discrepancies, and possibly masking diversion of controlled substances. Utilization of an electronic health record (EHR) report of unreconciled dispenses is one of several possible surveillance methods to detect potential controlled substance diversion. This report can also be embedded within an EHR dashboard for ease of use. The dashboard can incorporate components that can query databases and enables visual representation of a large amount of data in a concise and easily interpretable manner. Within the dashboard, embedded reports can provide real-time data that enables users to make operational decisions or can display trends over periods of time.

The objective of this study is to determine the extent to which the utilization of an EHR reporting dashboard by nursing leaders decreases unreconciled dispenses. An existing report available through the EHR will be used to identify a baseline of average daily unreconciled dispenses. A dashboard was built to include an unreconciled dispenses report that provided real-time data as well as a visualization of historical data. This dashboard was integrated into the nursing leadership workflow on select units covering different levels of care and reviewed regularly. The primary endpoint was the difference between the average daily number of unreconciled dispenses over the study period pre- and post-implementation of the EHR dashboard. The secondary outcome was the rate of interaction with the dashboard report to assess the ease of use of the tool.

Learning Objectives:

Describe the implications of unreconciled controlled substance dispenses within a healthcare system.

Identify a potential solution to improving controlled substance documentation within a healthcare system.

Self Assessment Questions:

Which of the following is a potential consequence of unreconciled controlled substance dispenses?

A. Reduced workload for nursing staff

B. Masking controlled substance diversion

C. Enhanced transparency in financial reporting

D. Fewer medication administration errors

Which of the following methods can be used to monitor unreconciled controlled substance dispenses?

A. Verbal reports from nursing staff

B. Tracking inventory

C. Electronic health record reports

D. It is not necessary to monitor unreconciled dispenses for controlled substances

Q1 Answer: B Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-754-L04-P

Desmopressin Reversal of Antiplatelet Therapy for Intracranial Bleeds

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Purpose

Increased utilization of intravenous desmopressin acetate (DDVAP) has been recognized in the Indiana University (IU) Methodist Hospital Emergency Department and intensive care units for intracranial bleed (ICB) reversal in patients with a documented history of taking aspirin, a purinergic receptor type Y, subtype 12â€¯(P2Y12) inhibitor, or both. The 2016 Neurocritical Care Society Guideline for Reversal of Antithrombotics in Intracranial Hemorrhage suggests that a single dose of DDAVP 0.4 mcg/kg IV may be considered in these patients. Similar to previous research, our study aims to evaluate the efficacy, defined as presence of hematoma expansion, of DDAVP administration in patients presenting with an ICB who are taking aspirin and/or a P2Y12 inhibitor prior to arrival. Unique to previous research, our study will additionally aim to evaluate whether administration of desmopressin was appropriate based on TEG values, as well as analyze differences in pre- and post-DDAVP TEG values.

Methods

This is a retrospective, observational cohort study based on chart review at a single tertiary academic medical center. The primary objective of this study is to determine the difference in percentage of patients with documented aspirin and/or P2Y12 use that develop hematoma expansion as shown on a repeat head computed tomography (CT) scan within 24 hours of presentation to the hospital between those that receive DDAVP and those that do not. Secondary objectives include determining differences in inpatient mortality, need for surgical or medical intervention related to expansion of bleed, hyponatremia, and patient functional outcomes based on administration of DDAVP.

Results

Results and conclusions will be presented at the 2025 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize the mechanism of DDAVP when used for antiplatelet reversal

Recall the dose of DDAVP recommended by guidelines to reverse antiplatelet medications in the setting of an intracranial hemorrhage

Self Assessment Questions:

What is the proposed mechanism by which desmopressin reverses the effects of an antiplatelet medication?

A. Antiplatelet neutralization by means of direct binding to it and its metabolites

B. Increased procoagulant and anti-fibrinolytic factors

C. Increased factor VII plasma levels

D. Increased factor VIII plasma levels

What dose of desmopressin is recommended by the 2016 Neurocritical Care Society Guidelines for antiplatelet reversal?

A. 0.3 mcg/kg

B. 0.4 mcg/kg

C. 0.3 mg/kg

D. 0.4 mg/kg

Q1 Answer: D Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-692-L01-P

Evaluation of Therapeutic Enoxaparin Dosing in Patients with Severe Renal Impairment

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Purpose: Enoxaparin has traditionally been avoided in patients with severe renal impairment (SRI; CrCl < 30 mL/min) due to concerns about drug accumulation and bleeding risk. Despite limited supporting evidence, enoxaparin is preferred over heparin at Detroit Medical Center (DMC) for its infrequent monitoring requirements and extended dosing intervals, which align with institutional goals to optimize operational efficiency and expedite therapeutic outcomes. This study aims to evaluate the safety and efficacy of therapeutic enoxaparin dosing in SRI patients.

Methods: This retrospective cohort study involves chart reviews of patients admitted to DMC hospitals (Harper University, Detroit Receiving, Sinai-Grace, and Huron Valley) between November 2017 and July 2024. Inclusion criteria are adult patients aged 18â€“89 years diagnosed with SRI, who received â‰¥3 doses of enoxaparin 1 mg/kg SC daily for indications such as DVT/VTE, unstable angina, NSTEMI, atrial fibrillation, valve replacement, or LV thrombus, and had at least one appropriately timed anti-Xa level. Patients with pregnancy, heparin allergy, or heparin-induced thrombocytopenia were excluded. The primary endpoint is the enoxaparin dose (mg/kg) achieving a therapeutic anti-Xa level (< 0.5 IU/mL). Secondary endpoints include rates of bleeding and thrombotic events, defined per ISTH criteria and confirmed through imaging or chart review. Data collection for approximately 350 patients includes demographics, CrCl, comorbidities, anticoagulation indications, and clinical outcomes.

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

Learning Objectives:

Describe the pharmacokinetics of enoxaparin in patients with severe renal impairment.

Discuss existing literature on the safety and efficacy of therapeutic enoxaparin dosing in patients with severe renal impairment.

Self Assessment Questions:

1. According to 2012 AHA/ASA guidelines, what is the recommended anti-Xa trough level range for patients with severe renal impairment receiving enoxaparin therapy?

A. <0.5 IU/mL

B. 0.5-1 IU/mL

C. 1-1.5 IU/mL

D. 1.5-2 IU/mL

2. Which of the following bleeding events would be classified as major per the ISTH criteria?

A. A mild nosebleed lasting less than 5 minutes

B. Bruising at the site of enoxaparin injection

C. Bleeding requiring a transfusion of â‰¥2 units of blood

D. A drop in hemoglobin of 0.5 g/dL without overt bleeding

Q1 Answer: A Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-588-L01-P

The Impact of Depression on Adherence in Patients Taking Oral Oncolytics

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Purpose

Depression is a common comorbidity in patients with cancer which harms prognosis, quality of life, and duration of hospitalization. This was an ongoing study that was initially able to quantify the incidence of depression in patients taking oral chemotherapy. Further research was conducted to quantify the severity of depression in these patients and their adherence to oral oncolytic regimens. The aim of this study was to determine if there was any correlation between depression and oral oncolytic adherence.

Methods

Patient information from January 1st, 2021, to August 30th, 2023, was obtained from the Indiana University Health electronic health record through retrospective chart review. Prescription information for oral oncolytics and antidepressants was obtained from the Advanced Therapy Pharmacy, specific manufacturers, external prescription history in Cerner, and provider-documented medication histories. Adult patients that started an oral oncolytic with indefinite intent or metastatic disease were 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 were excluded. Depression was identified and quantified using the patient health questionnaire 2 and 9 (PHQ2/PHQ9), ICD-10 codes for depression, and use of antidepressants for psychiatric purposes. Adherence was measured by the difference in the intended start date of the cycle and the date the medication was started by the patient. Patients that were less than 1 week late to start their prescription are considered adherent while all others are non-adherent. Depression scores and adherence data was correlated using Spearmanâ€™s correlation analysis. Patient outcomes were gathered through Indiana University Health Ball Memorial Cancer Centerâ€™s data.

Preliminary Results/Conclusions

To be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize the effects of depression along with its lack of treatment on prognosis, quality of life and hospitalization in cancer patients.

Relate depression, adherence and clinical outcomes in patients taking oral oncolytics.

Self Assessment Questions:

In patients with major depression and cancer what percent were being treated with a mental health professional?

A. 1

B. 0.73

C. 0.24

D. 0.05

Which was the most common reason for discontinuation of oral oncolytic therapy in cancer patients in this study?

A. Toxicity/adverse effects to therapy

B. Completion of therapy

C. Death related to or unrelated to cancer diagnosis

D. Progression of cancer

Q1 Answer: D Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-848-L01-P

Establishing and Evaluating the Benefits of Virtual Pharmacy Services

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Studies show that Virtual Pharmacy Services (VPS) enhance clinical pharmacy care while reducing workload for on-site pharmacists. With increasing workforce shortages and limited resources in healthcare, VPS leverages telehealth technology to extend pharmacy services, particularly in inpatient medicine and surgery. Froedtert Health currently uses virtual positions within the pharmacy team to support on-site pharmacists and provide coverage for smaller community hospitals. VPS aims to complement these services, optimizing pharmacy care across the organization.

This projectâ€™s goal is to pilot VPS at Froedtert Hospital and Froedtert Menomonee Falls Hospital, evaluating its effectiveness in reducing pharmacist workload. The study will follow a pre- and post-implementation design, beginning with a comprehensive assessment of current pharmacist workloads. The pilot will consist of two phases, separated by a washout period, allowing for a full evaluation of VPSâ€™s impact.

The primary outcome is to measure the change in the percentage of time pharmacists spend on time-intensive tasks. Prior to the pilot, a pharmacist survey and a workload assessment will estimate the average time spent on various activities, such as profile review, transitions of care, and clinical tasks. Based on these pre-implementation results, the VPS pilot will target the most time-consuming activities to help reduce strain on pharmacists. Secondary outcomes will include surveys to gauge pharmacists' perspectives on workload before and after VPS implementation. This will provide valuable insight into how VPS affects their job satisfaction and perceived workload

The expected outcome is a reduction in the time pharmacists spend on designated tasks and a shift in pharmacists' perceptions of their workload. VPS will increase flexibility in pharmacy services, provide a timely response to staffing challenges, and lay the foundation for the future integration of virtual services across the organization. This initiative will streamline workflow, improve service delivery, and benefit both pharmacists and patients.

Learning Objectives:

Discuss the activities able to be completed by traditional acute care pharmacists and virtual pharmacy services

Define the role of virtual pharmacy services within the acute care setting

Self Assessment Questions:

Which of these tasks can be completed by both traditional acute care pharmacists and virtual pharmacy services?

A. Profile Review

B. Consults

C. Order Verification

D. All of the above

Which of the following best describes the role of virtual pharmacy services?

A. Provides the option to remove pharmacist from de-centralized locations

B. A system that allows all acute care pharmacists to work from home

C. A way to optimize pharmacist workload through task redistribution and the leveraging of expanded tele-health capabilities.

D. Allows for outpatient retail locations to staff acute care positions during the workday

Q1 Answer: D Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-749-L04-P

Examining the Utilization of Molecular Testing in Non-Small Cell Lung Cancer at a Single VA

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Immunotherapy and targeted therapy agents can be more effective than traditional chemotherapy alone in non-small cell lung cancer (NSCLC) with actionable mutations or biomarkers discovered through molecular testing. This study evaluated molecular testing ordering within Lexington VA Healthcare System (LVAHCS) in Veterans diagnosed with NSCLC to identify areas of optimization in the process. All Veterans diagnosed with NSCLC at the LVAHCS in 2023 were identified using the tumor registry. The timeline from diagnosis, establishing care with medical oncology, test ordering and results, and receiving treatment was determined. The primary outcome was the percentage of Veterans receiving molecular testing in alignment with National Precision Oncology Program (NPOP) standards. Secondary outcomes included time from diagnosis to first appointment with medical oncology, PD-L1 results, and NGS results and the number of Veterans receiving treatment prior to molecular testing results. Of the 114 Veterans diagnosed with NSCLC at the facility in 2023, 62 were excluded from analysis due to receiving non-VA care or incomplete staging. Of the 52 remaining Veterans, the testing status of 40 (76.9%) was in alignment with NPOP standards, 5 (9.6%) received testing without indication, and 7 (13.5%) with indication were not tested. Average time from diagnosis to initial appointment with medical oncology was 53.61 days. PD-L1 and NGS results were received an average of 68.62 and 72.8 days after diagnosis, respectively. Systemic treatment with traditional chemotherapy +/- immunotherapy was initiated in 7 Veterans (13.5%) before molecular testing results had returned. Due to the omission of molecular tests in some with indication and delay in the ordering of molecular tests after diagnosis, it is reasonable to target this process for quality improvement initiatives.

Learning Objectives:

Define molecular testing

Report findings of a single center review of molecular testing practices

Self Assessment Questions:

What is next-generation sequencing?

A. A new type of biopsy that can only be performed in those with NSCLC

B. A test that predicts the likelihood of adverse effects from chemotherapy

C. A method for analyzing genetic material to determine if certain mutations are present on cancer cells

D. A technique that analyzes genetic material to predict if a patientâ€™s child has a high risk of cancer

What was the average length of time between diagnosis and first appointment with medical oncology?

