Nearly one in four Veterans treated at a VA facility have diabetes according to the U.S. Department of Veterans Affairs. If left untreated, diabetes can cause many microvascular and macrovascular complications. While there are several classes of antidiabetic medications that help improve blood glucose control, weight loss and a healthy diet continue to have the greatest impact on hemoglobin A1c (HgbA1c) and preventing long term complications associated with diabetes.

The Managing Overweight and Obese Veterans Everywhere (MOVE®) program was implemented in Veterans Affairs Medical Centers to aid Veterans in learning healthy lifestyle behaviors. This weight management program is free of charge to Veterans and consists of individualized plans that help Veterans to lose or maintain weight through balanced diet, physical activity, and behavioral change approaches. Despite the number of studies establishing the efficacy of the MOVE® group program on weight loss, there is a lack of data demonstrating the impact on pharmacotherapy and HgbA1c in Veterans with diabetes.

This study is a retrospective chart review of Veterans with diabetes that participated in the MOVE® group program from January 1st, 2008 to December 31st, 2014. The purpose of this study is to determine whether weight, HgbA1c and diabetic pharmacotherapy are reduced after Veterans learn healthy lifestyle habits after 1 year of participating in the MOVE® group program.

The results of this study will be utilized to illustrate how the MOVE® group program can influence diabetes control in the Veteran population.

Learning Objectives:

1) Describe important aspects of the MOVE® group program

Self-Assessment Questions:

1) The MOVE® group program is:
   A. Free of charge to Veterans
   B. Focused only on dietary changes
   C. Composed of a multidisciplinary team of instructors
   D. A & C

Q1 Answer: D

Poor medication adherence is associated with increased medication-related hospitalization, and is prevalent in psychiatric patient population.

The objective of this study was to assess the impact of pharmacist coaching on 8-Item Morisky Medication Adherence Scale (MMAS-8) scores obtained following hospital discharge among psychiatric patients by measuring the mean within-person change in MMAS-8 score from hospital admission to the first home visit within 30-days of hospital discharge.

This retrospective quality-improvement cohort study included hospitalized psychiatric patients between June 2014 and May 2015, and was 95% powered to detect a difference of 2 or more in mean within-person change in MMAS-8 score. The inclusion criteria were high risk for readmission, mental health diagnosis, baseline in-hospital MMAS-8 score less than 6, and follow-up MMAS-8 score within 30-days of the hospital discharge. A clinical pharmacist was consulted to coach all patients. Coached patients were included in the intervention group, while the control group were patients that were not coached.

Eighty seven patients (38 control, 49 intervention) were included. MMAS-8 scores increased in the intervention group compared to the control group by a mean difference of 0.59 (95% CI 0.45 to 1.64, P=0.26) using linear regression adjusted for nine covariates. Mean in-hospital MMAS-8 score was 4.4 ± 1.1 and 4.3 ± 1.2, while the mean home visit MMAS-8 score was 6.0 ± 2.0 and 6.3 ± 1.8 for the control and intervention group, respectively.

This study did not find a difference in MMAS-8 scores between patients who were and were not coached by an inpatient pharmacist.

Learning Objectives:

1) Describe the 8-Item Morisky Medication Adherence Scale (MMAS-8) scores

Self-Assessment Questions:

1) The 8-Item Morisky Medication Adherence Scale (MMAS-8) is:
   A. A validated self-report medication adherence tool
   B. An 8-item medication adherence tool with scores ranging from 0-12
   C. Categorized into low, medium, or high medication adherence depending on the score
   D. A and C

Q1 Answer: D
EVALUATION OF THE USE OF QUETIAPINE FOR THE TREATMENT OF DELIRIUM IN THE INTENSIVE CARE UNIT.
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Delirium is an acute onset of cerebral dysfunction experienced by up to 80% of mechanically ventilated patients in the intensive care unit (ICU). It has been associated with negative clinical outcomes including increased mortality, hospital length of stay, cost, and long-term cognitive impairment. Delirium remains a poorly understood syndrome and there are no definitive treatment options.

Haloperidol has traditionally been used as the primary agent for delirium treatment. However, there is little published evidence to support its efficacy and it is associated with severe adverse effects such as QTc prolongation, torsade de pointes, and extrapyramidal symptoms. Quetiapine, a second-generation antipsychotic, has been used as an alternative to haloperidol for the management of delirium. Several small studies have shown quetiapine resolves symptoms of delirium more quickly than placebo and is as effective as other antipsychotics such as haloperidol. However, quetiapine is also associated with adverse effects such as QTc prolongation, extrapyramidal symptoms, and somnolence. The incidence of these adverse effects when quetiapine is used for the treatment of delirium remains poorly described.

The objective of this study is to evaluate the safety of quetiapine when used in the ICU for the treatment of delirium. This is a retrospective, observational review that includes patients admitted to the ICU who were started on quetiapine for the treatment of agitation or delirium. The primary outcome is the incidence and degree of QTc prolongation. Secondary outcomes include the incidence of other adverse effects as well as its impact on delirium based on CAM-ICU positive days.

Learning Objective:
1) Evaluate the safety of quetiapine when used for the treatment of delirium in the ICU

Self-Assessment Question:
1) Delirium has been associated with which of the following negative clinical outcomes in critically ill patients?
   A. Increased mortality
   B. Increased hospital length of stay
   C. Long-term cognitive impairment
   D. All of the above
   E.

Answer: D

IMPACT OF PHARMACIST INVOLVEMENT ON UTILIZATION OF 4-FACTOR PROTHROMBIN COMPLEX CONCENTRATE (4PCC) FOR MANAGEMENT OF BLEEDING AFTER ORAL ANTICOAGULATION. Scott Allen, Brian Trevor, Nebraska Medicine, 981090 Nebraska Medical Center 68186-1090.
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Vitamin K antagonists (VKA) and oral factor Xa inhibitors (OXI) are used by millions of patients in the United States for the prevention and treatment of venous thromboembolism and prevention of cardiac thromboembolism.

CHEST guidelines recommend emergent reversal of VKAs with vitamin K and 4PCC or fresh frozen plasma. Kcentra is a 4PCC approved for emergent reversal of VKAs and has been used off label in the reversal of OXIs. Kcentra is associated with an increased risk of thrombosis. Patient safety in the setting of major bleeding is an important consideration.

Clinical pharmacists play a vital role in assessing patients when high risk or high cost medications are being considered. The purpose of this study is to describe and characterize the influence and involvement of clinical pharmacists in the utilization of 4PCC at an academic medical center.

This retrospective descriptive study will include all patients who are 18 years or older with a history of VKA or OXI therapy and an order or a request for 4PCC. Patients will be grouped based upon 4PCC use or alternative and class of oral anticoagulant (VKA or OXI). We will evaluate clinical pharmacist involvement in assessing appropriate use and dosing of 4PCC based upon institution protocol, and compare secondary outcomes in patients who received 4PCC versus those who did not. Secondary outcomes include cost savings, hospital length of stay, incidence of thrombosis, and 28-day mortality.

Data collection is underway. Pharmacist involvement in 4PCC utilization is anticipated to reduce costs.

Learning Objective:
1) Describe the role of the pharmacist in assessing appropriate use and dosing of 4PCC

Self-Assessment Question:
1) Pharmacist involvement in 4PCC utilization may result in:
   A. Avoidance of unnecessary administration and drug costs
   B. Increased cost due to administration fees
   C. Poor outcomes as a result of administration delay
   D. No effect on overall cost

Answer: A
A COMPARISON OF TWO MODELS OF OUTPATIENT WARFARIN MANAGEMENT

Mindy Anders, Michael Gulseth, Sanford USD Medical Center, 1305 W 18th St, Sioux Falls, SD 57117

Careful monitoring of anticoagulation therapy is important to prevent adverse events and to ensure the benefits of anticoagulation. Several models of anticoagulation management help ensure both the safety and benefit of anticoagulant therapy. Traditional models rely upon general practitioners to monitor laboratory parameters and adjust anticoagulation therapies. Other models use an anticoagulation clinic, generally pharmacist-managed or nurse-managed, to monitor and adjust therapy. Sanford Medical Center in Sioux Falls, South Dakota has designed a clinic that utilizes nurses and pharmacists and relies on the collaborative effort of both disciplines to manage patients on anticoagulants.

A retrospective concurrent data analysis of patients treated with warfarin for select indications with a target INR range of 2 to 3 and managed by a Sanford clinic between June 1, 2011 and September 30, 2015 will be conducted. The primary objective of the study is to evaluate the difference in time in therapeutic range (TTR) between patients managed by two different models of anticoagulation management services: a traditional care model using general practitioners in rural areas and a clinic utilizing interdisciplinary collaboration between pharmacists and nurses. The secondary objective is to compare the rate of bleeding and the rate of thrombotic events between groups. Events will be identified by the primary ICD-9 code for an admission and/or emergency department visit.

Study results will be presented at Midwest Pharmacy Residency Conference and used to encourage any needed changes in rural care models.

Learning Objective:

1) Identify the benefits of an anticoagulation management model that utilizes the collaborative efforts of pharmacists and nurses.

Self-Assessment Question:

1) Systematic anticoagulation care models, when compared to traditional care models, have been found to:
   A. Increase the rate of bleeding events
   B. Improve INR control and patient outcomes
   C. Increase the rate of thrombotic events
   D. Rely on general practitioners to manage anticoagulation therapy

Answer: B

ESTABLISHMENT OF AN INTERPROFESSIONAL MEDICATION THERAPY MANAGEMENT SERVICE AT A GENERAL MEDICINE CLINIC

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Abbott Northwestern General Medicine Associates (ANGMA) Medicine Clinic provides a full range of primary health care services to approximately 5,900 adults a year with special emphasis on chronic medical problems such as diabetes, high blood pressure and high cholesterol. The patient population at the Medicine Clinic is at or near the poverty line and many of the patients are at a higher risk for medication-related problems (MRPs) due to low healthcare literacy and polypharmacy. The goal of medication therapy management (MTM) is to identify and evaluate potential or actual MRPs so they can be prevented, diminished, or resolved, thereby ensuring that the patient’s medication regimen is appropriate, effective, safe and convenient.

The purpose of this study is to determine how a pharmacist led medication therapy management service would impact resolution of medication-related problems at a primary care clinic staffed by internal medicine residents. A secondary purpose is to assess internal medicine resident satisfaction with the services provided by a pharmacist on the multidisciplinary team.

A pharmacist will meet with select patients every Tuesday to perform medication reconciliation, review medications for indication, effectiveness, safety and adherence and perform interventions via collaboration with the internal medicine residents. Patient visits and interventions will be documented in the patient’s electronic medical record in Epic®.

The results of the study will be used to support a business plan to place a pharmacist in the ANGMA clinic on a more permanent basis with the opportunity for first-year pharmacy residents to participate through a longitudinal rotation.

Learning Objectives:

1) Identify characteristics that suggest a patient would benefit from a comprehensive medication review.
2) Recognize and categorize medication-related problems.

Self-Assessment Questions:

1) Which of the following characteristics suggest that a patient would benefit from a comprehensive medication review?
   A. A patient on taking multiple supplements and/or herbal
   B. A patients with chronic disease who are not at goal or not maintaining their goals
   C. A patient with pre-diabetes controlled by lifestyle modifications
   D. A & B

2) Which of the following examples represent a medication-related problem?
   A. A patient is not at blood pressure goal
   B. A patient is taking their carvedilol with a meal
   C. A patient experiencing a dry cough while on lisinopril
   D. A & C

Q1 Answer: D Q2 Answer: D
Physiological stress in critically ill patients may lead to the development of gastrointestinal mucosal damage. Approximately 75 to 100% of critically ill patients develop stress-related mucosal disease within the first 24 hours of intensive care unit admission, which can progress into ulceration and gastrointestinal bleeding. To prevent such events, stress ulcer prophylaxis (SUP) is widely considered a standard of care in critically ill patients. Histamine-2 receptor antagonists (H2RA) and proton pump inhibitors (PPI) are thought to be appropriate agents for SUP, however concerns regarding the development of hospital-acquired Clostridium difficile infection (CDI) and pneumonia while receiving these agents have emerged.

A retrospective, chart review was performed and included intensive care patients who developed CDI and/or pneumonia from January 2014 to December 2015 at a large academic medical center. The primary objective of this study was to assess the rate of hospital-acquired CDI and pneumonia in critically ill patients receiving SUP with H2RA or PPI. Secondary objectives include an evaluation of the prescribing trends of SUP, estimation of the financial impact of SUP-associated CDI and pneumonia, and evaluation of SUP efficacy. Outcomes will be assessed using descriptive statistics, chi-square analyses, and risk evaluation as appropriate.

The results of this study may be used to justify changes in current policies and procedures, recognize educational needs, and influence ordering preferences.

Learning Objectives:

1) Identify indications for stress ulcer prophylaxis

2) Discuss why stress ulcer prophylaxis is implicated in hospital-acquired CDI and pneumonia

Self-Assessment Questions:

1) Which of the following would indicate the need for stress ulcer prophylaxis?
   A. INR 1.3
   B. Mechanical ventilation for greater than 48 hours
   C. Use of greater than 250 mg per day of hydrocortisone or equivalent
   D. ICU stay greater than 7 days

2. Why is SUP implicated in the development of hospital-acquired CDI and pneumonia?
   A. Increased gastric pH facilitates microbial overgrowth
   B. SUP leads to increased risk of aspiration
   C. SUP induces changes in gut microbes that increase their virulence
   D. Agents commonly used for SUP are often contaminated during the manufacturing process

Q1 Answer: B  Q2 Answer: A

Periprocedural antithrombotic management is based on risk assessment for thromboembolism and bleeding. Current guidelines are based on weak evidence and lack specific direction for patients at moderate thromboembolic risk. Our institution’s protocol is based on these guidelines but leaves specific periprocedural antithrombotic management for patients at moderate risk up to clinical judgement. New research has recently been published providing significant new data suggesting that the theoretical benefit to using a low molecular weight heparin (LMWH) to “bridge” patients does not outweigh the increased risk of bleeding in this population. A recent cohort analysis at our institution found that almost two-thirds of patients at moderate thromboembolic risk receive bridging with a LMWH.

The purpose of this study is to determine the effect of providing education on the rate of prescribing bridge therapy for patients at moderate thromboembolic risk. Secondary outcomes will include rates of bleeding and thromboembolic events 30 days post procedure.

A review of patients undergoing periprocedural warfarin interruption was conducted to determine initial rates of prescribing bridging therapy. Education regarding recently published literature was then provided to general internal medicine physicians and anticoagulation clinic pharmacists. A second cohort analysis will be performed to identify differences in prescribing patterns as a result. The data will be analyzed using descriptive statistics.

Expected outcomes include a decrease in the rate of bridging therapy for patients at moderate thromboembolic risk. The results will be shared with the anticoagulation clinic director and manager to identify potential areas for further practice improvement or policy change.

Learning Objective:

1. Identify a patient’s level of thromboembolic risk based on individual risk factors.

Self-Assessment Question:

1. Which of the following patients would be considered to have a moderate risk of thromboembolism?
   A. A 65 year old patient with a mechanical mitral valve
   B. A 72 year old patient with a DVT 10 years ago
   C. A 56 year old patient with atrial fibrillation, type 2 diabetes, and hypertension
   D. A 57 year old patient with atrial fibrillation and a St. Jude aortic valve.

Answer: D
learning Objective:

1. Evaluate importance of antipsychotic formulation on patient length of stay and six-month readmission rates

Self-Assessment Question:

1. Which antipsychotic does not have a long-acting injectable formulation?
   A. paliperidone
   B. risperidone
   C. quetiapine
   D. aripiprazole

Answer: C
Health care organizations are continually pressured to maintain optimal levels of patient safety while simultaneously instituting methods to achieve cost containment. Medication costs, comprising the majority of health-system pharmacy budgets and approximately 10-20 percent of the average hospital’s operating budget, represent a constant logical target for cost savings initiatives. In addition, reduction of medication errors, particularly those that occur in the pharmacy dispensing process, represent a further opportunity for cost containment in the maximization of patient safety. Optimizing central pharmacy automation processes can have a deep impact on both patient safety as well as the allocation and efficient use on cost repositioning and the pharmacy labor pool. The purpose of this study was to evaluate the medication distribution system at Saint Luke’s Hospital before and after implementation of a three-phase central pharmacy automation intervention.

Learning Objective:

1) Describe how an operational philosophy for automation can improve workflow decisions

Self-Assessment Question:

1) An operational philosophy can impact:
   A. Workflow decisions
   B. On-hand inventory
   C. Operational efficiency
   D. All of the above

Answer: D
A FEASIBILITY STUDY TO IMPLEMENT A TRANSITIONS OF CARE SERVICE IN A COMMUNITY PHARMACY. Annie Barry, Peggy Kuehl, UMKC/Price Chopper Pharmacy #36, 6475 N Prospect Ave, Gladstone, MO 64119. annie.barry@ballsfoods.com

To determine the feasibility of a proposed transition of care service in a community pharmacy, in partnership with a local hospital. Community pharmacists will share medication profiles with the hospital when a patient is admitted; and provide patients with comprehensive medication reviews and enrollment in a medication synchronization program post-discharge.

Feasibility will be based on whether the service can be financially sustainable, and whether an efficient mechanism to provide this service can be developed. Data will come from pharmacy databases MyDataMart and RX1 (LPS, Fort Worth, TX) and include: number of patients with prescriptions written by hospitalists at the partner hospital, number of chronic prescription medications for each patient, percent adherence in the community pharmacy for those who are and are not on the medication synchronization program, average reimbursement for prescriptions at our pharmacies, and pharmacist/technician time/salary to provide the service. The service will be developed and piloted in partnership with the local hospital. Projected revenue will be determined from the product of number of patients, number of chronic prescriptions, average revenue per prescription, and increased rate of adherence. Efficiency will be determined by pharmacist/technician time/salary and its effect on projected revenue. Sensitivity analysis will be used to determine the robustness of our model.

Our hope is to deepen relationships with our patients allowing us to provide other services to them and improve their overall health. Reduced hospital readmissions are the ultimate outcome desired.

Learning Objectives:
1) Describe how a feasibility study can be used when implementing a new service in a community pharmacy.
2) Identify a mechanism that can be used in a community pharmacy to implement a transitions of care service.

Self-Assessment Questions:
1) All except which one of the following are true of feasibility studies?
   A. They can be done before a service is implemented to determine a likelihood of financial sustainability
   B. They can be used after a service is implemented to determine if the service is meeting its patient care goals
   C. They can be used to determine factors that could improve the efficiency of how a new service is provided
   D. They may include different factors depending on the setting involved

2) All except which one of the following are true of transitions of care services?
   A. Community pharmacists are able to identify discrepancies between what is prescribed on discharge, the pharmacy profile, and what the patient is actually taking.
   B. Community pharmacists are in a unique position to be the first health care provider to come in contact with a patient following a hospital discharge.
   C. Community pharmacists are paid for the majority of their transition of care activities.
   D. To date, transitions of care activities have commonly been performed within a health system without inclusion of community pharmacy practitioners.

EFFECTS OF MEDICATION THERAPY MANAGEMENT ON PATIENT ADHERENCE. Lindsey Batz, Dani Markus, OutcomesMTM, 505 Market Street, Suite 200, West Des Moines, IA 50266. lbatz@outcomesmtm.com

Patient adherence continues to be an important issue affecting our healthcare system today. Nonadherence leads to worse patient outcomes and unnecessary waste. Community pharmacists are well-positioned to address adherence issues among the patients they serve.

The objective of this study is to evaluate the effectiveness of MTM interventions provided by community pharmacists on adherence for patients taking non-insulin diabetes medications, statins or renin-angiotensin system antagonists (ACEI, ARB and DRI).

Patients identified as at risk of becoming or already non-adherent were targeted for at least one adherence service including Adherence – Needs Check-in, Adherence – Needs 90-day Fill and the Adherence Monitoring Program during calendar year 2015. Utilizing a web-based MTM platform, community pharmacists had the opportunity to provide these services for targeted patients and subsequently document and bill services. Patients’ proportion of days covered (PDC) rates were calculated and stratified based on successfully receiving an adherence intervention or receiving no intervention. Inferential statistics was used to compare the groups.

Through provision of MTM interventions by community pharmacists, patient adherence to non-insulin diabetes medications, statins and renin-angiotensin system antagonists has improved.

Learning Objectives:
1) Describe the types of adherence services received by patients.
2) Recognize the impact of MTM interventions on patient adherence for non-insulin diabetes medications, statins and renin-angiotensin system antagonists (ACEI, ARB and DRI).

Self-Assessment Questions:
1) What type(s) of adherence services were patients eligible to receive?
   A. Adherence – Underuse of Medication and Adherence – Needs Check-in
   B. Adherence – Needs 90-day Fill and Adherence – Needs Check-in
   C. Adherence Monitoring Program
   D. Adherence – Needs Check-in, Adherence – Needs 90-day Fill and Adherence Monitoring Program

2) How did the provision of MTM interventions affect patient adherence?
   A. Patients who received an adherence intervention had a lower PDC rate
   B. Patients who received an adherence intervention had a higher PDC rate
   C. There was no difference in PDC rate between patients who received an intervention and those who did not
   D. Only patients who received an adherence intervention for statins had a higher PDC rate

Q1 Answer: D Q2 Answer: B
EVALUATION OF HOSPITAL-WIDE UTILIZATION OF THE HEPARIN DOSING PROTOCOL FOR DEEP VEIN THROMBOSIS (DVT) AND PULMONARY EMBOLISM (PE) IN THE OBESE POPULATION. Jacob A Beck, PharmD; Starr-Mar’ee C Bedy, PharmD BCPS; Kara Goddard, PharmD BCPS, University of Missouri Health Care, One Hospital Drive, Columbia, MO 65212 DC060.00 beckjac@health.missouri.edu

The rationale of our project is to compare the safety and efficacy of our uncapped heparin DVT/PE protocol in obese versus non-obese patients. Capped regimens are utilized in other heparin protocols such as acute coronary syndrome. It has been established using actual body weight rapidly reaches therapeutic anticoagulation in uncapped nomograms, however this leaves the obese population at higher risk for developing supra-therapeutic anticoagulation. This study is a single center retrospective chart review of patients placed on our heparin DVT/PE protocol for at least 24 hours between February 19, 2013 and August 19, 2015. Exclusion criteria include initiation of heparin at an outside hospital and improper utilization of the protocol. Primary objectives of the study are the rate patients achieve a supra-therapeutic anti-factor Xa level (defined as anti-factor Xa level> 0.7 units/ml) and time to achieve a therapeutic anti-factor Xa level (0.3 units/ml to 0.7 units/ml).

Preliminary results of 116 patients (62 non-obese and 54 obese) show a trend towards supra-therapeutic initial anti-factor Xa levels in the obese population. Protocol was properly followed in 76% of the non-obese population and 59% of the obese population. A sub-group analysis of patients with protocol treatment found the initial anti-factor Xa level was significantly different between the obese and non-obese (0.88 units/ml vs 0.54 units/ml; mean, p = 0.00014). The sub-group analysis showed longer times to therapeutic anti-factor Xa levels in the obese population (24 hours versus 18 hours; median, obese vs. non-obese). Further data collection and assessment of clinical outcomes is underway.

Learning Objectives:
1) Evaluate the association between obesity and supratherapeutic Xa concentrations in patients initiated on an uncapped weight based heparin nomogram
2) Discover if supratherapeutic Xa concentrations are correlated with adverse clinical outcomes

Self-Assessment Question:
1) Is there a significant trend towards supratherapeutic Xa concentrations in the obese patients who followed protocol? AND What is defined as a supratherapeutic Xa concentration?
   A. Yes; >1.2 units/ml
   B. Yes; >0.7 units/ml
   C. No; >1.2 units/ml
   D. No; >0.7 units/ml
Answer: B

EVALUATION OF THYMOglobulin PROTOCOLS FOR INDUCTION IMMUNOSUPPRESSION IN KIDNEY TRANSPLant PATIENTS. Laurel Beck, Christine Borscheid, Heidi Sarumi, 420 Delaware St. SE Minneapolis, MN 55455. lbeck4@fairview.org

Thymoglobulin is an agent used most often in induction immunosuppression regimens for kidney transplants in the United States, although it lacks an FDA approved indication for this use. There are many different thymoglobulin induction regimens used across the nation in transplant centers. The University of Minnesota Medical Center recently changed to a new regimen consisting of fewer doses of thymoglobulin for their Kidney Induction Immunosuppression protocol in the beginning of 2015. This change was based off a retrospective chart review of 123 adult kidney transplant recipients from January through December 2013. The outcomes assessed were biopsy proven acute cellular rejection and infection. It was concluded that thymoglobulin dose adjustments based on absolute leukocyte count resulted in increased rejection rates without a decrease in infections.

Currently the total dose of thymoglobulin for kidney induction immunosuppression is 6 mg/kg. This is typically administered as three 2 mg/kg doses on post operative days 0,1, and 2. Dose adjustments are based on white blood cell count and platelets per package insert. Absolute lymphocyte count is no longer used as a dose adjustment parameter.

A retrospective chart review of patients from 2015 will be conducted. The primary objective is to assess both efficacy and safety of the new regimen. Efficacy will be assessed by comparing rates of rejection between the regimens. Safety will be measured by comparing rates of infection between the two protocol groups.

Learning Objectives:
1) Explain the role of thymoglobulin in kidney transplantation.
2) Describe the advantages of the 2015 Kidney Transplant Induction Immunosuppression protocol compared to the 2013 protocol at the University of Minnesota Medical Center.

Self Assessment Questions:
1) Thymoglobulin is:
   A. FDA approved for both induction immunosuppression and rejection in kidney transplantation
   B. A medication with very few side effects associated with its use.
   C. An agent that works by reducing the number of circulating T-lymphocytes.
   D. Both A and C
2) What is one of the advantages of the new 2015 Thymoglobulin Induction Immunosuppression protocol compared to the 2013 protocol at the University of Minnesota?
   A. Patients are receiving lower doses of thymoglobulin, and as a result, therapy is cheaper.
   B. There appears to be lower rates of both rejection and infection within 3 months of transplantation in the patients who receive dosing according to the 2015 protocol.
   C. White blood cell count is no longer used to adjust thymoglobulin dosing in the 2015 protocol.
   D. The goal total dose of thymoglobulin for kidney immunosuppression in the 2015 protocol is 8 mg/kg.

Q1 Answer: C Q2 Answer: B
Osteoporosis in men is often a silent disease until the development of a fracture. While women with risk factors for osteoporosis are commonly screened, osteoporosis is frequently under diagnosed and undertreated in males per the VA Health Services and Research Development. In recent years there has been a heightened awareness of male osteoporosis within the Department of Veterans Affairs (VA). Therefore, the VA has created a screening algorithm for their male population, which is based on the World Health Organization (WHO) risk factors for osteoporosis, evidence in osteoporosis literature, as well as reviews of osteoporosis in men.

The purposes of this quality improvement project are to utilize the VA screening algorithm to identify male patients in one Patient Aligned Care Team (PACT) with risk factors for osteoporosis and contact these patients via letter and automated telephone call to have them screened for osteoporosis via dual energy x-ray absorptiometry (DXA) scans. Once screened, chart reviews will be completed and treatment will be recommended by pharmacy as indicated.

These objectives will be assessed by comparing the percentage of patients screened before and after patient contact. Secondary outcomes include DXA results and pharmacist recommended medication initiation rates.

The results of this study will be used to improve identification of male patients at risk for osteoporosis and increase screening of these patients. By implementing this patient identification, outreach, and chart review approach, there is opportunity to advance the role of the clinical ambulatory pharmacist at the Kansas City VA.

Learning Objective:
1) Describe the impact of bone mineral density screening for patients at risk for osteoporosis

Self-Assessment Question:
1) Which of the following are true regarding osteoporosis?
   A. Early treatment may help prevent osteoporotic fractures
   B. Early identification allows for patients to make lifestyle changes
   C. Osteoporosis is more prevalent in males than females
   D. Osteoporosis is more prevalent in females than males

Answer: A, B, D

EVALUATION OF A NEW BLOOD CULTURE PROTOCOL IN PEDIATRIC PATIENTS WITH FEVER IN THE PRESENCE OF A CENTRAL LINE. Jenna Bender, Elizabeth Amelon, Nathan Price, Mary Beth Davis, Nichole Sly, and Marshall Johnson, University of Iowa Hospitals and Clinics, 200 Hawkins Dr., CC101 GH, Iowa City, IA 52242. jlbendr@healthcare.uiowa.edu

The University of Iowa Children’s Hospital has initiated a new blood culture protocol in pediatric patients with fever in the presence of a central line to improve detection of true bacteremias and limit over exposure to antibiotics by identifying and not treating contaminants and to more closely align with recommended standards of care.

The Infectious Diseases Society of America guidelines for the diagnosis and management of intravascular catheter-related infection strongly recommend the collection of both peripheral and central venous catheter (CVC) cultures if there is suspicion of catheter-related bloodstream infections (CRBSI). While this practice is routinely followed in adult patients, this is not the case in pediatric patients. Current pediatric guidelines for febrile neutropenia only recommend considering the addition of peripheral cultures due to the lack of conclusive evidence when balancing potential benefits of differentiating between CRBSI and true bacteremia and increasing detection of true bacteremia with perceived risks such as pain and inconvenience for the patient.

The primary objective of this study is to evaluate compliance with the new blood culture protocol, while the secondary objective is to evaluate the clinical utility of the peripheral cultures.

A retrospective chart review of pediatric patients with fever in the presence of a central line is being completed to assess utilization of the protocol order set. There will also be a cohort comparison between pre-protocol implementation and post-protocol implementation to assess for changes in antibiotic duration, detection rate of pathogens, time to positivity, and length of stay.

Learning Objectives:
1) Describe the rationale for collection of peripheral cultures in pediatric patients with fever in the presence of a central line.

Self Assessment Questions:
1) Which of the following statements are correct regarding the collection of peripheral cultures in pediatric patients with fever in the presence of a central line?
   A. Peripheral cultures are used in the diagnosis of catheter-related bloodstream infections.
   B. Peripheral cultures have higher rates of contamination compared to central venous catheter cultures.
   C. Peripheral cultures can help increase detection rate of pathogens.
   D. Both A and C.

Answer: D
ASSESSMENT OF CURRENT PREVENTION AND TREATMENT STRATEGIES FOR PEDIATRIC OPIOID-ASSOCIATED CONSTIPATION. Sarah Berger, Glenda Adams, Deb McFatridge, CoxHealth, 3801 S. National Ave, Springfield, MO 65807; Sarah.berger2@coxhealth.com.

Pediatric patients may be at risk for complications of constipation when started on opioids without laxatives. This study will assess the need for a standardized bowel management protocol for the pediatric population within a not-for-profit community health system.

The primary objective is to determine how often laxatives were prescribed with opioids in pediatric patients and compare the outcomes to patients without laxatives prescribed. Secondary objectives include assessing appropriateness of laxative dosing and determining differences in prescribing patterns in the medical and surgical teams.

This study looks at patients admitted from October 2011 to October 2015 who were between the ages of 2 and 17 years at the time of admission, were admitted for greater than or equal to 48 hours, and received greater than or equal to one dose of opioid pain medication. Patients with cystic fibrosis, Hirschsprung disease, cerebral palsy, diabetes mellitus, celiac disease, impacted stool on admission, gastrointestinal obstruction, lead poisoning, and hypothyroidism are excluded. Relevant data taken from patient charts includes patient’s age, weight, admission reason, dose/frequency of opioid, laxative agent ordered (if any), time bowel agent was ordered, time to stool, and past medical history.

Of the 15 patients analyzed thus far, the average length of stay was 4.6 days. 27% of patients on opioids were prescribed a laxative. 40% of patients without laxatives ordered had a bowel movement prior to discharge. None of the patients reviewed who had a laxative ordered stools prior to discharge. 75% of laxatives ordered were from the surgical team.

Learning Objective:

1) Identify reasons why adding laxatives as prophylaxis to opioid pain medications could be beneficial in the pediatric population.

Self-Assessment Question:

1) What are some benefits to adding a laxative on to orders for opioid pain medications in the pediatric population?
   A. Prevent constipation
   B. Prevent the psychosocial effect of pediatric patients being afraid to stool in the future when they experience constipation
   C. Increase the efficacy of the opioid pain medication
   D. Both A & B

Answer: D

IMPACT OF A DAPTOMYCIN DOSE ADJUSTMENT PROTOCOL ON CLINICAL AND ECONOMIC OUTCOMES IN OBESE PATIENTS. Tara Bergland, Diana Karkow, and Erika Ernst; 200 Hawkins Dr, University of Iowa Hospitals and Clinics, Iowa City, IA 52140; tara.bergland@uiowa.edu.

Conventional dosing of daptomycin is based on total body weight (TBW). However, studies show approximately 30% higher drug exposures in obese patients when dosed using TBW. Additionally, minimum daptomycin concentrations ≥ 24.3 mg/L have been associated with an increased probability of creatine phosphokinase elevations, and patients ≥ 111 kg were more likely to have these concentrations when dosed using TBW.

Based on the data, the University of Iowa Hospitals and Clinics (UIHC) adopted a dose adjustment protocol in which pharmacists are authorized to automatically adjust daptomycin doses in patients weighing ≥ 111 kg. The purpose of this study is to evaluate the impact of the dose adjustment protocol on clinical and economic outcomes in eligible patients.

This study will be a retrospective study of inpatients admitted to UIHC between September 1, 2012 and August 31, 2015. Patients who are 18 years or older will be included if they weigh ≥ 111 kg and received at least 72 hours of daptomycin therapy, with the first dose administered at UIHC. Patients who received daptomycin at an outside facility within 24 hours prior to transfer or those with a daptomycin non-susceptible pathogen will be excluded. Eligible patients will be divided into two groups based on whether they received conventional doses or adjusted doses of daptomycin.

The primary outcome will be the rate of clinical success. Secondary outcomes will include the rate of microbiological success, hospital length of stay, 30-day readmission, in-hospital mortality, incidence of CPK elevations and musculoskeletal adverse events, and daptomycin costs.

Learning Objective:

1) Explain the rationale for using adjusted doses of daptomycin in patients weighing ≥111 kg.

Self-Assessment Question:

1) What is the risk of using total body weight (TBW) to calculate daptomycin doses in patients weighing ≥111 kg?
   A. Patients ≥ 111 kg have decreased clearance and may develop eosinophilic pneumonia with TBW dosing
   B. TBW dosing may result in treatment failure in patients ≥ 111 kg due to inadequate serum concentrations
   C. Increased creatine phosphokinase levels are more likely to occur with TBW dosing in patients ≥111 kg
   D. There is no risk associated with TBW dosing in patients ≥111 kg

Answer: C
A paucity of data exists regarding the ideal pharmacologic regimen for venous thromboembolism (VTE) prophylaxis in two high-risk populations of critically ill patients: the underweight and the neurologically injured. It is, therefore, unknown whether underweight, neurologically injured patients have different risks of bleeding or thrombosis when prescribed standard doses of VTE prophylaxis regimens.

The objectives of this study are to describe the VTE prophylaxis strategies employed in patients with neurologic injury, to elucidate the prevalence of thrombotic and bleeding events in this population, and to describe the impact of weight, specifically low weight, on these clinical outcomes.