A. 14.0 days

B. 25.3 days

C. 53.6 days

D. 95.1 days

Q1 Answer: C Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-633-L01-P

Providers' Knowledge and Perceptions Regarding Basal-bolus Insulin Therapy Utilization in Acute Care Settings.

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An internal survey among directors of pharmacy revealed that knowledge regarding basal-bolus insulin therapy utilization was limited. Variable glycemic control in hospitalized patients has been associated with adverse health outcomes and increased healthcare costs. Despite the documented evidence for basal-bolus insulin therapy for glycemic management in acute care settings, clinician- and health care system-related challenges present numerous obstacles for its consistent implementation and utilization. Studies assessing providersâ€™ knowledge and perceptions regarding basal-bolus insulin therapy use are limited. The aim of this study is to evaluate the knowledge and perceptions of basal-bolus insulin therapy among providersâ€™ practicing in acute care settings.
Methods:
An anonymous, self-administered online survey will be utilized to assess providersâ€™ knowledge and perceptions regarding basal-bolus insulin therapy in acute care settings. The target population will include healthcare providers such as family and internal medicine residents, critical care specialists, hospitalists, and pharmacists practicing in acute care settings. Participants will be recruited via email, using departmental and institutional contact lists. Data collection will take place from January to February 2025. The survey will include approximately 20 questions focusing on both objective knowledge of basal-bolus insulin therapy and subjective perceptions of its use and challenges in clinical practice. Questions will address clinical guidelines, indications, barriers to implementation, and familiarity with relevant protocols. Additionally, baseline characteristics will be collected, including demographic information (age, gender), years of practice, specialty, and the frequency of insulin therapy use in their practice setting. Responses will be recorded using a 5-point Likert scale for perception-based questions, and multiple-choice or true/false for knowledge-based questions. Descriptive and inferential statistics will be used to analyze the data.

Learning Objectives:
Describe best practices for basal bolus insulin
Identify resources that may contribute to increasing utilization of basal insulin
Self Assessment Questions:
Which of the following best aligns with evidence-based best practices for basal-bolus insulin therapy in hospitalized patients?
A. Utilizing sliding scale insulin as the primary method of glucose control
B. Administering basal insulin in combination with scheduled prandial and correctional insulin
C. Avoiding insulin therapy in patients with type 2 diabetes to prevent hypoglycemia
D. Prescribing basal insulin only for patients already using it at home
Which of the following resources can help improve the utilization of basal insulin therapy in hospitalized patients?
A. Institutional protocols based on the American Diabetes Association (ADA) and American Association of Clinical Endocrinology (AACE) guidelines
B. Manufacturer-sponsored promotional materials
C. Social media discussions among healthcare professionals
D. Anecdotal reports from providers with personal experience
Q1 Answer: B Q2 Answer: A
APCE Universal Activity Number 0121-9999-25-747-L04-P

Assessing Time to Appropriate Antibiotic Therapy with the Use of Blood Culture Rapid Diagnostic Systems in Combination with Pharmacist-Led Stewardship Efforts
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Purpose: Multi-drug-resistant organisms (MDROs) have been increasing within many healthcare institutions. Ineffective antimicrobial therapy compromises patient outcomes. Rapid diagnostic blood culture platforms can quickly identify microorganisms with resistance genes. A previous study at the Indiana University Health Academic Health Center (AHC) showed that hospitals with a real-time notification of blood culture results to a clinical pharmacist reduced time to appropriate antibiotic therapy. The objective of this study is to assess the time to appropriate antibiotic therapy at IU Health AHC compared to other hospitals in the health system after undergoing the expansion of the notification system.
Methods: This was a retrospective chart review conducted between multiple hospitals within the IU Health system including data from the calendar year 2023 compared to data from the previous study in 2020 to assess the impact of expanding the notification system to all hospitals. Inclusion criteria were if the patient was admitted to an adult IU Health institution with a critical BiofireÂ® result. Exclusion criteria were hospice/death before interpretation of results, transfer to another institution before interpretation of results, known sensitivity before admission, admission to Riley Hospital for Children, and Candida tropicalis false positive. A subgroup analysis was conducted to look at data within the hospitals in the current study to highlight any further process improvements that could be made.
Results: We found that the time to appropriate antibiotic therapy decreased from 13.5 hours to 2.9 hours among the community hospitals in the IU Health system after the expansion of antimicrobial stewardship efforts. The time to order entry of these antibiotics also decreased along with patientsâ€™ length of stay.
Conclusion: The use of rapid diagnostic testing in conjunction with antimicrobial stewardship efforts has been shown to improve the time of appropriate therapy administration and order entry along with improving the length of hospital stay.

Learning Objectives:

Define critical results regarding rapid diagnostic testing on positive blood cultures and its appropriate antimicrobial therapy.

Recognize the importance of timing of administration of appropriate antimicrobial therapy in patients with bacteremia.

Self Assessment Questions:

A patient is initiated on piperacillin/tazobactam and vancomycin for an intra-abdominal abscess. Which of the following would be an appropriate action after receiving an alert that the patient has Enterococcus faecium (VRE) in the blood identified by PCR?

A. Change vancomycin to daptomycin or linezolid based on initial PCR results
B. Continuing empiric therapy with piperacillin/tazobactam and vancomycin until susceptibilities finalize
C. Narrowing to ampicillin which is preferred to cover Enterococcus species per IU Health antibiogram
D. Discontinuing vancomycin and continuing piperacillin/tazobactam monotherapy

Which of the following interventions did this study show to reduce time to appropriate antibiotic therapy?

A. An education program focused on antibiotic administration

B. Standardized antibiotic prescribing guidelines without the use of a notification system of critical blood culture alerts
C. A traditional patient chart review system

D. Rapid diagnostic testing along with pharmacist-led stewardship efforts with the use of a real-time notification system

Q1 Answer: A Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-627-L01-P

Evaluating Clinical Outcomes in a Pharmacist-Led Pharmacotherapy Clinic for Hypertension and Lung Disease Management

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This study evaluates the effectiveness of a Pharmacist-Led Pharmacotherapy Clinic (PTC) in managing uncontrolled hypertension and poorly controlled chronic obstructive pulmonary disease (COPD) or asthma. Operating under established collaborative practice agreements, the clinic seeks to optimize medication regimens, improve adherence, and reduce healthcare utilization. Findings will help determine the clinicâ€™s impact on chronic disease management and guide potential expansion to other high-need conditions, to enhance access to specialized pharmacist care within our health system.

This observational study includes patients referred to the clinic meeting specific criteria:
1. Hypertension: Prescribe two or more antihypertensive medications and five or more total medications.
2. Lung Diseases: At least one hospital or emergency department visit related to their condition in the last three months.
Baseline data, including demographics, initial blood pressure readings, medication regimens, and recent hospitalizations, are being collected. Follow-up data is being recorded to assess blood pressure control, symptom burden for COPD/asthma using validated assessment tools, medication adherence, hospital readmissions, and emergency department visits.

Data collection is ongoing, and early trends suggest that pharmacist-led interventions may contribute to improved blood pressure control in patients with hypertension and enhanced symptom management in patients with COPD and asthma. Further analysis will provide a clearer understanding of the impact of the Pharmacotherapy Clinic on chronic disease management.

Preliminary findings suggest that the Pharmacist-Led Pharmacotherapy Clinic effectively supports chronic disease management by optimizing medication regimens and improving clinical outcomes. Continued patient enrollment and data collection will provide a clearer understanding of the clinicâ€™s overall impact. These findings may also inform future efforts to enhance care coordination, strengthen referral pathways for complex patients, and explore the clinicâ€™s potential expansion to additional chronic conditions.

Learning Objectives:

Recognize the role of pharmacists in improving chronic disease management and their potential impact on healthcare systems

Describe the impact of our pharmacist-led pharmacotherapy clinic on patient outcomes, including blood pressure control and emergency department visit reduction

Self Assessment Questions:

What is a key benefit of pharmacist-led clinics in managing chronic diseases?

A. They primarily focus on providing patient education and lifestyle recommendations, with no authority to adjust medications or initiate therapy changes

B. They provide comprehensive medication management, improve adherence, and reduce healthcare utilization

C. They are designed primarily for acute care settings and are not structured to manage chronic disease progression

D. They emphasize deprescribing and minimizing medication use, prioritizing the reduction of polypharmacy over disease control and symptom management

What is a primary outcome measure for lung disease patients in this study?

A. Assessment of lung function improvements through spirometry, focusing on forced expiratory volume and peak flow measurements

B. Tracking of patients who achieve complete symptom resolution within three months without the need for ongoing maintenance therapy

C. Reduction in the combined rate of hospital readmissions and emergency department visits related to lung diseases

D. Evaluation of medication regimen changes, including dose reductions or discontinuation of inhaled therapies, as a measure of disease stability

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-511-L01-P

Comparison of Angiotensin II (Giapreza) Use for Perioperative Hypotension surrounding Kidney Transplantation between Black and non-Black Patients

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Purpose: Kidney transplantation is the preferred treatment for end stage renal disease and perioperative hypotension poses risk to graft function and survival. Angiotensin II (AngII) is a vasoconstrictor targeting the renin-angiotensin-aldosterone-system (RAAS) to increase blood pressure. Endogenously, renin is needed to produce active AngII. Black patients commonly have hyporeninemia leading to upregulation of angiotensin receptors secondary to lower levels of endogenous AngII. This means Black patients may respond more effectively to synthetic angiotensin II (AT2s) than non-Black patients. The purpose of this study is to assess the difference between Black and non-Black patients in response to AT2s when needed for hypotension during kidney transplantation.
Methods: This is a single-center, retrospective cohort study. 305 adult patients requiring AT2s as a first-line vasopressor for hypotension during kidney transplantation at an academic medical center from 1/1/21 and 9/1/24 were included and stratified into Black (122) and non-Black (183) patient groups. Pregnant patients and prisoners were excluded. The primary outcome will be the total dose of AT2s received during the intraoperative and postoperative phase of kidney transplantation. Secondary outcomes will include graft function (categorized as slow, delayed, or immediate based on the change in serum creatinine and need for renal replacement therapy), duration of AT2s use, need for additional vasopressors, and 28-day mortality. Safety outcomes will include tachyarrhythmias and thrombosis. Outcomes will be analyzed for normality of data to determine the appropriate test of central tendency and statistical tests (chi-square, t-tests or Wilcoxon rank sum) will be used to compare the two groups. Additionally, linear and logistic regression analyses will be performed to determine variables associated with total AT2s dose and poor allograft function, respectively.

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

Learning Objectives:

Recognize the utility of synthetic angiotensin II in comparison to other vasopressors

Identify why Black patients may have a different response to synthetic angiotensin II

Self Assessment Questions:

What adverse effect associated with catecholamines may occur less frequently with Angiotensin II?

A. Thrombotic events

B. Digital Ischemia

C. Arrhythmias

D. Splanchnic Ischemia

Compared to other races, Black patients may respond differently to Angiotensin II because they:

A. are more likely to have lower levels of renin

B. do not have endogenous angiotensin II

C. have more difficulty converting angiotensin I to angiotensin II

D. cannot convert angiotensinogen to angiotensin I

Q1 Answer: C Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-687-L01-P

Evaluation of a pharmacist-driven electrolyte replacement protocol in a community health system

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Purpose: Electrolytes are essential for countless physiologic functions, so it is critical to address deficiencies to prevent harmful sequelae. Outcomes vary in severity from asymptomatic to life-threatening conditions; examples include arrhythmias and seizures. Our institution allows providers to consult pharmacy to manage electrolyte(s) utilizing a hospital-approved protocol. Any practitionerâ€™s electrolyte management carries a risk of practice variability; examples include inappropriate laboratory monitoring, under- or over- correction, or suboptimal dosage form choice. This is an evaluation of provider use of the pharmacy-to-dose electrolyte consult, application of the pre-approved replacement protocol, and electrolyte response to explore optimal utilization for electrolyte replacement therapies.
Methods: This retrospective chart review evaluates current use of a pharmacy-to-dose electrolyte protocol within a community health system. It includes hospitalized patients aged 18 years or older, who had a consult order placed for pharmacist-managed electrolyte(s) during their admission from August 2023 to August 2024. Patients were excluded if the consultation was initiated while the patient was in an intensive care unit (ICU) or emergency department (ED). Providers within our health system can enter a pharmacy-to-dose consult order for potassium, calcium, magnesium, or phosphorus. Once consulted, pharmacists manage the electrolyte(s) by ordering labs and supplementation as recommended under the pre-approved replacement protocol. The primary objective of this study aims to evaluate the appropriateness of consult order(s), defined by the availability of laboratory values and presence of abnormalities based on hospital-accepted parameters at time of consultation. Secondary measures will include congruence of replacement dosage, administration timing, suitable formulations, and impact of follow-up monitoring. Each of the four electrolytes will also be individually assessed to identify potential areas of concern and trends for targeted interventions.
Results/Conclusions: Data collection and analysis ongoing; results and conclusions will be presented at the 2025 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize consequences of electrolyte abnormalities and the importance of repletion while inpatient.
Discuss best practices for providers to get pharmacist assistance in appropriate electrolyte replacement.

Self Assessment Questions:

A 65-year-old male presents with muscle weakness and ECG changes showing peaked T waves. Which electrolyte abnormality is most likely responsible for these findings?
A. Hypocalcemia
B. Hyponatremia
C. Hyperkalemia
D. Hypomagnesemia
Electrolyte management decisions are least affected by:
A. Patient temperature
B. Patient swallow cabability
C. Intravenous access
D. Telemetry monitoring
Q1 Answer: C Q2 Answer: A
APCE Universal Activity Number 0121-9999-25-601-L01-P

The Adaptive Role of Transplant Pharmacists: A Comparative Analysis of Glycemic Management and its Outcomes on Kidney Transplant Recipients

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Kidney transplantation is a critical treatment for end-stage renal disease, but complications such as post-transplant diabetes can jeopardize graft survival. UI Health, a leading transplant center in Illinois, performed nearly 300 kidney transplants last year and employs transplant pharmacists to manage care pre- and post-transplant. However, in 2021, staffing issues led to a six-month period where a small cohort of kidney transplant recipients did not receive synchronous follow-up from a transplant pharmacist. This retrospective cohort study will evaluate the impact of transplant pharmacists on glycemic management and patient outcomes in adult kidney transplant recipients at UI Health. The control cohort will include patients who received transplants in fall 2021 and were not followed by a transplant pharmacist, while the intervention cohort will include those transplanted in fall 2022 who were followed synchronously by a transplant pharmacist. Exclusion criteria include non-kidney transplants, patients not planning to follow up at UI Health, and those with graft failure before discharge. The primary outcome is the difference in average HbA1c at 6 months post-transplant. Secondary outcomes include differences in disease state management, graft function, and survival, with safety outcomes focusing on pharmacotherapy-related emergency room visits and infection rates. A total of 80 patients were included in the control cohort, and 89 patients were in the intervention cohort. Baseline characteristics were similar between the control and intervention cohorts, such as median age (52.5 years vs. 42 years) and female sex (49% vs. 45%). Differences were noted in the average organ KDPI score (45% vs. 52%) and mortality (15 patients vs. 6 patients). Trends evaluating overall glycemic management and pharmacist interventions are still in progress. Final results will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify the specific organizations that require transplant centers to employ pharmacology specialists and the rationale behind this policy.

Recognize modifiable and nonmodifiable risk factors for developing post-transplant diabetes.

Self Assessment Questions:

1. Which organization requires transplant centers to have a pharmacology specialist on their team?

A. United Network for Organ Sharing

B. American Society of Transplantation

C. Association of Organ Procurement Organizations

D. American Society of Health-System Pharmacists

2. Which of the following agents increases the risk for post-transplant diabetes?

A. Azathioprine

B. Belatacept

C. Mycophenolate

D. Tacrolimus

Q1 Answer: A Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-802-L01-P

Evaluation of Symptom-Triggered Benzodiazepine Monotherapy versus Alternative Benzodiazepine-Based Treatment Regimens for Alcohol Withdrawal Syndrome

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Purpose:
Alcohol use disorder (AUD) in America is widespread with 28.1 million cases reported in adults in 2023. The Clinical Institute Withdrawal Assessment for Alcohol-Revised (CIWA-Ar) is a widespread tool to manage alcohol withdrawal with benzodiazepines. Benzodiazepines work by potentiating gaba-aminobutyric (GABA) receptors, similar to alcohol. Chronic alcohol abuse disturbs the equilibrium of GABA and glutamate. Alcohol cessation gives rise to excitatory symptoms, collectively known as alcohol withdrawal syndrome (AWS). Patients assessed with the CIWA-Ar tool while inpatient are frequently treated with a variety of symptom-triggered or fixed dose benzodiazepine regimen.
Methods:
A retrospective, single-center, cohort study was conducted at a 433-bed community hospital in Lexington, Kentucky. Eligible patients were 18 years or older, inpatient, had an active diagnosis of AWS, documented administration of benzodiazepines, and utilized the CIWA-Ar for monitoring. Exclusion criteria included patients with a history of seizure disorder, vulnerable populations, ongoing or alcohol consumption, use of mechanical ventilation, or death, transfer to hospice, or discharge within 72 hours. Cohorts were characterized by the treatment regimen and stratified into two groups. Patients who received symptom-triggered benzodiazepine monotherapy were compared with patients treated with alternative benzodiazepine-based therapies, including but not limited to, fixed-dose benzodiazepine regimens with or without adjunctive agents. The primary outcome was benzodiazepine use, in lorazepam equivalents, at 24, 48, and 72 hours after first administered benzodiazepine dose. Secondary outcomes included hospital length of stay, time to first benzodiazepine dose, incidence of delirium, incidence of intensive care unit (ICU) admission, ICU length of stay, adjunct therapy continuation at discharge, and CIWA-Ar score at 24, 48, and 72 hours. All data was analyzed using SPSS Version 29 with statistical significance shown by a p-value of < 0.05.
Learning Objectives:
Discuss the mechanism of action for benzodiazepines in the setting of alcohol withdrawal.
Review the Clinical Institute Withdrawal Assessment for Alcohol-Revised tool.
Self Assessment Questions:

Which of the following best describes the mechanism of action of benzodiazepines in the treatment of alcohol withdrawal?
A. They inhibit dopamine release to reduce cravings.
B. They enhance GABAergic activity, leading to CNS depression and calming withdrawal symptoms.
C. They block serotonin receptors to prevent anxiety.
D. They increase norepinephrine levels to stabilize mood.
Which of the following is a key component assessed in the Clinical Institute Withdrawal Assessment for Alcohol Withdrawal (CIWA-Ar) tool?
A. Blood alcohol level
B. Heart rate variability
C. Severity of tremors, nausea, and anxiety
D. Presence of delirium tremens only
Q1 Answer: B Q2 Answer: C
APCE Universal Activity Number 0121-9999-25-604-L01-P

Impact of Tailored Antimicrobial Prophylaxis for Urologic Procedures
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Background: Postoperative infectious complications after urologic procedures are associated with a negative impact on morbidity, mortality, and burden on the healthcare system. Currently, the 2019 American Urologic Association (AUA) guidelines recommend tailored prophylaxis prior to stone interventions, and the 2024 European Association of Urology (EAU) guidelines recommend tailored prophylaxis before transrectal prostate biopsy. These recommendations are based on weak evidence, and there is a paucity of data for other urologic procedures. In October 2022, University of Michigan Health (UMH) adopted a policy to administer tailored antimicrobial prophylaxis based on prior culture results before genitourinary procedures.

Purpose: The objective of this study is to assess the impact of tailored antimicrobial prophylaxis prior to high-risk urologic procedures on postoperative infectious complications.

Study Design: Single center, retrospective, observational cohort study to assess the effect of tailored, non-tailored, and empiric prophylaxis in patients undergoing urologic procedures at UMH between January 2020 and June 2024, before and after the protocol update.

Methods: Adults who underwent a urologic procedure of interest at UMH will be included. Patients will be identified using procedure codes. Data collected will include demographics, surgical characteristics, culture results, antimicrobial prophylaxis, and infectious complications. Results of the most recent urine culture prior to procedure will be compared to antimicrobial agent given to classify patients into tailored, non-tailored, or empiric groups. The primary outcome will be incidence of UTI within 30 days following urologic procedure, with UTI defined as symptoms and/or growth on urine culture and treatment with antimicrobials.

Conclusions: The results of this study will quantify the effect of a pharmacist-driven intervention to tailor antimicrobial prophylaxis before urologic procedures based on prior culture data. Studying tailored prophylaxis in a wider range of urologic procedures will bridge a current gap in literature and support clinical decision making.

Learning Objectives:

Identify guideline recommendations for tailored urologic procedure prophylaxis

Discuss potential impact of tailored antimicrobial prophylaxis on the incidence of postoperative infectious complications

Self Assessment Questions:

Which of the following is a significant gap in literature surrounding urologic procedure prophylaxis?Â

A. Impact of tailored antimicrobial prophylaxis before prostate biopsies on postoperative infectionsÂ

B. Impact of tailored antimicrobial prophylaxis before other urologic procedures on postoperative infectionsÂ

C. Impact of tailored antimicrobial prophylaxis on clinical outcomes, including readmissionsÂ Â Â

D. B & C

Which of the following is a potential benefit of tailored antimicrobial prophylaxis?

A. SuppressÂ the most likely causativeÂ pathogen(s) of postoperativeÂ surgical site infections

B. Practice stewardship and prevent resistance

C. Prevent adverse effects associated with multiple antimicrobial agent regimens

D. All of the above

Q1 Answer: D Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-713-L01-P

Identifying medication reconciliation inconsistencies impacting thirty-day readmission rates at a 200+ bed community hospital in the Midwest

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Purpose: Thirty-day readmission rates are a significant indicator of health care quality and can impact reimbursement. Many hospital readmissions are avoidable and can be prevented by reducing medication errors. Therefore, optimizing and standardizing the medication reconciliation process may present a significant opportunity to reduce thirty-day readmissions. The aim of this study is to assess the current medication reconciliation process at a community hospital and identify factors that may contribute to hospital readmissions.

Methods: Readmission rates were identified as a key area of improvement at a 200+ bed community hospital in the Midwest. Currently, the medication reconciliation process transitions between several different hospital personnel, including pharmacy technicians, nurses, and providers, leading to inconsistent process completion and documentation. This unpredictable process often results in medication errors and omissions, which may contribute to hospital readmissions. Medication events submitted to the hospitalâ€™s internal event reporting system from October 1, 2023 to October 1, 2024 will be analyzed to determine if they were related to medication reconciliation inconsistencies or omissions. Additionally, a chart review will be conducted for any patient readmitted within thirty days during the same timeframe to assess contributing factors. A standardized process will be used for each chart review, including utilization of uniform search terms, review of provider notes from admission to discharge, and comparison of medications lists from previous discharge to the following readmission. Descriptive statistics will be used to summarize all data.

Summary of Preliminary Data/ Conclusions Reached: Data collection is in progress. Results and conclusions will be presented at GLRC.

Learning Objectives:
Discuss the medication reconciliation process and the obstacles that impact its effectiveness.

Recognize the role of medication reconciliation in minimizing preventable medication errors and enhancing patient safety.

Self Assessment Questions:
Which of the following is a standardized tool for categorizing harm caused by medication safety events?
A. NCC MERP Index
B. ISMP High-Alert Medication List
C. FDA Adverse Event Reporting System (FAERS)
D. MedWatch Reporting Program
To what degree does polypharmacy (i.e., prescribed 5 or more medications) increase the likelihood of an inpatient medication error?
A. 0.15
B. 0.2
C. 0.3
D. 0.45
Q1 Answer: A Q2 Answer: C
APCE Universal Activity Number 0121-9999-25-755-L04-P

Impact of Ambulatory Care Pharmacist Interventions on Patients Initiated on a Glucagon-Like Peptide-1 Receptor Agonist (GLP-1 RA) in a Weight Management Clinic

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Purpose: Obesity has negative health impacts and is associated with numerous comorbidities. Use of anti-obesity medications may be necessary to achieve clinically significant weight loss of at least 5%. Guidelines recommend a glucagon-like peptide-1 receptor agonist (GLP-1 RA) if patients are overweight with at least 1 weight-related comorbidity or diagnosed with obesity. The purpose of this study is to evaluate the clinical and financial impact of current ambulatory care pharmacistsâ€™ interventions on patients initiated on GLP-1 RAs for weight management at the University of Wisconsin Northern Illinois (UWNI) medication management clinic (MMC).
Methods: This was a retrospective, single-center chart review of patients referred to UWNI MMC for weight management from April 1, 2023 to March 31, 2024. Patients aged 18-75 years old diagnosed with obesity or overweight with at least 1 weight-related comorbidity and prescribed a GLP-1 RA with at least 1 interaction with the MMC pharmacist were included. Exclusion criteria included pregnancy or diagnosis of type 1 or 2 diabetes. The primary outcome was the percentage of patients achieving at least 5% weight reduction from baseline at 3-6 months after GLP-1 RA optimization. Secondary outcomes included absolute weight change and revenue.
Conclusion: Preliminary results suggest clinically significant weight loss for all patients who have finished criteria to date for the primary outcome analysis (n = 6). On average, patients were 49 years old, female (90%), and had a baseline BMI of 40 kg/mÂ². Almost half (47.5%) had a diagnosis of pre-diabetes. Average total weight loss was 39.2 lbs for patients on optimized GLP-1 RA dose (n = 6). Tirzepatide and semaglutide were the most common GLP-1 RAs initiated. Final results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference 2025. Data will be used to justify pharmacistsâ€™ role in medication management and guide future expansion.

Learning Objectives:

Discuss place in therapy of GLP-1 RAs for weight management.

Identify opportunities for ambulatory care pharmacists to optimize GLP-1 RA prescribing and monitoring when used for weight management.

Self Assessment Questions:

Which statement is correct about using GLP-1 receptor agonists (GLP-1 RAs) for weight management?

A. GLP-1 RAs are indicated for BMI of at least 25 kg/mÂ² with at least one weight-related condition

B. GLP-1 RAs are indicated for BMI of at least 27 kg/mÂ² with at least one weight-related condition

C. GLP-1 RAs are contraindicated in patients with chronic kidney disease or heart failure

D. GLP-1 RAs are contraindicated in patients who cannot adhere to lifestyle modifications like diet and exercise

What is one key opportunity for ambulatory care pharmacists to optimize GLP-1 RA prescribing?