This is a retrospective study of adults admitted to the intensive care unit (ICU) with neurologic injury over a five-year period. Patients were excluded if they received more than one VTE prophylaxis regimen, had an ICU length of stay <72 hours, or received a VTE prophylaxis regimen for <48 hours. Patients were stratified into two groups according to total body weight: underweight and non-obese. Following stratification, non-obese patients were matched 2:1 to underweight patients based on age and diagnosis. The prophylaxis regimen utilized, prevalence and type of thrombotic and/or bleeding events, evidence of prolonged activated partial thromboplastin time (aPTT), hematoma expansion, and discharge disposition will be collected and assessed for the underweight group, and subsequently compared to the non-obese group.

The results of this study could potentially be utilized to improve VTE prophylaxis prescribing methods and decrease the incidence of bleeding or thrombosis events in underweight, neurologically injured patients.

**Learning Objectives:**

1) Identify an underrepresented patient population in prospective trials of venous thromboembolism prophylaxis

2) Recall the matching criteria utilized in Practice Patterns of Venous Thromboembolism Prophylaxis in Underweight Critically Ill Patients with Intracranial Bleeding

**Self-Assessment Questions:**

1) Which patient population has been, historically, underrepresented in previously published VTE prophylaxis?

A. Normal weight
B. Medical floor patients
C. Underweight
D. Morbidly obese

2) Practice Patterns of Venous Thromboembolism Prophylaxis in Underweight Critically Ill Patients with Intracranial Bleeding matched on the following criteria:

A. Age
B. Length of Stay
C. Diagnosis
D. A & C

Q1 Answer: C  Q2 Answer: D

**Learning Objective:**

1) Describe the impact of standardized pharmacist monitoring processes and a documentation tool on patient outcomes related to anticoagulation use.

**Self-Assessment Question:**

1) Which of the below benefits of a standardized documentation process for anticoagulation monitoring is FALSE?

A. Consistent communication between pharmacy staff
B. Enhanced accountability for monitoring activities
C. Reporting and data related to anticoagulation outcomes
D. Pharmacists communicate less about anticoagulation monitoring activities

Answer: D
Ischemic stroke is a leading cause of disability and death in the developed world. Intravenous tissue-type plasminogen activator (tPA) has been FDA approved for use in acute ischemic stroke within 3 hours of symptom onset based on the NINDS tPA trial, which showed a 30% improvement in functional outcomes compared to placebo. The American Heart Association recommends intravenous tPA at a dose of 0.9 mg/kg to be administered to select patients experiencing an ischemic stroke with a goal door-to-needle (DTN) time of 60 minutes. This recommendation is based on studies showing improved outcomes and decreased adverse effects when tPA was administered within this time frame.

The purpose of this study is to assess the benefit of bedside tPA preparation as a component of the stroke response. The primary objective is to compare DTN times in the pre-bedside tPA preparation group to the post-bedside preparation group. Secondary study objectives include assessing pre-bedside preparation to post-bedside preparation in regards to imaging-to-drug times, order entry to drug administration, percent of patients meeting the DTN goal of 60 minutes, rate of intracranial hemorrhage post-tPA, and patient discharge disposition.

Patients from January 1, 2012 to January 31, 2015 will be assessed for the pre-bedside preparation group and compared to the patients from February 1, 2015 to April 30, 2016 in the post-bedside preparation group. The results of the study will be used to show the difference in DTN times and outcomes when tPA is prepared bedside compared to preparation in central pharmacy.

**Learning Objective:**

1) Recognize the benefit in reducing door-to-needle time for stroke patients receiving tPA.

**Self Assessment Question:**

1) Door-to-needle time of 60 minutes or less may
   A. Reduce discharge disposition to home
   B. Reduce risk of symptomatic intracranial hemorrhages
   C. Increase risk of hospital mortality

**Answer:** B

**Learning Objectives:**

1) Identify patients that would qualify for enteral iron supplementation.

2) Discuss the potential clinical impact of decreased iron supplementation in the intensive care nursery.

**Self-Assessment Questions:**

1) The American Academy of Pediatrics based their 2010 iron supplementation recommendation based on:
   A. Extensive studies done in the neonatal population
   B. The concept that there is an increasing deficit of total body iron with decreasing gestational age
   C. The risk of iron overload
   D. B & C

2) What clinical markers can indicate that a patient has decreased iron stores?
   A. Low hemoglobin
   B. Elevated temperature
   C. Failure to thrive
   D. Increased O2 requirements

**Q1 Answer:** D  **Q2 Answer:** A
Pharmacists are charged with the task of providing general patient care and managing pharmacotherapy for patients with a broad range of disease states. Certain specialties, such as Hematology/Oncology (Hem/Onc), require specialized training in order to effectively and efficiently fulfill these tasks. Although it is not an expectation for non-oncology pharmacists to provide patient care at an expert level, they are expected to have a basic understanding of chemotherapy, including the process of accurately verifying chemotherapy orders.

The primary objective is to develop a chemotherapy competency module that will improve pharmacists’ level of comfort with the order verification process and basic chemotherapy knowledge. This module will also review the current institutional chemotherapy resources available for pharmacists.

A baseline online 10-question assessment test was administered to non-oncology pharmacists to gain an understanding of the current level of competency. Out of 15 respondents, 60-93.3% and 80-86.7% answered clinical and order verification questions correctly, respectively. A survey showed 81.25% and 62.5% of respondents were uncomfortable with the first and second chemotherapy order verification, respectively. Most pharmacists (62.5%) were uncomfortable with monitoring drug therapy for a patient admitted on chemotherapy.

Each pharmacist at the institution will be required to complete the chemotherapy competency module, followed by a post-assessment survey. It is projected that basic chemotherapy knowledge and level of comfort with order verification will be improved from baseline.

Learning Objectives:
1) Discuss common and basic chemotherapy competencies pharmacists should possess.
2) Report preliminary results from the Development of a Chemotherapy Competency Module for Non-Oncology Pharmacists.

Self-Assessment Questions:
1) _____ is administered with ifosfamide and high dose cyclophosphamide to prevent hemorrhagic cystitis. 
   A. Leucovorin 
   B. Folic acid 
   C. Sodium bicarbonate 
   D. Mesna

Answer: D

Urinary tract infections (UTIs) are a common complication following kidney transplantation (KT) and a significant cause of morbidity and mortality in this population. While associations between post-KT UTIs and both graft and patient outcomes are well-described in the literature, the impact of recurrent post-KT UTIs is less researched. Risk factors for recurrent post-KT UTIs are not well established as studies have been limited to small centers. Additionally, there is little data to guide empiric treatment and duration of therapy for post-KT recurrent UTIs.

To address these important gaps in the literature, the objectives of this study were to: i) describe the microbiology of recurrent post-KT UTIs; ii) determine risk factors associated with recurrent post-KT UTIs; and iii) determine the optimal length of antimicrobial therapy associated with improved graft and patient outcomes in the treatment of recurrent post-KT UTI. This was a retrospective, single center cohort study at Barnes-Jewish Hospital and Washington University in St. Louis clinics. All adult KT recipients from 1999 through 2014 were included and patients who experienced early mortality (within 30 days post-KT) were excluded from analyses. Outcomes were compared using standard statistical tests for continuous and dichotomous variables.

This study was the largest investigation of recurrent post-KT UTIs to date and will address important gaps in the existing literature. Findings from this study are expected to lead to a better understanding of the optimal length of antimicrobial therapy for recurrent post-KT UTIs, which has the potential to decrease long-term morbidity and mortality among KT recipients.

Learning Objectives:
1) Identify the most common infectious complication following kidney transplantation.
2) List common pathogens causing urinary tract infection in the post-kidney transplant population.

Self-Assessment Questions:
1) What is the most common infectious complication following kidney transplantation?
   A. Bone/joint infection 
   B. Urinary tract infection 
   C. Bloodstream infection 
   D. Skin/soft tissue infection

2) What is the most common pathogen causing urinary tract infections in the post-kidney transplantation population?
   A. Escherichia coli
   B. Morganella morganii
   C. Enterococcus faecalis
   D. Pseudomonas aeruginosa

Q1 Answer: B   Q2 Answer: A
VANCOMYCIN PHARMACOKINETIC DOSING: IMPACT OF A PHARMACOKINETIC STANDARDIZED METHOD ON ACHIEVING THERAPEUTIC VANCOMYCIN GOALS. Ashley Brondum, Pamela Foral, Michaela Hrdy, Christopher Destache. Veteran’s Affairs Nebraska-Western Iowa Health Care System. 4101 Woolworth Ave., Omaha, NE 68105. ashley.brondum@va.gov

The proper approach to pharmacokinetic dosing of vancomycin has been interpreted and applied in various ways in the health care community. Many health care institutions have developed protocols for dosing vancomycin, but a validated standard of practice has yet to be published. Obese patient populations represent an even greater challenge in achieving target therapeutic goals of weight based antimicrobial therapy and the literature regarding dosing of vancomycin in obese patients is limited.

In April of 2014, in an attempt to optimize vancomycin dosing, a standardized approach to pharmacokinetic calculations was implemented at the Veteran’s Affairs Nebraska-Western Iowa Health Care System (VA NWIHCS). The primary objective of this study is to determine the impact of a pharmacokinetic standardization method on achieving therapeutic vancomycin goals. The secondary objectives of this study include: the percent of vancomycin trough levels above or below the desired therapeutic range at steady state, the number of times the regimen was changed prior to reaching therapeutic levels at steady state, the time required to reach therapeutic levels at steady state, and the incidence of renal toxicity.

A retrospective chart review will be conducted from 02/01/13 to 03/31/14 and 06/01/14 to 07/31/15 to evaluate vancomycin trough levels of patients, managed by pharmacists, at our institution before and after the implementation of the pharmacokinetic standardization in April 2014. Results will be utilized to address the effectiveness of the pharmacokinetic standardization on achieving therapeutic vancomycin goals as VA NWIHCS.

Learning Objectives:

1) List components of the pharmacokinetic standardization implemented at the VA NWIHCS in April 2014.
2) Discuss pharmacokinetic parameters altered in obese patients and how this can affect vancomycin dosing.

Self-Assessment Questions:

1) Which element was part of the pharmacokinetic standardization at VA NWIHCS?
   A) A CrCl of 120mL/min will be used for calculated CrCl values >120mL/min for patients > 30 yrs old
   B) Tau will equal vancomycin half-life x 1.5
   C) Serum creatinine measurements will not be rounded
   D) Vancomycin trough level goals will always be > 5mg/L

2) Which pharmacokinetic parameter has the greatest alteration in obese patients and requires an adjustment in vancomycin dosing?
   A) Volume of distribution
   B) Clearance
   C) Protein binding
   D) Absorption

Q1 Answer: C     Q2 Answer: A
An increasing prevalence of antimicrobial resistance and declines in the development of new antibiotics have led clinicians to seek methods to optimize treatment with existing antibiotics. One method to improve the bactericidal activity of an antimicrobial agent includes taking advantage of the pharmacokinetic and pharmacodynamic properties of the drug. Studies have shown that extending the infusion time for piperacillin/tazobactam from 30 minutes to 4 hours have produced pharmacodynamic, pharmacoeconomic, and clinical outcomes benefits.

This is a single-center, retrospective, pre- and post-implementation study of a hospital-wide extended-infusion protocol for piperacillin/tazobactam (PTZ). Prior to the implementation of the protocol, all patients received traditional infusion PTZ. In January 2016, the extended-infusion PTZ protocol was implemented. The purpose of this study was to evaluate the new protocol.

The primary outcome is all-cause mortality. Secondary outcomes include hospital LOS, ICU LOS, treatment failure rates, duration of therapy, and pharmacoeconomic benefits. Data from patients who received piperacillin/tazobactam between January 2016 and March 2016 will be compared to patients who received piperacillin/tazobactam during the same time period for the preceding year.

Multivariate analyses will be performed for the primary outcome. A case-match analysis will match patients based on age, sex, Charlson Comorbidity Index, and renal function. Results will be presented.

Learning Objectives:
1) Describe the pharmacokinetic/pharmacodynamics properties of beta-lactam antibiotics.
2) Explain the rationale behind using extended-infusion dosing methods for piperacillin/tazobactam.

Self-Assessment Questions:
1) Beta-lactam antibiotics are:
   A. Time-dependent killers
   B. Concentration-dependent killers

2) When compared to traditional infusion (TI) methods, the use of extended-infusion (EI) piperacillin/tazobactam:
   A. Requires less doses per day than TI
   B. Produces similar or better clinical outcomes than TI
   C. Produces similar adverse drug events
   D. All of the above

Q1 Answer: A  Q2 Answer: D

Daptomycin for the Treatment of Enterococcus Bacteremia. Caitlin S. Brown, Kirstin Kooda, Jason Barreto, Mayo Clinic Hospital – Rochester, 200 First Street SW, Rochester, MN 55905 brown.caitlin1@mayo.edu

Enterococcus species is the 2nd most common cause of nosocomial bacteremia and resistance, specifically vancomycin resistant Enterococcus (VRE), is increasing in prevalence. Daptomycin activity covers vancomycin susceptible and resistant Enterococcus but lacks FDA approval for treatment of bacteremia. The efficacy of daptomycin for Enterococcus bacteremia with minimum inhibitory concentration (MIC) values near the breakpoint is unknown. This study retrospectively assess the use of daptomycin for the treatment of Enterococcus bacteremia to determine if this therapy provides sustained clinical and microbiological cure based on MIC values.

The primary outcome of this study is to evaluate the efficacy of daptomycin for the treatment of Enterococcus bacteremia by comparing MIC values of <1,1,2,4, and >4. Secondary objectives include assessment of dosing strategy, safety, and identification of risk factors for daptomycin failure. Three hundred and thirty-one adult patients with Enterococcus bacteremia who received daptomycin for at least 48 hours from January 2005 – October 2015 were included in the study.

The results of this study will aid in defining the optimum use of daptomycin for the treatment of Enterococcus bacteremia based on patient specific culture data. It will also provide evidence for patients who could potentially be better suited for alternative therapies. It is anticipated that treatment with daptomycin for Enterococcus bacteremia will result in sustained clinical and microbiological cure for MIC ≤ 4. Our results will help us to identify patients in whom daptomycin will be appropriate for the treatment of Enterococcus bacteremia, as well as optimum dosing strategies.

Learning Objectives:
1) Describe the use of daptomycin for the treatment of Enterococcus bacteremia
2) Analyze daptomycin efficacy based on MIC values

Questions:
1) Daptomycin has activity against which of the following:
   A. Enterococcus species
   B. Methicillin-resistant Staphylococcus aureus
   C. Streptococcus pneumonia
   D. All of the above

2) Daptomycin MIC breakpoint is ≤ 4
   a. True
   b. False

Q1 Answer: D  Q2 Answer: A
Recombinant factor VIIa (rFVIIa) was initially approved in the United States in 1999 and currently holds FDA approved indications for the treatment of bleeding episodes and perioperative management in adults and children with hemophilia A or B with inhibitors, congenital factor VII deficiency, and Glanzmann’s thrombasthenia. The efficacy of rFVIIa in improving bleeding outcomes in pediatric hemophilia patients has sparked its use in off-label scenarios. Due to activation of the clotting cascade, serious arterial and venous thrombotic events have been well described as complications following administration of rFVIIa. The purpose of this study is to provide a descriptive analysis of the off-label usage of rFVIIa in pediatric patients at our academic medical center.

This will be a retrospective review of patients who received at least 1 dose of rFVIIa as an inpatient for an off-label indication from March 2009 to June 2015. Patients must have been less than 18 years of age at the time of rFVIIa administration to be included in the analysis. The primary outcome will be the number of potentially inappropriate administrations of rFVIIa usage when compared to off-label, institution protocol criteria. A secondary outcome will be identification of thrombotic complications, including death, following usage of rFVIIa.

Expected results include a descriptive analysis of our institution’s off-label usage of rFVIIa in the pediatric population as well as quantification of any clinically relevant complications associated with the administration of rFVIIa.

Learning Objective:
1) Describe the benefits and risks associated with off-label usage of rFVIIa.

Self-Assessment Question:
1) Which of the following statements regarding rFVIIa is correct?
   a) rFVIIa should be administered at twice the recommended dose when used for off-label purposes
   b) There is an increased risk of thrombotic complications when rFVIIa is used for off-label purposes
   c) rFVIIa is only effective in patients with bleeding due to aspirin therapy
   d) Dosing for off-label use does not require an accurate weight as fixed dose regimens are typically preferred

Q1 Answer: B

EFFECT OF COMPUTERIZED ORDER ENTRY ON THE PROCESS OF INPATIENT CHEMOTHERAPY ORDER EFFICIENCY AND MEDICATION ERROR POTENTIAL. Janice Bueter, Jeff Martin, Lisa Veit, and Natalie Hunter. UnityPoint Health - Allen Hospital, 1825 Logan Ave, Waterloo, IA 50703 Janice.bueter@unitypoint.org.

Recent studies have shown a decrease in medication errors when institutions implement a computerized physician order entry (CPOE) system for chemotherapy orders. The purpose of this study is to streamline the chemotherapy order process from the physician to the patient, maximizing efficiency and reducing the potential for error.

The current chemotherapy order process will be documented from the time the order is written to the administration of the finished product, focusing on the amount of time spent at each stage of the process, potential sources of error, and user satisfaction. A new electronic order entry process will be developed and implemented to replace the current system based on this information. The new process will be evaluated from the time of order entry to the administration of the finished product, again focusing on the amount of time spent at each stage, potential points of error, as well as user satisfaction. These objectives will be assessed by surveying participants in each stage of the process for satisfaction and perception of the usability of each method of order entry.

The data collected will be compared to determine if a CPOE system will save time, reduce potential errors, and increase staff satisfaction compared to the current written chemotherapy order system.

Learning Objectives:
1. Identify potential sources of medication error in preprinted and handwritten chemotherapy order sets.
2. Describe potential sources of medication error that can be caused by a CPOE system.

Self-Assessment Questions:
1. Which of the following are possible sources of medication error in handwritten chemotherapy orders?
   a. Illegible drug name/dosage
   b. Duplication of supportive care medications
   c. Missing or mismatched height, weight, or BSA information
   d. All of the above

2. A potential source of medication error in a CPOE system is:
   a. Mistyping a chemotherapy medication dose
   b. Illegible handwriting
   c. Inappropriate abbreviations
   d. All of the above

Q1 Answer: D  Q2 Answer: A
Impact of Chlorhexidine Bathing on Hospital Acquired Clostridium Difficile Infection in a Surgical Intensive Care Unit. Lan Bui, Joshua Swan, Beverly Shirkey, Scott Long, Jesse Harris, Lena Rakouki, Randall Olsen, and Edward Graviss. Houston Methodist Hospital, 6565 Fannin Street DB1-99, Houston, Texas, Lnbui@houstonmethodist.org

In the CHlorhexidine Gluconate BATHing (CHG-BATH) randomized controlled trial, chlorhexidine bathing significantly decreased the risk of acquiring healthcare-associated infections (HAIs) in surgical intensive care unit (ICU) patients compared to soap and water bathing. *Clostridium difficile*, the most common HAI pathogen in ICU, was not included as a trial outcome. This study uses data from the CHG-BATH trial to evaluate a new infection outcome of *Clostridium difficile* infection (CDI). We hypothesize that compared with daily soap and water bathing, 2% chlorhexidine bathing decreases the risk of hospital-acquired CDI.

Adults admitted to a surgical ICU from 07/2012 through 05/2013 with an anticipated ICU stay ≥48 hours were included. Patients were randomized to bathing with 2% chlorhexidine alternating with soap and water every other day or to bathing with soap and water daily for up to 28 days. Included patients were retrospectively adjudicated by two independent blinded investigators for CDI outcome if they had positive *C. difficile* toxin, received an administrative billing code for CDI, received oral vancomycin or fidaxomicin, or had radiology evidence of pseudomembranous colitis. The primary outcome is the proportion of incident CDIs among patients who stayed in the study more than 48 hours and did not have a prevalent CDI, compared between two study arms.

Of 350 randomized patients, 325 were analyzed (164 soap and water versus 161 chlorhexidine). Forty-one patients (12.6%) met criteria for potential CDI and are undergoing adjudication to be classified as no CDI, prevalent CDI, or incident CDI. Other results of the study are pending.

**Learning Objective:**

1) Describe the impact of chlorhexidine bathing on preventing hospital acquired infection in surgical intensive care patients.

**Self-Assessment Question:**

1) Bathing surgical intensive care unit patients with 2% chlorhexidine solution will:
   A. Decrease risk for hospital acquired infections
   B. Increase risk for hospital acquired infections
   C. Show no difference in risk of hospital acquired infection

**Q1 Answer:** A

Assessment of Cetuximab-Induced Infusion Reactions and Administration Re-Challenge at an Academic Medical Center. Ellen Burke, Dennis Grauer, Dave Henry, Prakash Neupane, and Michelle Rockey. The University of Kansas Hospital, 3901 Rainbow Blvd, Kansas City, KS 66160 Eburke2@kumc.edu

Cetuximab is approved for treatment of squamous cell carcinoma of the head and neck (SCCHN). Cetuximab is generally well tolerated, but does carry a black box warning for infusion reactions (IR). Incidence of IR in clinical trials was 15-20% for all grades and 3-5% for grades 3-4. Retrospective studies reported a higher incidence of all grade IR and grades 3-4 IR in areas of the Southeastern United States. Information regarding re-challenge doses after an IR have not been well described. At our institution, we frequently re-challenge on the same day after an initial IR.

The primary objective was to determine the incidence, timing, IR grade, and completion of a re-challenge dose in patients who experienced an initial IR. Secondary objectives included: 1) determine the incidence and grade of IR in patients who received a first dose of cetuximab 2) identify specific risk factors for cetuximab IR with the first dose.

A single center retrospective chart review was conducted in SCCHN patients treated with cetuximab between June 2008 - September 2015 at the University of Kansas Hospital or Westwood Cancer Center.

The majority of patients (87.9%) were able to be quickly and successfully re-challenged after an initial IR. Minimal patients (27.6%) experienced a re-challenge IR, resulting in only 1 patient discontinuation. Re-challenge doses were most frequently (37.9%) administered between 30-59 minutes after initial dose discontinuation. These findings demonstrate our current practice of same day re-challenges in initial IR patients is feasible and safe.

**Learning Objective:**

1) Describe the incidence, timing, IR grade, and completion of a re-challenge dose in patients who experienced an initial IR.

**Self-Assessment Questions:**

1) How soon after initial dose discontinuations were re-challenge doses most commonly administered?
   a) 0-14 min
   b) 15-29 min
   c) 30-59 min
   d) ≥ 60 min

**Q1 Answer:** C.
IMPLEMENTATION AND EVALUATION OF PHARMACY SERVICES IN AN ADULT CYSTIC FIBROSIS CLINIC.
Sheena Burwell, Laura Butkievich, Ryan Camden, Kyle Ludwig, University of Missouri Health Care, One Hospital Drive, Columbia, MO 65212. burwells@health.missouri.edu

Cystic fibrosis (CF) is a complex disease that requires a multidisciplinary team to achieve optimal outcomes. Currently within our institution, a pharmacist reviews all inpatient CF patients at least thrice weekly with minimal interactions in the outpatient clinic. This study will assess the impact of a pharmacist on medication management in an adult CF clinic at University of Missouri Health Care. Upon study initiation, the CF clinic pharmacist will be responsible for obtaining a complete medication history for each patient, assessing barriers to adherence, identifying drug related problems, and providing medication counseling and education.

Adult cystic fibrosis patients with one clinic visit between January 1, 2015 and September 30, 2015 (pre-implementation) and a second visit between October 1, 2015 and April 1, 2016 (post-implementation) will be eligible for enrollment. Patients less than 18 years of age or those without a valid phone number will be excluded. Implementation of pharmacy services will occur after baseline data collection and continue through the end of the study period. The primary endpoint, assessing patients’ perceptions of medications, will be measured using the beliefs about medicines questionnaire (BMQ) at baseline and at end of study. The secondary endpoints, pharmacy-related patient satisfaction and CF-related quality of life, will be measured to evaluate the impact of a pharmacist on achieving optimal outcomes in the CF population. All endpoints will be assessed by methods of telephone survey with study results analyzed using appropriate statistical tests.

Learning Objective:

1) Identify required and recommended CF team members as defined by the Cystic Fibrosis Foundation.

Self-Assessment Questions:

1) Which health care provider is recommended, but not required, as a member of the CF care team?
   A. Dietitian
   B. Pharmacist
   C. Physician
   D. Social Worker

2) Which patient belief is unlikely to influence adherence?
   A. Beliefs about medications
   B. Beliefs about themselves
   C. Beliefs about the disease state
   D. Beliefs about politics

Q1 Answer: B  Q2 Answer: D

ASSESSMENT OF COACHING PROGRAM ENROLLMENT FROM PHARMACIST CONTACT FOLLOWING MISSED BIOMETRIC MARKER AT ANNUAL HEALTH SCREENINGS IN THE DILLONS CORPORATE OFFICES
Ailey Carroll, Abby Winter, University of Kansas School of Pharmacy and Dillons Pharmacy, 1010 N. Kansas, Suite 2331, Wichita, KS 67214. acarroll_sta@ku.edu

Kroger Co. associate insurance offers full coverage for eligible patients in the Fitness, Nutrition, and Weight Loss coaching program. Despite full coverage for services, the program is not highly utilized by patients that could highly benefit from the service. In the past, programs have been promoted inconsistently through word of mouth, flyers, health screening counseling, and online information. Annual health screenings are required for Kroger associates to have choice in health care plan and for HSA incentives. By assessing for associates who miss pre-specified BMI marker, we would be able to target patients eligible for the Fitness, Nutrition, and Weight Loss coaching program.

The aim of this study was to assess change in enrollment for pharmacist lead Fitness, Nutrition, Weight Loss coaching program after targeted outreach by a pharmacist utilizing a personalized mail. Of the 661 patients included in the Dillons corporate office area 2015 pharmacy data, 356 patients were eligible for the coaching program and 202 emails were sent to inform patients of upcoming class. From the initial email, 35 patients contacted the pharmacist with interest and 28 patients attended the first program class. At the completion of the 8 week class, the participant’s outcomes, knowledge assessment, and patient survey results will be analyzed. Final data will be compared to 2015 Fitness, Nutrition, Weight Loss participants. Preliminary data shows that patients are more likely to enroll in coaching programs when contacted directly from a pharmacist about the services. The need for these services should be better addressed by divisions nationwide to meet the interest of eligible patients.

Learning Objectives:

1) Review the utilization and benefits of a pharmacist-led fitness, nutrition, weight loss coaching program.
2) Discuss outcomes on patient engagement when utilizing targeted pharmacist contact for patient enrollment in health coaching programs.

Self Assessment Questions:

1) Kroger coaching programs are:
   A. Highly utilized by eligible associates
   B. Underutilized by eligible associates
   C. Easily and frequently marketed
   D. Free for any patient

2) Targeted outreach by a pharmacist:
   A. Increased associate enrollment
   B. Decreased associate enrollment
   C. Had no effect on associate enrollment

Q1 Answer: B  Q2 Answer: A
In 2014, The International Society for Heart and Lung Transplantation published consensus guidelines listing age greater than 65 years as a relative contraindication to lung transplant due to reduced physiologic reserve and presence of comorbidities that may lead to poorer outcomes. The purpose of this study is to assess clinical outcomes and post-transplant complications among elderly lung transplant recipients (LTR) compared to younger cohorts at our institution.

This is a single center, retrospective, cohort study. Eligible patients received a single or double lung transplant between January 1, 2012 and December 31, 2014 and were 50 years or older at transplant. Patients who received redo lung or multi-organ transplants, or expired prior to discharge were excluded. The primary endpoint is number of days alive and outside a healthcare facility in the first year post-transplant.

Two-hundred thirty-seven patients met eligibility criteria: 50-59 years (n=68); 60-69 years (n=105); and greater than 70 years (n=64). Lung allocation scores were similar among cohorts (42.7±16.2 vs. 43.8±17.9 vs. 45±16; p=0.73). More patients in the older cohorts received a single lung transplant (30.9% vs. 56.2% vs. 78.1%; p<0.01). Data suggest no difference in total days alive and outside a healthcare facility in the first year post-transplant (289.4±98.9 vs. 268.5±110.4 vs. 270.6±112.9 days; p=0.43), 1-year patient survival (91.2% vs. 83% vs. 81.3%; p=0.22), or total hospitalized days in the first year post-transplant (16.2±22.9 vs. 21.8±26.8 vs. 19.6±22.7 days; p=0.34).

Study results suggest outcomes in elderly LTR in the first year post-transplant may be similar to their younger counterparts.

To compare the use of methylnaltrexone bromide in the inpatient setting before and after implementation of a bowel regimen order set.

Methylnaltrexone bromide is FDA approved for the treatment of opioid induced constipation in patients who are receiving opioid medications for at least four weeks, and for patients who are receiving palliative care who are taking opioid pain medications and have failed laxative therapy. Frequently patients are receiving opioid medications while in-patient without being first prescribed an appropriate bowel regimen for the prevention and treatment of opioid-induced constipation. It can be more cost-effective and less invasive for the patient to receive a bowel regimen consisting of laxatives, stool softeners, and enemas prior to the initiation of methylnaltrexone bromide.

This is a retrospective study looking at patients 18 years and older hospitalized at Mosaic Life Care from January 1, 2015 through March 31, 2015 who were prescribed methylnaltrexone bromide compared with patients who were hospitalized January 1, 2016 through March 31, 2016 who were prescribed methylnaltrexone bromide. A bowel regimen order set will be implemented between the two study groups. An evaluation of the prescribing habits of methylnaltrexone bromide prior to and after the initiation of the order set will be performed. Inclusion criteria include male and female patients eighteen years and older prescribed at least one dose of methylnaltrexone bromide during the study periods. Exclusion criteria include pregnant females. Results and conclusion pending as the study period is currently in progress.

Learning Objectives:
1) Discuss the potential benefits of using a bowel regimen order set for patients with opioid induced constipation.
2) Discuss the FDA approved indications for methylnaltrexone bromide.

Self-Assessment Question:
1) Compared to their younger counterparts, elderly lung transplant recipients are more likely to:
   A. Spend more time in acute care hospitals during the first-year post-transplant
   B. Spend less time alive and outside a healthcare facility during the first-year post-transplant
   C. Have a similar overall length of stay during their index admission
   D. Spend more time in the ICU during their index admission

Q1 Answer: C
Learning Objectives:
1) Recognize the treatment challenges associated with appropriate management of enterococcal BSI.
2) Evaluate the clinical and economic impact of MALDI-TOF/ASP intervention bundle in patients with enterococcal BSI.

Self-Assessment Questions:
1) Which of the following is a correct statement on enterococcal bacteremia?
   A. Most patients with enterococcal bacteremia have no previous healthcare contact prior to infection.
   B. Less than 1% of nosocomial bacteremia is caused by Enterococcus species.
   C. Patients with bacteremia from vancomycin-resistant enterococci (VRE) have mortality rates over 50%.
   D. Piperacillin-tazobactam is a broad-spectrum antibiotic agent that effectively covers VRE.

2) Which of the following effectively evaluates the clinical impact of MALDI-TOF/ASP intervention?
   A. Time to organism identification in the intervention group compared with pre-intervention group.
   B. Number of comorbidities in the intervention group compared with pre-intervention group.
   C. Total hospitalization costs in the intervention group compared with pre-intervention group.
   D. Characteristics of ASP interventions in the intervention group.

Q1 Answer: C  Q2 Answer: A
PROPOSED METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS TREATMENT PATHWAY: VALIDATION ACCORDING TO PATIENT-SPECIFIC TREATMENT SELECTIONS MADE BY INFECTIOUS DISEASE PHYSICIANS. 
Alicia Christensen, Brad Laible, Brandon Bloomgren, and Jawad Nazir, Avera McKennan Hospital & University Health Center, 1325 S Cliff Ave, Sioux Falls, SD 57117. alicia.christensen@avera.org

Methicillin-resistant Staphylococcus aureus (MRSA) infections of all types continue to provide a challenge to healthcare providers. Current MRSA guidelines list vancomycin as first line for most indications; yet alternative agents are typically suggested with the same strength of recommendation and quality of evidence rating. The purpose of this study is to determine if a proposed MRSA treatment pathway designed by the antimicrobial therapy subcommittee reflects actual patient-specific treatment selections made by our infectious disease physicians. Further, we aim to determine if a daptomycin pharmacy discharge consult (process introduced in the new pathway) decreases the number of unintentional inpatient daptomycin doses in situations where daptomycin is used to facilitate discharge.

This study will evaluate patients admitted to our institution with an infectious disease consult along with a proven or suspected MRSA infection of the following subtypes: skin/soft tissue, intra-abdominal, urinary tract, bone/joint, pneumonia, or bacteremia/endocarditis. Charts will be reviewed to determine the percentage agreement between patient-specific treatment decisions and the proposed pathway. In addition, reasons will be identified and quantified when an alternative therapy to vancomycin is chosen. Finally, the number of unintentional inpatient daptomycin doses avoided will be calculated and recorded.

The results of this study will be reported to the antimicrobial subcommittee for evaluation and potential implementation of the pathway at all Avera institutions.

Learning Objective:

1) Describe situations where alternative agents may be selected instead of vancomycin for proven or suspected MRSA infections.

Self-Assessment Question:

1) Which of the following are appropriate reasons to select an alternative agent over vancomycin for a proven or suspected MRSA infection?
   A. Unsatisfactory response to vancomycin
   B. Proven or anticipated difficulty achieving target vancomycin trough levels
   C. Red Man Syndrome
   D. a & b
   E. All of the above

Q1 Answer: D

EVALUATION OF NURSE DRIVEN TEACHING DURING NEW MEDICATION ADMINISTRATION: A HOSPITAL CONSUMER ASSESSMENT OF PROVIDERS AND SYSTEMS (HCAHPS) MEASURE. Pamela Chukwuleta, Ivy Nispel, Marwa Buser, Heather Hansen, Wesley Healthcare, 550 N Hillside, Wichita, KS, 67214. pamela.chukwuleta@wesleymc.com

The HCAHPS survey is a standardized survey tool that measures patient satisfaction. The Center for Medicaid and Medicare Services (CMS) provides this report to aid patients in choosing their healthcare providers. This practice gives hospitals accountability to perform at their highest level. The hospital receives reimbursement incentives for reporting and improving on survey scores. Communication about new medications’ indication and side effects is one of the survey measures reported. This measure is met if the patient reports that their nurse always educated them about new medications and their side effects before administration.

The purpose of this project was to analyze the challenges of new medication teaching by the nursing staff designated to provide the patient education. The results of the analysis were used to determine an approach that aimed to improve the new medication teaching process and the HCAHPS score on this measure.

These objectives were assessed through a survey completed by the nurses at the selected hospital unit. Based on the results of the survey, a list of commonly prescribed medications and their indications and side effects was developed to be used as a teaching tool during initial administration as well as sent home at discharge. Nursing education on teaching behaviors and methods to reassess patient understanding was also provided.

Effective new medication communication process utilized across Wesley Medical Center hospital units to improve patient care.

Learning Objectives:

1) Identify challenges to nursing-provided new medication teaching
2) Implementation of a new medication teaching process aimed to improve reported HCAHPS scores

Self-Assessment Questions:

1) What are the components of the HCAHPS survey on communication about new medication?
   A. Name and direction of use of medication
   B. Indication and side effect of medication
   C. Name and drug class of medication
   D. Indication and direction of use

Q1 Answer: B

2) Purposes of CMS utilizing HCAHPS survey scores do not include:
   A. Directs the public to make informed decisions about their choice of healthcare institution
   B. Comparison of hospital units within the same hospital
   C. Directs the public to make informed decisions about their choice of physician providers
   D. Both B and C

Q1 Answer: B Q2 Answer: D
The objectives of this study were (1) to develop a documentation process compliant to Medicare Part B incident-to-billing requirements for chronic care management (CCM) services and (2) to describe opportunities and barriers associated with the design and implementation of the incident-to-billing model for CCM services in a community pharmacy. Limited information exists regarding how community pharmacists can provide billable services under the new incident-to-billing rules. The purpose of this study is to provide community pharmacists with an example of an attempt to create an incident-to-billing model for CCM services.

Descriptive in design, this study explored the implementation of an incident-to-billing model for CCM services at a single site community pharmacy in Iowa. Medicare Part B required elements regarding documentation, patient encounters, and physician communication were addressed. The documentation development process involved the use of customizable software to build templates for the assessment of chronic conditions. The CCM service model was then examined as a whole to identify and evaluate opportunities and barriers.

CCM scope of service and billing requirements were identified and evaluated for opportunities and barriers. The new Medicare Part B incident-to-billing rules allow for non-physician health professionals, including pharmacists, to obtain reimbursement for the time spent non-face-to-face providing care management service, including medication management. Barriers identified mostly involved lack of access to electronic health records, and certified technology requirements.

Learning Objective:

1) Describe opportunities and barriers associated with chronic care management services in a community pharmacy.

Self-Assessment Question:

1) Which of the following best describes pharmacist opportunities in chronic care management services?
   A. Providing medication management only
   B. Establishing a comprehensive care plan
   C. Billing Medicare for CCM services
   D. Providing 20 minutes of non-face-to-face care management services

Q1 Answer: D

The use of extended-interval intravenous aminoglycosides is a cornerstone of therapy for the treatment of acute pulmonary exacerbations in pediatric Cystic Fibrosis (CF) patients due to their activity against Pseudomonas aeruginosa. While guidelines exist for empiric dosing strategies in this population, direction is lacking in terms of the optimal approach for monitoring serum levels and making dose modifications. Current institutional practice involves obtaining three post-infusion tobramycin levels on the first day of therapy to determine patient-specific pharmacokinetic parameters. Subsequent four-hour post-infusion levels are obtained two to three times weekly for comparison to the initial set in order to guide decisions regarding dose adjustments. Significant pharmacist resources are utilized interpreting these levels and assessing appropriateness of therapy throughout each patient’s stay.

The primary objective of this study is to evaluate current practice and to recommend new standardized procedures for dosing and monitoring tobramycin in pediatric CF patients in order to decrease the significant efforts and cost associated with this process.

Pediatric CF patients presenting between 2009 and 2015 with an acute pulmonary exacerbation who received once-daily intravenous tobramycin during their admission will be assessed retrospectively. Outcomes will include the number of tobramycin dose adjustments made per patient, number of tobramycin serum levels drawn, total costs of therapeutic drug monitoring for each patient, and incidence of acute kidney injury.

Outcomes of this study will guide the development of a more efficient and cost-effective strategy for dosing and monitoring intravenous tobramycin in this population, with an emphasis on patient safety.

Learning Objective:

1) Describe the role of extended-interval dosing of aminoglycosides in pediatric cystic fibrosis patients

Self Assessment Question:

1) Which of the following is correct regarding the use of extended-interval aminoglycosides in pediatric cystic fibrosis patients?
   A. Incidence of acute kidney injury is increased
   B. Extended-interval dosing allows for greater time-dependent bacterial killing
   C. The strategy takes advantage of the post-antibiotic effect of aminoglycosides
   D. Guidelines exist regarding appropriate monitoring strategies in extended-interval dosing

Q1 Answer: C
EVALUATION OF INTERVENTIONS AIMED AT REDUCING INCIDENCE OF AND RESPONSE TIME TO SUPRATHERAPEUTIC VANCOMYCIN LEVELS. Emily Coler, Melissa Carlson, Kimberly Boeser, UMMC—Fairview, 2450 Riverside Avenue, Minneapolis, MN 55454. ecoler1@fairview.org

Vancomycin is an antibiotic commonly used in the hospital setting for treatment of infections caused by methicillin-resistant Staphylococcus aureus. Guidelines have recommended that vancomycin trough goals of 15-20mg/L be targeted for serious infections, however these levels can be difficult to achieve without exceeding the goal range and increasing the risk of vancomycin associated nephrotoxicity. Careful monitoring and assessment is required in order to effectively prevent and address supratherapeutic vancomycin troughs.

Between January and July 2015, a series of policy changes aimed at decreasing the occurrence of supratherapeutic vancomycin levels were implemented at the University of Minnesota Medical Center—Fairview. Additionally, a new notification system was initiated with the goal of decreasing time to pharmacist evaluation of vancomycin levels >25mg/dL. Chart review of 90-day periods prior to and post-implementation of these changes will be completed. This observational study aims to assess whether the changes implemented were successful in decreasing the incidence of supratherapeutic vancomycin trough levels and time to pharmacist evaluation of supratherapeutic levels. Additional outcomes include assessment of trends in vancomycin associated nephrotoxicity that may help guide further changes to the way that vancomycin is dosed and monitored at the University of Minnesota Medical Center—Fairview.

Learning Objectives:

1) Describe steps taken to reduce the rate of vancomycin associated nephrotoxicity at University of Minnesota Medical Center—Fairview

Self-Assessment Question:

1) Which of the following is a step taken by the pharmacy department at UMMC—Fairview to help reduce the incidence of supratherapeutic vancomycin levels?
   A. Targeting lower trough goals (10-15mg/L) for patients receiving vancomycin
   B. Requiring that pharmacists complete an online learning module about vancomycin
   C. Encouraging physicians to take charge of pharmacokinetic monitoring themselves
   D. Implementing a paging system for vancomycin levels >25mg/L

Q1 Answer: B.

EVALUATION OF MULTIPLE DOSE DINOPROSTONE FOR CERVICAL RIPENING FOR INDUCTION OF LABOR AT A HIGH VOLUME COMMUNITY BIRTH CENTER. Savannah Connolly, Dawn Caspers, Rudd Hetrick, Larry Segars, Kathryn Burnett, Shawnee Mission Medical Center, 9100 W. 74th St., Shawnee Mission, Kansas 66204, Savannah. Connolly@shawneemission.org

Induction of labor is often necessary for women with certain conditions or risk factors. A prostaglandin such as dinoprostone is often used for cervical ripening prior to induction. Current guidelines and product labeling do not address multiple doses of dinoprostone, which is increasingly common. This study was designed to evaluate the outcomes of mother and neonate during induction of labor following single versus multiple doses of dinoprostone.

This IRB-approved retrospective cohort analysis of 734 females aged 18 or older admitted to SMMC for induction of singleton cephalic pregnancies examined mode of delivery as well as Apgar scores and Neonatal Intensive Care Unit (NICU) admissions. Statistical analysis utilized Chi-square and t-test to compare demographic and outcome data. Univariate regression was used for all outcomes, and multivariate logistic regression was used to control for confounders.

Of the patients who received single doses, 73.2% achieved spontaneous vaginal delivery (SVD) compared to 55.8% who received multiple doses (p=0.001). Of the multi-dose group, 16.9% delivered infants admitted to NICU compared to 6.1% in the single dose group (p=0.001). Adjusted odds of SVD with multiple doses were 0.516 (95% CI 0.298-0.894), or about 48% less than with single doses. In a subset of nulliparous women, multiple doses were associated with 54.6% lesser odds of SVD singles doses (p=0.16).

Multiple doses of dinoprostone were associated with lesser odds of SVD and greater odds of NICU admission. In the subset of nulliparous women, unadjusted odds of SVD dropped by a little over 50% with multiple doses.

Learning Objective:

1) Compare the outcomes of patients who received a single dose of dinoprostone versus multiple doses

Self-Assessment Question:

1) Which of the following statements is correct?
   A. Multiple doses of dinoprostone led to higher odds of achieving spontaneous vaginal delivery (SVD)
   B. Statistically, nulliparous women require fewer doses of dinoprostone to achieve SVD
   C. NICU admissions were profoundly higher in neonates born to mothers who received single doses of dinoprostone
   D. Even when controlling for confounders, receiving multiple doses of dinoprostone is associated with lower odds of achieving SVD

Q1 Answer: D
UNIT EQUIVALENCY OF INSULIN GLARGINE TO INSULIN DETEMIR. Elizabeth Cook, Taylor Gill, Scott Taylor, Via Christi Hospitals, Wichita Inc., 929 North St. Francis, Wichita, KS 67214. elizabeth.cook@viachristi.org

Insulin glargine and insulin detemir are the most commonly prescribed basal insulin analogues for treatment of Type I and Type II diabetes mellitus. Clinical trials have established that there is no significant difference in efficacy or safety between the two products. However, uncertainty remains as to whether the agents are comparable in unit equivalency and dosing frequency.

The purpose of this study is to determine the ratio of glucose lowering capabilities of insulin glargine compared to insulin detemir to formulate a conversion factor between the two products.

Patients admitted to Via Christi Hospitals, from 7/1/14 to 6/20/15, who were treated with both insulin detemir and insulin glargine on the same or separate admissions, were included in this retrospective crossover study. The following data was collected: patient age, sex, ethnicity, height, weight, fasting blood glucose (FBG), serum creatinine, units of insulin detemir and insulin glargine administered, and diagnosis of Type I or Type II diabetes mellitus. The primary objective is to derive a conversion ratio between insulin glargine and insulin detemir based on the units of basal insulin administered prior to measurement of FBG. Our secondary objective is to explore whether patient specific factors such BMI, renal function, age, ethnicity, sex, and Type I versus Type II diabetes mellitus, impacted the utility of said ratio.

The results of this study will be used to evaluate whether Via Christi Hospital’s current autosubstitution policy of converting insulin glargine to insulin detemir using a 1:1 ratio is appropriate for inpatient FBG control.

Learning Objective:

1) Identify current prescribing recommendations for the conversion of insulin glargine to insulin detemir.

Self-Assessment Question:

1) Current prescribing information recommends converting insulin glargine to insulin detemir by:
   A. Using a 2:1 ratio of detemir to glargine
   B. Using a 1:1 ratio of detemir to glargine
   C. Preemptively increasing the dose of detemir by 20%
   D. There are no data available for the conversion between basal insulin analogues

Q1 Answer: B

MEASURING THE IMPACT OF HIV AMBULATORY CARE PHARMACY SERVICES WITHIN AN INFECTIOUS DISEASE CLINIC. Angelica Costanzo, Samaneh Wilkinson; TUKH, 3901 Rainbow Blvd. Suite B400, Mailstop 4040 Kansas City, KS 66160. acostanzo@kumc.edu

The human immunodeficiency virus (HIV), HIV-1, continues to remain a major problem with more than 1.2 million people living in the United States with HIV. While, there is no cure for HIV, treatment with antiretroviral therapy (ART), has been proven to help patients live longer, fuller lives. In a study assessing the effect of pharmacist interventions in a HIV clinic, it was found that pharmacists improved patient CD4 counts, viral load and drug related toxicities. Pharmacists can provide and contribute to the care of HIV patients with their expanding roles in the profession by optimizing treatment regimens, providing education to patients and other providers, improving medication adherence rates and overcoming barriers to effective treatment.

The University of Kansas Hospital (TUKH) has more than 550 HIV patients seen by infectious disease specialists every year. With the increasing number of patients seen within the clinic, two full time pharmacist positions became available to pilot and provide HIV services.

The purpose of this study is to determine the impact through interventions made by pharmacists for patients within the clinic. The secondary objective is to define the potential cost avoidance of providing HIV services. These objectives will be assessed through a questionnaire completed by clinic patients, utilizing the ASHP PACT application and a database resource. Descriptive statistics will be calculated to analyze the data. The results of the study will be used to implement changes and provide the ideal workflow for future patient pharmacy advocates in order to improve patient care and satisfaction.

Learning Objective:

1) Describe potential interventions HIV pharmacists can make in an infectious disease clinic

Self-Assessment Questions:

1) What are some potential interventions pharmacists can make in the infectious disease clinic?
   A. Medication reconciliation
   B. Prescribe a new medication regimen without consulting an infectious disease specialist
   C. Recommend starting, stopping, adjusting a medication
   D. Both A and C

Q1 Answer: D
Learning Objective:

1) Define patient outcomes that have been attributed to pharmacist-driven services designed specifically for the care of transplant recipients.

Self Assessment Question:

1) Pharmacy-driven services designed for transplant recipients have led to all of the following outcomes except:
   A. Improved adherence rates to immunsuppressive medications
   B. Reduced infection and rejection rates
   C. Increased hospital lengths of stay due to time-consuming medication counseling sessions
   D. Reduced readmission rates

Q1 Answer: C

Learning Objectives:

1) List the benefits of proper analgesia and sedation for postoperative mechanically ventilated patients

2) Recognize the potential benefits of early extubation in postoperative mechanically ventilated coronary artery bypass graft patients

Self-Assessment Questions:

1) Which of the following are potential benefits of proper analgesia and sedation for postoperative mechanically ventilated patients?
   A. Maintain patient comfort
   B. Minimize patient anxiety
   C. Limit cardiac instability
   D. All of the above

2) Which of the following are potential benefits of early extubation in mechanically ventilated postoperative coronary artery bypass graft patients?
   A. Decreased incidence of ventilator associated pneumonia
   B. Shorter intensive care unit length of stay
   C. Lower healthcare costs
   D. All of the above

Q1 Answer: D   Q2 Answer: D
HEALTH LITERACY AND 30-DAY READMISSIONS IN THE HEART FAILURE POPULATION  Sarah Cox; Meghan McComb; Kevin Garey; Mike Liebl; David Wallace; 6565 Fannin St., DB1-09, Houston, TX scox@houstonmethodist.org

30-day readmissions cost Medicare over $17 billion per year. Heart failure is the leading cause of 30-day readmission in the United States with a current rate of 22 percent. Literature demonstrates that patients with low health literacy are at an increased risk for readmission compared to those with adequate health literacy. However, no studies to date have evaluated the impact of health literacy on 30-day readmission rates in the heart failure population. This study aims to assess the 30-day readmission rate in patients with low health literacy versus adequate health literacy.

This is a prospective observational study. Health literacy of heart failure patients was evaluated using the 3-Question Brief Health Literacy Screen (BHLS). Based on their score, patients were categorized as low health literacy (≤10) or adequate health literacy (>10). Patients were contacted via telephone 30 days post-discharge to identify readmission.

The primary outcome is 30-day all-cause readmission rate. Secondary outcomes include 30-day all-cause ED visit rate, 30-day combined all-cause readmission and ED visit rate, and medication reconciliation complexity index (MRCI).

A total of 300 patients were enrolled. 137 patients (46%) were identified to have low health literacy and 163 (60%) were identified to have adequate health literacy. Results are pending. However, if readmission rates differ between the groups, there is potential to select patients for targeted interventions aimed at reducing readmissions.

Learning Objective:

1) Discuss options for assessing health literacy

Self-Assessment Question:

1) Which of the following is a subjective assessment of health-literacy?
   A.  S-TOFHLA
   B.  3-Question Brief Health Literacy Assessment
   C.  REALM
   D.  None of the above

Q1 Answer: B

Learning Objectives:

1) Explain the potential benefits of CYP2C19 in relation to clopidogrel dosing.
2) Describe how the results of this project can help improve clinical practice and patient care.

Self-Assessment Questions:

1) Which genotyping test best predicts patient response to clopidogrel?
   A.  2D6
   B.  3C19
   C.  2A4
   D.  2C19

2) What are the ways future genotyping efforts may make big impact?
   A.  Continuing current efforts
   B.  Changing to different provider groups
   C.  Focusing on inpatient providers
   D.  Stopping genotyping efforts
   E.  More than one is correct

Q1 Answer: B  Q2 Answer: E

ASSESSING PROVIDER RESPONSE AND ANTIPLATELET THERAPY CHANGE TO CYP2C19 GENOTYPING THROUGH BEST PRACTICE ADVISORIES. Breanna Curtis, Natasha Petry, David Leedahl, Jesse Breidenbach, Robert Biberdorf, Lindsay Hines, Eric Larson, Russell Wilke. Sanford Medical Center Fargo, 801 Broadway N, Fargo ND 58122. Breanna.Curtis@sanfordhealth.org

Pharmacogenomics is a growing area of medicine allowing for personalized care. Sanford’s Imagenetics program is working to implement this care into Internal Medicine practice. Certain medications, such as clopidogrel, have a greater need for genetic testing due to factors including narrow therapeutic index and high risk if failure occurs. Integrating this care into practice can be challenging and requires provider acceptance and technology support efforts to aid providers in choosing an appropriate response.

The objective of this study is to assess how providers respond to best practice advisories (BPA) and if appropriate therapy changes are made. Other secondary objectives include analyzing which providers and departments are utilizing this new opportunity and in what ways might pharmacogenomics be best utilized.

The methods used to assess the objectives included collecting data throughout the Sanford health computer system to include all patients who have been CYP2C19 tested since the implementation of the Epic software and availability of this genotype test, as well as collecting data through a report of the BPAs that have fired since the creation of the CYP2C19 alert.

After preliminary analysis, providers who encounter this BPA do respond appropriately and change to an effective antiplatelet agent. It also appears that Neurology [Sanford Sioux Falls] and the initial research patients comprise the majority of patients who have been genetically tested for the CYP2C19 enzyme. This data will help to decipher future interventions to be made and areas this test may best be utilized.
EVALUATION OF MEDICATION TRANSITIONS OF CARE FROM HOSPITAL TO HOME INFUSION WITHIN A HEALTH SYSTEM. Carolyn Dahlman, Tamara Bezdicek, and Dana Simonson, Fairview Southdale Hospital, 6401 France Avenue South, Edina, MN 55435, cdahlma1@fairview.org

Patients who are discharged from the hospital on intravenous antibiotics or total parenteral nutrition often require home infusion services to receive these medications. To date, no publications exist on optimizing transitions of care from hospitals to home infusion centers. Communication regarding discharge orders for intravenous medications does not occur between pharmacists at Fairview Southdale Hospital and Fairview Home Infusion. Two different medical record systems are utilized between sites, complicating the transition of care. Pharmacists at Fairview Home Infusion are responsible for reviewing the inpatient electronic health record for appropriateness of therapy. It is hypothesized that errors occur in the discharge transfer process.

The primary objective of this project is to identify medication therapy interventions for intravenous antibiotics and total parenteral nutrition that occurred from hospital discharge to home infusion. A retrospective chart review study will be conducted using electronic health records of patients who received care at Fairview Southdale Hospital and initiated care with Fairview Home Infusion for intravenous antibiotics and total parenteral nutrition. Patient charts from August 1st, 2014 to August 1st, 2015 will be reviewed to identify interventions in medication therapy prescribing and adjustments made in therapy in patients who received care at Fairview Southdale Hospital and initiated home care with Fairview Home Infusion.

Learning Objective:

1) Identify areas where errors occur in the discharge process between a community hospital and a home infusion pharmacy.

Self-assessment Question:

1) Which of the following is an area at discharge that may weaken the discharge process?

   A. Lack of formal discharge paperwork
   B. Written prescriptions given to patient to continue medication therapy
   C. Lack of communication to pharmacy staff about discharge
   D. Lack of communication between the patient, nurse, and physician

Q1 Answer: C.

EVALUATION OF LACTOBACILLUS THERAPY ON DURATION OF MECHANICAL VENTILATION THERAPY IN CRITICALLY ILL ADULT PATIENTS. Merry Daniel, Jenni Catlin and Karrie Derenski. Coxhealth Hospital. 3801 S National Ave. Springfield, MO 65807 divya.daniel@coxhealth.com

The objective of this study is to evaluate the effect/s of the probiotic Lactobacillus Rhamnosus GG (LGG), e.g., ventilator free days, length of stay (LOS) and mortality in intensive care units, when administered to ventilated critically-ill patients receiving enteral nutrition (EN) in a community hospital.

Intestinal microbiome maintains the integrity of the gut mucosa via both the enhancement of immune functions and the prevention of opportunistic and/or pathogenic micro-organism infections. Critically-ill patients often suffer the ramifications resulting from medication and/or inflammation induced suppression of these beneficial bacterial functions. Supplementing patients with probiotics, in an attempt to restore normal gut homeostasis, is thought to both assist critically-ill patients with recovery and, subsequently, decrease the duration of artificial ventilation.

This is a minimal-risk, prospective, observational study meant to examine approximately 70 patients partitioned into two groups of critically-ill patients receiving EN therapy: Group 1 (control group) and Group 2 (recipients of probiotic therapy). Group 2 patients will receive LGG via capsules of the commercially available product Culturelle®

To date, data has been collected for the control group. Patients (n = 70) had an average APACHE II score of 19.5, and medical complications being the primary reason for admission to the ICU. Average time on ventilator was 7.7 days. Average ICU and hospital LOS were 10 and 14.4 days.

The results of our study will validate use of LGG therapy in our institution and potentially add to the body of literature evaluating probiotic supplementation in critically ill patients.

Learning Objectives:

1) Identify when to use probiotics in critically ill patients
2) Understand the association between lactobacillus GG and ventilated patients on enteral nutrition

Self-Assessment Questions:

1) Probiotics should be avoided in which of the following patient?
   A. 18 year old male on mechanical ventilation following motor vehicle crash
   B. 55 year old female with febrile neutropenia post chemotherapy
   C. 72 year old male on mechanical ventilation following acute respiratory failure secondary to pneumonia
   D. 45 year old female on enteral nutrition for short bowel syndrome

2) Which of the following statements are correct?
   A. Probiotics must be given to all patients in the critical care unit
   B. Probiotics can be used to treat clostridium difficile colitis
   C. Probiotics and prebiotics are thought to benefit select critically ill patients by enhancing immunity
   D. Probiotics should be avoided in critically ill patients on mechanical ventilation

Q1 Answer: B    Q2 Answer: C
A RETROSPECTIVE REVIEW OF INTENSIVE VERSUS CONVENTIONAL BLOOD GLUCOSE PROTOCOLS IN CRITICALLY ILL PATIENTS. Michelle Davids, Wendy Weber, CHI Health – Creighton University Medical Center, 601 North 30th Street, Omaha, NE 68102. michelle.davids@alegent.org

Critically ill patients experience several endocrine and metabolic disturbances including hyperglycemia. Several medical groups and professional associations have published insulin therapy guidelines, but optimal target blood glucose range remains controversial. Clinical Practice Guidelines published in 2012 by the Society of Critical Care Medicine suggested a target blood glucose of less than 150 mg/dL, reporting a hospital mortality benefit. In response, our institution implemented a more intensive insulin infusion protocol for patients in the intensive care unit (ICU) and cardiac care unit (CCU) targeting blood glucose levels between 110 and 150 mg/dL.

The objective of this retrospective cohort is to assess the effect of the ICU/CCU Insulin Infusion Protocol on mortality, morbidity and length of stay in a heterogeneous population of critically ill adult patients compared to the previous standard of care. Efficacy and safety of the protocol will also be assessed in terms of time to achieve target range, time within target range and incidence of hypoglycemia.

Inclusion criteria consists of an ICU/CCU stay of at least 24 hours, insulin infusion therapy using the designated protocol for 24 hours or longer, and age of at least 19 years. Exclusion criteria include patients with diabetic ketoacidosis or hyperglycemic hyperosmolar state. Patient data is collected using retrospective chart review identifying patients who received an insulin infusion protocol for patients in the intensive care unit (ICU) and cardiac care unit (CCU) targeting blood glucose levels between 110 and 150 mg/dL.

Results of this study will be used for quality assurance and may warrant further investigation or modifications to the protocol.

**Learning Objectives:**

1) Recognize recommended target blood glucose ranges in critically ill patients across various medical groups and professional associations.

2) Discuss trials which have evaluated intensive glucose control in critically ill patients.

**Self-Assessment Questions:**

1) The Clinical Practice Guidelines published in 2012 by the Society of Critical Care Medicine suggest a target blood glucose goal of _____ for the management of hyperglycemia in critically ill patients.
   A. 80 mg/dL to 110 mg/dL
   B. 140 mg/dL to 180 mg/dL
   C. < 150 mg/dL
   D. < 180 mg/dL

2) The NICE-SUGAR trial reported intensive glucose control in critically ill adults resulted in:
   A. Decreased hospital length of stay
   B. Decreased mortality
   C. Increased hospital length of stay
   D. Increased mortality

Q1 Answer: C  Q2 Answer: D

IMPACT OF RAPID METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS COLONIZATION DETECTION ON VANCOMYCIN DISCONTINUATION IN PNEUMONIA. Daniel Delaney, Galina Shlyeyman, Jeff Larson, and Anne Schullo-Feulner. Park Nicollet Methodist Hospital, 6500 Excelsior Blvd, St. Louis Park, MN, 55426 daniel.delaney@parknicollet.com

Current guidelines recommend 5-7 and 7-8 days of antimicrobial therapy for uncomplicated community acquired and healthcare associated pneumonia (CAP/HCAP), respectively. Further, utilizing rapid detection methods for methicillin-resistant Staphylococcus aureus (MRSA) colonization may decrease vancomycin use.

To provide a foundation for an interdisciplinary request for additional pharmacy-driven infectious disease services, we aimed to identify potential interventions surrounding empirical antimicrobial de-escalation, specifically utilizing utilization of rapid nasal MRSA colonization detection in clinical decision making. We also sought to determine if total duration of antimicrobial therapy was consistent with current guidelines.

Data collection consisted solely of retrospective electronic medical record review, patients were included in the final data analysis if they were ≥18 years old, admitted from 09/01/2014 – 03/14/2015 with clinical and radiographic evidence supporting a diagnosis of CAP/HCAP, were subjected to screening for nasal MRSA colonization, received antimicrobial therapy for pneumonia within 24 hours of admission (of which included vancomycin), and did not meet exclusion criterion (hospitalized ≥14 days, had subsequent complications related to pneumonia, were transferred to an intensive care unit within 48 hours of admission).

Of the patients included in this review (32 total), there were two instances (6.2%) where MRSA colonization screening results were documented as rationale for vancomycin discontinuation, more judicious use of these results may decrease days of vancomycin therapy by 52% and vancomycin troughs drawn by 71%. Additionally, patients received antimicrobials for 10.6 days on average (which included 3.5 days of vancomycin therapy); total duration of CAP/HCAP therapy could be decreased by ~30%.

**Learning Objectives:**

1) Discuss how rapid detection of MRSA colonization may be utilized to de-escalate empirical therapy

2) Describe the effect of potential pharmacist intervention on resource utilization in this patient population

**Self-Assessment Questions:**

1) In pneumonia, the clinical value of rapid detection of nasal MRSA colonization is due to the test’s:
   A. High sensitivity
   B. Low specificity
   C. Low positive predictive value
   D. High negative predictive value

2) Based on the results of this review, our institution may be able to decrease vancomycin _______ in this patient population
   A. Troughs drawn by 52%
   B. Duration of therapy by 2 days
   C. Troughs drawn by 71%
   D. Use by 30%

Q1 Answer: D  Q2 Answer: C
The 2012 CHEST guidelines recommend that bridge therapy for patients with venous thromboembolism or pulmonary embolism should be continued for at least five days and the INR must be therapeutic for at least 24 hours. The primary purpose of this study is to determine whether process change and pharmacist education helps increase compliance with the CHEST bridge therapy guidelines in a large community hospital. Secondary purposes include determining the mean INR and time in days when bridge therapy was discontinued as well as determining if dosing of bridge anticoagulants are appropriate for patient parameters.

Patients will be identified using the hospital pharmacy-lab surveillance system. Inclusion criteria will include any patient greater than 18 years who received at least one dose of warfarin plus a parenteral anticoagulant for venous thromboembolism or pulmonary embolism. Exclusion criteria will be patients with atrial fibrillation. Study groups will include patients prior to and following process change and pharmacist education over bridge therapy. The following data will be collected for each patient: age, sex, weight, serum creatinine, creatinine clearance, parenteral anticoagulant used, dose, and indication. All patient data will be recorded without patient identifiers and maintained confidentially. Chi-squared and descriptive statistics will be used to analyze the data.

The results of this study will be used to implement changes in the hospital anticoagulation policy to improve patient care.

Learning Objectives:
1) Review the purpose of bridge therapy in patients with venous thromboembolism or pulmonary embolism

Self-Assessment Questions:
1) What is the purpose of bridge therapy with parenteral anticoagulants for venous thromboembolism or pulmonary embolism in patients being treated with warfarin?
   A. Bridging increases the effectiveness of warfarin
   B. Bridging covers the patient until warfarin has full effect
   C. Bridging breaks up the thrombus
   D. The 2012 guidelines don’t recommend bridge therapy for a patient being treated with warfarin

Q1 Answer: B
The United States (U.S.) has an aging population requiring monitoring of geriatric-related health issues. A significant aspect of this monitoring is inappropriate medication prescribing patterns. Skeletal muscle relaxants (SMRs) may be prescribed for pain in patients with injury. The Beers Criteria lists SMRs as inappropriate for people ≥65 years old due to anticholinergic adverse effects, sedation, and risk of falls/fractures. This places older patients who are prescribed SMRs for injury at increased risk for adverse medication events.

Prescribing patterns of SMRs in older adults with injury have not been well studied at the population level. Using 2012 National Ambulatory Medical Care Survey data, we examined the prevalence and characteristics of older adults prescribed SMRs who presented to U.S. primary care clinics with injury.

Multivariate regression analysis yielded adults ≥65 years old presenting to a rural primary care clinic for injury had 28% greater odds of being prescribed SMRs, non-Caucasian adults had 11% greater odds of being prescribed SMRs, and adults ≥65 years old seen at least twice in the past 12 months had 34% greater odds of being prescribed SMRs. Logistic regression analysis yielded that those aged 65-74 years and those who were female had greater odds of being prescribed SMRs.

Results identified disparities among adults ≥65 years old that presented to U.S. primary care clinics with injury and prescribed SMRs. As medication experts trained in appropriate medication use in older adults and accessible healthcare team members, pharmacists should be utilized to ensure safe medication usage in our aging population.

**Learning Objectives:**

1) Discuss why skeletal muscle relaxants (SMRs) are inappropriate in adults ≥65 years old.

2) Report the results of 2012 population level data examining adults ≥65 years old presenting to U.S. primary care clinics with injury and prescribed SMRs.

**Self-Assessment Questions:**

1) SMR use is inappropriate in adults ≥65 years old because of:
   A. Anticholinergic adverse effects  
   B. Risk of addiction  
   C. Sedation  
   D. Both A and C

2) Results of this study showed that adults ≥65 years old presenting to primary care clinics with injury had greater odds of being prescribed SMRs with which one of the following characteristics:
   A. Presentation to an urban primary care clinic
   B. Non-Caucasian
   C. >75 years old
   D. Male

Q1 Answer: D  Q2 Answer: B

Pneumonia is one of the most common infections encountered in the emergency department, and it remains one of the leading causes of hospital readmission and mortality. Appropriate antibiotic selection and timely administration of therapy has been shown to significantly decrease morbidity and hospital length of stay for patients with pneumonia. Clinical pharmacists practicing in the Emergency Department are often involved in antibiotic selection and dosing recommendations for patients with pneumonia. The presence of a pharmacist in the Emergency Department can positively impact the prescribing of antimicrobial therapy. However, previous studies have not shown the impact of a pharmacist on patient-oriented outcomes.

This study aims to evaluate the impact of Emergency Department pharmacists on time to antibiotics and appropriate dosing and selection of empiric antibiotic therapy for the treatment of pneumonia. The study will analyze the effects of timing and use of appropriate antibiotic therapy on mortality rates and hospital lengths of stay.

This study is a single-center, retrospective chart review of patients who presented to the University of Iowa Hospitals and Clinics Emergency Department beginning May 1, 2009 through May 1, 2015. The study will include patients who received empiric antibiotics for treatment of pneumonia in the Emergency Department and were subsequently admitted to the hospital. The control group will include patients who presented to the ED when a pharmacist was not present (1800-0900), and the treatment group will include patients who presented to the ED when a pharmacist was present (0900-1800). Risk factors will be assessed, including age, gender, immunosuppression, chronic hemodialysis, recent hospitalization in the last 90 days, admission from a long-term care facility, and home infusion therapy.

**Learning Objectives:**

1) Describe the impact of an Emergency Department pharmacist on antimicrobial selection and timing for the treatment of pneumonia.

**Self-Assessment Questions:**

1) Which of the following is a risk factor for HCAP according to the IDSA definition?
   A. Hospitalization in an acute care hospital for two or more days within 30 days
   B. Residence in a nursing home or long-term care facility
   C. Recent intravenous antibiotic therapy within the past 60 days
   D. Recent wound care within the past 90 days

Q1 Answer: B
Most patients admitted to an intensive care unit (ICU) will receive intravenous fluids. Patients receiving fluids, over time, may develop a positive fluid balance. A positive fluid balance can have potentially detrimental implications for patients. Current literature demonstrates patients with excessive fluid balances have an increased length of hospitalization, increased ventilator time, and increased mortality. A literature search was conducted to evaluate the role of carrier fluids and resulted in little to no information supporting or refuting their use. Without solid evidence supporting the use of carrier fluids and the potential risk of administering extra fluids causing fluid overload, their role in practice is questionable.

The purpose of this study is to evaluate patients hospitalized in the ICU at Rapid City Regional Hospital (RCRH) with a positive fluid balance. The volume of fluid contributed by carrier fluids will be assessed to gauge if a meaningful effect on the patients' overall fluid balance is observed.

The facilities electronic medical record system will be used to identify patients admitted to the ICU from January 2013 through September 2015 with a positive fluid balance of at least five liters and receiving carrier fluids. The data collected will be used to evaluate the percentage of fluid overload contributed by carrier fluids.

The results of the study will be used to implement changes in practice at RCRH to improve patient care.

**Learning Objective:**

1) Recognize the potential implications of a positive fluid balance in critically ill patients

**Self-Assessment Question:**

1) Which of the following is a potential implication for critically ill patients having a positive fluid balance?
   A) Increased duration of hospitalization
   B) Decreased ventilator days
   C) Decreased mortality
   D) Decreased morbidity

**Q1 Answer:** A) Increased hospitalization duration

**Learning Objective:**

1) Report the results of a pharmacist led intervention to transition patients stabilized on long-acting injectable and oral antipsychotic polypharmacy to long-acting injectable antipsychotic monotherapy

**Self-Assessment Question:**

1) This research initiative showed:
   A. An increase in psychiatric hospitalizations 3 months following transition to monotherapy
   B. A decrease in psychiatric hospitalizations 3 months following transition to monotherapy
   C. A decrease in metabolic side effects in patients transitioned to monotherapy
   D. No significant differences between groups

**Q1 Answer:** D
Understanding the impact of delirium on patients admitted to the ICU in a community-based, Level II trauma center. Pavlin Dimitrov, Terry Altringer, Lisa Loken, Rachel Schaan, Trinity Hospitals, One Burdick Expwy. West, PO Box 5020, Minot, ND 58701. pavlin.dimitrov@trinityhealth.org

Delirium is increasingly being acknowledged as a significant comorbidity of critical illness, affecting up to 80% of mechanically ventilated patients. Patients who develop delirium experience increased ventilator days, longer ICU stays, higher costs, higher mortality, PTSD and long term cognitive impairment. The objective of this study is to better understand the factors that may contribute to the development of delirium, how they impact outcomes of patients admitted to this facility’s ICU, implement a standardized monitoring tool and assess its effectiveness. As delirium is not formally monitored, this will be the first step towards applying a uniform approach to managing delirium at this institution.