A. Recommend GLP-1 RA therapy for all patients regardless of medical history

B. Prescribe GLP-1 RA therapy without physician approval

C. Prioritize cost over patient-specific clinical factors when recommending therapy

D. Aid in the insurance approval process to ensure therapy is affordable and accessible

Q1 Answer: B Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-653-L01-P

Comparison of Door-to-Needle Times with Alteplase and Tenecteplase for Acute Ischemic Stroke

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Statement of Purpose:
Acute ischemic stroke (AIS) remains one of the leading causes of death and disability worldwide. For patients with AIS, thrombolytics may be necessary to restore blood flow to the brain and reduce stroke-related disability. Alteplase was the first thrombolytic approved by the FDA for treatment of AIS; however, recent practice has shifted to use of tenecteplase due to its perceived ease of preparation and administration. Extensive literature exists comparing the safety and efficacy of alteplase and tenecteplase; however, there is conflicting evidence on whether a true difference exists in door-to-needle (DTN) time between the two medications. Furthermore, existing literature fails to analyze differences in pharmacy-specific metrics. This study assesses the potential impact of the transition from alteplase to tenecteplase for the management of AIS on DTN, order verification, preparation, and delivery times.

Methods:
In this single-center, retrospective, observational cohort study, we analyzed a registry of patients treated for AIS at a primary stroke center. Patients treated with alteplase from December 1st, 2020, to November 30th, 2022, were compared to patients treated with tenecteplase from December 1st, 2022, to November 30th, 2024, after an institution-wide formulary switch. The primary outcome was door-to-needle time. Secondary outcomes included order-to-verification time, verification-to-preparation time, preparation-to-hang time, and order-to-hang time.

Results:
Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference in April 2025.

Learning Objectives:
Describe the impact of acute ischemic stroke on patients and health systems.
Explain differences in the pharmacokinetics, preparation, and administration of alteplase and tenecteplase.
Self Assessment Questions:
Which of the following correctly describes how ischemic strokes impact patients and the health system as a whole?
A. Stroke is a leading cause of serious, long-term disability
B. Stroke-related costs from 2019 to 2020 exceeded 50 billion dollars
C. Stroke is a leading cause of death worldwide
D. All the above
Which of the following is a benefit regarding the preparation or administration of tenecteplase when compared to alteplase?
A. Tenecteplase requires an infusion pump to administer
B. Tenecteplase has a shorter half-life when compared to alteplase
C. Tenecteplase can be administered as IV push over 5-10 seconds
D. Tenecteplase does not have to be reconstituted prior to administration
Q1 Answer: D Q2 Answer: C
APCE Universal Activity Number 0121-9999-25-679-L01-P

Assessing Full versus Half Loading Dose to Transition Between P2Y12 Inhibitors in Patients Undergoing Percutaneous Coronary Intervention

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The objective of this study is to compare the safety and effectiveness of full versus half loading doses of clopidogrel or ticagrelor when transitioning from prasugrel in patients with acute coronary syndrome (ACS) after percutaneous coronary intervention (PCI). Literature suggest that de-escalation may reduce bleeding without increasing ischemic events, but expert consensus does not define the optimal dosing strategy when transitioning between agents. Guidelines generally recommends full loading doses when transitioning, but half loading doses are used in practice based on clinical judgement. This study aims to provide clearer guidance for loading dose selection when transitioning between P2Y12 inhibitors.

This is an observational study utilizing retrospective data from adult patients who presented to Trinity Health Ann Arbor with ACS between February 1st, 2020 and September 30th, 2024. Patients are divided into two groups based on whether prasugrel was transitioned to clopidogrel or ticagrelor, and then subdivided based on the loading dose of clopidogrel or ticagrelor that was given. Inclusion criteria include a diagnosis of ACS, successful primary PCI with stent placement, treatment with prasugrel 60 mg prior to PCI, and a switch to either clopidogrel or ticagrelor during the index hospitalization with administration of a loading dose. Exclusion criteria include the use of intravenous P2Y12 inhibitors such as cangrelor, pregnant or breastfeeding patients, and patients who are on a P2Y12 inhibitor prior to presentation. The primary outcome is bleeding, defined by BARC type 3a or higher, within hospitalization and seven days after discharge. Secondary outcomes include stent thrombosis, MACE (defined as MI, stroke, or CV death), all-cause mortality, the number of blood transfusions during admission, and a hemoglobin decrease of at least 2 mg/dL. Baseline demographic characteristics stratified by groups are collected and compared. Logistic regression models and descriptive summaries are utilized to analyze outcomes.

Learning Objectives:

Review current literature and guidance on switching between P2Y12 inhibitors in patients with Acute Coronary Syndrome (ACS) who have underwent percutaneous coronary intervention (PCI).

Discuss the incidence of bleeding and thrombotic events between patients given a full verses a half loading dose of clopidogrel or ticagrelor when switching from prasugrel.

Self Assessment Questions:

Which of the following is true regarding de-escalation of P2Y12 inhibitors in patients with Acute Coronary Syndrome (ACS) after PCI?

A. De-escalation from ticagrelor or prasugrel to clopidogrel increases the risk of ischemic events without reducing bleeding.

B. De-escalation from ticagrelor or prasugrel to clopidogrel may reduce bleeding risk without increasing ischemic events.

C. De-escalation of P2Y12 inhibitors is generally recommended in all ACS patients, regardless of their bleeding risk.

D. There is no evidence to suggest that de-escalation affects bleeding or ischemic events in ACS patients after PCI.

According to recent international consensus, what is the recommended approach for switching from prasugrel to clopidogrel in the acute phase of ACS, particularly when concerned about bleeding risk?

A. A full clopidogrel loading dose should always be given immediately after switching.

B. Clopidogrel loading doses should be omitted entirely to reduce bleeding risk.

C. A lower loading dose of 300 mg may be considered for patients with higher bleeding risk.

D. A loading dose of 600 mg clopidogrel should be avoided in all cases of prasugrel de-escalation.

Q1 Answer: B Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-500-L01-P

You're so VAIM You Probably Think This Project is About You: Vitalograph Aerosol Inhalation Monitoring

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Purpose:
Inadequate inhaler adherence and technique attribute to lack of symptom control in 31.1% of chronic obstructive pulmonary disease (COPD) patients despite being on appropriate inhaler therapy. Inhaler technique is an area that pharmacists can intervene in. Poor technique contributes to worsened outcomes, including unwanted exacerbations and readmissions to the hospital. Vitalograph Aerosol Inhalation Monitoring (VAIM) evaluates inhaler use and is designed to assist medical practitioners in evaluating if patients are correctly using and on the most optimal inhaler. Though VAIM is primarily employed outpatient, providers have requested for inpatient use. The purpose of this study is to assess the benefit that pharmacists have on inpatient VAIM testing for COPD patients and hospital readmission rates upon discharge.

Methods:
This is a retrospective cohort study examining COPD patients at Henry Ford Hospital in Detroit, MI. The study consists of patients â‰¥18 years of age admitted to the pulmonary floor, diagnosed with COPD, have an inhaler prescription filled within the past 6 months, and meet the COPD scoring tool criteria (diagnosis of COPD exacerbation and receiving steroids equivalent to oral prednisone â‰¥40 mg) from August 1, 2020 to August 1, 2024. Patients are excluded if they have had a tracheostomy or lung transplant, are a transplant patient with prolonged steroid use equivalent to prednisone â‰¥40 mg, diagnosed with interstitial lung disease, pulmonary arterial hypertension, sarcoidosis, or lung cancer, admitted for bronchoscopic lung volume reduction, are COVID-19 positive or contact/droplet plus, or are pregnant, incarcerated, or cognitively impaired. The primary outcome is the proportion of patients who are readmitted for COPD exacerbation within 30 days of discharge. Secondary outcomes include discharge medication cost inquiries and appropriate inhaler therapy at discharge. Statistical analysis will be completed using parametric T-test for continuous data. Categorical data will be analyzed using Chi-square.

Results:
In progress.

Learning Objectives:
Identify factors that lead to a hospital admission for COPD exacerbation.
Describe the role of VAIM in COPD patients.

Self Assessment Questions:
What is not a cause of a COPD exacerbation?
A. Nonadherence to inhaler
B. Poor inhaler technique
C. Suboptimal inhaler
D. Acute Coronary Syndrome (ACS)
Which of the following is VAIM able to evaluate?
A. Exhale out prior to inhalation
B. Flow rate throughout inspiration
C. Improper priming of inhaler
D. Cost of inhaler
Q1 Answer: D Q2 Answer: B
APCE Universal Activity Number 0121-9999-25-566-L01-P

The Effect of Carousel Downtime on Wrong Ingredient Alerts

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Barcode scanning technology has greatly improved the accuracy of medication dispensing. Often times, this technology is paired with automated pharmacy carousel systems (APCS). The effect of APCS downtime has an unknown effect on the number of errors during the medication dispensing process, since many of these systems also rely on barcode scanning technology. Keeping barcode scanning technology as a constant, the objective of this study is to determine the effects of APCS equipment downtime on accurate medication dispensing by looking at wrong ingredient alerts with Epic Dispense Preparation.

This study will be conducted by comparing Epic Dispense Preparation data and inventory data from two different locations: an APCS, and a wire rack storage system, during the same four-month period. Wire racks are the standard static inventory location during APCS downtime. The same dispensing and medication bar code scanning system was used by both inventory locations during this time in which a medication order is received, the pharmacy technician is given the location of the medication, the technician retrieves the medication, and the medication barcode is scanned against the medication order barcode within Epic Dispense Preparation to ensure accuracy. Data will be extracted to compare the number of incorrect medication alerts from the APCS and static inventory location. By comparing the number of wrong ingredient alerts triggered by the dispensing system during the same four-month period, the effect of carousel equipment downtime on accuracy will be able to be evaluated.

Results in progress.

Learning Objectives:

Recognize what wrong ingredient alerts are and how they are triggered.

Discuss the effect of automation equipment downtime on accurate medication dispensing and possible strategies to address this.

Self Assessment Questions:

When is a wrong ingredient alert generated?

A. When a scanned medication does not match the medication order.â€¯

B. When a scanned medicationâ€™s active ingredient does not match the medication order, the strength does not matter.

C. When the scanning of a medication is bypassed using override.â€¯

D. When a scanned medication order has not yet been verified by a pharmacist.

What is a strategy to improve accurate medication dispensing?

A. Put look-alike, sound-alike medications near each other.â€¯

B. Utilize barcode scanning technology.

C. Create a loud, busy, chaotic work environment.â€¯

D. Have multiple medication orders for different patients be dispensed at the same time

Q1 Answer: A Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-765-L04-P

Comparison of low-dose anti-thymocyte globulin versus basiliximab induction in low-to-moderate immunologic risk kidney transplant recipients

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Purpose:
Kidney transplant is a treatment option for end-stage renal disease and can improve survival and quality of life in select patients. Induction immunosuppression is used at the time of transplant to decrease rejection risk and provide time to titrate maintenance immunosuppression.

Guidelines recommend basiliximab as first-line induction therapy in low-to-moderate immunologic risk kidney transplant recipients. Lymphocyte-depleting agents like rabbit anti-thymocyte globulin (rATG) are suggested for use in higher immunologic risk recipients, though they carry a higher risk for infection than basiliximab due to their lymphocyte-depleting mechanism. Literature comparing the two agents showed rATG led to less incidence and severity of acute cellular rejection than basiliximab in high-risk kidney transplant recipients and had similar rates of graft loss, delayed graft function, and death. Previous studies utilized rATG doses closer to 6 mg/kg, but there is a literature gap comparing lower dose rATG to basiliximab for low-to-moderate risk patients.

Methods:
For low-to-moderate risk kidney transplant recipients, our center historically used basiliximab induction. Low-to-moderate risk was defined as primary transplant, age â‰¥50 years old, Panel Reactive Antibody <80%, negative crossmatch, and Kidney Donor Profile Index â‰¤85%. Protocol changes in 2023 introduced the use of rATG 3 mg/kg for low-to-moderate risk patients. This project compares current and historic induction regimens in low-to-moderate immunologic risk patients.

This single-center retrospective chart review compares basiliximab induction administered 4/1/22 to 3/31/23 versus rATG 3 mg/kg induction administered 6/1/23 to 5/31/24. Patients that underwent simultaneous multi-organ transplants, had a previous kidney transplant, or received belatacept within 3 months of transplantation were excluded. The primary outcome was biopsy-proven acute rejection rates at 6 months post-kidney transplant. Secondary outcomes assessed infection rates and kidney function between groups.

Results:
Data analysis is underway. Results will be presented at the conference.

Learning Objectives:

Identify the potential risks and benefits of anti-thymocyte globulin and basiliximab in kidney transplant induction

Discuss efficacy and safety of anti-thymocyte globulin 3 mg/kg in low-to-moderate immunologic risk kidney transplant recipients compared to basiliximab.

Self Assessment Questions:

Which of the following is a potential benefit of using basiliximab over anti-thymocyte globulin in kidney transplant induction?

A. Lower incidence of acute cellular rejection

B. Lower risk of infection and infusion-related reactions

C. Greater incidence of delayed graft function

D. Lower risk of graft loss

According to the 2009 KDIGO guidelines, what is the recommended induction therapy for low-immunologic risk kidney transplant recipients?

A. Basiliximab

B. Rabbit-derived anti-thymocyte globulin (rATG)

C. Corticosteroids alone

D. Belatacept

Q1 Answer: B Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-637-L01-P

Economic Impact of Investigational Drug Service at an Academic Medical Center

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Purpose: This study evaluates the economic, operational, and research contributions of the Investigational Drug Service (IDS) at UI Health. Specifically, it focuses on patients enrolled in open-label oncology/hematology trials who received IDS-dispensed medications, including sponsor-supplied or reimbursed drugs that are also FDA-approved. The aim is to quantify the cost avoidance and revenue generation attributed to the IDS, hypothesizing a positive economic impact on UI Health.