A retrospective chart review of patients admitted to the ICU for a length of 2 days or greater will be performed. Individuals that are younger than 18 years of age, pregnant or breastfeeding will be excluded. Eligible patient charts will be reviewed and various indicators will be recorded including but not limited to patient demographics, concomitant medication use, comorbidities, duration of delirium, length of ICU and hospital stay, ventilator days, adverse reactions and mortality. Appropriate statistical analysis will be performed to identify the association of local risk factors and their effect on delirium development within the general population and specified sub-populations. Clinical staff in the ICU will be educated on the proper assessment of delirium using the CAM-ICU tool.

The purpose of this study is to implement an ICU delirium assessment tool and test its effectiveness in a community-based, level II trauma center.

Learning Objectives:

1) Review the pros and cons of atypical antipsychotics in various age groups.
2) Describe the role of atypical antipsychotics in the management of delirium.

Self-Assessment Questions:

1) Why is there a boxed warning for the use of antipsychotic drugs in elderly patients?
   A. Increase the risk of death in elderly patients with dementia-related psychosis
   B. They cause CNS depression in elderly patients, which may impair physical or mental abilities
   C. Increase the risk of suicidal thinking and behavior in elderly patients
   D. Increase risk of neuroleptic malignant syndrome in elderly patients

2) How are antipsychotics used for the management of delirium?
   A. They are indicated for the prevention of delirium
   B. They are used for the prevention of delirium
   C. They are indicated for decreasing the severity of delirium
   D. They are used to decrease the severity of delirium

Q1 Answer: A  Q2 Answer: D

Improving diabetes care at rural VA outpatient clinics. Tamara Dixon, Krista Sarvis, Amy Doten, William Hayes, VA Black Hills Health Care System, 113 Comanche Road, Fort Meade, SD 57741. Tamara.Dixon3@va.gov

This quality improvement project established comprehensive diabetes care within the Pharmacy Medication Therapy Management (MTM) Clinic at VA Black Hills Health Care System (BHHCS). Currently, pharmacists provide MTM services based on disease-specific consults. Comprehensive diabetes care includes hypertension and dyslipidemia management, renal testing and retinal eye exams. This project allowed the provider to order a comprehensive diabetes MTM consult where the pharmacist monitored diabetes, blood pressure and cholesterol. Additionally, education was provided to nursing and providers to aid in compliance with renal testing and retinal eye exams.

Initial diabetes consults were included for four months pre- and post-implementation of the comprehensive diabetes consult. To improve quality of care, interventions performed for this quality improvement project included: education of providers, nursing and pharmacists about the facility diabetes core measures, implementation of a comprehensive diabetes consult, and identifying patients eligible for comprehensive diabetes MTM.

Effectiveness of the intervention will be assessed by monitoring the number of patients impacted by the comprehensive diabetes consult versus pre-comprehensive diabetes consult, pharmacy interventions and impact on pharmacists working within the MTM clinic. In addition, clinical outcomes monitored include: education of providers, nursing and pharmacists about the facility diabetes care within the Pharmacy Medication Therapy Management (MTM) Clinic at VA Black Hills Health Care System (BHHCS). Currently, pharmacists provide MTM services based on disease-specific consults. Comprehensive diabetes care includes hypertension and dyslipidemia management, renal testing and retinal eye exams. This project allowed the provider to order a comprehensive diabetes MTM consult where the pharmacist monitored diabetes, blood pressure and cholesterol. Additionally, education was provided to nursing and providers to aid in compliance with renal testing and retinal eye exams.

Descriptive statistics will be calculated and chi-square analysis will be conducted to compare the groups. The results of the quality improvement project will be used to assess further opportunities to improve patient care at BHHCS.

Learning Objectives:

1) Describe what comprehensive diabetes care entails

Self-Assessment Question:

1) Which of the following disease states were assessed as a result of the comprehensive diabetes consult?
   A. Hypertension
   B. Diabetes
   C. COPD
   D. A & B

Q1 Answer: D
Learning Objective:

1) Describe the impact of prospective audit and feedback on clinical and economic outcomes at the University of Iowa Hospitals and Clinics.

Self-Assessment Question:

1) Which of the following is a potential benefit of prospective audit and feedback as part of an antimicrobial stewardship program?
   A. Decreased risk of selecting for drug-resistant pathogens
   B. Improved patient outcomes
   C. Reduced costs of medical care
   D. All of the above

Q1 Answer: D

Learning Objectives:

1) Explain methods and processes used to improve the effectiveness of patient education and counseling

Self-Assessment Questions:

1) According to ASHP guidelines on patient education and recent literature, which of the following is suggested to be provided to the patient as a supplement to verbal counseling?
   A. A recording of the education session
   B. The pharmacist's personal cell phone number
   C. Written material about the medications discussed
   D. Drug discount cards

Q1 Answer: C
Learning Objective:

1) Describe services that ambulatory MTM pharmacists are able to provide to patients at HCMC.

Self-Assessment Question:

1) For which services can patients be referred to HCMC MTM pharmacists by community pharmacists?
   A. Complex medication regimens
   B. Tobacco cessation
   C. Adherence concerns
   D. All the above

Answer: D

Learning Objectives:

1) Describe the outcomes utilized to measure the effectiveness of expanding the pharmacist-managed hypertension clinic.

Self-Assessment Question:

1) What was the primary outcome of this quality improvement project?
   A. Number of patients consulted to the hypertension clinic
   B. Percentage of patients who reach blood pressure goal as specified by the 2014 VA/DoD Guidelines
   C. Average number of antihypertensive medications ordered by pharmacists
   D. Cost savings of a pharmacist-managed hypertension clinic

Answer: B
Growing rates of Vancomycin resistant Enterococcal (VRE) bacteremia amongst hematopoietic stem cell transplant (HSCT) patients have been reported in the literature within the past 10 years, and a similar increase has been reported at the University of Iowa Hospitals and Clinics (UIHC). Little data exist explaining the increased rate of resistance and infection. An in-depth analysis of patients will be conducted to determine if this increase is correlated with patient and disease characteristics, iatrogenic causes, or a combination of both. The purpose of this study is to determine risk factors associated with VRE bacteremia among patients who have undergone HSCT. Patient outcomes will be examined to determine if VRE bacteremia is associated with increased morbidity and mortality.

A single-center, retrospective chart review will be performed on all adult HSCT patients who have been treated at UIHC between June 2009 and June 2015. The risk factors examined include: age, type of malignancy, type of transplant, previous transplant, conditioning regimen, colonization with VRE, recent antibiotic use, duration of neutropenia, and presence of graft versus host disease, mucositis, or a central line. Outcomes analysis will be performed exploring: length of hospital stay, ICU admission, 30 day and 1 year mortality, time from transplant to positive culture, and delay of engraftment.

HSCT patients with bacteremia will be matched against those without an infection according to sex and month of positive culture. Descriptive statistics will be utilized, and risk factor identification along with outcomes will be analyzed using logistic regression as appropriate.

Learning Objective:

1) Discuss the proposed risk factors associated with VRE bacteremia in HSCT patients.

Self-assessment Question:

1) Identify which patient specific characteristics were evaluated for association with VRE bacteremia.
   A) Gender
   B) Type of transplant
   C) Chemotherapy associated co-morbidities
   D) B & C

Answer: D

Efficacy of Late Afternoon Plerixafor Administration for Stem Cell Mobilization. Cynthia el Rahi, James Cox, Rammurti Kamble, Houston Methodist Hospital, 6565 Fannin St. Houston, TX 77030. celrahi@houstonmethodist.org

Plerixafor is indicated in combination with granulocyte-colony stimulating factor for hematopoietic progenitor cell mobilization prior to autologous hematopoietic stem cell transplantation (HSCT) for non-Hodgkin’s lymphoma (NHL) and multiple myeloma (MM). The manufacturer recommends administering plerixafor 11 hours prior to initiation of apheresis based on the peak effect of 10-14 hours, translating to an administration time of 10-11 pm. In June 2013, FDA-mandated labeling changes described a risk of anaphylactic reactions post-plerixafor, and recommended monitoring after administration. In July 2013, following the FDA guidance and data suggesting sustained plerixafor activity at 18 hours, we changed our administration time to 4pm.

This aim of this study was to retrospectively compare the stem cell collection efficiency of patients treated with plerixafor before and after the change in practice at our institution.

A retrospective chart review of patients with NHL and MM, who received a plerixafor-containing mobilization regimen prior to autologous HSCT, was conducted.

208 patients were included in the analysis (68 and 140 patients in the 4 pm and 10 pm administration time groups, respectively). 91% of patients in the 4 pm group achieved minimal CD-34(+) cell goal (2 x 10^5 CD34+ cells/kg) in ≤ 2 apheresis days compared to 89% in the 10 pm group (P-value=0.804) resulting in comparable stem cell collection efficiency. A multivariate analysis is being conducted to account for different factors that may affect the stem cell collection efficiency such as age, number of therapy lines, prior cytotoxic chemotherapy, number of prior lenalidomide cycles, and thrombocytopenia.

Learning Objectives:

1) Describe the rationale behind the practice change at our institution to administer plerixafor at 4 pm
2) Report the effect of our practice change on stem cell collection efficiency

Self-Assessment Questions:

1) Which of the following best describes the rationale behind the practice change at our institution to administer plerixafor at 4 pm?
   A. FDA’s recommendation to monitor patients for 30 minutes after administration of plerixafor due to the risk of anaphylactic reactions
   B. FDA’s recommendation for plerixafor to be administered under the supervision of an experienced chemotherapy physician
   C. Patients’ preference not to self-administer plerixafor at home

   Q1 Answer: A

2) Compared to the 10 pm plerixafor administration, the 4 pm plerixafor administration resulted in:
   A. Significantly lower percentage of patients achieving minimal CD-34(+) cell goal
   B. Comparable percentage of patients achieving minimal CD-34(+) cell goal
   C. Significantly higher percentage of patients achieving minimal CD-34(+) cell goal

   Q2 Answer: B
ASSESSMENT OF ANTIBIOTIC DURATION IN ADULTS WITH COMMUNITY-ACQUIRED PNEUMONIA AND NEED FOR ANTIMICROBIAL STEWARDSHIP AT DISCHARGE. Noha Elbermawy, Helen Newland, Olathe Medical Center, 20333 W. 151st St., Olathe, KS 66061 Noha.Elbermawy@olathehealth.org

The Infectious Diseases Society of America (IDSA) and the American Thoracic Society (ATS) have published consensus guidelines on the management of community–acquired pneumonia (CAP) in adults. These guidelines recommend an individualized approach to duration of therapy when the following criteria are met: treated for a minimum of 5 days, afebrile for 48-72 hours, and have no more than one CAP-associated sign of clinical instability. According to the guidelines, durations longer than 5 to 7 days of therapy are rarely necessary. Longer durations of antibiotic therapy are associated with increased risk of resistance, *Clostridium difficile* infections, and adverse drug reactions. Previous studies have shown that individualized treatment approaches have not been adopted in clinical practice.

The purpose of this study is to define the current practice of total duration of antibiotic therapy in non-intensive care unit (non-ICU) hospitalized adults with CAP at our institution. A secondary purpose is to identify the potential need to expand antimicrobial stewardship services to the discharge process at Olathe Medical Center.

These objectives will be assessed through a retrospective chart review of approximately 100 non-ICU inpatients discharged between January 1st 2013 and December 31st 2014 with a diagnosis of CAP.

If a significant number of patients with durations exceeding the usual recommended 5 to 7 days is shown, the results of the study will be used to expand pharmacy antimicrobial stewardship services to the discharge process at Olathe Medical Center.

**Learning Objective:**

1) Describe the impact of longer durations of antibiotic therapy.

**Self-Assessment Question:**

1) Longer durations of antibiotic therapy are associated with which of the following:
   A. Increased risk of antimicrobial resistance
   B. Decreased adverse drug reactions
   C. Increased *Clostridium difficile* infections
   D. Both A and C

**Answer:** D

ASSESSMENT OF MEDICATION THERAPY MANAGEMENT TRAINING AND WORKFLOW REDESIGN IN A MULTI-SITE COMMUNITY PHARMACY Beth Engel, Heather Rickertsen, Jessica Smith, Yiran Zhang, Christine Catney, Mercy Family Pharmacy, 1920 Elm Street, Dubuque, IA, 52001. beth-engel@uiowa.edu

The objectives of this study were to: (1) determine if individualized pharmacist training on medication therapy management (MTM) increases claim submission and (2) assess pharmacist perceptions of individualized MTM training and workflow redesign. The rationale for these objectives was to create a more sustainable MTM program.

This quality improvement project was a prospective, pre- and post-comparison conducted at a multi-site community pharmacy in the Midwest. Each participating pharmacist completed an investigator-developed checklist assessing their ability to perform certain MTM skills, such as platform navigation, claim submission, patient work-ups, prescriber communication, and workflow integration. The investigator then provided individualized, face-to-face training sessions to each pharmacist until all training checklist items were satisfactorily completed as determined by direct observation. Training materials included existing resources from OutcomesMTM and Mirixa platforms as well as investigator-developed procedural guides.

Data on MTM claims submitted were collected from OutcomesMTM and Mirixa platforms before and after training completion. Additional data to assess pharmacist perceptions of MTM training and workflow redesign came from anonymous electronic surveys distributed to participants. Results are being analyzed and will be presented.

**Learning Objective:**

1) Summarize pharmacist reported perceptions of individualized training on medication therapy management.

**Self-Assessment Question:**

1) Pharmacists reported which of the following perceptions regarding individualized training on medication therapy management?
   A. Decreased comfort level with navigating MTM platforms
   B. Increased comfort level with documentation and billing of MTM services
   C. No change in comfort level with prescriber communication
   D. Dissatisfaction with training, materials provided, and amount of time spent

**Answer:** B
IMPACT OF COMMUNITY-BASED A1C SCREENING AND LIFESTYLE EDUCATION ON PATIENTS AT-RISK FOR DIABETES IN A RURAL AREA. Megan Engel, Matthew Osterhaus, Benjamin Urick, Christine Catney. Osterhaus Pharmacy, 918 W. Platt, Suite #2, Maquoketa, IA 52060. megan-engel@uiowa.edu

The objectives of this study were to: (1) assess the impact of point-of-care A1c screening and lifestyle education on patients’ knowledge of diabetes and patient follow-up with providers and (2) evaluate the feasibility of future A1c screening events. The rationale for these objectives was to address increasing rates of diabetes and identify potentially undiagnosed cases in a community perceived to be at high-risk.

This was a descriptive study of community-based screening events conducted by one independent pharmacy in a rural Midwestern city. Patients with a score of five or more points on the American Diabetes Association’s Diabetes Risk Test had their A1c measured with the A1CNow+ device while those with a score of less than five points had their blood glucose measured. Patients with an A1c ≥ 5.7 percent, fasting blood glucose ≥100 mg/dL, or random blood glucose ≥140 mg/dL were referred to a primary care provider (PCP) to confirm the results and make a diabetes diagnosis if appropriate. Each patient was provided educational materials on lifestyle changes including healthy food choices, regular exercise, and safe weight loss goals. Feasibility of future A1c screenings was determined based on patient satisfaction surveys completed on the day of the event. Telephone surveys were conducted with patients one month after each event to assess perceptions of the screening’s impact on their knowledge of lifestyle changes and their follow-up with a PCP.

There were a total of 110 participants in the study. Results are being analyzed and will be presented.

Learning Objective:

1) Describe the A1cNow device.

Self-Assessment Question:

1) Which of the following statements is correct about the A1cNow device?
   A. It involves a venous blood draw.
   B. It is not yet considered CLIA-waived.
   C. It measures a 3-month average of blood sugar.
   D. Results take 10 minutes after collecting the sample.

Answer: C

THE UTILITY OF PROCALCITONIN IN PEDIATRIC PATIENTS WITH VIRAL PNEUMONIA WITH A SUSPECTED CO-BACTERIAL INFECTION; A RETROSPECTIVE REVIEW. Erica Erixon, Keili Cunningham, Allison Schlicher, Maria Victoria Dajud, Amy Ferguson, Hayden Smith, Stephanie Duehlmeyer, Andrew Fondell, Jennifer Hess, UnityPoint Health – Des Moines, 1200 Pleasant St, Des Moines, IA 50309. Erica.Erixon@unitypoint.org

Viral respiratory illnesses are common among pediatric patients and bacterial co-infections are thought to occur in up to 30% of these patients. In some cases, it is difficult to determine the presence of bacterial co-infections based on the patient’s chest x-rays and current laboratory markers, such as CRP and WBC. Recent literature suggests PCT can be used to distinguish bacterial from viral infections. However, there is limited literature available in the pediatric population regarding the use of PCT in the detection and differentiation between viral and bacterial pneumonia.

The primary objective of this study is to determine if procalcitonin is a useful biomarker in identifying patients with a known viral respiratory infection with a questionable secondary co-bacterial pneumonia.

This is a single center, retrospective cohort study of pediatric patients admitted from October 1st, 2015 to March 31st, 2016 for any upper respiratory tract illness in which the patient had a minimum of two PCT levels drawn. Descriptive statistics will be utilized to determine the percentage of patients who were diagnosed and/or treated for bacterial pneumonia, viral pneumonia, or a viral pneumonia with a co-bacterial infection. Additional analyses will be reviewed and conducted by a statistician based on any additional outcomes noted in the data analyses. This data will be compared to baseline data obtained from October 1st, 2014 to March 31st, 2015. Conclusions will be drawn once all data has been collected and analyzed.

Learning Objectives:

1) Describe the role of procalcitonin in the body in response to an infectious process.
2) Assess the utility of procalcitonin as a laboratory marker for the detection of bacterial pneumonia in pediatric patients compared to commonly use laboratory markers, such as C-Reactive Protein (CRP) and white blood cell count (WBC).

Self Assessment Questions:

1) Which of the following procalcitonin values is more reliable in determining the presence of a bacterial infection:
   A. A single procalcitonin value
   B. A procalcitonin level of <0.25
   C. Trend of two or more procalcitonin values
   D. Procalcitonin is not a reliable marker for bacterial infections

2) Which of the following laboratory values best correlates with the presence of a bacterial pneumonia in pediatric patients based on the literature:
   A. C-Reactive Protein
   B. Procalcitonin
   C. White Blood Cell Count
   D. Temperature

Q1 Answer: C Q2 Answer: B
PREVALENCE OF PHARMACY-LED WARFARIN PATIENT EDUCATION IN A COMMUNITY HOSPITAL: Ashley Evans, Brian Grace, James Houpt, Elizabeth Englin 3801 S National Ave, Springfield, MO 65807

For patients being discharged on warfarin, written education compliant with Centers for Medicare and Medicaid Services VTE-5 criteria is required. Pharmacists, as medication experts, are well positioned to provide education on the complex monitoring, dietary restrictions, and medication interactions that accompany warfarin use. Additionally, it is established that student pharmacists can effectively provide clinical services as pharmacist extenders.

The primary objective of this study is to determine the proportion of warfarin patients educated by the pharmacy department. The study will also determine which pharmacy personnel are providing educations by reviewing the proportion of educations provided by pharmacists, resident pharmacists, and student pharmacists respectively. Additionally, thirty and sixty day readmission rates and estimated cost associated with providing these educations will be reviewed.

This is a retrospective, cross-sectional review of current pharmacy warfarin patient education practices. Medical records of inpatient adults with active warfarin orders from February 1 to March 31, 2015 will be reviewed, and patients who were discharged on warfarin will be included in the study up to a goal sample size of 150. Date of pharmacy warfarin education, pharmacy personnel providing education, and time spent providing education will be collected, as well as date of discharge from study qualifying admission and incidence of readmission within 30 and 60 days.

Forty three patients have been reviewed. Ten patients were excluded and one patient (3%) received pharmacy-led warfarin education performed by a student pharmacist. Five patients were readmitted within 30 days of discharge, along with an additional four within 60 days.

Learning Objective:

1) Explain the requirements for the VTE-5 CMS Quality Measure.

Self-Assessment Questions:

1) Which of the following topics are required in written VTE-5 discharge instructions?
   A. Compliance issues
   B. Dietary advice
   C. Follow-up monitoring
   D. Potential for adverse drug reactions and interactions
   E. All of the Above

2) Describe examples of successful use of student pharmacists as pharmacist extenders.

3) List at least one potential advantage of having student pharmacists participate in direct patient care activities.

Possible Answers: Reach more patients, improve student pharmacists’ communication skills and confidence, fulfill accreditation standards for pharmacy education, improved HCAHPS scores, or decrease readmission rates

TAKING AWAY THE PAIN OF NUMBERS: IMPLEMENTATION OF THE CLINICALLY ALIGNED PAIN ASSESSMENT (CAPA) METHOD. Mollie Fearing, Stephanie Porto, and Shelley Terrell, Lawrence Memorial Hospital, 325 Maine Street, Lawrence, KS 66044, Mollie.Fearing@lmh.org

Pain is an extensive and complex problem that affects millions of patients each year. Inappropriately managed pain may lead to consequences including increased morbidity, mortality, and length of hospital stay. Pain management also plays a key role in patient satisfaction of hospital stay and care. Despite continuous efforts to improve pain management and patient satisfaction, Lawrence Memorial Hospital’s Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scores relating to pain have remained stagnant. The Clinically Aligned Pain Assessment (CAPA), developed by the University of Utah Hospitals and Clinics, provides an alternative method of pain management. CAPA focuses on discussions with patients about pain in place of the traditional 0-10 Numerical Rating Scale (NRS). CAPA describes pain using comfort, change in pain, pain control, functioning, and sleep. In an effort to improve patient pain management and hospital HCAHPS scores, a multidisciplinary team proposed the implementation of CAPA.

The purpose of this quality improvement project is to implement a physical change in the institution’s pain assessment method. As part of the documentation design, a trial period of at least six weeks is currently assessing patients with CAPA in parallel with their NRS. Using feedback from nursing staff, CAPA will be incorporated into electronic documentation throughout the institution.

This project is in progress; results of the trial period will be used to facilitate CAPA implementation throughout the hospital and improve patients’ pain management and satisfaction at Lawrence Memorial Hospital.

Learning Objective:

1) Identify the impact of implementing the Clinically Aligned Pain Assessment method on patient satisfaction.

Self-Assessment Question:

1) The Centers for Medicare and Medicaid Services utilize which of the following when assessing patients’ pain management?
   A. Clinically Aligned Pain Assessment (CAPA)
   B. Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS)
   C. 0-10 Numerical Rating Scale (NRS)
   D. FLACC Behavior Pain Assessment Scale

Q Answer: B
IMPACT OF SURGICAL ANTIBIOTIC ORDER MENU ON PRESCRIBING HABITS. Elizabeth Ficek, Joshua Howitt, R. Spencer Schaefer, Jonathan Corbett, Kansas City Veterans Affairs Medical Center, 4801 Linwood Blvd., Kansas City, MO 64128. elizabeth.ficek@va.gov

The American Society of Health System Pharmacists (ASHP), in conjunction with the Infectious Disease Society of America (IDSA), the Surgical Infection Society (SIS), and the Society for Healthcare Epidemiology of America (SHEA), published clinical practice guidelines for Antimicrobial Prophylaxis in Surgery in February 2013 with the intent to provide a standardized approach to the use of antimicrobial agents in this setting. The best way to implement these new standards of practice is still unclear. Providing surgeons with a standardized order menu is one possible solution for ensuring patients receive appropriate antibiotic prophylaxis as outlined by the guidelines.

The objective of this study is to evaluate the impact of a computerized patient record system (CPRS) surgical antibiotic order menu on prescribing habits and compliance with current guideline recommendations. The order menu will allow for providers to choose antibiotics based on surgery type, patient weight, and other patient specific factors.

This objective will be assessed by comparing percentage of orders following the guidelines, including selection of appropriate antibiotic based on surgery type, correct weight-based dosing of antibiotics, and appropriate antibiotic stop times, pre- and post-order menu implementation.

The results of this study will be used to improve the order process for post-op surgical antibiotics, and in turn, reduce surgical complications such as infection, improving patient outcomes.

Learning Objective:
1) Identify and improve gaps in care related to appropriate timing, dosing, and administration of surgical prophylactic antibiotics as set forth by current guideline recommendations.

Self-Assessment Question:
1) Which method has been studied and proven effective in improving physician integration and compliance with published guidelines when ordering medications?
   A. Electronic order entry systems with clinical decision support
   B. Requiring prescribing providers to pass short CE course on updated guidelines as they are released
   C. Denial of all orders not in compliance with current guidelines
   D. No method have been proven effective in achieving this goal

Answer: A

EVALUATING THE UTILIZATION OF TBO-FILGRASTIM IN ADULT PATIENTS WITH SOLID TUMORS AND NON-MYELOID MALIGNANCIES. Meggie Finley, Kari McCracken, St. John Medical Center, 1923 S. Utica Ave, Tulsa, OK 74104. meggie.finley@sjmc.org

Current National Comprehensive Cancer Guidelines (NCCN) and the Infectious Disease Society of America (IDSA) recommend the prophylactic use of granulocyte colony-stimulating factors (G-CSFs) in patients on chemotherapeutic regimens with a high risk of febrile neutropenia. Administering G-CSFs to patients on intermediate or low risk regimens with other risk factors may also be appropriate. Although not indicated for the treatment of febrile neutropenia, G-CSFs are commonly prescribed for this purpose.

The purpose of this study is to determine the extent to which treatment provided to patients on a G-CSF complies with current guidelines.

The objective will be assessed identifying patients who have received at least one dose of tbo-filgrastim. The following data will be collected: patient age, gender, weight, documented diagnosis, and documented chemotherapeutic regimen. If treatment does not comply with current guidelines, provider documentation will be reviewed to determine if reasons for non-compliance are documented. If available, results of renal and hepatic function tests will be collected. All data will be recorded without patient identifiers and maintained confidentially. Chemotherapeutic regimens will be ranked as high, intermediate, or low based on their risk of febrile neutropenia. Additional risk factors such as previous chemotherapy or radiation, preexisting neutropenia, infection, or recent surgery will be reviewed. Each patient’s care will be rated as compliant or noncompliant with current guidelines.

Decreasing the use of G-CSFs and reserving them for patients with clear indications will help reduce costs for the institution.

Learning Objective:
1) Review G-CSF indications based on current guidelines

Self Assessment Questions:
1) Current guidelines suggest the use of G-CSFs for:
   A. Prophylaxis of febrile neutropenia for patients on high risk chemotherapeutic regimens
   B. Treatment of febrile neutropenia
   C. Patients with a ≥20% risk for developing febrile neutropenia
   D. A and C

Answer: D
**IS TENOFOVIR ASSOCIATED WITH KIDNEY FUNCTION DECLINE IN PATIENTS TREATED FOR HEPATITIS B?**

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Nucleoside and nucleotide reverse transcriptase inhibitors have become a standard treatment for both HIV infection and Hepatitis B. Tenofovir disoproxil fumarate (TDF) has been associated with kidney injury and possible long-term damage in HIV patients. Few studies have examined whether this holds true for patients treated for hepatitis B.

Determine whether TDF in hepatitis B patients is associated with kidney injury.

Data was gathered from the Veterans Health Administration Computer Data Warehouse between July 1, 2005 and July 31, 2015. Patients 18 years or older with hepatitis B, prescribed a nucleoside/tide inhibitor for greater than one month were included in the study and followed for 36 months. Patients with HIV infection were excluded, and combination emtricitabine/tenofovir were analyzed separately from TDF patients. A linear mixed model was used to examine the effects of time and specific agent on renal function, which was measured with eGFR at various time intervals.

There were 413 incidences of nucleoside/tide use in 308 subjects during the 10 years of the study with 39 cases of TDF use. There was a significant effect of time, with eGFR reduction of 4.546 mL/min (p<0.001) over the course of the study, but the effect of each medication was not significant. This suggests that TDF is not associated with a greater degree of kidney injury than other nucleoside/tide inhibitors in hepatitis B patients, but further studies are warranted.

**Learning Objective:**

1) Compare the risk of kidney injury between nucleoside/tide inhibitors in hepatitis B.

**Self-Assessment Question:**

1) Which of these factors is associated with kidney decline in the present study?
   - A. Use of tenofovir disoproxil
   - B. Use of lamivudine
   - C. Time
   - D. Gender

**Answer:** C

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**EVALUATION OF FACTORS PRIOR TO HYPERGLYCEMIC EVENTS IN ADULT HOSPITALIZED PATIENTS.**

Mallory Freeman, Lauren Morton, Jennifer Wade, Marwa Buser, Wesley Medical Center, 550 N Hillside St, Wichita, KS 67214. Mallory.Freeman2@wesleymc.com

An estimated 25-35% of inpatient adults in the United States have a hyperglycemic event, with one-third of these patients having no prior diagnosis of diabetes. This is of particular concern as prolonged states of hyperglycemia have been shown to have negative effects on the body, which may lead to longer durations of hospitalization and increased risk of infection. While some general risk factors for elevated blood glucose are known, few studies exist that examine the frequency of these risk factors leading to hyperglycemic events. Identification of factors more commonly found in patients who experience a hyperglycemic event would aid clinicians in targeting patients that may be more likely to require intervention. Earlier identification of these factors and patients may in turn lead to decreases in the number of future hyperglycemic events.

This retrospective, single-center analysis will evaluate if certain patient specific factors have an increased frequency of hyperglycemic events in the adult inpatient population. Two hundred adults who experienced at least one random blood glucose reading > 180 mg/dL during a pre-specified six month period will be included in the study. Various patient factors known to hold potential of increasing blood glucose will be collected to determine the overall frequency in the study population. Further analysis will be conducted to determine any difference in frequency between patients experiencing a single hyperglycemic event versus multiple hyperglycemic events. Results of this study will be used by pharmacists to identify those patients who may be more likely to require clinical intervention or increased monitoring.

**Learning Objectives:**

1) Describe the impact of hyperglycemia in the hospital setting
2) Discuss factors identified to increase the occurrence of hyperglycemic events

**Self-Assessment Questions:**

1) Hyperglycemia in the hospital setting can cause:
   - A. Decreased number of adverse events
   - B. Increased risk of mortality
   - C. Decreased length of hospital stay
   - D. Decreased cardiovascular complications

2) Factors identified to increase the occurrence of hyperglycemic events were:
   - A. BMI > 30
   - B. Patients < 40 years old
   - C. History of diabetes
   - D. Both A and C

**Q1 Answer:** B  **Q2 Answer:** D
Pharmacists play an integral role in the advancement of immunization rates. Much of the emphasis to date has been on the impact of pharmacist efforts as vaccine administrators. Pharmacists can play a critical role as vaccine promoters as well, as can be seen in long term care settings known as Community Living Centers (CLCs) in the Department of Veterans Affairs (VA). These interventions can potentially have a tremendous impact on improving immunization rates in this high risk demographic, and reduce healthcare expenditure as well.

The primary objective of this quality improvement project is to improve the current immunization assessment process at the Grand Island CLC. This will potentially result in minimizing risks to veterans of acquiring vaccine preventable diseases, and ensure compliance with Centers for Medicare and Medicaid mandated long term care immunization requirements. The primary outcome will be the rate of immunization assessments completed for influenza, zoster, Tdap/Td, PPSV23/PCV13 vaccines, and consequently the number of veterans immunized.

The project will evaluate implementation of best practices known to improve vaccination rates in other VA settings. Methods will include electronic clinical vaccination reminders, and incorporation of immunization assessments into medication reconciliation and monthly drug regimen review. The method of assessment will be recorded, and reason if vaccination was not administered for further sub-analysis. Collection is ongoing, and results will be used to establish a standard operating procedure that delegates the task of CLC immunization assessments to one specific service line (pharmacy), to ensure immunization assessments are completed in a timely manner.

Learning Objectives:

1) Identify vaccinations that are important to assess in long term care residents
2) List best practices that may be applied to improve long term care immunizations within the VA

Self-Assessment Questions:

1) All LTC residents should have immunization assessments for:
   A. Influenza
   B. Human Papilloma Virus (HPV)
   C. Inactivated Polio Vaccine (IPV)
   D. Yellow fever

2) Current best practices to improve immunizations within the VA include:
   A. Admission and discharge medication reconciliation
   B. Computer generated electronic clinical reminders
   C. Monthly Drug Regimen Review
   D. All of the above

Q1 Answer: A  Q2 Answer: D

Antibiotics are often used chronically by the immunocompetent population for conditions such as recurrent urinary tract infections or acne vulgaris. The over-prescribing of antibiotics and the development of microbial resistance has been declared an important public health issue by government agencies. Without understanding the extent of the risks involved in utilizing these chronic regimens, it is difficult for the clinician to weigh risk versus benefit. Interestingly, few studies are available that examine the long-term outcomes of these chronic regimens. The objective of this study is to determine if there is an increased rate of microbial resistance associated with chronic antibiotics in immunocompetent patients.

This retrospective matched case-control study will examine adult patients admitted to Mayo Clinic Health System-Mankato Hospital between January 1, 2010 and September 30, 2015 who have signed a consent waiver for research. Case patients will be identified as those with S.aureus resistant to sulfamethoxazole/trimethoprim or doxycycline, or E.coli resistant to sulfamethoxazole/trimethoprim. Control patients will be those with sensitive S.aureus or E.coli. The rates of prior chronic antibiotic use will then be compared between the two groups using conditional logistic regression.

The use of chronic antibiotics is expected to have an association with higher rates of microbial resistance. The results of this study will be used to provide clinicians with an understanding of the risks involved in utilizing these chronic regimens, it is difficult for the clinician to weigh risk versus benefit. Interestingly, few studies are available that examine the long-term outcomes of these chronic regimens. The objective of this study is to determine if there is an increased rate of microbial resistance associated with chronic antibiotics in immunocompetent patients.

Learning Objectives:

1) Identify the known risks of chronic antibiotics in immunocompetent patients

Self-Assessment Question:

1) Which of the following is not a risk of chronic antibiotics established in studies?
   A. Chronic antibiotics are linked with a 3-fold increase in risk of S.pyogenes colonization in the oropharynx
   B. Chronic antibiotics are linked with an increased length of hospital stay
   C. Chronic antibiotics are linked with an increase in S.pyogenes resistance
   D. Chronic antibiotics have been linked with a doubled odds of upper respiratory tract infection

Answer: B
Previously conducted studies suggest a reduced therapeutic enoxaparin dose is indicated for patients with a body mass index (BMI) above 40 kg/m². However, there is a lack of data regarding doses needed to achieve therapeutic anti-Xa levels in patients with a BMI between 30 and 40 kg/m². The objective of this study is to evaluate the efficacy and safety of subcutaneous enoxaparin 1 mg/kg twice daily in patients with a BMI of 30 to 40 kg/m² and 0.75 mg/kg twice daily in patients with a BMI greater than 40 kg/m² via monitoring of anti-Xa levels and the occurrence of events.

Obese patients receiving therapeutic enoxaparin will be identified through an anticoagulation daily report and via the pharmacy medication monitoring system. Pharmacists will order an anti-Xa level four hours after the third therapeutic enoxaparin dose and automatically reduce the enoxaparin dose to 0.75 mg/kg BID in patients with a BMI greater than 40 kg/m² according to the Pharmacy and Therapeutics Committee Policy. The provider will be contacted for subsequent anti-Xa levels and dose adjustments. The average enoxaparin dose achieving therapeutic anti-Xa levels in patients with a BMI between 30 to 40 kg/m² and greater than 40 kg/m², the dose required based on the level of renal impairment, and the number of venous thromboembolic and bleeding events will be calculated.