Methods: This single-center, retrospective, single-arm study analyzes patients in oncology studies at UI Health who received IDS-dispensed medications. Inclusion criteria are patients in open-label oncology studies with sponsor-supplied or reimbursed drugs that are FDA-approved. Patients enrolled in non-oncology, blinded or placebo-controlled studies are excluded. The primary outcome is the amount of cost avoidance per fiscal year (FY) from sponsor-supplied drugs. The secondary outcome is a comparison of cost avoidance between drugs for solid organ tumors versus hematologic malignancies. Data will be collected from the IDS management system and Electronic Health Records (EHR) over the last six FY, and statistical analyses will be used to compare the economic impact across different drug types and study categories.

Preliminary Results: Although final data analysis is still in progress, initial observations suggest that the IDS at UI Health positively influences the institutionâ€™s economic outcomes. The study encompasses 105 protocols and involves 52 distinct FDA-approved oncology drugs administered to approximately 150 patients. Early data reviews indicate potential cost avoidance through sponsor-supplied or reimbursed medications. These preliminary indicators are consistent with the projectâ€™s hypothesis that IDS participation yields meaningful economic benefits. Further detailed analyses will be conducted to quantify these cost avoidance and revenue contributions more precisely.

Conclusion: Data collection is currently in progress. Full results will be presented at the Great Lakes conference.

Learning Objectives:

Identify the annual cost avoidance associated with the use of sponsor-supplied or reimbursed FDA-approved drugs in open-label oncology trials at UI Health.

Recognize cost avoidance between sponsor-supplied or reimbursed drugs used for solid organ tumors versus those used for hematologic malignancies based on six-year retrospective data analysis.

Self Assessment Questions:

What is the primary outcome measured in this study of the Investigational Drug Service (IDS) at UI Health?

A. Total number of patients enrolled in all oncology trials

B. Reduction in pharmacy staff workload

C. Amount of annual cost avoidance due to sponsor-supplied or reimbursed drugs

D. Percentage of drug dispensing errors in the IDS

Which factor best describes the secondary outcome in evaluating the economic impact of IDS on open-label oncology studies?

A. Long-term survival rates of patients in oncology trials

B. Comparison of cost avoidance between drugs for solid organ tumors and hematologic malignancies

C. Number of regulatory approvals obtained for sponsor-provided drugs

D. Frequency of protocol deviations in IDS-managed trials

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-751-L04-P

Evaluation of the Effectiveness of Rapid Diagnostic Tests for Inpatient Community-Acquired Pneumonia on Atypical Antimicrobial De-Escalation

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Purpose: Current guidelines recommend Î²-Lactam and atypical antimicrobial combination therapy for the management of community-acquired pneumonia. Currently, there is a lack of evidence as to whether use of rapid diagnostic tests can assist in de-escalation of atypical antimicrobial therapy. The objective of this study is to evaluate the impact of the use of rapid diagnostic tests on duration of atypical antimicrobial use in a rural community health center.

Methods: This is a single center, retrospective chart review that evaluates the impact of rapid diagnostic tests on the duration of atypical antibiotics. Clinical support software was used to retrospectively identify patients admitted to the hospital who received an antimicrobial with atypical coverage for community-acquired pneumonia between the time period of January 2023 and December 2023. Patients were reviewed to determine whether rapid diagnostic tests were employed during hospital stay. Rapid diagnostic tests of interest include a comprehensive respiratory panel and urinary antigen testing. The control group consists of patients without rapid diagnostic tests while the intervention group includes patients who received both a comprehensive respiratory panel and a Legionella urine antigen test with negative results. Patients with a positive diagnostic test for atypical species are excluded from this study. The primary outcome of this study is the difference in days of therapy of atypical antimicrobials. Secondary outcomes include length of hospital stay, intensive care unit admission, and mortality.

Results/Conclusion: Data analysis is ongoing. Results and conclusions will be presented at the 2025 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review current clinical guidelines for the treatment of inpatient community-acquired pneumonia.

Identify the effectiveness of rapid-diagnostic tests in facilitating the de-escalation of atypical antimicrobials in the treatment of community-acquired pneumonia.

Self Assessment Questions:

Which of the following is an antibiotic used to cover atypical organisms in community-acquired pneumonia?

A. Amoxicillin

B. Cefepime

C. Vancomycin

D. Azithromycin

What is the recommended minimum duration of therapy for doxycycline in community-acquired pneumonia?

A. 1 day

B. 3 days

C. 5 days

D. 7 days

Q1 Answer: D Q2 Answer: C

APCE Universal Activity Number 0121-9999-25-532-L01-P

Comparison of the Use of Andexanet Alfa and Prothrombin Complex Concentrate for Reversal of Apixaban and Rivaroxaban in Trauma Patients

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Apixaban and rivaroxaban, direct oral anticoagulants (DOACs) targeting factor-Xa, are widely used for preventing and treating thromboembolic events due to their predictable pharmacokinetics and lack of routine monitoring; However, they carry a bleeding risk, particularly in trauma patients, where rapid reversal is crucial. Historically, 4-factor prothrombin complex concentrate (4F-PCC) has been used off-label to reverse factor-Xa inhibitors and is relatively inexpensive, though its efficacy is limited. Andexanet alfa, approved in 2018, offers a more targeted reversal but is costly and carries potential thromboembolic risks. The lack of evidence supporting one agent over the other in the trauma setting highlights the need for further research to determine the most effective reversal strategy for improving patient outcomes in trauma patients using DOACs.

This single-health system, retrospective cohort study was conducted at the University of Cincinnati Medical Center (UCMC). Patients admitted with an acute traumatic injury receiving andexanet alfa or 4F-PCC for the reversal of apixaban and rivaroxaban were included. Exclusion criteria included patients who died or transitioned to comfort care within 24-hr of admission and those with intracranial bleeds where the initial brain scan was not conducted at UCMC or lacked a repeat scan within 24 hours of reversal.

The primary outcomes compared hemostatic efficacy within 24-hr of receiving the reversal agent. Secondary outcomes included ICU & hospital mortality and length of stay, 30-day mortality, time from reversal agent administration to death, proportion of patients who received any blood product before and within 24-hr of reversal, hospital discharge disposition, resumption of anticoagulation, and change in GCS from admission to discharge. Safety endpoints included 30-day thrombo-ischemic event rate and time to thrombo-ischemic event.

Data collection and analysis are ongoing, with results to be presented at the Great Lakes Pharmacy Residents Conference in April 2024.

Conclusions will be made once results are available.

Learning Objectives:

Review the current treatment options for reversal of DOACs.

Describe the differences in treatment success associated with andexanet alfa versus 4-F PCC for trauma related DOAC reversal.

Self Assessment Questions:

What is the preferred test for monitoring DOACs?

A. Anti Factor-Xa Assay

B. Activated Partial Thromboplastin Time

C. Prothrombin Time

D. Platelet Count

Which factors do 4F-PCC replete?

A. Factors II, VII, IIX, X

B. Factors I, II, III, IV

C. Factors II, VI, X, XI

D. Factors II, VII, IX, X

Q1 Answer: A Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-643-L01-P

Impact of a Pharmacist Driven Blood Culture Algorithm in the Emergency Department

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Purpose: In January 2024, UW Health SwedishAmerican Hospital (SAH) implemented a new pharmacist driven protocol for follow up of blood cultures drawn in the emergency department (ED). With this protocol, patients with positive blood cultures are only contacted for re-evaluation if their blood culture(s) grow an infecting pathogen or if they fall into a high-risk population. The purpose of this study is to evaluate the impact of ED return visits due to contaminated blood cultures before and after the implementation of an ED pharmacist driven blood culture algorithm.
Methods: This is a multi-center, retrospective cohort analysis of pre-post implementation of a blood culture assessment algorithm for patients discharged directly from the ED. Adult patients were included if they were seen and discharged from SAH ED or Belvidere Hospital (BEH) ED between July 16, 2023 â€“ July 16, 2024, and had a positive blood culture from their visit with an organism pre-defined as a contaminant. Patients were excluded if they were admitted to the hospital or transferred to an outside facility, immunosuppressed, pregnant, or had â‰¥2 positive blood cultures. Data points included demographics, blood cultures drawn during ED visit, organism grown on initial and repeat cultures, initial ED visit date, return ED visit date, hospital admission, antibiotic(s) administered, duration of antibiotic(s) administered, and hospital length of stay. The primary outcome is the estimated number of ED return visits prevented after the implementation of this algorithm. Secondary outcomes include the estimated number of avoided hospital admissions, number of hospital days prevented, number of patients who returned to the ED within 7 days of index blood culture, and the number of potential antibiotic administrations prevented.
Results/Conclusion: Data collection and analysis are ongoing. Results will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify common bacteria that present as contaminants in blood cultures
Recognize the consequences of incorrectly treating contaminated blood cultures

Self Assessment Questions:

Which of the following bacteria is commonly classified as a contaminant in blood cultures?
A. Bacillus anthracis
B. Escherichia coli
C. Staphylococcus aureus
D. Staphylococcus epidermidis
Which of the following is a negative consequence of treating contaminated blood cultures?
A. Antimicrobial resistance
B. Decreased institutional costs
C. Decreased patient costs
D. Shorter hospital lengths of stay
Q1 Answer: D Q2 Answer: A
APCE Universal Activity Number 0121-9999-25-686-L01-P

Evaluation of an Educational Module for Student Pharmacists Addressing Medication Access and Affordability

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Background: Prescription drug prices in the United States are the highest among industrialized nations. Challenges related to medication access and affordability have resulted in patient nonadherence and worsening health outcomes. With the availability of healthcare resources, such as medication assistance and prescription savings programs, pharmacists can help patients overcome these challenges. Pharmacists' knowledge and the utilization of these healthcare resources in practice are unclear. The objective of this project is to evaluate the impact of an educational module for student pharmacists addressing medication access and affordability.

Methods: Second-year student pharmacists will participate in an educational module focused on insurance formularies, medication assistance programs, and prescription savings initiatives. This module is a mandatory component within a core course. Students will complete a 30-item pre- and a 26-item post-questionnaire via the internet-based survey platform, Qualtrics. Questionnaire items are based on the theory of planned behavior to assess students' attitudes, subjective norms, behavioral control, and intentions in using healthcare resources to improve patientsâ€™ medication access and affordability. A 5-point, Likert-type scale will be utilized for response options. Studentsâ€™ prior experience using healthcare resources for medication access and affordability will also be assessed. Pre- and post-questionnaires will be linked using a unique identifier, allowing for anonymous responses. Descriptive statistics will be performed. Pre- and post-questionnaire responses will be compared. Statistical tests will be determined based on the normality of the data. An a-priori alpha level of 0.05 will be used for statistical significance.

Results: In Progress.

Conclusion: The goal of this study is to enhance student pharmacists' knowledge to better address patients' challenges related to medication access and affordability. This study seeks to influence students' attitudes, subjective norms, behavioral control, and intentions with assisting patients with medication access and affordability in their future practice.

Learning Objectives:

Discuss how integrating an educational module addressing medication access and affordability into the pharmacy curriculum can enhance student pharmacists' preparedness to address these challenges in clinical practice.

Discuss how participation in an educational module addressing medication access and affordability influences student pharmacists' knowledge, attitudes, subjective norms, confidence, and intentions regarding the use of healthcare resources to address these challenges in clinical practice.

Self Assessment Questions:

What was the objective of this project?

A. To assess student pharmacists' ability to enroll patients in medication assistance programs.

B. To evaluate the impact of an educational module for student pharmacists addressing medication access and affordability.

C. To compare medication access and affordability policies across different healthcare systems.

D. To measure patient outcomes based on pharmacist-led medication access and affordability interventions.

How can incorporating educational modules on medication access and affordability into the pharmacy curriculum impact student pharmacistsâ€™ preparedness for future practice?

A. Students are better prepared to provide patient-centered care and develop their critical thinking and problem-solving skills in future practice.

B. Provides general awareness of medication access and affordability challenges but may not significantly impact studentsâ€™ ability to apply this knowledge in practice.

C. Helps students understand medication access and affordability challenges but is not essential for all pharmacy career paths.

D. Could be valuable as an elective for students interested in addressing medication access and affordability but may not be necessary as a required component for all pharmacy students.

Q1 Answer: B Q2 Answer: A

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Strategies to Document and Reduce Medication Waste in an Inpatient Pharmacy's Reverse Distribution Channel

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Purpose: In health-systems across the United States, strategies to document and reduce medication waste represent an underutilized area of optimization for inpatient pharmacies. During routine pharmacy activities, certain types of medication waste can be managed via reverse distribution of drug products that are unused or otherwise incompletely consumed by the supply chain. The interplay between reducing inventory surpluses that lead to medication waste and maintaining adequate inventory to ensure patient access represents a unique challenge that warrants a commitment of resources to define best practices. The objectives of this research project are to determine the amount of medication waste being managed through reverse distribution within a health-system pharmacy and to identify strategies for reducing medication waste processed through reverse distribution.