The results of this study will be used to determine if institution-specific thromboprophylaxis guidelines should be developed for multiple myeloma patients on IMiDs. Additionally, this study will evaluate thromboprophylaxis prescribing patterns in this population and compare observed clinical utilization to guideline recommendations.

The purpose of this study is to compare the safety and efficacy of aspirin and LMWH for prevention of VTE in multiple myeloma patients taking IMiDs. The primary outcome is proportion of patients developing a first episode of VTE during active treatment with thalidomide, lenalidomide, or pomalidomide. Secondary endpoints include the incidence of major and minor bleeding events.

The results of this study will be used to determine if institution-specific thromboprophylaxis guidelines should be developed for multiple myeloma patients on IMiDs.

Learning Objective:

1) Identify the enoxaparin dose reductions suggested by the current literature regarding the obese population with a BMI greater than 30 kg/m².

Self-Assessment Question:

1) Which of the following statements is correct regarding the current literature evaluating enoxaparin dose reductions in obese patients?

A. Enoxaparin in patients with a BMI between 30 and 40 kg/m² have been well studied.
B. Anti-Xa levels in the obese population can be measured 4 hours after the second enoxaparin dose.
C. Enoxaparin 0.75 mg/kg BID in patients with a BMI > 40 kg/m² achieved therapeutic anti-Xa levels.
D. Obese patients with renal impairment need an enoxaparin dose reduction to 0.8 mg/kg BID.

Answer: C
TIME TO DISCONTINUATION OF ANTICHOLINERGIC AGENTS FOR OVERACTIVE BLADDER (OAB) IN A U.S. VETERAN POPULATION. Ali Goodson, Matthew Cantrell, Brian Lund, Robert Shaw, Alexandra Lovell, Iowa City VA Medical Center, 601 Hwy 6 W, Iowa City, IA 52246. Ali.goodson@va.gov

Overactive bladder (OAB) is a common syndrome, especially among older adults. The effects of OAB are not limited to urinary symptoms, as it has been associated with impairments in health-related quality of life (HRQL) and increased rates of depression and anxiety.

Anticholinergic agents are often used first-line for pharmacologic treatment of OAB. They provide symptomatic relief by preventing acetylcholine from binding to the M2 and M3 muscarinic receptors in the bladder. Oxybutynin, which lacks bladder tissue specificity, often causes adverse side effects such as xerostomia, constipation, and blurred vision resulting in high discontinuation rates. Subsequent congeners in this class differ in their selectivity for muscarinic receptors with potential advantages in efficacy and tolerability. However, head to head trials are lacking.

We aim to determine the effectiveness of anticholinergic agents (tolterodine, fesoterodine, trospium, solifenacin, darifenacin) used for overactive bladder in U.S. veterans as measured by time to discontinuation. We will study U.S. veterans who were initiated on their first trial of an anticholinergic agent between October 2007 and August 2015. Our primary analysis will use multiple logistic regression to contrast 1 year persistence rates between anticholinergic medications. As a secondary analysis, we will use multivariable Cox proportional hazard regression to model time to anticholinergic discontinuation, to determine if findings are consistent. The results of this study will be used to guide selection of anticholinergic agents used for treatment. The clinical impact of this research study is forthcoming.

Learning Objectives:

1) Explain the mechanism of action of anticholinergic medications used for overactive bladder.

2) Identify common adverse effects associated with anticholinergic medications used in the management of OAB.

Self-Assessment Questions:

1) Which of the following statements best describes the mechanism of action of trospium (Sanctura)?
   A. Promotes action of acetylcholine on muscarinic receptors (M2 and M3)
   B. Elicits inhibition of acetylcholine action on muscarinic receptors
   C. Agonist of gamma-aminobutyric acid (GABA) receptors
   D. Antagonist of the histamine (H1) receptor

2) Which of the following adverse effects are commonly associated with anticholinergic medications used for OAB?
   I. Diarrhea
   II. Dizziness
   III. Dry mouth
   IV. Myalgia
   A. I, II, IV
   B. I, III
   C. I, III, IV
   D. II, III

Q1 Answer: B  Q2 Answer: D

EVALUATION OF AN ALTERNATE CEFEPIME DOSING PROTOCOL AT AN ACADEMIC MEDICAL CENTER. Alyssa Gould, Kiri Rolek, Jayme Anderson, Trevor VanSchooneveld, Nebraska Medicine, 981090 Nebraska Medical Center, Omaha, NE, 68198. algould@nebraskamed.com

Due to increasing drug resistance, there has been significant interest in optimizing the pharmacokinetic and pharmacodynamic parameters of antimicrobials. Cefepime is a fourth generation cephalosporin that exhibits time-dependent pharmacokinetics, with efficacy corresponding to the percentage of time that free drug concentrations remain above the minimum inhibitory concentration (MIC) of a pathogen.

Based on data from an internal study, an alternate cefepime dosing protocol was implemented at Nebraska Medicine in 2011. Per protocol, pharmacists automatically interchange standard doses of cefepime 2 grams every 8 to 12 hours to 1 gram every 6 hours. By giving smaller doses more frequently, there is a higher probability of achieving target attainment. While several pharmacokinetic studies support this alternate dosing strategy for cefepime, there are few studies regarding clinical outcomes.

The objective of this retrospective cohort study is to evaluate the clinical safety and efficacy of this alternate cefepime dosing protocol. These objectives will be assessed by looking at clinical outcomes of a pre-protocol implementation group receiving standard doses and comparing them to those of a post-protocol group receiving alternate doses per protocol. Endpoints including clinical and microbiologic cure, time to defervescence, duration of mechanical ventilation, length of stay, hospital mortality, 30-day readmission, and cost of therapy will be analyzed. The results of this study will be used to assess appropriateness of this alternate cefepime dosing regimen. Study outcomes will be presented at the Midwest Pharmacy Residency Conference.

Learning Objective:

1) Recognize the potential advantages associated with an alternate cefepime dosing regimen

Self-Assessment Question:

1) An advantage to using an alternate dosing regimen for cefepime is:
   A. Optimizing pharmacokinetics and reducing the probability of target attainment
   B. Optimizing pharmacokinetics and maintaining the probability of target attainment
   C. Increasing the potential for antimicrobial resistance
   D. Increased drug revenue for pharmacy

Answer: B
THE EFFECT OF MULTI-COMPARTMENT ADHERENCE PACKAGING ON MEDICARE PART D ADHERENCE RELATED STAR RATING MEASUREMENTS Erin E. Graham, Emily S. Prohaska, Janelle F. Ruisinger, Brittany L. Melton, Hen House Pharmacy #32, 13600 S Black Bob Rd, Olathe, KS 66062. Erin.Graham@ballsfoods.com

The Centers for Medicare and Medicaid Services (CMS) use a five star rating system to evaluate health insurance plans as a part of their pay for performance model. Increased medication adherence has a benefit to cost ratio of 2:1 to 13:1 depending on patient factors. Additionally, a systematic review found multi-compartment packaging in combination with reminders increased medication adherence by 23% (P<0.05). Three of the 15 CMS Medicare Part D star rating measures are based on adherence in the following medication categories: 1) oral diabetes agents, 2) renin-angiotensin system (RAS) antagonists, and 3) statins. A five star rating correlates to a percent of Medicare Part D beneficiaries maintaining a proportion of days covered (PDC) of 80% or greater.

The objective of this pre-post intervention study is to measure the percent change of beneficiaries with a PDC less than 80% for each Medicare Part D adherence measure after conversion to medication dispensing in multi-compartment packaging.

This was assessed by dispensing four 30-day cycles of maintenance prescription medications in multi-compartment packaging. Adult patients were eligible if they had poor adherence (PDC < 80%) in one or more of the adherence related Medicare Part D measures, took three or more maintenance medications, and filled prescriptions at one of three study pharmacies.

Preliminary results show an increase in PDC after two dispensing cycles using multi-compartment packaging. To date, the PDC values have not exceeded the 80% threshold for a five star rating; however, data collection is ongoing.

Learning Objectives:

1) Name the three Medicare Part D adherence related star rating measures
2) Define the required proportion of days covered to achieve a five star rating

Self-Assessment Questions:

1) Which of the following is not a Medicare Part D adherence related star rating measure?
   A. Oral diabetes medications
   B. Oral and injectable diabetes related medications
   C. Renin-angiotensin system antagonist medications
   D. Statin medications

2) Which of the following proportion of days covered correlates to a five star Medicare Part D rating for an adherence related measure?
   A. 65% or greater
   B. 70% or greater
   C. 75% or greater
   D. 80% or greater

Q1 Answer: B Q2 Answer: D

INPATIENT EVALUATION OF PHARMACIST-MANAGED WARFARIN PATIENTS. Wendy Grainger, Melissa Morais. HealthEast St.Joseph’s Hospital 45 West 10th Street, St.Paul MN 55102. wgrainger@healtheast.org

Warfarin has been recognized as a high-risk medication requiring close monitoring due to increased risk of adverse effects such as bleeding. Patients admitted to the hospital often have dietary changes, medication changes and new diagnoses. All of these factors can alter the pharmacokinetics of warfarin, so close monitoring with appropriate dose adjustments is important. Hospital National Patient Safety Goals (NPSG) are designed to improve patient safety. In 2008, The Joint Commission published NPSG 03.05.01, which addressed the necessity for safe anticoagulation use in hospitalized patients to reduce the likelihood of patient harm. To be compliant with this goal, it is recommended that institutions evaluate current safety practices to facilitate improvement in these practices and then measure the effectiveness of the improvements.

The purpose of this study is to assess the effectiveness of a pharmacist-managed warfarin service to identify opportunities for improved patient safety. This will be achieved by monitoring the percentage of time the International normalised Ratio (INR) is within therapeutic range for pharmacist-managed warfarin patients. Secondary endpoints include mean time to first therapeutic INR, percentage of new-start warfarin patients in therapeutic range within 5 days, and percentage of time the INR is greater than or equal to 4 at any time during hospitalization. Descriptive statistics will be calculated then the results compared to previously published literature.

The results of this study will be used to determine areas for improvement in order to improve patient safety and compliance with NPSG 03.05.01.

Learning Objectives:

1) Describe the impact of NPSG 03.05.01
2) Identify effective endpoints that can be used to assess for improvement in safe anticoagulation

Self-Assessment Questions:

1) NPSG 03.05.01 is designed to:
   A. Improve patient safety
   B. Aid in pharmacokinetic monitoring of warfarin
   C. Address safe anticoagulation use in hospitalized patients only
   D. Both A and C

2) Evaluating safety practices for compliance with NPSG 03.05.01 in regards to warfarin therapy management can be achieved by:
   A. Measuring the frequency of INR values >4
   B. Determining the percentage of time the INR is within therapeutic range
   C. Only evaluating new-start patients
   D. Both A and B

Q1 Answer: D Q2 Answer: D
ACCURACY OF THE UPDATED SCHWARTZ EQUATION IN NON-RENALLY IMPAIRED PEDIATRIC PATIENTS. Megan Greene, Quyen Le, University of Minnesota Medical Center, 2450 Riverside Ave., Minneapolis, MN 55104 mgreene5@fairview.org

To determine the accuracy of the updated Schwartz equation in non-renally impaired pediatric patients by comparing calculated and measured GFR.

Schwartz et al utilized data collected from the Chronic Kidney Disease in Children (CKiD) study wherein patients had median measured creatinine clearance of 41.3 milliliters per minute per 1.73 meters squared. Using the simplified bedside equation derived from this cohort, 79.4 percent of estimated glomerular filtration rate (GFR) values fell within 30 percent of the measured GFR.

Applicability of this newly modified equation to patients without renal insufficiency is not well established. There is limited data to support use of the modified Schwartz equation in pediatric patients with normal renal function. The current literature is limited to patients from 1 to 16 years of age mirroring the age group in Schwartz’s original study. Many studies have compared nuclear medicine GFR testing with iohexol as opposed to the radioisotope Tc-99m DPTA used at our institution.

Data will be collected from electronic records of pediatric patients with nuclear medicine GFR testing results. Information from the time of nuclear GFR testing that will be collected include age, gender, height, weight, serum creatinine, and diagnosis of renal insufficiency. The calculated GFR will be compared with nuclear GFR results. Statistical analysis will be performed to determine accuracy and bias of collected data.

Outcomes of this study will facilitate appropriate use of this equation for monitoring renal function and dosing adjustments of renally excreted medications in pediatric patients.

Learning Objective:

1) Describe development of the Schwartz equation

Self-Assessment Question:

1) Variables utilized in the Schwartz equation include:
   A. Patient height (cm) and weight (kg)
   B. Patient height (cm) and serum creatinine (mg/dL)
   C. Patient weight (kg) and serum creatinine (mg/dL)
   D. Patient age (year) and serum creatinine (mg/dL)

Answer: B

PHARMACY CONSULT SERVICE FOR PREVENTION OF DELIRIUM IN THE INTENSIVE CARE UNIT (ICU) Katherine A. Haas, Jessica M. Swearingen. Mercy Hospital, part of Allina Health. 4050 Coon Rapids Blvd., Coon Rapids, MN 55433. Katherine.haas@allina.com

To develop a proactive, pharmacy-driven approach to prevent delirium and assess the impact on patients determined to be at high-risk for developing delirium in the ICU.

Delirium is a major public health problem in critically ill patients. The 2013 Clinical Practice Guidelines for the Management of Pain, Agitation, and Delirium in Adult Patients in the ICU highlight the importance of delirium prevention and the negative clinical outcomes associated with it. In July 2015, the Allina Health Neuro ICU Council adopted the intensive care delirium screening checklist (ICDSC) and developed the ICU Delirium Prevention & Recognition Guideline for delirium prevention and management in the ICU. Pharmacists are a vital part of this process and have the necessary training and expertise to be proactive with delirium prevention.

This single-center pilot project consists of three phases: pre-implementation, pharmacy delirium consult, post-implementation. During the consult period, patients in the ICU are screened daily for inclusion criteria: history of dementia, continuous sedation, psychoactive medications prior to admission, alcohol or substance abuse, ICDSC score ≥ four. Qualifying patients receive a comprehensive medication review, and progress note outlining recommendations to reduce delirium risk. Post-implementation consists of retrospective chart review of those patients in pre-implementation and consult periods to characterize the impact of services.

This innovative process elevates the pharmacist’s role on the interdisciplinary ICU team by starting the conversation of delirium prevention. The consult intends to guide future practice system-wide and work to decrease the rate and duration of delirium and negative clinical outcomes associated with it.

Learning Objectives:

1) Describe the pharmacist's role on the interdisciplinary team for delirium prevention in the ICU.
2) Identify medication classes commonly associated with delirium in the ICU.

Self-Assessment Questions:

1) Which of the following is an avenue for pharmacist intervention in preventing delirium in the ICU?
   A. Repositioning patients
   B. Proactively screening for high-risk patients
   C. Removing unnecessary lines
   D. Early progressive mobility

2) Which class of medication is commonly associated with delirium in the ICU?
   A. Oral contraceptives
   B. Anticoagulants
   C. Benzodiazepines
   D. Stool softeners

Q1 Answer: B  Q2 Answer: C
Diabetic ketoacidosis (DKA) is a disease that is defined by hyperglycemia, metabolic acidosis, and dehydration. Due to the acidosis and osmotic diuresis, patients may present with a total-body deficit of electrolytes such as potassium. Electrolyte replacement is often achieved through the administration of electrolyte-containing rehydration fluids. At Wesley Healthcare, intravenous (IV) electrolyte replacement fluids for the treatment of DKA required physician-defined electrolyte values prior to the implementation of computerized physician order entry (CPOE). Following CPOE implementation, electrolyte values for rehydration fluids have become pre-defined. The goal of this study is to determine the effect of physician-selected versus pre-defined electrolyte values on total IV preparation cost. The cost comparison of IV and/or oral electrolytes ordered outside of the order set and IV fluid waste represent the secondary goals of this study. The null hypothesis is that there is no cost difference between the two electrolyte replacement ordering processes. This cost comparison will be achieved by analyzing electrolyte orders for adult patients who were treated using the CPOE DKA order set compared to historical controls. Costs will be calculated for each group as averages with standard deviation. Groups will be compared by utilizing the Student’s T-test or Mann-Whitney U test as appropriate. Study results will be used to improve the design and algorithm of the CPOE DKA order set in order to achieve more cost efficient care.

Learning Objective:
1) Explain the differences between handwritten versus CPOE ordering processes in the treatment of DKA

Self-Assessment Question:
1) Advantage(s) of CPOE would be:
A. Selection of patient-specific doses for electrolyte replacement  
B. Timely ordering and administration of electrolyte containing rehydration fluids  
C. Fewer misinterpreted orders  
D. Both B and C 
Answer: D
Type 2 diabetes mellitus (T2DM) is a common chronic disease that is rapidly increasing in prevalence throughout the United States. The incidence of adult patients with T2DM has quadrupled over the past three decades. The 2016 Standard of Medical Care in Diabetes published by the American Diabetes Association discusses and supports the necessity of “team-based” care to adequately meet the health care needs of patients with diabetes. Clinical pharmacists are uniquely positioned to provide chronic disease state management, especially diabetes care, as they receive specialized training in medication management and can provide extensive patient education.

The primary objective of this project was to implement and integrate clinical pharmacy services within a family medicine clinic to augment physician management of T2DM. Patients were referred by their primary care physician or identified by the clinical pharmacist. A pharmacy resident served as the clinical pharmacist and integrated into the clinic one-half day per week to care for patients and help achieve goals of care.

At the completion of this project, the number of pharmacist interventions and acceptance rate will be analyzed. Additional analyses will include: change in hemoglobin A1c from baseline; adherence to other common medication-related recommendations for patients with T2DM (statin use, aspirin use, evaluation of microalbuminuria); time spent by the clinical pharmacist; and patient/provider satisfaction with the new clinical pharmacy service.

Results are expected to further justify the importance of adding a clinical pharmacist to team-based care in the management of T2DM in a clinic without current pharmacy services.

Learning Objectives:

1) Describe the role of a pharmacist in the management of type 2 diabetes mellitus.

Self Assessment Question:

2) Which of the following represent common pharmacist interventions that would improve management of type 2 diabetes mellitus in select individuals?
   A. Adherence assessment, simplification of antihyperglycemic medication regimens, and medication education
   B. Routine diagnosis of T2DM in the primary care setting
   C. Management of psychosocial barriers to glycemic control (homelessness, health literacy, social work support)

Answer: A

Learning Objectives:

1) Identify the adverse effects related to atypical antipsychotics and the impact on the quality of life of patients.
2) Recognize how metformin can be beneficial to patients on atypical antipsychotics.

Self-assessment Questions:

1) Which is a common adverse effect of atypical antipsychotics?
   A. Weight loss
   B. Weight gain
   C. Dysphagia
   D. Migraine

2) How can metformin be beneficial to patients taking atypical antipsychotics?
   A. Cause weight gain
   B. Attenuate weight loss and glucose dysregulation
   C. Attenuate lipid abnormalities
   D. Attenuate lipid abnormalities and glucose dysregulation

Q1 Answer: B  Q2 Answer: D
INCIDENCE AND MANAGEMENT OF HYPERSENSITIVITY AND INFUSION REACTIONS OVER FIVE YEARS AT A COMMUNITY CANCER CENTER. Sarah M. Hayes, Jeremy Whalen. North Memorial Health Care, 3300 Oakdale Avenue North, Robbinsdale, MN 55422. Sarah.Hayes@NorthMemorial.com

Hypersensitivity reactions to chemotherapeutic agents are frequently observed during administration. Immediate, appropriate management of hypersensitivity reactions is critical. The care team must decide to delay therapy, discontinue therapy, or re-initiate therapy which may be potentially life-saving. This decision is tenuous, as the risk of an anaphylactic reaction may be life-threatening.

We assessed each hypersensitivity reaction occurring at our outpatient Cancer Center between July 2009 and December 2015 to determine which agents were associated with the highest incidence of infusion reactions and how these reactions were managed. In total, 251 infusion reactions were identified, with fifteen CTCAE Grade 3/4 reactions. The top five implicated agents were rituximab, paclitaxel, docetaxel, carboplatin, and oxaliplatin, accounting for 87.3% of all reactions. Reactions to platinum compounds occurred, on average, during the fourth exposure, whereas reactions to taxanes occurred at the first or second exposure. 78% of reactions to rituximab occurred during the first dose, and likely represented a cytokine release syndrome.

The incidence of infusion reactions for each agent was calculated using information from the dispensing database. Incidences were 0.88% for oxaliplatin, 0.73% for carboplatin, 1.89% for docetaxel, 1.23% for paclitaxel, and 4.52% for rituxumab. In 76.3% of Grade 2 reactions therapy was able to be continued. Our Cancer Center saw reaction rates lower than reported in package inserts and medical literature suggesting generally appropriate pre-medications and proper management of reactions that occurred.

Learning Objectives:
1) Describe the differences observed in the usual timing of hypersensitivity reactions to taxanes, platinum agents, and rituximab.
2) Recall the basic components of the acute management of infusion reactions.

Self Assessment Questions:
1) Which of the following agents usually causes hypersensitivity reactions after six or more cycles of therapy?
   A. Rituximab
   B. Carboplatin
   C. Intravenous immune globulin (IVIg)
   D. Docetaxel

2) Of the following therapies, which would be least helpful in managing most acute infusion reactions?
   A. Epinephrine 0.3 mg intramuscularly STAT
   B. Hydrocortisone 100 mg intravenously STAT
   C. Albuterol sulfate 2.5 mg inhaled via nebulizer STAT
   D. Nitroglycerin 0.4 mg tablet sublingually STAT

Q1 Answer: B  Q2 Answer: D

THE EFFECT OF A CRITICAL CARE INTRAVENOUS ROOM ON TIMELY ANTIMICROBIAL ADMINISTRATION. Ann Heble, Sarah Bledsoe, Ekeni Livingston, Diana Yu, Amanda Gansen, Children’s Mercy Kansas City, 2401 Gillham Road, Kansas City, MO 64108. Alheble@cmmh.edu

Timely administration of medication is required for optimal patient outcomes in the intensive care unit. However within the dispensing process, there are many individual steps in-between medication order entry and medication administration, which result in delays. Positive outcomes in many infectious conditions, such as sepsis, depend on immediate antimicrobial therapy. At Children’s Mercy Hospital, first-dose and STAT orders must be administered to the patient within 30 minutes and 90 minutes respectively. On August 13, 2012, Children’s Mercy Inpatient Pharmacy opened an additional critical care intravenous (CCIV) room located in the pediatric intensive care unit (PICU) in order to further decrease medication delays in critically ill patients.

The purpose of this study is to determine the effect of the CCIV room on time to intravenous (IV) antimicrobial administration in the PICU for first-dose and STAT orders. Secondary purposes are to examine the medication dispensing process after the addition of the CCIV and to characterize the first-dose and STAT IV antimicrobial orders.

These objectives will be assessed through a retrospective chart review. A patient group will be assessed before and after the creation of the CCIV room. Only first-dose or STAT IV antimicrobial orders will be included in both populations. The student’s t test will be used to analyze the primary objective. Descriptive statistics will be used to analyze the secondary objectives.

The results of the study will be used to educate practitioners on the impact of a CCIV room on timely antimicrobial administration to critically ill patients.

Learning Objectives:
1) Review the importance of timely antimicrobial administration in infectious conditions
2) Identify interventions made to provide medications to critically ill patients on a more timely basis

Self-Assessment Questions:
1) According to the Surviving Sepsis Guidelines, broad-spectrum antimicrobials should be administered within what time frame following recognition of septic shock and severe sepsis?
   A. 3 hours
   B. 15 minutes
   C. 1 hour
   D. 45 minutes

2) The main purpose of the critical care IV room at Children’s Mercy Hospital is to:
   A. Provide medications to critically ill patients in the pediatric intensive care unit on a more timely basis
   B. Provide medications to the entire hospital on a more timely basis
   C. Serve as a back up IV room
   D. Serve as the primary IV room for the hospital

Q1 Answer: C  Q2 Answer: A
Lung cancer is the second most diagnosed cancer in the United States (U.S.) and the leading cause of cancer death. Cigarette smoking is the leading risk factor for lung cancer and rural residency is an independent risk factor for smoking. Rural residency has been identified as a significant contributing factor to health-related inequities.

This population-based study sought to explore if there were geographic health-related disparities pertaining to both smoking status and lung cancer in the U.S. Using bivariate and multivariate analytic strategies, 2012 data from the National Ambulatory Medical Care Survey (NAMCS) were analyzed. The dependent variable for analyses performed in this study was lung cancer. Independent variables were patient age, patient sex, patient race/ethnicity, health insurance status, geographic location of provider, and cancer stage. Supplemental analysis was performed on 2012 Behavioral Risk Factor Surveillance System (BRFSS) data.

Bivariate analysis revealed rural adults had a higher prevalence of current smoking, and low socioeconomic status rural adults had the highest prevalence of current smokers. Multivariate analysis yielded older patients had higher odds of having a diagnosis of lung cancer, and patients with lung cancer had greater odds of advanced cancer staging (stages 3 or 4). Non-Hispanic white and black patients had greater odds of having a lung cancer diagnosis than non-Hispanic others. Patients being seen by rural primary care providers had greater odds of having a lung cancer diagnosis. The results identified differences in smoking, as well as lung cancer prevalence between rural and urban adults in the U.S.

Learning Objectives:
1) Recognize the impact of lung cancer in the United States
2) Identify geographic disparities from national data in relation to smoking status and lung cancer diagnosis

Self-Assessment Questions:
1) What is the estimated percent of Medicare’s total cancer expenditures that lung cancer care utilizes?
   A. 5%
   B. 10%
   C. 20%
   D. 30%

2) True or False: Urban adults with the lowest socioeconomic status had the highest prevalence of current smoking compared to all other socioeconomic status levels of both rural and urban adults.
   A. True
   B. False

Q1 Answer: C   Q2 Answer: B

On April 20, 2015, the inpatient management of left ventricular assist device (LVAD) anticoagulation (heparin and/or warfarin) at the study institution shifted from physician/nurse coordinator driven to a pharmacy-managed protocol. The aim of this study is to describe early outcomes of the newly implemented pharmacy-managed anticoagulation (heparin and/or warfarin) protocol in hospitalized LVAD patients, who were admitted between 4/20/15 and 8/31/15. The primary endpoint was: percent time therapeutic (%TT) within PTT goal range (60-80 seconds) for heparin, and %TT within patient-specific therapeutic INR goal range for warfarin. Secondary endpoints included: time to therapeutic target, total time on protocol, and safety analysis.

There were 115 unique LVAD patient encounters included; 25 patient encounters were evaluated in an interim analysis. All LVAD patients in interim analysis were on warfarin prior to admission; only 7/25 patients had a therapeutic INR at readmission. Pharmacy was consulted to manage anticoagulation within 24 hours of admission in 24/25 encounters. The mean target INR range was 1.8-2.3. Pharmacy managed warfarin therapy for a median of 5 days (IQR 2-12), and achieved a therapeutic INR within a median of 0.5 days (0-2). Approximately three-fourths of patient encounters had at least one therapeutic INR, and half were therapeutic at discharge. Four patients also had pharmacy-managed heparin therapy for a median of 6 days (5-12.5). Analysis of the primary and secondary endpoints for the entire cohort is ongoing.

Evaluation of primary and secondary outcomes is ongoing. These early results suggest inpatient pharmacy-managed anticoagulation may be reasonable for LVAD patients.

Learning Objectives:
1) Review ISHLT guideline recommendations for anticoagulation in LVAD patients.
2) Define the INR goal range of patients evaluated.

Self-Assessment Questions:
1) ISHLT recommends that LVAD patients be anticoagulated with
   A. New oral anticoagulants
   B. Heparin and/or warfarin
   C. Aspirin
   D. No anticoagulation is recommended

2) At the study institution, the average goal INR range for warfarin was
   A. 1.0-1.5
   B. 1.8-2.3
   C. 2.5-3.0
   D. 3.0-3.5

Q1 Answer: B   Q2 Answer: B
While overriding medications from automated dispensing devices (ADD) are a means to meet a specific need, there is the risk for staff to use them improperly. The primary concern around overriding medications is the absence of pharmacist review and the potential for medication error. Only medications that are truly needed emergently should be able to be overridden in order to provide safe and effective patient care. At the University of Kansas Hospital (UKH), a need was identified to have a thorough review process for override medication eligibility.

A quality improvement project was performed at UKH to determine the appropriateness of automated dispensing device overrides from April 2015 to January 2016.

Learning Objectives:

1) Recognize the importance of pharmacist verification of medications prior to administration.
2) Identify a process in which to approve and remove medications for override.

Self-Assessment Questions:

1) The importance of pharmacist verification prior to administration is?
   A. Patient safety and effective patient care
   B. Pharmacist struggling for power
   C. Quick access to all medications

2) The KU process for approval or removal of medications for override is?
   A. Clinical sub-committee
   B. Patient centered review board
   C. P&T committee
   D. Both A and C
   E. None of the Above

Q1 Answer: A  Q2 Answer: D

For the proposed study, the researchers aim to investigate which FDA weight loss medication is the most effective. The rationale for this study includes the following: (1) Lack of head-to-head trials comparing the effectiveness of these medications; (2) To have a better understanding on adherence to these medications in a patient’s natural surroundings. The ability to adhere to these medications in addition to lifestyle modifications can influence whether or not these medications are both safe and effective. Additionally, this information is important to health care providers, when selecting a medication to aid in weight loss. Primarily, there may be one medication that leads to more substantial weight loss. Secondly, the benefit of the medications may not outweigh the risks. As obesity rates rise in the United States, there will be public pressure for safe and effective medications.

After the RCT’s, researchers analyzed and compared the efficacy of the medications using a systemic review of all the RCTs. They measured the proportion of patients achieving clinically meaningful (at least 5%) weight loss. The results for weight loss were: 37% to 47% for lorcaserin, 35% to 73% for orlistat, and 67% to 70% for top-dose phentermine plus topiramate extended release. By looking at these percentages, one can conclude that phentermine/topiramate XR may be the most effective medication. A retrospective study is unique to an RCT because we can see if the results are generalized to a patient in their natural environment.

Learning Objectives:

1) Compare the differences in percentage of weight loss between the medications
2) Determine the benefits of the medications after an extended period of time

Self-Assessment Questions:

1) Which medication had the biggest reduction in weight loss from existing evidence?
   A. Lorcaserin
   B. Phentermine
   C. Phentermine/topiramate
   D. Orlistat

2) What percentage of weight loss is required after 12 weeks of therapy in order to continue these medications?
   A. 3-5%
   B. 5-7%
   C. 2-3%
   D. 4-6%

Q1 Answer: C  Q2 Answer: A
DILTIAZEM AND THE ROLE OF HEART RATE REDUCTION ON EXERCISE CAPACITY IN HEART TRANSPLANT PATIENTS. Ashley Huntsberry, Eugenia Raichlin, Sara Varnado, Nebraska Medicine, 981090 Nebraska Medical Center, Omaha, NE 68198-1090 Ahuntsberry@nebraskamed.com

Heart transplant patients can have tachycardia due to allograft denervation, oftentimes requiring pharmacologic agents for heart rate reduction. In healthy individuals, an inverse correlation between resting heart rate and life expectancy is known and this translates to better cardiopulmonary exercise testing parameters. There is little data to support or refute the use of diltiazem for heart rate reduction in patients post heart transplant, but it is recommended in current guidelines for blood pressure lowering.

The purpose of this study is to evaluate the use of diltiazem in heart transplant patients and the effects of heart rate reduction on cardiac remodeling and exercise capacity.

The study is a single-center, retrospective, observational cohort conducted at Nebraska Medicine. Heart transplant recipients at least 19 years of age were included in the study from September 2005 and 2014. Patient medical records were reviewed for diltiazem use, defined as use for at least 3 consecutive months during the first year post transplant. Data collection will include baseline characteristics, diltiazem use, concomitant medication use, heart rate and cardiopulmonary exercise test (CPX) data. The primary outcome is change in exercise capacity in patients who received diltiazem compared to those who did not using peak VO₂ on CPX at 1 year. Secondary outcomes include heart rate, left ventricular dimensions, and other CPX parameters.

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

Learning Objective:

1) Describe the projected effect of diltiazem on cardiac remodeling and exercise capacity

Self-Assessment Question:

1) What is the proposed effect of diltiazem on CPX parameters at one year compared to baseline?
   A. Increase in peak VO₂
   B. Decrease in peak VO₂
   C. Increase in peak RER
   D. Decrease in peak RER

Q1 Answer: A

ASSESSMENT OF PHYSICIANS’ UNDERSTANDING OF ORAL CHEMOTHERAPY DRUG/FOOD INTERACTIONS AND SIDE EFFECTS: A NATIONAL SURVEY. Alexandra Hurst, Stephanie Johnson, Laura Gleason, Gregory Bociek, and Susanne Liewer, Nebraska Medicine, 981090 Nebraska Medical Center, Omaha, NE 68198-1090 ahurst@nebraskamed.com

Oral chemotherapy agents encompass a large and rapidly growing class of pharmaceuticals, including cytotoxic and targeted agents. While oral chemotherapy often allows greater convenience for patients and improved quality of life, a common misconception is that oral agents are less toxic than intravenous therapies. Many of the oral agents are substrates for cytochrome P450 (CYP) isoenzymes and other pathways that affect the pharmacokinetic profile when used in combination with inhibitors/inducers, resulting in drug-drug interactions. In addition to CYP drug-drug interactions, other potential drug interactions exist such as drug-food interactions. Oral chemotherapy provides new challenges for practitioners that may affect safety, efficacy and patient adherence because the patient is now responsible for ensuring the medications are administered in the correct manner. To maximize outcomes, prescribers should regularly assess patient adherence and review all potential drug-drug and drug-food interactions.

The primary objective was to characterize physicians’ understanding of drug/food interactions with oral chemotherapy agents. Secondary objectives were to describe prescribers’ recognition of unique adverse reactions associated with new targeted oral chemotherapies, characterize interventions made by prescribers when interactions are recognized, and describe prescribers’ practices to assess patient adherence. A self-administered case-based questionnaire was developed to compare prescribing practices of physicians for oral chemotherapy agents regarding drug-drug and drug-food interactions, side effects, and patient adherence. Hypothetical case scenarios will be provided to assess variables influencing treatment choices. Data will be analyzed using descriptive statistics.

Data collection is currently in progress.

Learning Objective:

1) Recognize potential challenges of treatment with oral chemotherapy agents.

Self-Assessment Question:

1) Which of the following is not a potential challenge with oral chemotherapy?
   A. Patient adherence
   B. Unique side effect profile
   C. Patient convenience
   D. Drug/food interactions

Q1 Answer: C
Vitamin D deficiency is common among kidney transplant recipients and is associated with bone loss, fractures, and possibly even an increased risk of mortality and poor graft function. The benefit of post-transplant vitamin D supplementation on bone mineral density, however, is unknown and there is no consensus on an optimal post-transplant vitamin D supplementation regimen. The objective of this study is to evaluate the impact of high-dose inpatient ergocalciferol supplementation on bone-related outcomes in kidney transplant recipients.