Methods: As part of a retrospective observational study, medication waste data was collected at a 1050-bed academic medical center in an inpatient pharmacy that utilizes reverse distribution to process drug returns and waste. A third-party reverse distribution client portal was used to obtain medication waste data from an inpatient pharmacy that services various acute care settings for adult and pediatric patients. With this data, the total waste within an inpatient pharmacy, managed via reverse distribution, was quantified. To define the best strategies for reducing medication waste in an inpatient pharmacy, data relating to pharmacy inventory management was compared with reverse distribution data. Pharmacy purchasing data was obtained and analyzed using drug wholesaler data. Inventory management data was analyzed using inventory management functions within an electronic health record system. Using this data, purchasing strategies and inventory management practices were compared with reverse distribution data to identify strategies to implement for the reduction of medication waste lost to reverse distribution.

Results: In progress

Conclusions: In progress

Learning Objectives:

Define the role of reverse distribution in the management of medication inventory within inpatient pharmacies.
List common reasons that medications in a reverse distribution channel may be processed as waste.

Self Assessment Questions:

What is the role of reverse distribution in the management of medication inventory within inpatient pharmacies?
A. To manage the return and disposal of expired or used medications
B. To coordinate the purchase and delivery of medications from wholesalers
C. To manage the return and disposal of expired or unused medications
D. To facilitate the exchange of medications between affiliated pharmacies
Which of the following medications would be processed through reverse distribution as medication waste?
A. The medicationâ€™s manufacturer does not accept returns
B. The medication is intact, within date, stored properly, and unused
C. The medication has been reconstituted and used to prepare patient doses
D. The medication was received as a loan from another pharmacy
Q1 Answer: C Q2 Answer: A
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A comparison of clinical and safety outcomes for patients with vancomycin resistant enterococcus faecium bacteremia treated with high dose daptomycin based on isolate MIC

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Background and purpose: Daptomycin is a frequently utilized treatment option for patients with vancomycin-resistant Enterococci (VRE) bacteremia. Observational study data have shown poorer clinical outcomes for patients with VRE bacteremia and isolate MICs of >1 Âµg/mL who were treated with standard dosing daptomycin (6mg/kg/day). Importantly, MIC testing for Enterococcus faecium can be variable which makes establishing a breakpoint for this organism difficult. CLSI recently revised the Enterococcus faecium breakpoints for daptomycin to SDD category of â‰¤4â€‰Âµg/mL based on 8-12 mg/kg/day dosing, a resistant category of â‰¥8â€‰Âµg/mL, and no susceptible category. There is evidence to support using the higher end of this dosing range though there is some hesitancy among clinicians due to potential toxicity. The purpose of this project is to compare clinical and safety outcomes among patients with vancomycin resistant Enterococcus faecium bacteremia and an isolate MIC of 2-4 Âµg/mL based on dose of daptomycin used.
Methods: This is a retrospective chart review assessing clinical and safety outcomes for patients age 18 and older treated with daptomycin for documented VRE bacteremia at The Detroit Medical Center. Patients were excluded if they had prior or concurrent treatment with a VRE active agent, were pregnant, had a primary infectious focus of pneumonia, or if they were on CRRT or ECMO. The primary outcome of interest is 14-day mortality based on daptomycin dose used (<10 mg/kg vs â‰¥10mg/kg) for isolates with an MIC of 2 Âµg/mL or 4 Âµg/mL. Secondary outcomes include a sub-group analysis of 14-day mortality based on both daptomycin dose used and isolate MIC, hospital mortality, time to microbiological clearance, microbiological failure, and clinical failure. A multivariable logistic regression will be utilized for analysis of the primary outcome.
Results/Conclusion: Data results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:
Discuss the evidence behind the CLSI breakpoints for E. Faecium and dosing recommendations for daptomycin
Outline considerations for utilization of higher daptomycin doses in patients with VRE bacteremia
Self Assessment Questions:
Why are higher doses (8-12mg/kg) of daptomycin recommended by CLSI for treatment of Enterococcus faecium with an isolate MIC of â‰¤4â€‰Âµg/mL?
A. Enterococcus faecium has low MICs to daptomycin but variable susceptibility testing
B. Treatment of Enterococcus faecium with MICs of >1 Âµg/mL using standard dosing has shown poor clinical outcomes and the organism has variable susceptibility testing
C. Enterococcus faecium has reliable susceptibility testing
D. Higher doses of daptomycin are not needed for treatment of Enterococcus faecium
Which patient would likely benefit the most from higher daptomycin doses (â‰¥10mg/kg)?
A. A patient with an Enterococcus faecium urinary tract infection and an isolate MIC of 2 Âµg/mL
B. A patient with an Enterococcus faecium wound infection and an isolate MIC of 1 Âµg/mL
C. A patient with an Enterococcus faecium endocarditis and an isolate MIC of 4 Âµg/mL
D. A patient with an Enterococcus faecium bacteremia and an isolate MIC of 1 Âµg/mL
Q1 Answer: B Q2 Answer: C
APCE Universal Activity Number 0121-9999-25-516-L01-P

Incidence of Hypersensitivity Reactions between Pegaspargase and Calaspargase Pegol in Pediatric Acute Lymphoblastic Leukemia (ALL)

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Substantial data has supported the use of asparaginase for ALL in the pediatric population. Beginning in 1977, the US Childrenâ€™s Cancer Study Group (CCG) 101/143 trial found a statistically significant improvement in complete response rate with a decrease in treatment failure rate when L-asparaginase was added to standard of care. Pegaspargase had remained the standard of care treatment for pediatric ALL until calaspargase pegol gained approval by the US Food and Drug Administration (FDA) in 2021 for patients <21 years old. Given the recent introduction of calaspargase pegol into clinical practice, the long-term and post-study side effect profile remains unknown. This study aims to determine the safety of calaspargase pegol versus pegaspargase for ALL in patients at Riley Childrenâ€™s Hospital and Indiana University Health (IU) North Hospital. This is a retrospective analysis comparing patients who received IV calaspargase pegol versus IV/IM pegaspargase for the treatment of ALL during any phase of therapy as an inpatient or outpatient. All patients included in this study will be aged 1 month-21 years old. Data was collected from January 1, 2020, through July 31, 2024. All endpoints will be compared between pediatric ALL patients who received at least 2 doses of IV calaspargase pegol or IV/IM pegaspargase. The primary endpoint is the incidence of hypersensitivity reactions, classified by any grade. Secondary endpoints assessed include grade of reaction based on CTCAE version 5.0 criteria, thrombotic complications, hemorrhage, pancreatitis, and hepatotoxicity. We hypothesize that there will be a statistically significant higher incidence of hypersensitivity reactions in patients who received calaspargase pegol than those who received pegaspargase. Of the 20 patients preliminarily reviewed, including 10 patients in each group, 4 patients in the pegaspargase group and 4 patients in the calaspargase pegol group (p = 1) had reported hypersensitivity reactions. Final results pending.

Learning Objectives:

Describe the place in therapy for pegaspargase and calaspargase pegol in the treatment of pediatric ALL.

Recognize the serious potential adverse reactions of pegaspargase and calaspargase pegol as described in medical literature and clinical practice.

Self Assessment Questions:

Which of the following accurately describes the place in therapy for pegaspargase and calaspargase pegol based on recommended treatment protocols from the Childrenâ€™s Oncology Group?

A. Relapsed ALL only

B. Last line therapy

C. Induction and consolidation phases

D. Induction, consolidation, and maintenance phases

Which of the following are literature defined and clinically observed asparaginase adverse reactions?

A. Stevens Johnson Syndrome, myopathies

B. Hypersensitivity reactions, thromboembolic complications

C. Interstitial pneumonitis, dyspnea

D. Hand-Foot Syndrome, thrombocytopenia

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-711-L01-P

Analysis of readmission rates for patients with diabetes managed in the outpatient setting by pharmacists versus physicians: a retrospective study

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Purpose: Pharmacists are a powerful resource when implemented in a clinic setting; their expertise facilitates measurable improvements in patient care. Pharmacists provide disease state education, lifestyle modification recommendations, and optimize drug therapies in between physician visits. Diabetes is one of many disease states that pharmacists are able to make a significant impact in patientsâ€™ lives. As of 2020, 8.9% of adults in the United States have diabetes, and within that same year there were approximately 490,000 admissions for acutely uncontrolled diabetes. The purpose of this research is to explore the impact of collaborative, pharmacist-based care versus care managed by physicians alone in terms of reducing emergency department visits and hospital admissions related to acutely uncontrolled diabetes. Reducing these critical encounters can improve patient outcomes, increase quality of life, and reduce health care expenditures for patients and the institution. Methods: Subjects will be randomly selected from a pool of potential patients and screened for the appropriate criteria. Upon completion, the target is 60 patients total, distributed 1:1 in each study group. The eligible patients will be investigated via chart review for the previous two years to determine if they visited the emergency department or were admitted for primary diagnoses of hypoglycemia, hyperglycemia, diabetic ketoacidosis (DKA), or hyperosmolar hyperglycemic nonketotic state (HHNS). Secondary endpoints include: A1C and body mass index (BMI) at 6-month intervals during the study period. The collected data will be deidentified and manually recorded into an encrypted Excel sheet, cataloging the primary and secondary endpoints. Data will then be analyzed with a linear regression model to determine if a correlation exists between the management type and rates of ED visits and admissions. As the study is ongoing, the results and conclusions will be presented at the 2025 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review the health outcomes associated with being admitted with either hypoglycemia or hyperglycemic emergencies in patients with uncontrolled diabetes.

Discuss the burden on both patients and the healthcare system related to admissions for uncontrolled diabetes.

Self Assessment Questions:

Patients are more prone to which outcomes when admitted for hypoglycemia requiring ICU level care?

A. Improved glycemic control after discharge

B. No significant difference in mortality rates while admitted

C. Increased likelihood of death within 1 year of admission

D. Increased incidence of ischemic stroke

Which statement describes the recent trends seen in the United States with length of stay for DKA and the associated costs of these admissions?

A. Length of stay is decreasing â€“ Associated cost is decreasing

B. Length of stay is decreasing â€“ Associated cost is increasing

C. Length of stay is increasing â€“ Associated cost is increasing

D. Length of stay is increasing â€“ Associated cost is decreasing

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-517-L01-P

A Retrospective Review of an Enhanced Recovery After Surgery (ERAS) Pain Protocol in Living Liver and Kidney Transplant Donors

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Purpose: Enhanced Recovery After Surgery (ERAS) is a patient-centered, evidence-based approach designed to optimize patient recovery following surgical procedures. Key components of ERAS include preoperative education, optimized nutrition, multimodal pain management, fluid management, minimally invasive techniques, and early mobilization. ERAS protocols have been shown to improve patient outcomes, decrease length of stay, and enhance overall satisfaction, making it a valuable framework in surgical care. Originally developed in the 1990s for colorectal surgery, the ERAS approach has gradually been adopted in the field of solid-organ transplantation. In recent years, kidney and liver transplant programs have begun implementing ERAS-based protocols, with a particular emphasis on pain management and minimizing opioid use. At UW Health, the ERAS protocol was updated and implemented in November 2017. The objective of this project is to determine the impact our ERAS protocols have had on adult living liver and kidney transplant donors.
Methods: This study involves a retrospective chart review of living adult liver and kidney transplant donors who followed the ERAS protocol from November 1, 2017, to October 31, 2024, alongside a control group from November 1, 2011, to October 31, 2017, prior to implementation of ERAS protocols. Patients who were non-opioid naÃ¯ve or who were < 18 years of age were excluded from the analysis. The primary outcome will be a composite endpoint of safety events post organ donation (ileus, bowel obstruction, return to OR, etc.). Secondary outcomes will include morphine milligram equivalence (MME) used perioperatively, MME prescribed at discharge, pain levels (rated on a scale of 0 to 10), length of stay (in days), time to the first bowel movement following surgery, readmission rates within 30 days of discharge, and gastrointestinal adverse effects.
Results/Conclusion: Data analysis is currently in progress. Results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the safety parameters of the ERAS protocol in living donors

Discuss efficacy of the ERAS protocol in decreasing opioid utilization and decrease length of stay

Self Assessment Questions:

1. Which of the following are key components of an ERAS protocol?

A. Multimodal Pain Management

B. Perioperative Education

C. Longer Length of Stay

D. A & B only

2. What outcomes has the ERAS protocol literature shown to improve?

A. Patient's overall satisfaction

B. Length of hospital stay

C. Decrease post-operative complication

D. All of the above

Q1 Answer: D Q2 Answer: D

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Patient outcomes of alternative dosing strategy for cefiderocol in adults with infections due to carbapenem-resistant organisms

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Cefiderocol has potent activity against difficult to treat pathogens such as carbapenem-resistant Acinetobacter baumannii (CRAB), Pseudomonas aeruginosa, and Stenotrophomonas maltophilia.1,2 The current dosing for patients with normal renal function is 2 grams every 8 hours, which costs $1,511.76 to $2,015.68 per day.3,4 Some of the package-insert-recommended doses for patients with impaired renal require using partial vials, which often wastes the remainder of vial.3 Investigating alternative dosing strategies is crucial to optimize the use of cefiderocol, potentially reducing costs while maintaining therapeutic efficacy and safety.