This single-center, retrospective chart review includes kidney transplant recipients at Barnes-Jewish Hospital from 1/1/1999 – 8/31/2014 and only excludes recipients of multi-organ and previous transplants. Kidney transplant recipients at Barnes-Jewish Hospital are universally supplemented with daily ergocalciferol post-transplant until time of hospital discharge. This protocol, however, has not been applied consistently, allowing for a comparison between patients who received greater than 50,000 units of ergocalciferol (or equivalent) and patients who received less than or equal to an equivalent of 50,000 units of ergocalciferol. The primary endpoint is the incidence of a post-transplant bone-related event (defined as a bone fracture, osteoporosis, or osteopenia). Secondary outcomes include time to bone-related event, incidence of parathyroidectomy post-transplant, and graft function and survival.

This study serves to determine the utility of high-dose inpatient ergocalciferol supplementation on bone-related outcomes in kidney transplant recipients. Furthermore, it characterizes the risk factors of the patients that experience a bone-related event and identifies the impact of ergocalciferol on graft function and patient survival.

Learning Objectives:

1) Discuss the impact of low 25-hydroxyvitamin D on kidney transplant recipients.
2) Evaluate the limitations surrounding the existing literature on vitamin D supplementation post-kidney transplant

Self-Assessment Questions:

1) Low 25-hydroxyvitamin D may be associated with which of the following:
   A. Bone loss
   B. Patient mortality
   C. Graft loss
   D. All of the above

2) Which of the following is correct?
   A. Kidney transplant recipients rarely have vitamin D deficiency
   B. All patients should receive calcium supplementation to prevent osteoporosis
   C. There is no consensus on how best to supplement vitamin D post-kidney transplant
   D. The studies evaluating vitamin D supplementation post-kidney transplant all treated patients with ergocalciferol

Q1 Answer: D  Q2 Answer: C
To compare the impact of warfarin vs. novel oral anticoagulants (NOACs) on hospital length of stay in patients with chronic kidney disease (CKD).

Hospital length of stay (LOS) can be prolonged in patients with renal insufficiency due to bleeding and thromboembolic complications during anticoagulant therapy. Warfarin has been the staple treatment in this patient population, but NOACs provide an appealing alternative to warfarin due to minimal monitoring requirements. However, the impact of renal insufficiency on clinical outcomes in patients receiving NOACs has not been clearly elucidated.

A retrospective cohort study of 200 CKD patients 18 year of age or older receiving new or home continuation of warfarin therapy or one of the NOACs (apixaban, dabigatran, and rivaroxaban) for atrial fibrillation, deep vein thrombosis, or pulmonary embolism was conducted. The primary outcome was hospital LOS in each treatment group. Secondary outcomes include new thromboembolic or bleeding events, death during hospitalization, and number of readmissions within 90 days of discharge.

In the primary analysis, the median hospital length of stay in the warfarin group was 10 days vs. 5 days in the NOACs group (P=0.001). New thromboembolic events occurred in 12 patients in the warfarin group and 4 patients in the NOACs group (P<0.065). Major bleeding events occurred in 9 patients in the warfarin group and 4 major bleeding events in the NOACs group (P<0.05).

In this study, NOACs use in CKD patients was associated with shorter LOS and better safety and efficacy outcomes compared to warfarin patients.

Learning Objectives:

1) Describe the impact of warfarin versus NOACs on hospital length of stay in patients with CKD

Self-Assessment Questions:

1) Which of the following statements are correct?
   A. CKD has no effect on hospital length of stay 
   B. There were no difference in hospital length of stay between NOACs group and warfarin group 
   C. CKD patients receiving one of the NOACs had shorter hospital length of stay than the warfarin group 
   D. CKD patients receiving warfarin therapy had shorter hospital length of stay than NOACs group

Q1 Answer: C
In 2014 the Centers for Medicare and Medicaid Services (CMS) expanded the Hospital Readmission Reduction Program (HRRP) to include COPD. Hospitals with excessive risk-adjusted, 30-day all-cause, unplanned readmission rates for COPD are penalized by reduced reimbursement. Other diseases included in the HRRP have evidence from studies to guide interventions that reduce readmission rates. In contrast, few studies have been completed demonstrating interventions that reduce COPD readmissions, providing little guidance to healthcare organizations.

The purpose of this study is to determine the effect of providing COPD patients with a 30-day supply of all inhalers at the time of discharge in conjunction with pharmacist discharge education on 30-day readmission rates. A secondary purpose is to assess patient satisfaction with medication education with Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scores. A final purpose of the study is to determine the commitment needed from pharmacy by recording the time spent on discharge education, number of recommendations made at discharge, and number of immunization recommendations made.

These objectives will be assessed by comparison of a control group to the intervention group to determine if there is a decrease in 30-day readmission rates. The intervention group received pharmacist discharge education, assessment of immunization status, and smoking cessation counseling.

The results of the study will be used to determine if changes to the inpatient supply of inhalers are needed and if pharmacist discharge counseling would provide benefit to this high readmission risk population.

Learning Objective:

1) Explain the Centers for Medicare and Medicaid Services’ (CMS) Hospital Readmission Reduction Program (HRRP) and the effect it has on healthcare organizations

Self-Assessment Question:

1) The Centers for Medicare and Medicaid Services’ (CMS) Hospital Readmission Reduction Program (HRRP) penalizes health care institutions for what?
   A. Excessive risk-adjusted, 30-day all-cause, unplanned readmission rates
   B. Excessive discharges for specific disease states
   C. Excessive complaints

Q1 Answer: A

ASSOCIATION OF CUMULATIVE EPINEPHRINE DOSE AND MORTALITY IN PATIENTS WITH IN-HOSPITAL CARDIAC ARREST. Amanda Johnson, Will Coolidge, and Surachat Ngorsuraches, Avera McKennan Hospital & University Health Center, 1325 S Clift Ave, Sioux Falls, SD 57117. Amanda.Johnson@avera.org

Many studies evaluating mortality and the cumulative epinephrine dose given during cardiac arrest were performed prior to the 2010 and 2015 ACLS guidelines, and most standards have changed since the studies were performed. These studies also mainly evaluate out-of-hospital arrest and functional outcomes instead of mortality.

This study aims to evaluate the association of cumulative epinephrine dose given during cardiac arrest and mortality in inpatients. Initial rhythm, mean time to first epinephrine dose, mean time between epinephrine doses, mean time to ROSC, mean arrest time, in-hospital mortality, and an evaluation of medications in the medication trays will also be evaluated.

This retrospective, single center, observational study includes all inpatients 18 years of age and older who received at least one dose of epinephrine during cardiac arrest. Patients who did not receive any epinephrine during cardiac arrest, suffered cardiac arrest in the emergency department, suffered more than one cardiac arrest during one inpatient stay, pregnant patients, and prisoners are excluded in this study. Patient characteristics and medication utilization will be descriptively analyzed. Multiple logistic regression analysis will be used to examine the association of the cumulative epinephrine dose and mortality. Clinically important confounders will be collected and included in the model.

Results will be used to add to the literature regarding the cumulative epinephrine dose associated to mortality in in-hospital cardiac arrest. Medication utilization data will be used to review the need to re-arrange the facility’s medication trays.

Learning Objective:

1) Discuss the available literature regarding the cumulative epinephrine dose given during cardiac arrest.

Self-Assessment Question:

1) Which of the following statements about the literature available regarding the cumulative epinephrine dose given during cardiac arrest is correct?
   A. The literature mainly evaluates patients with in-hospital cardiac arrest.
   B. Mortality is the main outcome the selected studies evaluated.
   C. Most studies were performed prior to the 2010 and 2015 ACLS Guidelines.
   D. Medication utilization was evaluated in these studies.

Q1 Answer: C
A correlation exists between lower respiratory tract infections and sepsis with elevated procalcitonin levels. Procalcitonin levels greater than 0.5 micrograms per liter correlate with high probability of bacterial infection in these patient populations. The objective of this study is to assess the current use of procalcitonin levels and physician responsiveness to the test results within 24 hours at CHI Health Creighton University Medical Center – Bergan Mercy in Omaha, Nebraska.

Electronic health records were assessed for patients with procalcitonin results during the month of August 2015. The following data was collected: procalcitonin results, infection diagnosis, serum creatinine at the time orders were placed for procalcitonin lab, antibiotics ordered at the time of test result, antibiotics ordered at 24 hours after test result, physician ordering procalcitonin lab. Patients not hospitalized at CHI Health Creighton University Medical Center – Bergan Mercy with procalcitonin test results, patients discharged within 24 hours after test result, patients that died within one week of procalcitonin result were excluded from primary outcome data analysis.

The data will be used to identify the indications for which procalcitonin is being ordered and the percentage of negative test results that prompt de-escalation of antibiotics within 24 hours. A sub-group analysis by physician specialty will also be conducted. This data will be used to help educate physicians on appropriate use of procalcitonin in patients at CHI Health Creighton University Medical Center – Bergan Mercy.

Learning Objectives:

1) Identify disease states in which procalcitonin has been validated.
2) Recall patient populations that may have a falsely elevated procalcitonin level.

Self-Assessment Questions:

1) In which of the following disease states would a procalcitonin level be useful as a validated marker?
   A. COPD
   B. Pneumonia
   C. Acute cardioembolic stroke
   D. Rheumatoid arthritis

2) In which of the following disease states could a procalcitonin level be falsely elevated?
   A. Chronic liver disease
   B. Pediatric populations
   C. End stage renal disease
   D. Acute myelogenous leukemia

Q1 Answer: B   Q2 Answer: C

PATTONS OF PAIN AND ANXIETY MANAGEMENT DURING WOUND CARE PROCEDURES IN PEDIATRIC BURN PATIENTS. Holly Johnson, Uyen Dinh, Pamala Pawloski, Mary Ullman, Leah Hanson, William Mohr. Regions Hospital, 640 Jackson Street, St. Paul, MN 55101.

Burn wound care procedures include burn debridement, cleaning, dressing applications, and dressing changes. One challenge of burn wound care in pediatric patients is the effective management of procedure-induced pain and anxiety. Inadequate pain and anxiety control can contribute to delayed wound healing and prolonged hospitalization. Various medication combinations used to prevent pain and anxiety for such procedures have been studied; however, standardized treatment or clinical guidelines have not been established.

Regions Hospital provides burn wound care for pediatric burn patients; however, there is no standard treatment regimen used. In addition, it is unknown whether documentation of burn wound care is consistently completed. Our objective for this project was to describe the patterns of care used for pain and anxiety management during wound care procedures in pediatric burn patients.

We conducted a retrospective chart review of pediatric inpatients aged 0-16 years treated for burn wounds at Regions Hospital Burn Unit from January 1st 2013 through December 31st 2015. Descriptive data collected included patient characteristics (age, sex, percent of body burned, mechanism of burn, depth of burn), medication information (use of an opioid, benzodiazepine, and ketamine, dose of medication with first and subsequent procedures, timing of medications given relative to the procedure, administration sequence of medications), and the consistency of documentation of burn wound care. Data analysis is ongoing. We plan to use the results of this study to educate Burn Center staff and facilitate burn wound care protocol development.

Learning Objective:

1) Evaluate the medications that are administered for procedural pain and anxiety associated with burn wound care in pediatric patients

Self-Assessment Question:

1) Which of the following could be a result of inadequate pain and anxiety control prior to burn wound care procedures?
   A. Delayed wound healing
   B. Prolonged hospitalization
   C. Exacerbate anxiety for future procedures
   D. All of the above

Answer: D
INCIDENCE AND ONSET OF IMMUNE-MEDIATED ENDOCRINOPATHIES: A RETROSPECTIVE REVIEW OF PATIENTS RECEIVING CHECKPOINT INHIBITORS. Jocelyn Joseph, Emily Kathol, Kaylee Drenker, Cory Bivona, Dave Henry, Dennis Grauer, Gary Doolittle, Michelle Rockey, The University of Kansas Hospital, 3901 Rainbow Boulevard Mailstop 4040, Kansas City, KS 66160 jjoseph2@kumc.edu

Enhancing T-cell function by blocking negative regulatory pathways (immune checkpoints) is utilized therapeutically against various cancers. Upregulating the immune system using the checkpoint inhibitors (CI), ipilimumab, pembrolizumab, and nivolumab, not only helps eradicate tumor cells, but may also result in T-cell infiltration of healthy tissues, leading to immune-related adverse events (irAEs). Clinically significant irAEs can occur at any time after a single dose of the immunomodulatory agent. The prescribing information (PI) for the CIs states that 0.2-8.1% and 0.2-1.8% of patients experience grades 1/2 and grades 3/4 endocrine irAEs, respectively.

The primary objective is to determine the Common Terminology Criteria for Adverse Events (CTCAE) grade of endocrinopathies occurring in patients receiving CIs. Additional objectives include: characterizing the occurrence of endocrinopathies associated with CIs, the time to onset of endocrinopathies, and the effect of checkpoint inhibitors in patients with baseline endocrinopathies.

A retrospective chart review of adult patients who received at least one dose of a CI from 1/1/2010 to 9/30/2015 was performed. Data was obtained for up to two years after the last CI dose. 59/194 patients developed an endocrine irAE, including new onset and exacerbation of existing endocrinopathy. A higher incidence of endocrine irAEs was observed in this review as compared to the incidence reported in the PI Grade 2 adrenal insufficiency and grade 2 hypothyroidism were the two most commonly observed endocrine irAEs. Although 61% of new onset endocrinopathies occurred within the first three months after starting CIs, endocrine irAEs occurred up to 30 months after starting therapy.

Learning Objectives:
1) Review the mechanism of action of checkpoint inhibitors.
2) Describe the most common endocrinopathies in this review and their respective CTCAE grading.

Self-Assessment Questions:
1) The mechanism of action of checkpoint inhibitors is:
   A. Inhibits DNA polymerase, resulting in decreased DNA synthesis and repair
   B. Causes hypomethylation of DNA, leading to cell death
   C. Upregulates T-cell function, thus allowing for apoptosis of tumor cells
   D. Binds to vascular endothelial growth factor (VEGF), thus inhibiting microvascular growth

2) The most common endocrinopathy and respective CTCAE grading seen in the prescribing information is:
   A. Grade 1 hypophysitis
   B. Grade 2 hypothyroidism
   C. Grade 3 hyperthyroidism
   D. Grade 4 diabetes mellitus

Q1 Answer: C Q2 Answer: B
IMPLEMENTATION OF PHARMACIST PROVIDED DIABETES MANAGEMENT THROUGH TELEMEDICINE FOR RURAL VETERANS. Malena Jost, Amy Cummings. Kansas City Veterans Affairs Medical Center. 4801 Linwood Blvd, Kansas City MO 64128. Malena.Jost@va.gov.

Pharmacy lead chronic disease management clinics have been shown to improve patient outcomes with regards to diabetes and other chronic disease states. One VA study shows similar patient outcomes when comparing pharmacist managed video telehealth anticoagulation clinics to face-to-face visits. Telemedicine clinics are able to provide specialty services to rural veterans while decreasing the burden of travel for patients that live many miles away from the main hospital. The Kansas City VA Medical Center provides pharmacy services in some, but not all outpatient clinics, and do not currently provide any pharmacy telemedicine services. At one distant VA clinic located in Nevada, MO, 95 miles from the main hospital, many patients have been identified through a primary care almanac that may benefit from diabetes management by a clinical pharmacist.

The purpose of this quality improvement project is to determine if enrollment in a telemedicine pharmacy chronic disease management clinic decreases patients’ A1C and average glucose readings after 3 months.

This project will assess veterans with uncontrolled diabetes and include patients seen at the Nevada, MO clinic by clinical pharmacist through telemedicine between January 2016 to June 2016. Inclusion criteria includes: veterans with a diagnosis of diabetes with an A1C >9% or patients identified by primary care providers requiring insulin titration or management of hypoglycemia.

It is expected to show that patients enrolled in a pharmacy managed telemedicine clinic in a rural setting will have a decrease in their A1C and average blood glucose readings after 3 month follow ups.

Learning Objective:

1) Understand the benefits of telemedicine services for veterans in a rural setting.

Self-Assessment Question:

1) Telemedicine services provide which of the following?
   A. Specialty services to veterans in rural areas
   B. Decreased travel time
   C. Decreased travel costs
   D. All of the above

Answer: D

PHARMACY EVALUATION OF INHALER EDUCATION TO REDUCE CHRONIC OBSTRUCTIVE PULMONARY DISEASE READMISSION RATES. Amber Kabrick, Vivian Carson, Amanda Hembree, and Jacyntha Sterling, Saint Francis Hospital, 6161 S. Yale Ave., Tulsa, OK 74136. amkabrick@saintfrancis.com

The Centers for Medicare and Medicaid Services (CMS) imposes financial penalties for hospitals with higher-than-expected readmission rates for specific medical conditions. In 2015, the list was expanded to include acute exacerbation of chronic obstructive pulmonary disease (COPD). About 20 percent of patients hospitalized with COPD exacerbation will be readmitted within 30 days. Poor adherence to medications has been identified as an area for improvement in this population.

The purpose of this study is to determine the effect of pharmacy intervention with inhaler education to patients with COPD on 30-day all-cause readmission rates at Saint Francis Hospital in Tulsa, Oklahoma.

Adult inpatients were eligible for inclusion if they were in the respiratory care unit with a diagnosis of chronic obstructive pulmonary disease and were prescribed one or more inhalers. Exclusion criteria included patients that were non-communicative or patients with comfort care or hospice orders. Eligible patients were enrolled until a target sample size was achieved. A pharmacist provided education on proper inhaler technique for each patient. If a patient reported a problem with affording medications, the pharmacist provided cost savings or coupon information for inhalers. If necessary, social work was contacted for additional financial help with medications. Secondarily, the study compared comorbidities, clinical findings and patient characteristics associated with 30-day all-cause readmission rates. All information gathered was analyzed using descriptive statistics. Readmission data for enrolled patients was compared to the historic data for the hospital.

Learning Objective:

1) Recall the 30-day all-cause hospital readmission rate for COPD in the United States.

Self-Assessment Question:

1) The 30-day all-cause hospital readmission rate for COPD in the United States is about:
   A. 5 %
   B. 14 %
   C. 20 %
   D. 30 %

Answer: C
Continuous renal replacement therapy (CRRT) is initiated for patients with significant renal impairment in critical care settings. A variety of factors are taken into consideration when determining appropriate candidates for this mode of therapy. These patients require close monitoring and highly individualized management.

The purpose of this study was to analyze morbidity and mortality outcomes, as well as safety data, for patients receiving continuous renal replacement therapy in the intensive care unit. A previous assessment of CRRT patients was completed at the same large community hospital and was used as a comparator.

A retrospective chart review was completed for patients who required continuous renal replacement therapy from January 2015 to June 2015. A number of factors were analyzed, including indication for continuous renal replacement therapy, anticoagulation status, vasopressor requirements, and continuous renal replacement therapy dose. Additionally, patient visitor safety reports were reviewed to assess the incidence of medication safety adverse events relating to CRRT therapy.

Continued assessment of patients who require continuous renal replacement therapy is warranted to ensure best practice techniques, both for safety and patient outcomes.

Learning Objective:

1) Report challenges associated with continuous renal replacement therapy (CRRT).

Self-Assessment Question:

1) Continuous renal replacement therapy can be associated with which of the following:
   A. Electrolyte abnormalities
   B. Hypotension and arrhythmias
   C. Infection
   D. All of the above

Answer: D

Learning Objectives:

1) Identify limitations encountered in reporting of HIV prescription and revenue data.

Self-Assessment Questions:

1) What were some limitations encountered for HIV medication reporting of prescription and revenue data?
   A. Lack of a dedicated pharmacy reporting staff position
   B. Outpatient pharmacies on different software systems
   C. Medications with multiple indications that may be used for other disease states
   D. Both B and C

Answer: D
The Department of Veterans Affairs divides its health care systems into complexity levels with the intent of grouping similar organizations together. Then, these similar organizations can be grouped together for operational reports, performance reviews and comparisons, research studies, and budget determinations under the Veterans Equitable Resource Allocation (VERA) model. Facilities are divided into one of five levels – 1a, 1b, 1c, 2, and 3. Level 1a are the most complex facilities to Level 3, the least complex. There are three sets of variables used in the decision making for determination of complexity level: patient population, clinical services complexity, and education and research. The complexity level assignment is reviewed every three years by the National Leadership Council Workforce Committee; the Nebraska-Western Iowa Health Care System (NWIHCS) was recently elevated from a 1c complexity level to a 1b complexity level.

The purpose of this quality improvement study is to compare NWIHCS’s pharmacy service to other 1b pharmacy services. Where differences were noted, the secondary purpose of this study aims to determine what changes could be made to more similarly align with other 1b systems and if feasible within the current budget. Data will be collected through a survey completed by pharmacy chiefs, associate pharmacy chiefs, or clinical coordinators at other 1b health care systems. The results of the study will be used to implement changes to help position the NWIHCs amongst other 1b facilities to ensure our pharmacy service is offering the necessary services for a health care system of our new size.

Learning Objectives:

1) Discuss the similarities and differences between the Nebraska-Western Iowa pharmacy service and other 1b pharmacy services
2) Outline if changes need to be made and whether they’re feasible within the current budget

Self-Assessment Questions:

1) The Nebraska-Western Iowa Health Care System has:
   A. More than the average number of PGY-1 residents
   B. Less than the average number of PGY-1 residents
   C. Equal to the average number of PGY-1 residents
2) The majority of 1b facilities labor map their pharmacists:
   A. Monthly
   B. Quarterly
   C. Yearly
   D. Never

Q1 Answer: A  Q2 Answer: A

SELECTIVE SEROTONIN REUPTAKE INHIBITOR (SSRI) USE IN PREGNANCY AND NEONATAL WITHDRAWAL. Alyssa Kelsch, Deb McPherson, Jennifer Paluh, and Jill Gion, CHI St. Alexius Health, 900 E Broadway Ave, Bismarck, ND 58501. amkelsch@primecare.org

Neonatal withdrawal, also referred to as neonatal abstinence syndrome, is a drug-withdrawal syndrome that most commonly occurs in newborns after prenatal exposure to opioids. The cause of neonatal withdrawal can be expanded beyond opioids to include illicit drugs and other prescription medications. Selective serotonin reuptake inhibitors (SSRIs) are the first line pharmacologic treatment recommendation for depression and other related mental health disorders in pregnant women. This class of antidepressant medications does cross the placenta and therefore are of concern relating to effects they have on the fetus.

The objective of this study is to determine whether neonates born to mothers taking SSRIs are at risk for experiencing neonatal withdrawal symptoms.

Retrospective data collection will be performed from an electronic medical record system generated list of women who were admitted to labor and delivery or maternity units at our institution from January 2012 to September 2015 and had an SSRI on their inpatient medication list. Newborns in this study will be grouped into those who were scored for withdrawal symptoms and those who were not scored for withdrawal symptoms. Newborns that were scored for withdrawal symptoms will be further stratified into groups based on urine and/or meconium drug screen results and prescription and/or illicit drug use by the mother.

Results of the study may influence how newborns at risk for experiencing withdrawal symptoms or neonatal abstinence syndrome are identified and treated at this institution.

Learning Objectives:

1) Identify symptoms of neonatal abstinence syndrome.
2) List pharmacologic treatments available to treat neonatal abstinence syndrome and/or withdrawal symptoms in a newborn.

Self-Assessment Questions:

1) Symptoms of neonatal abstinence syndrome include which of the following:
   A. Hypertonia, autonomic instability, and irritability
   B. Poor sucking reflex and impaired weight gain
   C. Hypocalcemia and hypoglycemia
   D. Both A and B
2) Which of the following products have literature supporting their use for the treatment of neonatal abstinence syndrome and/or withdrawal symptoms in a newborn?
   A. Propofol
   B. Midazolam
   C. Morphine
   D. Fentanyl

Q1 Answer: D  Q2 Answer: C
CHARACTERIZATION OF BLEEDING COMPLICATIONS ASSOCIATED WITH ENOXAPARIN USE IN VENOUS THROMBOEMBOLISM (VTE) IN CHEMOTHERAPY-INDUCED THROMBOCYTOPENIA. Ashley Kenkel, Devon Greer, Emily Krekemeier, Stephanie Johnson, Susanne Liewer; Nebraska Medicine, 981090 Nebraska Medical Center, Omaha, NE 68198-1090; akenkel@nebrskamed.com.

Hospitalized patients with hematologic malignancies are at an increased risk for venous thromboembolism (VTE) due to their cancer diagnosis as well as other risk factors. Conversely, these patients also have an increased risk of bleeding due to therapy-induced thrombocytopenia, which is often severe and persists for prolonged periods of time. In patients with both an increased risk for thrombosis and bleeding, management of anticoagulation can be challenging.

For treatment of VTE, low-molecular weight heparins (LMWH) are recommended. However, there is no consensus on how anticoagulation should be managed in the setting of thrombocytopenia. When platelets fall to <50,000/microliter, different strategies are used such as transfusing platelets or reducing the dose of LMWH. Withholding anticoagulation is often recommended if platelets are <20,000/microliter.

At our academic institution, patients with hematologic malignancies and a platelet count <50,000/microliter in need of anticoagulation receive enoxaparin 40 mg daily. This dose is often continued regardless of platelet count. However, this management strategy may increase the risk of bleeding, and there is a paucity of published literature using this approach.

To evaluate safety, we conducted a retrospective analysis of inpatients with hematologic malignancies who received enoxaparin for a VTE while platelets were <50,000/microliter. The primary objective was to determine the incidence of major bleeding. The incidence of recurrent VTE, minor versus major bleeds, and fatal bleeds was also characterized. A matched cohort of patients with hematologic malignancies and platelets <50,000/microliter not on anticoagulation was used as a comparator group, and statistical tests were conducted to explore differences between the cohorts.

Learning Objective:

1) Discuss challenges to using anticoagulation in patients with hematologic malignancies receiving chemotherapy.

Assessment Question:

1) Which of the following make using anticoagulation challenging in patients with hematologic malignancies receiving chemotherapy?
   A. Risk of venous thromboembolism (VTE) is decreased due to cancer diagnosis
   B. Risk of bleeding is decreased due to cancer diagnosis
   C. Risk of VTE is increased due to therapy-induced thrombocytopenia
   D. Risk of bleeding is increased due to therapy-induced thrombocytopenia

Answer: D

USE OF COMMUNICATION TOOL WITHIN ELECTRONIC MEDICAL RECORD TO IMPROVE PRIMARY NON-ADHERENCE. Daniel Kerner, Emily Knezevich, CHI Health Alegent Creighton Clinic – Dundee, 5002 Underwood Ave, Omaha, NE 68132. DanielKerner@creighton.edu.

Recent studies show that almost one-third of the US population aged 20 years or older has hypertension. Furthermore, forty-eight percent of those patients have uncontrolled hypertension. One reason for the lack of blood pressure control is medication non-adherence. Failure to fill a new prescription, known as primary non-adherence, is an often overlooked form of non-adherence. Studies have shown that about twenty-eight percent of new prescriptions are never filled.

The purpose of this study is to determine if an online reminder sent via a portal in the electronic medical record will decrease the rate of primary non-adherence. A secondary purpose is to determine if the intervention results in improved blood pressures at follow-up visits.

The objectives will be assessed by first identifying a baseline percentage of primary non-adherence in our patient population. Next, we will prospectively enroll patients that have been prescribed a new prescription for an antihypertensive medication and who are enrolled in MyChart, an online portal that allows patients to track their health information. The intervention will be an online reminder sent through the MyChart portal at the end of each week to patients that have not picked up their new antihypertensive medication. The prospective data will be compared to baseline data to determine the effectiveness of the intervention. Blood pressure data will be collected via chart review of enrolled patients.

The results will be used to determine if the intervention should be implemented as an automatic reminder in the electronic medical record for patients prescribed a new medication.

Learning Objective:

1) Define primary non-adherence

Self-Assessment Question:

1) Primary non-adherence is defined as:
   A. Failure to fill and pick up a newly prescribed medication
   B. Missing a day of medication therapy
   C. Stopping a medication without doctor approval
   D. Taking a medication in a manner different than what was prescribed

Answer: A
The department of pharmacy plays a key role in healthcare by ensuring safe and effective medication use and providing an ever-increasing list of services that produce improved outcomes through patient specific care. Due to the major impact on the healthcare process, it is important for pharmacy managers to continually measure and improve productivity.

The Veterans Affairs (VA) Pharmacy Benefits Manager has provided two separate tools that, when combined, are intended to capture the operational and clinical activities of inpatient pharmacists. The purpose of the tools is to determine the full time employee equivalents required to provide pharmacy’s core services. Workload mapping is the process of determining when and where tasks are being completed. A workload map may be created by graphing the average daily tasks based on the hour of the day and day of the week they occur. Staffing models may then be compared to the map, determining the effectiveness of the current practices. If discrepancies are found, this data will provide a guide for optimizing the staffing model.

The primary objective of this retrospective review is to evaluate the inpatient staffing model based on workload mapping and VA specific staffing tools. The staffing model evaluations and the workload map will serve as an internal benchmark from which to measure the efficacy of future staffing changes.

### Learning Objectives:

1. Describe the role of staffing models in pharmacy operations management.
2. Define the purpose of workload mapping.

### Self-Assessment Questions:

1. What is the purpose of creating and analyzing a staffing model?
   - A. Ensure profitability of the pharmacy
   - B. Ensure day-to-day operations run smoothly
   - C. Reduce costs without regard to the effects on quality
   - D. Ensure the full time employee equivalents available are appropriate to provide the pharmacy’s core services

2. Workload mapping is a tool used by pharmacy managers to ________.
   - A. Define the most efficient layout of the pharmacy
   - B. Schedule vacation/leave for pharmacy personnel
   - C. Appropriately match demand for pharmacy personnel with supply of pharmacy personnel
   - D. Determine the full time employee equivalents needed to provide the pharmacy’s core services

**Q1 Answer:** D  **Q2 Answer:** C
Four-factor prothrombin complex concentrate (PCC) is indicated to reverse bleeding in patients taking vitamin K antagonists. When prothrombin complex concentrate (PCC) (Kcentra®) was first added to formulary, various dosing methods were utilized. This study retrospectively compared the efficacy and safety of two dosing regimens: fixed versus weight-based dosing. Information gained will be used to implement a consistent dosing strategy for four-factor PCC.

The electronic billing system was used to identify patients who received four-factor PCC from November 2013 through October 2015. The following de-identified data were obtained from the electronic medical record: demographic information, anticoagulation indication, four-factor PCC indication, administration of additional blood products, four-factor PCC dosing regimen, use of recombinant activated factor VII, changes in international normalized ratio (INR), and outcomes such as thromboembolic events, bleeding events, failure to reverse bleeding, or death. Data were stratified into cohorts based on dosing regimen. Statistical analyses was performed where appropriate using SAS version 9.2 (SAS Institute Inc., Cary, NC). Descriptive statistics were used to describe the majority of baseline demographics. Mean and standard deviations (SD) were calculated for continuous variables while a number and a percentage were reported for categorical variables. The rate of efficacy and safety events were compared between the two cohorts using the Chi Square test. Numerical values were compared using student’s t tests.

Results and conclusion will be presented at the Midwest Pharmacy Residents Conference.

Learning Objective:

1) Describe the differences in clinical outcomes between the fixed dose and the weight-based dosing cohorts of four-factor prothrombin complex concentrate.

Self-Assessment Question:

1) Which of the following statements is true regarding the outcomes of the study?
   A. Mean percent reduction in INR was lowest with weight-based dosing
   B. Number of patients that developed a DVT after administration of prothrombin complex concentrate was higher in patients in the weight-based dosing
   C. Length of stay in the hospital was longer in the weight-based dosing cohort
   D. More patients in the fixed dose cohort died compared to the weight-based cohort

Answer: C

Evaluation Of Clinical Pharmacists Performing Antimicrobial Stewardship Services  Emir Kobic, Emily Herstine, Nick Schutz, Mary Foss. 3300 Oakdale Avenue North, Robbinsdale, MN 55422. Emir.kobic@northmemorial.com

Antimicrobial stewardship programs (ASP) are advocated to ensure judicious antimicrobial use in an effort to improve patient outcomes, safety, resistance patterns, and healthcare costs. Barriers to providing ASP at community hospitals include funding and a lack of specialty trained pharmacists. In the summer of 2015, North Memorial Medical Center initiated a new model of ASP where hospital pharmacists performed daily reviews for antibiotic stewardship with an infectious disease specialist available for questions and support when needed. The objective of this study is to assess pharmacist’s ID knowledge/confidence and to evaluate effectiveness of the new model. This project also includes researching built in features of an existing electronic health record to leverage future antimicrobial stewardship services.

North Memorial Hospital pharmacists completed an online survey to assess their learning needs. After identifying learning opportunities through the survey, an in-service was provided to educate pharmacists. In order to assess performance of hospital pharmacists vs. an infectious disease specialist, intervention acceptance rates and antibiotic days of therapy per 1,000 patient days were reviewed for the first quarter of 2015 and the first quarter of 2016. In addition, coordination with the information technology department has led to outlining the steps to build an infectious disease accordion report. Further work with our electronic health record includes researching the background to implementing an antimicrobial stewardship scoring tool to maximize pharmacist’s efficiency in providing antimicrobial stewardship.

The results of this study will be used to validate or modify recently implemented antimicrobial stewardship services at North Memorial Medical Center.

Learning Objectives:

1) Review core components of a hospital antibiotic stewardship program.
2) Identify and define methods for reporting and analyzing institutional antimicrobial use.

Self-Assessment Question:

1) Which of the following is true regarding stewardship metrics for antimicrobial consumption?
   A. Days of therapy (DOT) reflect the actual dose and the number of days a patient is on an antibiotic.
   B. The WHO’s recommended metric is the defined daily dose (DDD).
   C. Defined daily doses (DDD) compare standardized doses among hospitals by taking into account alternative dosing regimens due to renal dysfunction and age.

Q1 Answer: B
IMPLEMENTATION AND ASSESSMENT OF AN OPIOID WITHDRAWAL PROCEDURE IN AN ADULT INPATIENT BEHAVIORAL HEALTH SETTING  
Gerard Kokett, Jeremy Daniel, Margaret Haberman, Avera McKennan Hospital and University Health Center 1325 S Cliff Ave PO BOX 5045 Sioux Falls, SD 57117 gerard.kokett@avera.org

Results from the Substance Abuse and Mental Health Services Administration’s 2014 National Survey on Drug Use and Health show 20.2 million adults are diagnosed with substance use disorders (SUD). Patients with a SUD represent 18.2% of adults diagnosed with any mental illness. Adverse effects from withdrawal may lead to chronic disease or dependence. The management of opioid withdrawal is primarily symptom based, and no standard protocol exists to treat these patients. The purpose of this study is to assess the implementation of a standard procedure for use by providers in the care of patients presenting with opioid withdrawal.

A procedure for opioid withdrawal was approved by the Pharmacy and Therapeutics committee at Avera McKennan Hospital. This procedure allows providers to conveniently prescribe an order set of comfort medications, including loperamide, ondansetron or promethazine, hydroxyzine, clonidine, acetaminophen, ibuprofen, and trazodone to treat common opioid withdrawal symptoms. The procedure also calls for nursing interventions including symptom checks every four hours. Retrospective chart review will be utilized to determine the percentage of procedure orders per number of patients admitted with a diagnosis of opioid withdrawal. Surveys will be given to both providers and nursing staff to assess overall satisfaction with the procedure. Outcomes to be analyzed include rate of provider use of the procedure, provider and nursing staff satisfaction via survey, and deviation from the approved order set. Results of the research will be shared with the hospital staff and amendments to the protocol can be addressed to improve utilization.

Learning Objective:
1) Describe the symptomatic presentation and management of opioid withdrawal

Self-Assessment Question:
1) Which of the following medications correctly matches with an opioid withdrawal symptom with which it is used to treat?
   A. Clonidine : Hypertension
   B. Hydroxyzine : Anxiety
   C. Loperamide : Constipation
   D. Both a. and b.

Q1 Answer: D

EVALUATION OF UNCLAIMED PRESCRIPTIONS AT A RURAL COMMUNITY PHARMACY.  
Scott Kollasch, Matthew Witry, Christine Catney, Stevie Veach, Amy Jackson, CarePro Pharmacy-Mount Vernon, 113 1st Street NE, Mount Vernon, IA 52314. scott-kollasch@uiowa.edu

To 1) assess the influence of a reminder telephone call on unclaimed prescription pick-up rate within three days of the call versus a control group and 2) classify the reasons for unclaimed prescriptions. The rationale for these objectives is unclaimed prescriptions are a major problem in the pharmacy studied and may indicate medication non-adherence.

A prospective quality improvement study on the effect of a prescription reminder call back process on unclaimed prescription rate, reason, and drug class was conducted from November 1st 2015 until January 15th 2016. This took place in a progressive, community pharmacy in a rural Midwestern city. Patients who had unclaimed prescription(s) for fourteen days were identified through the pharmacy’s prescription processing system (Qs1®). Prescriptions were randomized using a random number generator at the patient level to call and no call groups. During the reminder call a pharmacist collected data using a structured call script on reason prescription was unclaimed. Data collected included the rate and total number of unclaimed prescriptions, the patient’s reason for not claiming the prescription, medication class, and prescription pick-up rate within three days of the call. Completed customer call script responses were compiled and the results reported using descriptive statistics.

There were a total of 502 prescriptions included in the study. Results are being analyzed and will be presented. Characterizing and classifying reasons for unclaimed prescriptions will enhance understanding of non-adherence and obstacles to adherence. Testing this intervention provided data on the effect and feasibility of a reminder call.

Learning Objective:
1) Describe how a reminder telephone call affects unclaimed prescription pick-up rate

Self-Assessment Question:
1) A reminder telephone call showed a(n):
   A. Decrease in patient satisfaction
   B. Increase in patient compliance to prescriptions
   C. Decrease in the number of unclaimed prescriptions
   D. Minimal effect on the number of unclaimed prescriptions

Q1 Answer: C
The risk of venous thromboembolism (VTE) is increased in hospitalized patients due to surgeries, bedrest, central lines, and infections, among others. These risk factors occur frequently in burn patients increasing the potential for VTE in this patient population. Hypermetabolism is a common pathophysiologic response to higher total body surface area (TBSA) burned, which affects the body's volume of distribution and pharmacokinetics of pharmacologic agents. At The University of Kansas Hospital, patients admitted with burns are started on enoxaparin 30mg twice daily for VTE prophylaxis. Anti-Xa levels are routinely drawn to assess adequacy of enoxaparin dosing. A retrospective review was performed to evaluate the utility of anti-Xa levels on adequate dosing of enoxaparin for VTE prophylaxis in burn patients. The review included patients on the burn service who received enoxaparin for VTE prophylaxis and had at least one anti-Xa level drawn from January 2011 to July 2015. Anti-Xa levels were considered appropriate if drawn four hours post-dose (+/- 1 hour) after three or more doses of enoxaparin. Adequate prophylactic enoxaparin dosing was determined as doses producing anti-Xa levels between 0.2-0.59 mcg/mL. The frequency of enoxaparin dose adjustments based on anti-Xa levels was analyzed for trends in correlation with TBSA burned. The results from this evaluation will be used to determine if routine monitoring of anti-Xa levels should be a standard of care for burn patients on enoxaparin for VTE prophylaxis. Education will be provided to healthcare professionals to increase the number of appropriate anti-Xa levels drawn.

**Learning Objective:**
1) Identify risk factors for venous thromboembolism in hospitalized patients.

**Self-Assessment Questions:**
1) One known risk factor for venous thromboembolism in a hospitalized patient is:
   A. Peripheral intravenous line
   B. Poor oral intake
   C. Infection
   D. Hypertension

Answer: C

**Learning objective:**
1) Discuss the benefits and limitations of rapid pathogen identification tests from positive blood samples

**Self-assessment question:**
1) Which of the following statements is correct?
   A. Rapid blood test identifies all common bacteria and provides final susceptibility data.
   B. Verigene® technology reliably identifies all bacteria in mixed cultures.
   C. Rapid tests identify selected organisms and some of the common resistance markers from positive blood cultures with a turnaround time of approximately three hours.

Answer: C
DAPTOMYCIN FOR OSTEOARTICULAR INFECTIONS IN OBESE PATIENTS: A RETROSPECTIVE COMPARISON OF DOSING BASED ON ADJUSTED BODY WEIGHT VERSUS TOTAL BODY WEIGHT. Tamara Krekel, Ed Casabar, Kevin Hseuh, Tom Bailey, and David Ritchie. Barnes-Jewish Hospital, 216 S. Kingshighway Boulevard, Mailstop 90-52-411, St. Louis, MO 63110. Tamara.Krekel@bjc.org.

Per the daptomycin label, dosing is recommended to be based on total body weight (TBW) with no specific dose adjustments for obese patients according to the manufacturer. Alternative dosing strategies have been suggested in the literature; however, to our knowledge, clinical outcomes in osteoarticular infections treated with daptomycin based on varying body weights have not been compared. In June 2014, our institution began dosing daptomycin, for all indications, based on adjusted body weight (AdjBW) in patients who weigh greater than 120% their ideal body weight (IBW).

The objective of this study is to compare clinical and microbiological outcomes between AdjBW and TBW dosing in obese patients with osteoarticular infections. The primary outcome was clinical success. Secondary outcomes included the incidence of treatment-emergent daptomycin non-susceptibility and a combined safety assessment of the incidence of myopathy, creatinine phosphokinase elevation, and rhabdomyolysis.

Adult patients with a diagnosis of infective arthritis or osteomyelitis, as designated by ICD-9 coding, and TBW greater than 120% their IBW were identified through a medical informatics query of the hospital's electronic medical record. Patients from three months pre- and post-implementation of this change in institutional daptomycin dosing were not included to allow for assimilation into practice. Descriptive statistics will be calculated and Fisher's exact test will be utilized to compare groups.

Results from this study will add to current literature and help guide providers in dosing strategies for daptomycin in obesity.

Learning Objective:

1) Discuss previous literature surrounding total body weight dosing of daptomycin in obese patients.

Self-Assessment Question:

1) Which of the following statements are correct regarding TBW dosing of daptomycin in obese patients?
   A. A 25-60% increase in maximum plasma concentration has been seen compared to TBW dosing in non-obese individuals
   B. A paradoxical 30-60% decrease in area under the concentration-time curve has been seen compared to TBW dosing in non-obese individuals
   C. TBW dosing in patients weighing >110 kg has been linked to an increased probability of creatine phosphokinase elevations
   D. Both A and C

Q1 Answer: D

NEBRASKA-WESTERN IOWA CONVERSION FROM ASPIRIN/DIPYRIDAMOLE SA TO CLOPIDOGREL AND INCIDENCE OF STROKE. Maggie Kruschel, Susan Stone. Nebraska-Western Iowa Health Care System, 600 S. 70th St, Lincoln, NE 68510. Maggie.kruschel@va.gov

NWI converted patients from aspirin/dipyridamole SA to clopidogrel. The aim of this study is to determine if there was a difference in incidence of stroke and bleeding between patients who converted from aspirin/dipyridamole SA (Aggrenox) to clopidogrel (Plavix) and those who remained on aspirin/dipyridamole SA after conversion, as well as evaluate incidence of stroke in patients who remained on omeprazole or esomeprazole after the conversion. The primary endpoint of this study is stroke or TIA. The secondary endpoints include major bleeding (currently defined as intracranial bleed, GI bleed, or bleed requiring hospitalization), and conversion back to aspirin/dipyridamole SA after initial conversion from aspirin/dipyridamole SA to clopidogrel. A retrospective chart review will focus on stroke or TIA after conversion to clopidogrel or staying on dipyridamole/aspirin SA, major bleeds (intracranial bleed, GI bleed, bleed requiring hospitalization), use of certain drugs (omeprazole, esomeprazole, ranitidine, pantoprazole, aspirin) and if patients discontinued clopidogrel after conversion for any reason. Chi-square and t test will be performed to compare study groups. The results of this research will either support or condemn the decision to change formulary agent in stroke prevention. If increase in incidence of stroke is found, a revision to the current policy may be warranted.

Learning Objective:

1) Explain the drug-drug interaction between omeprazole and clopidogrel

Self-Assessment Question:

1) What is the drug-drug interaction between omeprazole and clopidogrel?
   A. Clopidogrel inhibits CYP2C19, which increases omeprazole levels in the blood
   B. Omeprazole inhibits CYP2C19, which decreases clopidogrel levels in the blood
   C. Omeprazole inhibits CYP3A4, which decreases clopidogrel levels in the blood
   D. Omeprazole inhibits CYP3A4, which increases clopidogrel levels in the blood

Q1 Answer: B
INCORPORATING HOME CLINICAL VIDEO TELEHEALTH INTO A PHARMACY MEDICATION THERAPY MANAGEMENT CLINIC AT A RURAL VETERANS AFFAIRS HEALTH CARE SYSTEM. Joshua Ladwig, William Hayes, and Michael Lemon, VA Black Hills Health Care System, 113 Comanche Road, Fort Meade, SD 57741 joshua.ladwig2@va.gov

To initiate home clinical video telehealth (HCVT) services in the pharmacy medication therapy management (MTM) clinic setting.

This quality improvement project included patients with an interest in receiving HCVT services and had access to a computer or tablet with video and sound capabilities. The patients were enrolled in at least one of the diabetes, hypertension, or dyslipidemia MTM clinics. This project was conducted consistent to current standards of practice as with other HCVT and MTM clinics at the Veterans Affairs Black Hills Health Care System. Primary interventions included assessing strengths and limitations of utilizing HCVT services in other pharmacy areas. Secondary interventions included analyzing students’ perceptions and number of interventions with the HCVT services compared to phone services alone. Initially, baseline patient information was gathered and assessed to identify the ideal patients who would benefit from this service. The strengths and limitations of HCVT were assessed after each interview. Throughout each Advanced Pharmacy Practice Experience (APPE), the students recorded their interventions. The students received a questionnaire to record their perceptions following their APPE. Upon completion of the project, the acquired data was compared to intervention data prior to the initiation of HCVT services. Descriptive statistic will be calculated and chi-square analysis will be completed to compare each group.

The results of this quality improvement project will be used to further opportunities of HCVT utilization within pharmacy services.

Learning Objective:
Describe the benefits of utilizing Home Clinical Video Telehealth services compared to phone services.

Self-Assessment Question:

1) What is a benefit of clinical video telehealth to the home compared to phone conversations?
   A. Internet is utilized in order for communication to occur
   B. Providers can communicate with patients in rural areas
   C. Providers may read a patient’s body language during communication
   D. Patients may be contacted anywhere at anytime

Answer: C

EVALUATING ADHERENCE TO THE FLUOROQUINOLONE-WARFARIN INTERACTION GUIDELINE IN A PHARMACIST-RUN ANTICOAGULATION CLINIC. Justin Lane, Lisa Bilsland, Brent Bollwitt, Veterans Affairs Medical Center, 2201 N. Broadwell Ave., Grand Island, NE 68803, justin.lane2@va.gov

Guidelines within the Veteran Affairs Nebraska-Western Iowa Health Care System (NWIHCS) regarding management of warfarin when concurrently prescribed fluoroquinolone medications have changed over the last three years. In the past, standard practice was to empirically dose-reduce warfarin over the duration of fluoroquinolone therapy. In February 2013, the NWIHCS warfarin interaction guideline was updated, suggesting empiric warfarin dose reduction was no longer recommended and follow-up PT/INR within 5-7 days of initiation of fluoroquinolone was advised.

The aim of this retrospective, quality improvement study is to analyze the adherence to the updated fluoroquinolone-warfarin interaction guideline established within NWIHCS. Veterans included in this study were outpatients prescribed ciprofloxacin or levofloxacin while concurrently on warfarin therapy from February 2013 through August 2015. Veterans receiving ciprofloxacin or levofloxacin for less than three days were excluded from the study. The primary outcome of this study is to evaluate the adherence to the updated NWIHCS fluoroquinolone-warfarin interaction guideline. A secondary outcome of this study will be evaluating the reasons for non-adherence to the guideline.

Based on preliminary review of data, two foreseeable outcomes exist. The first possible outcome is: the guideline was followed the majority of visits when ciprofloxacin or levofloxacin is concurrently prescribed with warfarin. The alternative outcome is: the guideline was not followed the majority of visits. With either outcome, challenges to the adherence of the guideline will be examined, which will lead to opportunities for education on the updated guideline and available supporting literature regarding this common drug-drug interaction.

Learning Objectives:
1) Describe the potential interaction between fluoroquinolones and warfarin.
2) Identify proper management of the fluoroquinolone-warfarin interaction according to most literature.

Self-Assessment Questions:

1) Which mechanism most likely explains the interaction between fluoroquinolones and warfarin?
   A. Fluoroquinolones interfere with hepatic metabolism by inhibiting the CYP-450 enzyme system, enhancing warfarin’s effect
   B. Fluoroquinolones have blood thinning properties, enhancing warfarin’s effect
   C. Fluoroquinolones promote vitamin-K producing bacteria, reducing warfarin’s effect
   D. Fluoroquinolones promote the metabolism of warfarin, reducing warfarin’s effect

Q1 Answer: A

2) When ciprofloxacin or levofloxacin is prescribed concurrently with warfarin, most literature suggests:
   A. Empiric dose-reduction of warfarin by 10-20% while on the antibiotic
   B. Empiric dose-reduction of warfarin by 20-30% while on the antibiotic
   C. No empiric dose-reduction of warfarin and follow-up INR within 7 days
   D. No empiric dose-reduction of warfarin and follow-up INR within 14 days

Q2 Answer: C
Febrile neutropenia is a common, potentially life-threatening complication of chemotherapy. There are often little to no initial signs or symptoms of illness, other than fever. It is imperative that these patients receive empiric antibiotic therapy within 120 minutes of the first presentation of fever to avoid progression to sepsis or possibly even death; therefore, febrile neutropenia should be treated as an oncologic emergency. Compliance with the recommended guidelines on time to antibiotic administration was identified as an institution-wide deficiency.

The purpose of this quasi-experimental study is to determine if pharmacy-driven interventions, including a revised guideline-based febrile neutropenia order set and education sessions targeted towards medical, pharmacy, and nursing staff, can improve the time to antibiotic administration in febrile neutropenia patients. The education sessions will highlight the importance of empiric antibiotic selection and timing, as well as consequences of treatment delay.

Study participants will be identified by using the electronic medical record system. Patients will be filtered by inpatient status, the diagnosis of neutropenic fever, and receipt of chemotherapy within the last 21 days. Only adult patients will be eligible for inclusion in the study, and must meet the guideline definition of febrile neutropenia. Eligible patients will not be actively participating in the study, and therefore will not be required to give consent.

At the end of the study period, the data collected from the eligible patients post-interventions will be analyzed and the time to empiric antibiotic administration will be compared to historical hospital data from 2013-2014 to assess for improvement.

Learning Objectives:

1) Define febrile neutropenia.
2) Identify the guideline-based recommendation for time to antibiotic administration in febrile neutropenia.

Self-Assessment Questions:

1) What constitutes febrile in a febrile neutropenia patient?
   A. A temperature of greater than or equal to 38.3°C, or a temperature of greater than or equal to 38°C sustained over a one-hour period
   B. A temperature of greater than 37°C sustained over a one-hour period, or a temperature of greater than or equal to 38.3°C
   C. A temperature of greater than or equal to 38°C sustained over a one-hour period, or a temperature of greater than or equal to 38.5°C
   D. A temperature of greater than 37°C sustained over a one-hour period, or a temperature of greater than or equal to 38.5°C

   Q1 Answer: A

2) What is the goal “door to needle” time for febrile neutropenia patients?
   A. 60 minutes
   B. 3 hours
   C. 90 minutes
   D. 2 hours

   Q1 Answer: A   Q2 Answer: D

IMPACT OF PHARMACY-DRIVEN INTERVENTIONS ON TIME TO ANTIBIOTIC ADMINISTRATION IN FEBRILE NEUTROPENIA PATIENTS: Susan Lane, and Ben Anderson, St. Luke’s Hospital, 915 East First Street, Duluth, MN 55805 Susan.Lane@slhduluth.com

Behavioral changes, medications, and a strong support system are all key, evidenced-based factors for successful and sustainable tobacco cessation. Shared Medical Appointments (SMAs) provide Veterans access to multiple clinicians of different disciplines to assist with behavioral and medication therapy management. These appointments allow Veterans to draw support from each other and share similar experiences. SMAs are a key feature of the Patient Aligned Care Team (PACT) model that focuses on improving Veteran satisfaction, wellness, and access to care. This project will examine the impact of SMAs on Veterans attempting tobacco cessation.

This quality improvement project will be reviewed by the Chief of Pharmacy, Medical Chief of Staff, Privacy Officer and Pharmacy and Therapeutics Committee. Veterans will primarily be consulted to the Shared Medical Appointment for tobacco cessation through primary and acute care referrals. The SMA will consist of 10-15 Veterans, a Clinical Pharmacy Specialist (CPS), and the Behavioral Health Coordinator. The Behavioral Health Coordinator will provide education and facilitate discussion regarding behavioral changes. The CPS will assist with education and the prescribing of evidenced-based, FDA-approved pharmacotherapy for tobacco cessation. The primary outcome of this project will be overall Veteran satisfaction with the SMA as measured by anonymous survey. Secondary outcomes will include: overall quit rates as reported by Veterans, number of sessions needed for the Veteran to achieve tobacco cessation, and satisfaction of other disciplines involved in tobacco cessation.

The results of this project will be used to improve the tobacco cessation resources available at VA Central Iowa Health Care System.

Learning Objective:

1) Identify the primary outcome of this quality improvement project.

Self-Assessment Question:

1) What is the primary outcome of this quality improvement project?
   A. Overall Veteran satisfaction of the Shared Medical Appointment
   B. Overall quit rates as reported by Veterans
   C. Number of sessions needed for the Veteran to achieve tobacco cessation
   D. Satisfaction of other disciplines involved in tobacco cessation

   Q1 Answer: A

IMPLEMENTATION OF A PHARMACIST-RUN, MULTIDISCIPLINARY TOBACCO CESSATION SHARED MEDICAL APPOINTMENT FOR VETERANS: Shelby Lang, Noelle Johnson, Karmen Jorgensen, Allison Berkland, Elizabeth Paterson, David Campbell, VA Central Iowa Healthcare System, 3600 30th St., Des Moines, IA 50310 shelby.lang@va.gov

Learning Objective:

1) Identify the primary outcome of this quality improvement project.

Self-Assessment Question:

1) What is the primary outcome of this quality improvement project?
   A. Overall Veteran satisfaction of the Shared Medical Appointment
   B. Overall quit rates as reported by Veterans
   C. Number of sessions needed for the Veteran to achieve tobacco cessation
   D. Satisfaction of other disciplines involved in tobacco cessation

   Q1 Answer: A

PATIENT ALIGNED CARE TEAM FOR VETERANS: Paterson, David Campbell, VA Central Iowa Healthcare System, 3600 30th St., Des Moines, IA 50310 shelby.lang@va.gov

Learning Objective:

1) Identify the primary outcome of this quality improvement project.

Self-Assessment Question:

1) What is the primary outcome of this quality improvement project?
   A. Overall Veteran satisfaction of the Shared Medical Appointment
   B. Overall quit rates as reported by Veterans
   C. Number of sessions needed for the Veteran to achieve tobacco cessation
   D. Satisfaction of other disciplines involved in tobacco cessation

   Q1 Answer: A

MULTIDISCIPLINARY TOBACCO CESSATION SHARED MEDICAL APPOINTMENT FOR VETERANS: Susan Lane, and Ben Anderson, St. Luke’s Hospital, 915 East First Street, Duluth, MN 55805 Susan.Lane@slhduluth.com

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**MYELOID GROWTH FACTORS: COMPLETION OF A MEDICATION USE EVALUATION, AND PROTOCOL DEVELOPMENT FOLLOWED BY IMPLEMENTATION TO STANDARDIZE USE IN PATIENTS ADMITTED WITH NEUTROPENIA.**

Kyle LaPorte, Robin Lockhorst, Rachel Elsey, Bradley Beck, Avera McKennan Hospital & University Health Center, 1000 E. 23rd St., Sioux Falls, SD 57105

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Colony stimulating factors (CSFs) have been shown to reduce the duration and severity of neutropenia and the risk of febrile neutropenia (FN) when used prophylactically. However, data supporting use for treatment of febrile neutropenia is lacking. Certain guidelines recommend that CSFs shouldn’t be routinely used with antibiotics for treatment of patients with FN. However, others state that use may be considered in patients with FN who are defined as having a high risk for infection-associated complications or have prognostic factors predictive of poor outcomes.

To retrospectively assess appropriate utilization of CSFs in patients admitted with neutropenia. From this information, develop and implement a protocol with subsequent revaluation to assess for changes in prescribing practices.

Retrospective review was conducted on patients admitted between October 2014 through October 2015 for management of neutropenia and who had received CSFs. From information collected and guideline recommendations, a protocol was developed and implemented. Retrospective review of CSFs prescribing was then evaluated from January 2016 through March 2016.

In initial analysis, 16 patients met inclusion criteria. Of these, 7 patients (43.8%) were prescribed CSFs outside of current guidelines. Through review of these instances and current guideline recommendations, a protocol was developed and implemented.

Analysis for changes in CSF prescribing following implementation of the protocol is currently underway.

**Learning Objective:**

1) Recognize appropriate use of CSFs based on current guidelines.

**Self-Assessment Question:**

1) Which of the following statements constitutes appropriate use of myeloid colony stimulating factors (CSFs)?
   A. CSFs should routinely be utilized in the management of afebrile neutropenia.
   B. All patients admitted with FN should receive CSFs and antibiotics.
   C. Administration of additional CSF within 14 days of pegfilgrastim is recommended.
   D. CSFs may be used in treatment of FN if patient if patient has prognostic factors predictive of poor outcomes.

**Answer:** D

**VALUE OF PHARMACIST INTERVENTIONS ON ANTIMICROBIAL THERAPY WITH OR WITHOUT THE PRESENCE OF ANTIMICROBIAL STEWARDSHIP ROUNDS.**

Mitch Larsen, Deborah Klein, United Hospital, 333 North Smith Ave – MR 60207, St. Paul, MN 55101 mitchell.larsen@allina.com

The Infectious Diseases Society of America (IDSA) and the Society for Healthcare Epidemiology of America (SHEA) guidelines for antimicrobial stewardship recommend a multidisciplinary approach towards monitoring antimicrobials and includes components such as prospective audit of antimicrobials, formulary restriction for specific agents, policies for intravenous (IV) to oral conversion, among many others.

Not all institutions have the resources to adopt these recommendations, however, and many require unique avenues to pursue antimicrobial stewardship within their capabilities. United Hospital is a large, acute care hospital which maintains an infectious disease (ID) physician group which covers multiple hospitals in the area. One provision for this group is to provide antimicrobial stewardship rounds (AMS) which occur between the physician and a decentralized clinical pharmacist on specific patient care units, but not hospital wide. Despite this model being in place for close to a decade, the effectiveness of these ID rounds has not been recently assessed. The purpose of this study is to assess the current state of the AMS program.

This prospective, observational, cohort study will look to assess the value of pharmacist interventions on floors where AMS rounds take place and compare them to floors where they do not occur. The incidence of acceptance of pharmacist-placed “i-Vents” as well as other antimicrobial stewardship measures will be investigated. Results for this study are currently pending and will be used to improve our AMS program.

**Learning Objectives:**

1) Describe the importance of antimicrobial stewardship and metrics used to assess it.

**Self-Assessment Questions:**

1) Which of the following are metrics that can be used to assess antimicrobial stewardship?
   A. Antimicrobial days of therapy/1000 patient days
   B. Number of patients experiencing fever in the hospital
   C. Antibiotic cost/patient day
   D. The number of order sets that contain antibiotics
   E. A and C

**Answer:** E
IMPACT OF TRANEXAMIC ACID ON BLOOD LOSS DURING AND AFTER TOTAL JOINT ARTHROPLASTY PROCEDURES.
Aaron Larson, Stacy Hoitsma, Justin Metzger, Kelley Oehlke, and Scott Bebensee, Sioux Falls VA Health Care System, 2501 W 22nd Street, Sioux Falls, SD 57105. Aaron.larson2@va.gov.

The number of patients undergoing total knee arthroplasty (TKA) and total hip arthroplasty (THA) has increased over the last few decades and is expected to continue to grow. Even though these procedures are becoming more prevalent, both procedures are associated with significant blood loss that may lead to complications such as postoperative anemia requiring blood transfusions. Tranexamic acid (TXA) is an antifibrinolytic agent used off-label during TKA and THA procedures to reduce blood loss. The dosing regimen, timing of the dose(s), and route of administration of TXA has not been standardized and is variable depending on a surgeon’s preference.

The objective of this study is to determine whether the administration of TXA at the dosing regimen, timing of doses, and route of administration used at the Sioux Falls VA Health Care System (SFVAHCS) improves outcomes related to blood loss. Patients who did not receive TXA during TKA and THA procedures prior to implementing TXA into the surgery protocol will be compared to those who did receive TXA after it was implemented in October 2012. Total blood loss will be the primary outcome of this study. Secondary outcomes will include change in hemoglobin/hematocrit before and after surgery, length of hospitalization after surgery, clotting complications within 30 days of surgery, and blood transfusions administered after surgery.

The results of this study will be used to determine whether the TXA dosing protocol used at SFVAHCS is effective in improving outcomes related to blood loss during TKA and THA procedures.

Learning Objective:
1) Explain the effect of tranexamic acid on blood loss parameters during and after total knee and hip arthroplasty procedures

Self-Assessment Question:
1) Tranexamic acid theoretically decreases blood loss related to total knee and hip arthroplasty procedures by:
   A. Promoting liver synthesis of clotting factors II, VII, IX, X
   B. Forming a reversible complex that displaces plasminogen from fibrin resulting in inhibition of fibrinolysis
   C. Initiating fibrinolysis and converting plasminogen to plasmin
   D. Directly inhibiting thrombin

Answer: B

DEVELOPMENT AND IMPLEMENTATION OF A RISK ASSESSMENT TOOL FOR PATIENTS RECEIVING ORAL CHEMOTHERAPY TO CONTINUALLY OFFER ENROLLMENT IN A SPECIALTY PHARMACY THERAPY MANAGEMENT PROGRAM. Ashley Larson, Robin Lockhorst, Rachel Elsey, Avera McKennan Hospital and University Health Center, 1325 S. Cliff Ave, PO Box 5045, Sioux Falls, SD 57106 ashley.larson@avera.org.

To analyze the impact of implementation of a risk assessment tool in an ambulatory oncology clinic and a specialty pharmacy on enrollment of patients receiving oral chemotherapy in a therapy management program.

URAC, an accrediting body for specialty pharmacies, recently updated guidelines for patient participation in therapy management programs to include the requirement of identifying “at risk” individuals to target for participation. To meet this requirement, a risk assessment tool was developed through literature review and retrospective review of admissions data to identify patients believed to be at high risk of adverse events and non-adherence. The risk assessment tool was implemented at an ambulatory oncology clinic and a specialty pharmacy on January 1, 2016 to continually refer high risk patients to a therapy management program. Enrollment percentages and reasons for non-enrollment in the therapy management program will be measured before and after implementation of the risk assessment tool. Analysis of feasibility of implementation into workflow and staff satisfaction with risk assessment tool will be completed after 3 months to assess how the risk assessment tool can be modified for future use.

Results and conclusions are currently in progress. Potential benefits of this project include improving patient access to the support offered by the therapy management program and promoting effective communication and transitions of care between the ambulatory care clinic and specialty pharmacy settings.

Learning Objectives:
1) Describe the new requirement for URAC accreditation of specialty pharmacies made in 2015 regarding patient management program participation
2) List features of oral chemotherapy that put patients at high risk for adverse effects and non-adherence

Self-Assessment Questions:
1) URAC accreditation standards for specialty pharmacies were updated in 2015 to require
   A. Home visits to all patients
   B. Providing the patient with free medication samples
   C. Active facilitation of “at risk” individuals’ participation in patient management programs
   D. Sending the patient medication advertisements in the mail

2) Features of oral chemotherapy that put patients at risk for decreased tolerability and non-adherence include
   which of the following:
   A. Simple regimens/schedules that are easily understood by patients
   B. Adverse effects that are much less frequent and not severe when compared to intravenous chemotherapy
   C. Cost of therapy that is affordable for the majority of patients
   D. Many challenges including complex regimens, unique adverse effect profiles, and special administration requirements

Q1 Answer: C     Q2 Answer: D
Medicare Advantage plans are now reimbursing physicians based on quality metrics including avoidance of high risk medications (HRMs) and medication adherence. There are no studies showing pharmacist impact on HRM prescribing and patient adherence rates and their resulting effect on star ratings.

The objective of this study is to reduce the number of Senior Health Center patients 65 years and older flagged by Medicare Advantage plans contracted with a not-for-profit health care system as having HRMs or non-adherence to prescribed medications for diabetes (excluding insulins), cholesterol, and blood pressure.

This prospective study has been approved by the Western Institutional Review Board. The study will seek to review approximately 100 patients. Patients must be 65 years or older and have a primary care physician within the Senior Health Center. The patients will be identified and reported by contracted Medicare Advantage plans as having medication issues related to high risk of side effects or adherence. Recommendations for alternative medications will be made via the electronic medical record and face-to-face communication with providers. Adherence issues will be addressed by face-to-face interaction with the patient or via phone call to the patient and/or patient’s pharmacy. Information involving medications continued, discontinued, switched to alternative therapy, or documented inaccurately after pharmacist intervention will be collected. Additionally, physician HRM prescribing rates and star ratings for payer’s reporting will be collected.

Preliminary results show 36 patients on high risk medications in the senior health center and approximately 225 patients with adherence issues. The study is currently in process.

Learning Objectives:
1) Discuss the high-risk medication and adherence measures.
2) Describe the impact of pharmacist intervention in reducing high risk medication prescribing and improving medication adherence

Self Assessment Questions:
1) High-risk medication and adherence measures are weighted how many times above baseline?
   A. 1.5
   B. 2
   C. 3
   D. 2.5

2) What alternative medication would you recommend for a patient taking zolpidem?
   A. Diphenhydramine
   B. Trazodone
   C. Losartan
   D. Zaleplon

Q1 Answer: C Q2 Answer: B

PHARMACIST IMPACT ON HIGH RISK MEDICATION USE AND ADHERENCE IN A SENIOR HEALTH CENTER.
Alyssa Laurich, Stefanie Hawkins, Stephanie Paul, April Risner, Bob John, Marlene Hall, and David Donald, The Children's Hospital at Saint Francis, 6161 S. Yale Avenue, Tulsa, OK 74136 jtle@saintfrancis.com

The Children’s Hospital at Saint Francis implemented a pharmacy-driven vancomycin safety monitoring service with the intent to decrease acute kidney injury in patients receiving therapy. The purpose of this research project is to compare the rates of acute kidney injury prior to and after the implementation of a pharmacy-driven vancomycin monitoring service.

The research project is a retrospective chart review. The first arm will consist of chart review of patients admitted from July 1, 2014 – December 31, 2014 for the pre-implementation period. This data will be compared to the second arm, which consists of chart review of patients on vancomycin admitted from July 1, 2015 – December 31, 2015 for the post-implementation period.

The inclusion criteria for both arms of the study include: any patient admitted to The Children's Hospital at Saint Francis less than 18 years of age receiving vancomycin, patients receiving greater than or equal to 48 hours of therapy continuously, patients receiving age-appropriate dosing. The exclusion criteria include patients with: vancomycin therapy less than 48 hours, insufficient labs, and lack of serum vancomycin trough levels.

Primary endpoint is to evaluate the incidence of acute kidney injury risk between the pre-implementation and post-implementation periods. Secondary endpoints include the number of supratherapeutic vancomycin trough levels, number of concomitant nephrotoxic medications patients received, and time to first therapeutic level.

The results of this study will be used to expand the types of interventions made by pharmacists within the vancomycin monitoring service and include monitoring of medications with a narrow therapeutic index.

Learning Objectives:
1) Review vancomycin drug information.
2) Describe the Pharmacist-Driven Vancomycin Monitoring Program at The Children's Hospital at Saint Francis (SFCH).

Self-Assessment Questions
1) Indications for use of vancomycin include:
   A. Methicillin-resistant S. aureus
   B. E. coli
   C. β-lactam resistant coagulase negative staphylococcus species
   D. Both A and C

2) Which one of these is NOT monitored by a pharmacist in the Monitoring Program?
   A. Urine output
   B. BUN
   C. CBC
   D. Trough concentrations

Q1 Answer: D Q2 Answer: C

IMPLEMENTATION OF A PHARMACY-DRIVEN PEDIATRIC VANCOMYCIN SAFETY MONITORING SERVICE.
Jenn Le, Bob John, Marlene Hall, and David Donald, The Children’s Hospital at Saint Francis, 6161 S. Yale Avenue, Tulsa, OK 74136 jtle@saintfrancis.com

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   A. Urine output
   B. BUN
   C. CBC
   D. Trough concentrations

Q1 Answer: D Q2 Answer: C
The primary objective of this quality improvement project is to implement an opioid surveillance program targeted at identifying and minimizing concomitant therapy of opioid and benzodiazepines.

The escalating trend for opioid-related abuse and misuse is widely recognized. Opioids and benzodiazepines are the top two classes of medications involved in pharmaceutical overdose deaths. Concurrent administration of these two classes of medications significantly increases the risk of death from overdose as a result of respiratory depression. The Veterans Health Administration has made efforts to reduce concurrent use as one of the four Opioid Safety Initiatives (OSI). Despite non-formulary policies in place for initiation of concomitant therapy, percentages of patients on combination therapy remains above national averages at VA Black Hills.

In order to minimize the utilization of the concomitant therapy of benzodiazepine and opioid, an opioid surveillance program was implemented in mental health patients at VA Black Hills. A standardized assessment tool was adopted to assess risk and appropriateness of benzodiazepine utilization in patients on long-term opioid therapy. Pre-assessment on comorbid conditions and controlled prescription utilization was performed through chart review. Then the results of the pre-assessment and education on risk and minimization of the combination therapy was provided to mental health providers. Lastly, the effectiveness of the program will be assessed through follow up chart review and providers’ feedback.

Learning Objectives:
1) Identify risks associated with concomitant therapy of benzodiazepine and opioid.
2) Describe components of opioid surveillance program utilized.