Animal models for cefiderocol have shown a free drug concentration above the minimum inhibitory concentration(MIC) for 75% of the dosing interval will result in a 1-log10 reduction of pathogens with MICs of ï‚£ 4 ï‚g/ml.5,6 A pharmacokinetic model demonstrated doses as low as 1 gram every 8 hours can achieve a 75% fT> MIC, suggesting there could be similar efficacy with lower doses.7 The CREDIBLE-CR trial showed comparable similar microbiological outcomes but more all-cause mortality in the cefiderocol group. Using the PK/PD study, the infectious diseases clinical pharmacists at the Indiana University Health (IUH) developed an alternative dosing scheme. The objective of this research is to identify patient outcomes in adults with infections due to carbapenem-resistant organisms.

Methods: This study is a retrospective cohort study of adult patients admitted to IUH from January 1, 2019, to July 31, 2024 with carbapenem-resistant gram negative infections using cefiderocol. The two comparator groups were IUH patients that matched the inclusion and exclusion criteria of CREDIBLE-CR and patients who did not meet those criteria. The primary endpoint is a composite of 28-day all-cause mortality or treatment failure. Secondary end points include rates of treatment failure and days of blood culture clearance.

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

Learning Objectives:

Explain the rationale behind using an alternative dosing scheme based on prior pharmacokinetic studies

Recall the recommended alternative dosing of cefiderocol used at Indiana University Health based on patient's renal function

Self Assessment Questions:

1.What time above MIC (T>MIC) required for cefiderocol to have adequate for clinical efficacy against Gram negative organisms?

A. 20% fT > MIC

B. 40% fT >MIC

C. 75% fT > MIC

D. 100% fT > MIC

Based on the Indiana University Health alternative dosing, what is the recommended dose of cefidercol dose in patients with a CrCl of >30ml/min?

A. 1 gm q6h

B. 4 gm q8h

C. 6 gm q12h

D. 2 gm q24h

Q1 Answer: C Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-632-L01-P

Intravenous Push Lacosamide and Levetiracetam: Description of Implementation and Outcomes

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Purpose: Status epilepticus (SE) is a medical emergency requiring prompt administration of anti-seizure medications (ASMs). While benzodiazepines are the first-line therapy for SE, other ASMs, such as levetiracetam and lacosamide, are often administered rapidly to terminate benzodiazepine-refractory seizures or to begin maintenance therapy to prevent recurrence. Historically, levetiracetam and lacosamide have been administered via intravenous piggyback (IVPB). This process creates barriers to prompt administration related to compounding, delivery, and, in the case of lacosamide, controlled substance dispensing processes. Evidence has emerged to support the safety of administering levetiracetam and lacosamide via intravenous push (IVP). Transitioning to IVP administration may result in reduced time to treatment, as medication vials can be stored in automated dispensing cabinets (ADCs) for nurse-driven dispensing. The purpose of this project is to describe the implementation of IVP levetiracetam and lacosamide at UW Health and assess time to administration in urgent situations, providing a framework for other institutions to implement a similar process. Methods: Select patient care areas where treatment of SE commonly occurs (e.g., ED, neurology units) will be transitioned to IVP lacosamide. EHR medication records and dispensing logic will be modified as medication vials will be stocked in the ADCs in these areas. Time from order to administration of one-time STAT orders will be collected for 3 months post-implementation and compared to the 6 months prior as a surrogate efficacy measure. Safety will be evaluated via events reported through organizational safety reporting. Results and Conclusions: Prior to implementation, mean time from order to administration of STAT orders was 53.4 minutes for levetiracetam and 98.4 minutes for lacosamide. Post-implementation results and conclusions, including a detailed description of operational, stakeholder, and regulatory considerations and challenges involved in implementation, will be presented.

Learning Objectives:

Recall the role of levetiracetam and lacosamide in treatment of status epilepticus

Describe operational barriers to prompt administration of anti-seizure medications (ASMs)

Self Assessment Questions:

Which of the following is correct regarding the use of levetiracetam in the treatment of status epilepticus?

A. It is a first line treatment option

B. It is a second line treatment option

C. It is not used for treatment of status epilepticus

D. It can only be used in adult patients, not pediatric

Which of the following is a potential advantage of intravenous push (IVP) administration of lacosamide?

A. Faster time to treatment

B. Reduced workload for preparation and dispensing

C. Simplified controlled substance accountability

D. All of the above

Q1 Answer: B Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-586-L01-P

Striking a Cord: Neonatal Gentamicin Concentrations Following Maternal Administration

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Background: Prenatal infections, such as clinical chorioamnionitis, are common in labor and delivery settings and can result in significant complications, including postpartum infections, neonatal sepsis, and long-term disabilities in infants. The standard empiric antibiotic treatment for chorioamnionitis and neonatal sepsis typically involves a combination of ampicillin and gentamicin. Gentamicin, an aminoglycoside characterized by its concentration-dependent bactericidal activity, may be administered via either a conventional dosing method (2 mg/kg IV every 8 hours) or an extended-interval regimen (5 mg/kg IV every 24 hours). The latter is favored due to its pharmacokinetic advantages, which promote higher peak and lower trough concentrations, thereby enhancing drug efficacy and prolonging post-antibiotic effects. Current research indicates that fetal gentamicin levels may attain approximately one-third of maternal peak concentrations, suggesting a potential therapeutic window for both mother and neonate, with an optimal target of maintaining trough levels below 1 Âµg/mL to minimize the risk of neonatal toxicity. However, the administration of high-dose extended-interval gentamicin during labor may increase the risk of adverse effects in neonates.

Purpose: This study aims to quantify the extent of placental transfer of gentamicin administered as part of a high-dose extended-interval prenatal regimen to inform initial dosing timing and mitigate the risks of nephrotoxicity in newborns.

Methods: This single-center, retrospective cohort study will include neonates born to pregnant individuals who received at least one dose of gentamicin (5 mg/kg) within 24 hours of delivery utilizing available frozen cord blood samples from September 1, 2019 to September 30, 2024. Neonates exposed to conventional dosing (less than 4.5 mg/kg, using adjusted body weight), those without cord samples, and neonates born to individuals on hemodialysis will be excluded.

Results/Conclusions: Data collection and 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 high-dose extended-interval gentamicin in prenatal infections.

Outline the impact of prenatal high-dose extended-interval gentamicin dosing in neonates.

Self Assessment Questions:

Fill in the blank: Based on current literature, gentamicin dosing of __ is preferred due to its pharmacokinetic advantages, enhanced drug efficacy, and prolonged post-antibiotic effects.

A. 5 mg/kg IV every 8 hours

B. 2 mg/kg IV every 8 hours

C. 5 mg/kg IV every 24 hours

D. 4.5 mg/kg every 12 hours

Which of the following accurately describes the risk for neonates receiving gentamicin after their mother has already received high-dose extended-interval gentamicin during pregnancy?

A. Risk of ototoxicity

B. Risk of nephrotoxicity

C. Risk of respiratory distress

D. Risk of neuromuscular blockade

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-640-L01-P

Discharge Discrepancies: Impact on High-Risk Medications, High-Risk Populations, and Readmission Rates

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It is estimated that medical errors are the third leading cause of death in the United States. Less than half of hospitalized patients are able to recall their discharge medications, and only a fraction of those patients are able to identify their associated indications. Effective discharge medication reconciliation has the potential to reduce emergency department (ED) contacts and hospital readmissions related to medication errors. The purpose of this review was to assess the accuracy of discharge medication reconciliation within the West Central Region (WCR) of the Indiana University (IU) Health system, and to identify any potential opportunities for improvement. This multi-centered, retrospective chart review was conducted to evaluate the accuracy of discharge medication lists for patients within the WCR of the IU Health system. Inclusion criteria consisted of all admitted patients 18 years of age or older who were discharged from IU Health Arnett, IU Health Frankfort, and IU Health White Memorial hospitals between May 13, 2024, to May 26, 2024. Patients were excluded if their medication history was not confirmed with the patient or patientâ€™s caregiver during their admission. The primary endpoint was the total number of discrepancies between the medication list in the physicianâ€™s discharge summary note documented in the electronic medical record (EMR) and the medication list in the discharge instructions that were printed out and provided to the patient. Secondary endpoints included total discrepancies related to high-risk medications, discrepancies related to high-risk populations, medications with inappropriate or unclear directions on the patientâ€™s discharge instructions, and ED visits or hospital readmissions within 30-days of discharge within the IU Health system. Descriptive statistics will be utilized to assess the data. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference. This study has been approved by the IU Institutional Review Board (IRB).

Learning Objectives:

Identify patients who are at an increased risk of being hospitalized for an adverse drug event in an outpatient setting.

Identify medication classes that are most likely to result in emergency department contact or hospitalization due to an adverse drug event in an outpatient setting.

Self Assessment Questions:

Which of the following increases the risk of hospitalization due to an adverse drug event?

A. Patient â‰¥ 40 years of age

B. Patient takes â‰¥ 3 medications at home

C. Patient started taking a new medication within the past 7 days

D. Patient has more than one chronic disease states

Which of the following medications has the greatest risk of hospitalization due to an adverse drug event in an outpatient setting?

A. Metoprolol succinate

B. Warfarin

C. Prednisone

D. Atorvastatin

Q1 Answer: C Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-784-L05-P

Early vs Late Oral Antibiotic Switch in Enterobacterales Bacteremia

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Purpose:
Gram-negative bacteremia is a serious and increasingly common bloodstream infection, with its incidence rising from 33% to 43% between 1997 and 2013. Historically, treatment has required prolonged intravenous (IV) antibiotic therapy, which is associated with complications such as catheter-related infections, extended hospital stays, and higher healthcare costs. Recent evidence suggests that early transition to oral antibiotics may be effective in stable patients, but the optimal timing for switching remains unclear. The purpose of this study is to evaluate the outcomes of early versus late oral antibiotic switch in patients with uncomplicated Enterobacterales bacteremia.

Methods:
This was a multi-center, retrospective cohort study that assessed adults initially treated with IV antibiotics for uncomplicated Enterobacterales bacteremia who then transitioned to oral antibiotic therapy either early (by day 4) or late (after day 4).Patients were included if they had achieved clinical stability within 72 hours of appropriate antibiotic therapy, defined as defervescence, hemodynamic stability, and the ability to take oral medications. Patients were excluded if they received inappropriate antimicrobial therapy based on cultures and sensitivities, switched back to IV therapy, were immunocompromised, or were discharged to hospice care. Data collected included patient demographics, Charlson Comorbidity Index, vitals, laboratory results, microbiology, and antimicrobial therapy. The primary outcome was treatment failure within 30 days of antibiotic completion, a composite endpoint encompassing infection recurrence, escalation of antimicrobial therapy, infection related re-admission, and death. Secondary outcomes included hospital length of stay and total antibiotic duration. Statistical analyses were performed using Chi-square or Fisherâ€™s exact test for categorical data, Studentâ€™s t-test or Mann-Whitney U test for numerical data, as appropriate.

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

Learning Objectives:

Describe the complications associated with prolonged IV antibiotic therapy in Enterobacterales bacteremia.

Explain the rationale and evidence supporting early oral antibiotic transition in the management of uncomplicated Enterobacterales bacteremia.

Self Assessment Questions:

What are potential risks of prolonged IV antibiotic therapy for gram-negative bacteremia?

A. Catheter-related infections

B. Extended hospital stays

C. Reduced healthcare costs

D. Both A and B

Given the literature provided, which of the following outcomes is an expected benefit of early transition to oral antibiotics?

A. Increased risk of catheter-related infections

B. Reduced hospital length of stay

C. Higher rates of microbiological relapse

D. Higher likelihood of adverse drug reactions

Q1 Answer: D Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-618-L01-P

Implementation of a Standardized Outpatient Pharmacist Documentation Template in a Veterans Affairs Medical Center

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Currently, the outpatient pharmacists at Veteran Health Indiana provide interventions on medication orders, patient education, and patient counseling during which several interventions and medication therapy management activities are taking place. These include, but are not limited to, medication reconciliation, medication counseling, adherence counseling, medication demonstration, order clarification, refilling medications per policy, and prescription issue resolution. These activities are currently not being consistently documented by outpatient pharmacists. The purpose of this project is to implement a structured process for outpatient pharmacist documentation of clinical interventions and patient education, and to evaluate the effectiveness of the documentation template by evaluating the level and type of interventions before and after template initiation. This study was conducted in three phases (a retrospective chart review of pre-template implementation, template implementation and staff education, and a retrospective chart review of post-template implementation). Data will be collected on the total number of outpatient pharmacy documentation notes placed by pharmacists and the type and frequency of interventions both before and after implementation of the note template. Time utilized per note will be included for informational purposes only. The number of total notes and the number and types of interventions between pre-and post-template implementation periods will be compared using a Poisson comparison of the rates.

Learning Objectives:

Describe the importance of documentation in pharmacy practice.

Identify the potential benefits of a standardized template for documentation in the electronic health record.

Self Assessment Questions:

Why would a standardized template be beneficial for pharmacist documentation?

A. Documentation is important for continuity of care

B. A systematic structure for the process of documentation increases efficiency, completeness, and reduces confusion regarding the placement of information

C. Documentation demonstrates the value and accountability of the pharmacistâ€™s services

D. All of the above

Which of the following items would be a potential benefit of a standardized documentation template?

A. Increased documentation time

B. Improvement in consistency, completeness, and accuracy of documentation

C. Reduced quality of documentation

D. Inability to capture data for quality metrics

Q1 Answer: D Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-800-L99-P

Evaluation of a pharmacist-driven urgent care microbiology result review program

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Purpose: Pharmacist-driven microbiology review programs within emergency departments (ED) have proven to be effective in reducing the time to appropriate antibiotics and readmission risk. Despite these positive outcomes, the benefit of a pharmacist-driven program in other outpatient settings have not been established. The Indiana University (IU) Health Arnett pharmacy department established a pharmacist-driven urgent care microbiology review program in 2019. The purpose of this evaluation is to compare the time to appropriate treatment from final culture result through pharmacist review versus provider review.

Methods: A multi-centered, retrospective cohort study was conducted to evaluate microbiology review programs at urgent cares within the IU Health system from January 1, 2021 through December 31, 2023. Included patients were 18 years or older who did not receive appropriate treatment at the visit based on results from urine cultures, wound cultures, or testing for certain sexually transmitted infections. Exclusion criteria consisted of patients lost to follow-up, patients where time to appropriate treatment cannot be determined, and vulnerable populations. Patients were divided into two groups: pharmacist-reviewed and provider-reviewed results. Pharmacist reviewed results were obtained from two urgent cares within the West Central Region of IU Health while provider-reviewed results were from eleven other urgent cares within the IU Health system. The primary objective of the study was time to appropriate treatment from final result in hours. Appropriate treatment was defined as an antibiotic susceptible to the identified microorganism. Secondary endpoints included time to appropriate treatment from final result in days, 30-day revisitation rates to the urgent care, ED, or hospitalization, and reason for change in antibiotics. Mann-Whitney U and Chi-square tests were used for continuous and nominal variables, respectively. This study was approved by the IU Institutional Review Board.

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

Learning Objectives:

Identify the benefits of pharmacist-driven microbiology review programs in emergency departments

Describe the clinical interventions pharmacists can make through a collaborative practice agreement for an urgent care microbiology review program and detail their clinical impact

Self Assessment Questions:

Which of the following statements best summarizes the current literature surrounding microbiology review programs?

A. Current literature supports a statistically significant decrease in 30-day revisitation rates with implementation of pharmacist-driven microbiology review programs in urgent care settings.

B. Pharmacist-driven microbiology review programs in the emergency department have not displayed a significant reduction in 30-day revisitation rates.

C. Emergency department pharmacist-driven microbiology review programs have shown a significant reduction in time to appropriate antibiotic treatment.

D. Implementation of a pharmacist-driven microbiology review program has not demonstrated a significant reduction in time to positive culture review.

Which of the following pharmacist interventions would most likely be included within a microbiology result review program?

A. Initiate Therapy: send amoxicillin prescription for a patient with Enterococcus faecalis urinary tract infection

B. Order Labs: order an HIV viral load and CD4 cell count for a patient with newly diagnosed HIV

C. Order Imaging: order a chest X-ray for a patient who reported respiratory symptoms during patient call for positive urine culture results

D. Change therapy: initiate sulfamethoxazole-trimethoprim for a patient with isolated methicillin-resistant Staphylococcus aureus from wound culture who has already received doxycycline (susceptible) for 10 days

Q1 Answer: C Q2 Answer: A

APCE Universal Activity Number 0121-9999-25-849-L99-P

Optimization of Subcutaneous Anti-Cancer Monoclonal Antibody Formulations in an Outpatient Infusion Clinic

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Purpose:
To evaluate the effect of implementing subcutaneous formulations of rituximab and the combination of trastuzumab/pertuzumab on chair time in a community cancer center infusion clinic.

Methods:
This single-center retrospective observational study will include adult hematology/oncology patients receiving intravenous pertuzumab, and rituximab products. The primary endpoint of this study is to measure chair time, defined as the interval from the completion of the nursing clinical review to the patientâ€™s appointment checkout timestamp. Patients treated with these intravenous formulations between March 1, 2023, and October 31, 2024, will be identified and reviewed utilizing the electronic medical record (EMR) for the inclusion in the pre-implementation data collection. Following the introduction of subcutaneous formulations, post-implementation data will be gathered for any patients who received the selected subcutaneous products. In addition to chair time, data will be collected on pharmacy preparation times, cost-analysis, and feedback from nursing staff through a survey assessing the ease of use of these formulations.

Summary of Preliminary Results:
Between October 2024, and January 2024, 136 administrations of pertuzumab/trastuzumab were identified for the treatment of breast cancer in patients aged 36 to 85 years. The average chair time for patients receiving these IV formulations was 211 minutes. Of these administrations, 61 (44.9%) included concomitant cancer agents beyond trastuzumab, such as docetaxel/carboplatin (65.6%), docetaxel (6.6%), and paclitaxel (27.9%). In contrast, 75 (55.1%) administrations contained only trastuzumab. The most utilized biosimilar was trastuzumab-qyyp (TrazimeraTM), accounting for 59.6% of all administrations.

Conclusion:
In conclusion, the utilization of intravenous formulations of trastuzumab, pertuzumab, and rituximab has been shown to require a significant amount of more time for patients to complete treatments. It is anticipated that the integration of subcutaneous formulations into standard practice will result in a substantial reduction in chair time.

Learning Objectives:

Discuss the significance of implementing subcutaneous anti-cancer formulations and its impact on patient chair time at an outpatient infusion clinic.

Describe the implications and limitations of the implementation of subcutaneous anti-cancer formulations.

Self Assessment Questions:

Identify one critical monitoring parameter for patients receiving pertuzumab/trastuzumab:

A. Nausea & vomiting

B. Cardiomyopathy

C. Infusion related reaction

D. Tumor lysis syndrome

Which of the following statements is correct regarding the substitution of subcutaneous rituximab for intravenous administration in patients with large B-cell lymphoma?

A. Subcutaneous rituximab cannot be substituted for intravenous rituximab

B. Subcutaneous rituximab can be substituted, provided that the first dose remains intravenous

C. Subcutaneous rituximab can be substituted with intravenous rituximab without restrictions

D. Subcutaneous rituximab is only approved for chronic lymphocytic leukemia (CLL) and cannot be used in large B-cell lymphoma

Q1 Answer: B Q2 Answer: B

APCE Universal Activity Number 0121-9999-25-573-L01-P

Enhancing the Review of Medication Event Reports

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Statement of purpose: The use of medication involves inherent risks. Some risks are known, while others are not. Medication errors and adverse drug reactions (ADRs), collectively known as medication events, are risks that can potentially cause harm. The American Society of Health-System Pharmacists recommends organizations have a system in place for detecting and investigating medication events. A multi-disciplinary team, with pharmacists playing a key role, should be tasked with reviewing events. The pharmacist should collaborate with others to monitor and analyze events as well as improve safe medication use. Information gathered during the review should be used to develop tools, risk mitigation strategies and educational resources that promote medication safety. A recent change in the medication event reporting platform at Froedtert Health has provided an opportunity to evaluate pharmacistsâ€™ approach in reviewing medication events.
Methodology: For this quasi-experimental quality improvement study, information regarding the current pharmacy medication event review approaches were obtained and evaluated from multiple sites within Froedtert Health. Process mapping was used to visualize similarities and differences between sites and reviewers with the goal of creating an aligned medication event review process. The primary outcome is to assess the percentage of medication events reviewed within 30 days pre- and post-alignment. Secondary outcomes include the creation of standardized instructions for pharmacy event reviewers, a comparison of self-reported satisfaction scores for event review process pre- and post-alignment, and creation of additional tools and dashboards.
Preliminary Results: Pharmacy residents, managers, and coordinators with medication event review experience are participating in the project. Analysis of medication event review approaches is ongoing. Process mapping and medication event review alignment is in progress.
Conclusion: Results and conclusions will be shared at the conference.
Learning Objectives:
Identify how medication event review can lead to the safe use of medications.
Explain the role of a pharmacist in medication event review.
Self Assessment Questions:
Information gathered during the medication event review process can be used to develop which of the following?
A. Revision of medication use policies
B. Medication safety education
C. Risk mitigation strategies
D. All of the above
How does a pharmacist contribute to medication event review?
A. Collaborate with a multidisciplinary team to improve the medication use process
B. Remove unsafe medications from the organizationâ€™s formulary independently
C. Monitor and analyze medication events for trends
D. A and C
Q1 Answer: D Q2 Answer: D
APCE Universal Activity Number 0121-9999-25-786-L05-P

Correction between Pre-operative Renin-angiotensin Inhibition and Vasoplegia in Patients after Coronary Artery Bypass Grafting

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Purpose: The vasoplegic syndrome (VS) is a deadly but common post-surgical complication after coronary artery bypass grafting (CABG), with an incidence rate between 5 and 25%. Vasoplegia is a vasodilatory shock with critically low systemic vascular resistance despite normal cardiac output. Even though the underlying mechanism of vasoplegia has remained unclear, many proposed pathways exist, including the renin-angiotensin system (RAS). Many medications, such as angiotensin-converting enzyme inhibitors (ACEI), angiotensin receptor blockers (ARB), and angiotensin receptor/neprilysin inhibitors (ARNI), are involved in the renin-angiotensin system. These medications are widely utilized in different disease states, particularly heart failure and hypertension. Multiple studies have identified ACEI and ARB are associated with an increased risk of VS after CABG. However, there are limited studies regarding ARNI. This study investigates the relationship between VS and RAS inhibitors after bypass. Method: Adults who underwent elective CABG between Jan 2021 and June 2024 at Medical Center Bowling Green are included in this study. The definition of vasoplegic syndrome is the combination of norepinephrine and vasopressin or the use of methylene blue. The primary interest is to observe the odds of vasoplegia if those patients had RAS inhibitors as home medications. Secondary observations are hospital length of stay and in-hospital mortality. Subgroup analyses are performed to identify characteristics such as diabetes, heart failure, body mass index, age, and type of RAS inhibitors. Result: Pre-surgical consumption of RAS inhibitors does not demonstrate significance (OR 4.47; 0.55, 36.58, 95% CI; $p = 0.16$). Patients with vasoplegia have longer hospital stays (10.63 days vs. 5.22 days; $p < 0.000002$) and higher mortality (37.5% vs. 0.5%). Conclusion: RAS inhibitors may not solely contribute to vasoplegic syndrome. Due to the highly varied observational outcome, further clinical studies are greatly suggested by narrowing down baseline characteristics such as surgical indication or cardiopulmonary bypass time.

Learning Objectives:

Outline risk factors of vasoplegic syndrome

Recognize potential pre-operative management

Self Assessment Questions:

Which drug class was added to the 2022 AHA/ACC/HFSA HFrEF guidelines?

A. Angiotensin-converting enzyme inhibitor

B. Angiotensin receptor blocker

C. Angiotensin receptor/neprilysin inhibitor

D. Beta-blocker

Which of the following risk factors are likely associated with vasoplegic syndrome?

A. Heart failure

B. End-stage renal disease

C. Pre-operative medications (e.g., renin-angiotensin system inhibitors)

D. All of the above

Q1 Answer: C Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-710-L01-P

Health-System Retail Pharmacist-Driven Per-Protocol Prescribing Practices at Eskenazi Health

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A fundamental shift for U.S. healthcare towards â€œpopulation healthâ€considering the population to be the patient, has been seen since the Institute of Medicine convened in 2013. The focus is no longer only on individual patients who come through hospital doors, but instead assumes responsibility for the larger population, via preventative and chronic care management.1 As U.S. healthcare shifts towards a population health model, health systems face significant challenges in addressing growing demands, exacerbated by primary care provider (PCP) shortages and public health crises, (e.g., unintended pregnancies, rising rates of smoking and vaping in select populations, resurgence of immunization-preventable diseases, lingering effects of COVID-19).

Enhancing prescribing authority of pharmacists may help alleviate strain on PCPs and increase patient access. Health-system retail pharmacists (HSRPs) are well-poised to provide comprehensive patient care given their access to patient health records and close working relationships with PCPs within their healthcare systems. HSRPs can help offload tasks from PCPs through medication management, a role that is well within pharmacistsâ€™ scope of practice. Eskenazi Health, an academic medical center and safety-net health system in Indianapolis, seeks to improve access to preventative care services using per-protocol prescribing by HSRPs.

This study evaluates pharmacistsâ€™ per-protocol prescribing impact on preventative and chronic care management through patient reach and medication adherence, ultimately assessing whether Eskenazi Healthâ€™s model for HSRPs can be leveraged to further support health systems and fill an identified gap in literature. This retrospective cohort study assesses all outpatient prescriptions written or adjusted per protocol within the health system during 2023 and 2024, positioning Eskenazi Healthâ€™s HSRPs as vital contributors to addressing health disparities in metropolitan Indianapolis.

Learning Objectives:

Identify current challenges within the United States healthcare system regarding preventative and chronic care management.

Discuss opportunities for improved integration in the healthcare continuum of care for health-system retail pharmacists.

Self Assessment Questions:

Which of the following is correct? In the state of Indianaâ€¦

A. Pharmacists have no limitations on prescribing authority.

B. Pharmacists can administer any immunization recommended by the CDC regardless of patient age.

C. Pharmacists can prescribe tobacco cessation products via a Standing Order.

D. Pharmacists can only prescribe contraception via a Collaborative Practice Agreement (CPA).

Which of the following is correct?

A. There is sufficient literature regarding the impact on "patient reach" via health-system retail pharmacists.

B. There are enough primary care providers to meet the needs of the United States population.

C. Literature illustrates pharmacists are the least accessible healthcare provider.

D. Legislative bodies continue to pose barriers to expanding pharmacistsâ€™ prescribing authorities.

Q1 Answer: C Q2 Answer: D

APCE Universal Activity Number 0121-9999-25-813-L99-P