Self Assessment Questions:
1) Concurrent administration of benzodiazepine and opioid will increase risk of death from overdose as result of which of the following mechanism?
   A. Hepatic failure
   B. Cardiac arrest
   C. Respiratory depression
   D. Stroke

2) Which of the following will increase patient’s risk of severe adverse events resulted from concomitant therapy of benzodiazepine and opioid?
   A. Family history of cancer
   B. Prior history of myocardial infarction
   C. Diagnosis of COPD
   D. Diagnosis of diabetes

Q1 Answer: C  Q2 Answer: C
IMPACT OF PROCALCITONIN LEVELS ON ANTIMICROBIAL DURATION IN MEDICAL INTENSIVE CARE UNIT PATIENTS.  
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Procalcitonin (PCT) can be a useful marker for the detection of bacterial infection in critically ill patients. Some institutions have implemented PCT based algorithms to help guide antimicrobial stewardship through appropriate antibiotic de-escalation. Currently, no formal recommendation for antibiotic de-escalation based on PCT levels in medical ICU (MICU) patients exists at The University of Kansas Hospital (TUKH). Additionally, no current standard exists for when to re-check PCT levels when initial levels are elevated.

The primary objective of this study was to determine if current practices utilizing PCT levels impact the duration of antibiotic therapy in MICU patients at TUKH. A secondary objective was to determine if patient outcomes were affected when PCT levels led to early discontinuation of therapy. A retrospective chart review of MICU patients with broad-spectrum antibiotic therapy initiated between July 1, 2014 and June 30, 2015 was performed. Patients were identified through a University HealthSystem Consortium (UHC) database query and separated into two groups based on the presence or absence of PCT levels.

The results of this study will be used to compare PCT guided antibiotic de-escalation before and after implementation of a PCT algorithm in the MICU.

Learning Objectives:

1) Describe the mechanism of PCT elevation in bacterial infections
2) Identify potential causes for false-positive elevations of PCT levels

Self-Assessment Questions

1) Procalcitonin is:
   A. A prohormone for calcitonin and is a component of the inflammatory cascade
   B. Released by bacterial cells as an infection starts to develop
   C. An inflammatory marker released in response to bacterial, viral or fungal infections
   D. Released slowly starting several days after an infection presents

   Q1 Answer: D  Q2 Answer: D
KETAMINE INFUSION FOR PATIENTS WITH RIB FRACTURE: A CASE SERIES  Ashley Losing, Adis Keric, Justin Jones, Nathan Leedahl, David Leedahl, Sanford Medical Center Fargo, 801 Broadway N, Fargo ND 58122. Ashley.losing@sanfordhealth.org

Rib fracture is a common medical occurrence typically associated with intense pain. Inadequate pain management and concurrent lung injury limit a patient’s ability to breathe deeply and cough, potentially leading to respiratory complications. Ketamine has been historically utilized for its anesthetic properties, but use is resurging in the analgesic setting. Ketamine’s compilation of potential mechanisms confers unique advantages in the setting of rib fracture compared to the classic analgesic classes of non-steroidal anti-inflammatory drugs and opioids.

Monthly charge reports were utilized to identify patients charged for a ketamine infusion at Sanford Medical Center Fargo (Fargo, ND) from 01/01/15 to 04/30/15. Retrospective review of the electronic medical record was conducted to identify patients receiving the infusion with an indication of rib fracture and for subsequent data collection. The primary description of interest was the average 8-hour pain score. Secondary descriptions of interest included daily opiate utilization, hospital length of stay, critical care length of stay, opiate side effect frequency, regional anesthesia utilization, occurrence of rib fracture complications, development of chronic pain or emergence reactions, and occurrence of hypersalivation.

Results from this case series will add to the limited body of literature regarding the use of ketamine for pain control in rib fracture patients.

THE INCIDENCE OF NEPHROTOXICITY IN PATIENTS RECEIVING VANCOMYCIN MONOTHERAPY COMPARED TO DUAL THERAPY WITH PIPERACILLIN/TAZOBACTAM IN AN ACADEMIC MEDICAL CENTER. Sarah Luby, Jessica Humphrey, The University of Kansas Hospital, 3901 Rainbow Blvd, Kansas City, KS 66160. sarahluby@kumc.edu

Empiric therapy with vancomycin and piperacillin/tazobactam is often initiated for polymicrobial organisms until cultures are finalized. One complication of these therapies is the development of acute kidney injury. The nephrotoxicity of vancomycin is well documented, but in contrast, piperacillin/tazobactam alone has rarely been associated with the development of nephrotoxicity. Recent studies have reported the incidence of nephrotoxicity is increased when these medication are used in combination. Since acute kidney injury can lead to significant complications and prolong the patient’s hospital stay, it is important to avoid empiric regimens that can potentiate nephrotoxicity. Due to the increased use of vancomycin and piperacillin/tazobactam as empiric therapy, it is crucial to determine the actual rate of nephrotoxicity/acute kidney injury with dual therapy.

The purpose of this study is to assess the incidence of nephrotoxicity/acute kidney injury in patients who received vancomycin monotherapy as compared to patients who received dual therapy. The secondary objectives are to compare the time of acute kidney injury presentation with the initiation of vancomycin and piperacillin/tazobactam dual therapy and determine if there is an increased incidence of acute kidney injury with dual therapy in elderly patients.

These objectives will be assessed by reviewing electronic medical charts of all patients who were treated with vancomycin and/or piperacillin/tazobactam and were clinically diagnosed with nephrotoxicity/acute kidney injury using the ICD-10 codes at The University of Kansas Hospital.

The results of this study could affect the future recommendations of empiric antimicrobial initiation at The University of Kansas Hospital.

Learning Objectives:

1) Identify patients most at risk for developing acute kidney injury (AKI).
2) Recognize medications that are more likely to induce nephrotoxicity/AKI.

Self-Assessment Questions:

1) The incidence of AKI is most increased in which patient population?
   A. Patients >65 years of age
   B. Patients on multiple nephrotoxic agents
   C. Patients with stroke like symptoms
   D. Answers A & B are correct
   
   2) Which medications or agents alone are more likely to induce nephrotoxicity?
   I. Vancomycin
   II. Contrast dye
   III. Piperacillin/tazobactam
   IV. Acetaminophen
   A. I only
   B. I and II only
   C. I, II, III only
   D. I, II, III, IV are correct

Q1 Answer: D   Q2 Answer: B
PHARMACIST-INITIATED DISCONTINUATION OF EMPIRIC VANCOMYCIN THERAPY IN PATIENTS WITH PNEUMONIA.

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With the misuse and overuse of antibiotics over the last decades, we are faced with more drug resistant (MDR) bacteria such as Methicillin-resistant S. aureus (MRSA) and a steady increase in minimum inhibitory concentration (MIC) of antibiotics such as vancomycin. In pneumonia patients with risk factors for MDR organisms, vancomycin is started empirically and often continued longer than indicated. S. aureus is a rapid growing pathogen and most cultures will be visible as colonies on a plate after 12-36 hours, therefore many hospitals urge to have vancomycin discontinued within 72 hours if cultures are negative.

This study will analyze the impact on the duration of vancomycin therapy when discontinued by a pharmacist after 3 days of therapy. Additionally, this study will also examine the rate of MRSA cultures and 30-day infection related readmissions.

Patients were divided into three groups. Group one is the historical group where vancomycin was discontinued by a physician without a call from a pharmacist, group two contains patients where a pharmacist called to discontinue vancomycin, but the physician wanted to continue therapy and the third group contains patients where vancomycin was discontinued after a call from a pharmacist. Inclusion criteria include patients 18 years or older with confirmed or suspected pneumonia receiving vancomycin. Exclusion criteria include patients with positive cultures for MRSA, immunocompromised, critical care unit patients and patients with lung abscesses or empyema.

Data collection is ongoing and results will be presented once completed.

Learning Objectives:

1) Identify when it is appropriate to discontinue empiric vancomycin therapy in patients with pneumonia

Self Assessment Questions:

1) For a pneumonia patient with negative cultures, in which of the following scenarios would it be appropriate to discontinue vancomycin?
   A. Only if a MRSA nares swab showed a negative result
   B. Not until the patient is afebrile and ready to be discharged
   C. Within 48-72 hours if showing signs of clinical improvement
   D. Only after the patient has received at least 5 doses of vancomycin

Q1 Answer: C

EVALUATING THE EFFICACY OF KEFIR FOR PREVENTION OF ANTIBiotic-ASSOCIATED DIARRHEA AND CLOSTRIDIUM DIFFICILE INFECTION. Traci Lundeen, Johan Bakken, and Jennifer Dixon. St. Luke’s Hospital, 915 East First Street, Duluth, MN 55805. Traci.Lundeen@slh duluth.com

Systemic antibiotics alter commensal gastrointestinal flora and can lead to antibiotic-associated diarrhea (AAD), primarily through overgrowth of gut pathogens such as Clostridium difficile. Probiotics have been identified as a potential prevention strategy. Some proposed mechanisms include competition for attachment sites, secretion of antimicrobial peptides, and stimulation of the host immune response. A recent meta-analysis concluded that probiotics reduce AAD and Clostridium difficile diarrhea; however, included trials studied many diverse products and regimens. The fermented milk product kefir, which contains a mixture of bacterial and yeast probiotic strains, has not been adequately studied for this purpose. This study aims to determine whether kefir is effective in reducing the incidence of AAD and Clostridium difficile infection.

This prospective study includes adult patients admitted to the hospital medical floor. Patients with orders for systemic antibiotics are screened, consented, and randomized to one of three study groups: patients who receive no kefir, patients who receive kefir during their hospital stay only, and patients who receive kefir for the duration of their antibiotic therapy. The kefir regimen is four ounces consumed three times daily. A patient journal is kept for 30 days after discharge, to record diarrhea and kefir intake, if applicable. During this 30 day follow-up period, telephone calls are made to assess for diarrhea and adherence. A fecal Clostridium difficile test is offered to any patient experiencing diarrhea. Once a sample size of 1,190 patients is reached, data will be analyzed to compare incidence of diarrhea and Clostridium difficile infection among study groups.

Learning Objectives:

1) Discuss the current role of probiotics in the primary prevention of Clostridium difficile infection.

Self Assessment Questions:

1) What is the current recommendation on probiotic use for the prevention of Clostridium difficile infection from the Infectious Diseases Society of America (IDSA) and the Society for Healthcare Epidemiology of America (SHEA)?
   A. Probiotics are not recommended to prevent primary Clostridium difficile infection, as there are limited data to support this approach and there is a potential risk of bloodstream infection
   B. Probiotics are recommended to prevent primary Clostridium difficile infection, though more studies are needed to support the recommendation of a specific probiotic strain
   C. Probiotics are not recommended to prevent primary Clostridium difficile infection, as current data suggests this approach is ineffective and results in unnecessary costs
   D. Probiotics are recommended to prevent primary Clostridium difficile infection, with most benefit likely from either Saccharomyces sp. or Lactobacillus sp.

Answer: A
To describe medication-related problems (MRPs) identified by community pharmacists in patients taking oral anticancer medications (OAMs).

It is estimated that OAMs account for a quarter of anticancer medications currently in development. In 2015, ten of seventeen newly approved anticancer medications are administered orally, OAMs demand increased patient responsibility, and adherence to OAMs has been reported to be as low as 16.8% and varies widely. Pharmacists in oncology clinic settings have improved adherence, identified MRPs, and made interventions in patients taking OAMs.

Community pharmacists at a large chain specialty pharmacy located within a medical center provide medication therapy management (MTM) services to patients prescribed OAMs. Orders are received on standardized oncology intake forms which include insurance information, cancer diagnosis, failed therapies, selected OAM with instructions, and other clinical assessment information. Patients are provided an initial MTM visit with a community pharmacist, which includes the functional assessment of cancer therapy-general 7 (FACT-G7), comprehensive medication review, and patient education on all prescribed medications. Ongoing follow up regarding MRPs occurs monthly and as needed.

Data will be collected retrospectively from patient charts created by the community pharmacists. Demographic information, concurrent disease states, maintenance medications, OAMs, FACT-G7 results, payor source, and MRPs will be collected. MRPs will be classified as follows: unnecessary drug therapy, needs additional therapy, ineffective/wrong drug, dosage too low, dosage too high, adverse drug reaction, and non-adherence. Descriptive statistics will be used to analyze data. IRB approval was obtained.

Research in progress. To date 31 patient charts are available for review.

Learning Objectives:

1) Describe a service in which pharmacists provide MTM to patients taking oral anticancer medications.

2) List seven categories of medication-related problems that may occur in patients taking oral anticancer medications.

Self-Assessment Questions:

1) Which one of the following regarding adherence to OAMs is true?
   A. It is reported to be as low as 5%
   B. It is reported to be as low as 16.8%
   C. It is not dependent upon patient factors
   D. It is mostly the responsibility of healthcare providers

2) All except which one of the following is a common type of medication-related problem?
   A. Experiencing a side effect from an oral anticancer medication
   B. Inability to adhere to treatment
   C. Filling the prescription with the wrong dosage of a medication
   D. Prescribing a dose that is too high

Q1 Answer: B    Q2 Answer: C

IMPLEMENTATION OF TOBACCO CESSATION SERVICES IN A CENTRALIZED OUTPATIENT SETTING

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Tobacco use contributes to many health conditions leading to hospitalization including respiratory diseases, cardiovascular diseases, and cancers. Hospitalization due to a tobacco-related condition may increase patient receptiveness to tobacco cessation interventions. While many patients are able quit tobacco during a hospitalization, they are likely to resume use post-discharge.

Tobacco-dependent patients hospitalized at Minneapolis VA must be contacted 15 to 30 days post discharge per Joint Commission national hospital inpatient quality measures. Patients are contacted to assess post-discharge tobacco use status and may be more receptive to tobacco cessation interventions at this time. If tobacco cessation medications were initiated during the hospitalization patients may benefit from extended follow-up counseling to aid in continued abstinence.

As the role of outpatient pharmacists are expanding, one area of opportunity is implementing clinical services in the centralized outpatient pharmacy. Having pharmacists in this setting providing tobacco cessation care can increase access to clinical services for patients. It also allows pharmacists an opportunity to provide advanced clinical services utilizing an independent scope of practice.

The purpose of this study is to assess the effects of tobacco cessation follow-up phone calls 15-30 days post-discharge to engage patients in a tobacco cessation program. A secondary purpose is to implement pharmacist-managed tobacco cessation services in an outpatient pharmacy setting. As well as create a training program for outpatient pharmacists to provide tobacco cessation case management. The objectives will be assessed through compilation of data obtained from patient phone calls and pharmacy staff feedback.

The results of the study will be used to implement a pharmacist-led tobacco cessation program in the MVAHCS outpatient pharmacy.

Learning Objective:

1) Develop steps to implement pharmacist-led tobacco cessation services in an outpatient setting

Self-Assessment Question:

1) What are the potential benefits of implementing pharmacist-led tobacco cessation services in an outpatient setting?
   A. Increase patient access to clinical services
   B. Decrease patient wait time
   C. Expand pharmacist roles in the outpatient pharmacy
   D. More intensive tobacco case management
   E. A, C, and D

Q1 Answer: E
To analyze the impact of procalcitonin (PCT) algorithm compliance on antimicrobial utilization in patients with lower respiratory tract infections.

Prompt and accurate diagnosis of bacterial infections continues to be challenging despite the availability of many inflammatory markers. Though delaying treatment is often associated with poorer outcomes, unnecessary exposure to antibiotic therapy is a financial burden to both the patient as well as the institution and increases the risk for adverse events such as *C. difficile* and acute kidney injury. In addition, the combined effects of antibiotic misuse and the gap in investigational antibiotic therapy is a significant public health concern.

In the hospital setting, PCT is used as a prognostic and diagnostic tool for early differentiation between bacterial and non-bacterial infections. It is widely accepted that up to 50% of antibiotic use in hospitals is considered to be inappropriate or unnecessary. Evidence from several randomized controlled trials have demonstrated that PCT can be used to safely decrease antibiotic use and guide appropriate duration of therapy for lower respiratory tract infections. However, observational studies are lacking and therefore there is little data regarding real-world use of PCT. In 2011, the Antimicrobial Stewardship Program at Nebraska Medicine implemented PCT protocols for LRTIs and sepsis. Compliance to the algorithm was assessed via a retrospective chart review to determine the impact of antimicrobial exposure on antibiotic adverse events, length of stay, 30-day readmission, hospital mortality rates, and cost. The results of this study will be used to characterize trends and improve our practice.

Learning objectives:

1) Describe the utility of procalcitonin in guiding antibiotic management for lower respiratory tract infections
2) List the advantages of using procalcitonin to reduce unnecessary antimicrobial exposure

Self-Assessment Question:

1) Procalcitonin has the strongest correlation with which of the following infections?
   A. Bacterial infections
   B. Fungal infections
   C. Viral infections
   D. None of the above

Q1 Answer: A

Learning Objectives:

1) Identify current guideline suggestions regarding interval between INR visits in stable patients.
2) Identify factors which may influence a patient’s ability to predict their INR value.

Self-assessment Questions:

1) 2012 CHEST guidelines suggest an interval not exceeding ___ weeks between INR determinations for stable, ambulatory patients.
2) Which of the following is/are factors which may influence a patient’s ability to predict their INR?
   A. Missed dose(s) of warfarin within the previous 1-2 weeks,
   B. Recent illness
   C. Recent medication change(s)
   D. Recent diet change(s)
   E. All of the above

Q1 Answer: 12 weeks    Q2 Answer: E
Venous thromboembolism (VTE) is a preventable complication of hospital stays. Prophylactic measures have been shown to reduce risk of VTE 45-63%. While all critically ill patients are at risk for VTE, obesity is an added, independent risk factor. Fixed dosing of enoxaparin is a popular choice for prophylaxis, but recent studies challenge the optimal dose in the obese population. Although there is a paucity of data collected in this patient subset, several trials have been completed in bariatric surgical literature. Pharmacokinetic and metabolic differences were noted when using heparinoids in obese patients. Weight based dosing strategies, up to 0.5 mg/kg of enoxaparin given twice daily, have been studied with no difference in side effect profile and favorable shifts in anti-Xa levels. Unfortunately, there are limited data related to patient outcomes. The current American College of Chest Physicians’ recommendations suggest using an increased dose in the obese population, but do not indicate a specific strategy.

This medication use evaluation including approximately 200 subjects will elucidate current practice for VTE prophylaxis of critically ill, obese patients at CHI Health Creighton University Medical Center. The primary purpose is to describe the dosing strategies used. Secondary endpoints include VTE and bleeding events. Logistic regression will be used to analyze potential risk factors’ correlation with identified events. Pharmacy billing data was used to identify enoxaparin orders. Records meeting eligibility criteria were analyzed. The results of this evaluation will be utilized to inform review of VTE prophylaxis protocols.

Learning Objectives:
1) Relate current VTE prophylaxis guidelines to current practice of VTE prophylaxis in bariatric patients.
2) Discuss weight based dosing strategies for VTE prophylaxis in obese patients.

Self-Assessment Questions:
1) The American College of Chest Physicians’ AT9 guidelines recommend ______________ dosing parameters for obese patients needing chemical prophylaxis with heparinoids.
   a. Standard
   b. 25 % increase over standard
   c. 30% increase over standard
   d. Increased

2) Bariatric surgeons have studied weight based dosing of enoxaparin and found no difference in bleeding rates with strategies as high as:
   a. 0.25 mg/kg total body weight daily
   b. 0.25 mg/kg total body weight BID
   c. 0.5 mg/kg total body weight daily
   d. 0.5 mg/kg total body weight BID

Q1 Answer: D  Q2 Answer: D
Abstract:
EKOS, EkoSonic Endovascular System, is a technique that enhances catheter-directed thrombolysis of clots in patients with pulmonary embolisms (PEs) and deep vein thrombosis (DVTs) by accelerating the fibrinolytic process with the application of ultrasound. In addition, peripheral heparin is administered during and post procedure to maintain anticoagulation. Presently, there is a lack of consistency in heparin dosing among clinical trials, manufacturer recommendations and providers performing EKOS. This inconsistency in heparin dosing has created confusion among pharmacy staff making it difficult to assess the appropriateness of heparin orders and provide high quality patient care.

The purpose of this study is to implement an evidence-based, standardized heparin dosing protocol for EKOS procedures. The study is a single-center project. A survey will be used to evaluate the knowledge and confidence of pharmacists in assessing the appropriateness of heparin dosing in EKOS. All pharmacists involved in verifying heparin orders for EKOS procedures will be included in the survey. Education will be provided to pharmacists after implementation of the protocol followed by a post implementation survey. A comprehensive chart review will be performed on all patients who received EKOS after implementation of the protocol to assess compliance of providers and pharmacists with the protocol.

Preliminary results are not yet available as the study is currently in the pre-implementation phase. The outcomes of this study is will allow the health care team to effectively assess for appropriateness of therapy and provide safe patient care to EKOS patients.

Learning Objective:
1) Explain the benefits of catheter directed thrombolysis treatments

Self-Assessment Question:
1) Which of the following is true regarding the EKOS procedures?
   a. Reduced dose of lytic
   b. Increased cost of therapy
   c. Longer hospital stay
   d. Intensive literature evidence supporting efficacy

Answer: A

Q1 Answer: A    Q2 Answer: D
UTLIZING THE ELECTRONIC MEDICAL RECORD TO FACILITATE ANTIMICROBIAL STEWARDSHIP
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Increased bacterial resistance to antibiotics has made treating infections challenging and costly for healthcare facilities and patients. The Society for Healthcare Epidemiology of America and the Infectious Disease Society of America advocate the use of antimicrobial stewardship programs as one of two strategies to prevent bacterial resistance. Utilizing a module in electronic health records that is updated in real time can quickly identify opportunities for antimicrobial stewardship interventions. Additionally, the various subtypes of antimicrobial stewardship utilized in this module could allow a healthcare facility to pinpoint areas that may require more training for the medical staff.

Antimicrobial stewardship pharmacist intervention documentation will be retrospectively collected from the electronic medical record system at SSM Health – St. Mary’s Hospital using an Excel based report. All applicable interventions will be analyzed. For the purpose of primary and secondary outcomes, patient data will be gathered including: number of antimicrobial stewardship interventions documented, content of documented interventions, subtype of intervention, whether the infection control module (ICON) was utilized, whether recommendations were implemented by physician, the method of communication to the physician, and time it took MD to respond to intervention.

The results of this study will be used to identify the utility of the ICON module located within the electronic health record and potentially identify areas that require further education for the medical staff regarding antimicrobial stewardship.

Learning Objectives:

1) Identify potential benefits of quality antimicrobial stewardship

Self Assessment Questions:

1) Which of the following represent clear benefits of quality antimicrobial stewardship in an inpatient setting?
   A. Decreased antibiotic cost
   B. Decreased mortality
   C. Decreased antibiotic resistance
   D. A and C

Answer: D

EVALUATION OF ENOXAPARIN TREATMENT DOSE CAPPING AND BLEEDING RATES: A FOCUS ON OBESITY AND RENAL IMPAIRMENT AT THE UNIVERSITY OF IOWA HOSPITALS AND CLINICS. Alex Mersch, PharmD and Jamie Smelser, BS Pharm, PharmD. University of Iowa Hospitals and Clinics, 200 Hawkins Drive, CC101GH, Iowa City, IA 52242. Alex-mersch@uiowa.edu

To describe current treatment dosing patterns of enoxaparin for obese and renally impaired patients.

Enoxaparin has specific dosing recommendations for its FDA-approved indications but lacks compelling evidence for dose adjustments in patients with moderate renal impairment (creatinine clearance 30 to 60 mL) and/or obesity. Weight-based treatment doses of enoxaparin in patients with obesity and lack of adjustment in dosing in patients with moderate renal impairment may cause supra-therapeutic levels and lead to bleeding. Debate exists as to whether the capping of enoxaparin treatment doses is an appropriate strategy in patients with obesity due to the paucity of data. Analysis of dosing in these patient populations may help determine appropriate dosing recommendations for these patients thereby improving standardization and quality of care provided to patients.

A retrospective chart review from 2012 - 2015 of the University of Iowa Hospitals and Clinics inpatients that have received enoxaparin treatment doses has been undertaken. The intent is to compare treatment dosing patterns in patients with obesity vs. patients with moderate renal insufficiency vs. patients with both conditions vs. “normal” patients. Assessment of the following will be made: indication; length of therapy; dosing in mg/kg; incidence and severity of bleeding; incidence of new (or continued) thrombosis; anti-factor Xa levels. Demographic variables, concurrent medications, dose changes, and other variables will also be collected. Data will be analyzed for safety, cost, and quality improvement opportunities.

Learning Objectives:

1) Describe the current evidence available for accumulation of enoxaparin in patients with morbid obesity and/or moderate renal impairment
2) Discuss the current evidence available for capping of weight based dosing

Self-Assessment Questions:

1) In regards to enoxaparin, marginal increases in anti-
   Factor Xa begin at a creatinine clearance of:
   A. 50 -80 mL/min
   B. 30 – 50 mL/min
   C. 15-30 mL/min
   D. < 15 mL/min

   Answer: B

2) Enoxaparin levels may accumulate in patients with
   obesity secondary to
   A. Decreased clearance with increased body weight
   B. Decreased ratio of total body water to adipose tissue
   C. Distribution into adipose tissue
   D. Decreased volume of distribution

Q1 Answer: A  Q2 Answer: B
To improve patient recruitment into clinical trials by analyzing current recruitment and implementation of newly optimized recruitment methods.

Many health systems choose to participate in clinical trials for their patients. Frequently, individual sites are responsible for recruiting patients to participate in clinical trials as contract research organizations and industry-sponsored recruitment is very expensive. Recruitment methods at this health system prior to this study included postcards, letters, automated telephone calls, or referral by a physician. Our goal was to increase patient enrollment into clinical trials by improving the current methods utilized to recruit participants. Evaluation of current recruitment methods was completed by organizing a focus group and survey to identify patient preferences so meaningful improvements may be incorporated.

Following the focus group and quantitative survey results, there were many areas of improvement and untapped potential identified in clinical trial recruitment. One area that was missing from the recruitment tools is personal connection to the target audience. Current participants recognized there are a variety of motivating factors for clinical trial participation including altruism, medical benefit, or financial incentives, and yet none of these were routinely addressed in the letters, postcards, or automated telephone calls. The focus group also highlighted the ability to communicate electronically via email has not been utilized, but warned to do so purposefully and personally.

Final optimization of current tools and careful consideration for new methods of recruitment have been ongoing and patient response rates are continually measured, emphasizing how to better communicate with patients.

Learning Objectives:

1) Following this presentation participants will be able to determine methods to optimize patient recruitment for clinical trials
2) Following this presentation, participants will be able to identify potentially new areas a pharmacist may contribute to patient care through clinical trial involvement

Self-Assessment Questions:

1) In this study’s focus group, which potential method of recruitment was poorly embraced?
   A. Letters
   B. Physician Contact
   C. MyChart
   D. Email

2) In which areas may pharmacists assist with clinical trials within a health system?
   A. Educating potential patients on their disease
   B. Storing and dispensing study materials and medication
   C. Collaborating with clinical trials department to improve patient recruitment
   D. Journal clubs and presentation on new investigational drugs
   E. All of the above

Q1 Answer: C  Q2 Answer: E
**EVALUATION OF THE MANAGEMENT OF STAPHYLOCOCCUS AUREUS BACTERIURI A**  
**By** Astyn Miller  
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*Staphylococcus aureus* is a frequent pathogen in bacteremia, associated with complications such as endocarditis, osteomyelitis and death. *S. aureus* bacteremia (SAB) is a disease which carries heavy burden if not recognized and treated appropriately. Concomitant *Staphylococcus aureus* bacteriuria (SABU) has been linked to more complicated SAB infections and the plausibility of an association between SABU and SAB has been investigated. The results have led to two theories: SABU as a consequence of SAB and SAB as a consequence of SABU. Regardless of the index event, the consequences of SAB on the health care system include higher costs, longer hospital stays and greater risk of mortality when compared to non-*Staphylococcus aureus* bacteremias.

The objective of this study is to evaluate proper recognition and management of SABU by medical staff at our institution, as well as identify potential complications. Clinicians’ intervention will be evaluated for appropriateness. The readmission rates for subsequent complications of SAB were collected.

This study is a single-center, retrospective chart review at the University of Arkansas for Medical Sciences (UAMS) of patients hospitalized from August 2012-October 2015. Inclusion criteria included positive monomicrobial urine culture for *S. aureus*, inpatient admission during study period and age ≥18 years of age. Data collected included information on infection, presence of urinary symptoms, treatment of SABU, and readmissions for complications of invasive *Staphylococcus* disease. Results will be presented using descriptive statistics.

**Learning Objectives:**

1) Describe the role of *S. aureus* bacteriuria as an indicator for *S. aureus* bacteremia  
2) Identification and management of SABU can be a target for stewardship interventions

**Self-Assessment question:**

1) Bacteriuria has been associated with:  
   A. SA related complications  
   B. Worse outcomes  
   C. A primary source for SAB  
   D. A hematogenous result of SAB  
   E. All of the above

2) Patients who develop symptoms of urinary tract infections  
   A. Have worse outcomes than those without symptoms  
   B. Have better outcomes than those without symptoms  
   C. Can be treated solely as a urinary tract infection without concern for SAB

**Q1 Answer:** E **Q2 Answer:** B

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**COMPUTER-GUIDED BLOOD GLUCOSE MANAGEMENT SOFTWARE FOR INSULIN DRIP ADMINISTRATION, BLOOD GLUCOSE CONTROL AND MONITORING IN POST-CARDIOVASCULAR SURGERY PATIENTS**  
**By** Andrea Miskimins  
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Glycemic control in the perioperative stages of cardiac surgery has been associated with positive patient outcomes including a lower rate of recurrent wound infections, ischemia, atrial fibrillation, as well as a shorter postoperative length of stay. Mercy Hospital recently completed a pilot program utilizing a computer-guided blood glucose management software (CGMS) to direct insulin drip administration in post-surgical cardiovascular patients. This software provides insulin drip rate, blood glucose monitoring, and subcutaneous insulin recommendations based on individual patient physiology and response to software recommendations. Similar insulin-related recommendations for this patient population were provided by nursing, diabetes educator, pharmacy, and physician driven protocols prior to the implementation of the software.

The primary objective of this review is to compare the former insulin drip management strategy with the new CGMS to determine which method more quickly achieves and subsequently maintains tighter glucose control. The secondary objectives are to quantify hypoglycemic events amongst the two management strategies, to analyze which strategy allows for earliest transition to subcutaneous insulin, to determine care team deviations from CGMS recommendations, and to compare frequency of blood glucose checks required with the management strategies.

Thirty patients in the pre- and post-CGMS implementation groups will be selected randomly from a report of all patients that underwent cardiovascular surgery and were maintained on insulin drips between the dates of October 2015 through February 2016. Data for this review will be obtained by retrospective patient chart evaluation and by processing reports retrievable through the CGMS analytics software.

Results of this review will reveal how the CGMS compares to the former protocol for blood glucose control and the secondary outcomes. This review may also uncover opportunities for pharmacist intervention, in concert with the CGMS, to improve the management of blood glucose in post-surgical CV patients.

**Learning Objective:**

1) Describe the importance of glycemic control in the perioperative stages of cardiac surgery.

**Self-Assessment Question:**

1) Glycemic control is imperative in post-surgical cardiovascular patients in order to:  
   A. Contribute to a lower hemoglobin A1c overtime  
   B. Decrease postoperative complications, including length of stay  
   C. Decrease nursing workload  
   D. Prevent all hypoglycemic events

**Answer:** B
Outcomes following heart transplant (HT) depend heavily on maintenance immunosuppression wherein the challenge remains to optimize efficacy while minimizing drug-related adverse effects. Advancements in immunosuppressive agents have allowed transplant centers an opportunity to examine the feasibility of steroid withdrawal, given the well-documented deleterious effects of chronic corticosteroid therapy. The purpose of this retrospective study was to evaluate the safety and efficacy of the HT steroid wean protocol (SWP) at Houston Methodist Hospital.

HT recipients more than 1 year post-transplant who underwent the institution’s SWP between 2013 and 2015 were reviewed. Steroid weaning was initiated at prednisone 5 mg daily, and then decreased by 1 mg per day every 2 weeks until complete discontinuation by week 9. Patients were monitored with Allomap™, echocardiogram, and endomyocardial biopsy (EMB) per protocol.

Thirty-six HT patients (55.8 ± 10.8 years, 77.8% white, 69.4% male) an average of 5.5 years post-transplant met inclusion criteria. Maintenance immunosuppression consisted predominantly of tacrolimus (83.3%) and mycophenolate (88.9%). Overall, 88.9% (n=32) patients were successfully weaned off steroids; of these, 75% (n=24) remain steroid-free at last follow-up. The most common reason for SWP discontinuation was patient intolerance. The incidence of acute cellular rejection (ACR), defined as biopsy-proven ISHLT grade 2R or higher, was 5.6% (n=2/36), and 10.3% (n=3/29) at 4 weeks and 1 year, respectively.

Our data suggests that the SWP was not associated with excessive rates of ACR and may be a reasonable option for clinically stable HT recipients, given current immunosuppressive agents and available monitoring with Allomap™ and EMB.

Learning Objectives:

1) Understand the rationale of a steroid wean protocol (SWP) in heart transplant recipients
2) Describe clinical outcomes of a SWP in heart transplant recipients more than 1 year post-transplant

Self-Assessment Questions:

1) Steroid withdrawal may be considered in HT recipients for the following reason(s):
   A. Increased risk of rejection and development of de novo donor specific antibodies
   B. Adverse effects of chronic steroid use such as weight gain, hypertension, osteoporosis, and others
   C. Frequent drug level monitoring needed to determine correct prednisone dose
   D. Drug interactions with other immunosuppressive agents

2) Following completion of the SWP, patients showed:
   A. Excessive rates of clinically significant ACR in the first year post-SWP
   B. Acceptable rates of clinically significant ACR in the first year post-SWP
   C. A decrease in all-cause mortality
   D. An increase in all-cause mortality

Q1 Answer: B  Q2 Answer: B

Rapid sequence intubation is a commonly utilized technique to ensure patent airways in non-responsive and respiratory distressed patients. Following successful intubation, emergency department practitioners are often faced with the task of stabilizing the patient in terms of analgesia, sedation and hemodynamics. Of the many inducing agents a practitioner has at their disposal, ketamine is unique in that it possesses analgesic and positive hemodynamic properties. The purpose of this study is to assess the effects that ketamine has on the direction of post-intubation treatment (i.e. amount of administered fentanyl and propofol) as well as hemodynamic stability.

This retrospective study will evaluate the effects of a ketamine bolus or continuous infusion on a myriad of outcomes. A patient sample will be pooled by filtering patient charts for concurrent propofol and fentanyl use in patients intubated in the emergency department between July 1st and December 31st 2015. Eligible patients will be categorized as receiving either no ketamine, non-dissociative dose ketamine (< 1 mg/kg bolus) or dissociative dose ketamine (> 1 mg/kg bolus or infusion). The primary outcome will be measured by assessing the number of titrations and total amount of fentanyl and propofol utilized post-intubation. Other measures to be evaluated include the presence or absence of post-intubation hemodynamic instability (i.e. SBP < 90 mmHg, 20% decrease in SBP, MAP < 65 mmHg, or use of a vasopressor) and the amount of time spent in the emergency department.

Learning Objectives:

1) Establish the appropriateness of the utilization of ketamine for rapid sequence intubation in Truman Medical Center’s emergency department.
2) Assess ketamine’s effects on post intubation management and outcomes.

Self-Assessment Questions:

1) Which of the following is not an example of post-intubation hemodynamic instability?
   A. Use of a norepinephrine drip to maintain stability 5 minutes post-intubation
   B. A blood pressure of 92/40 mmHg 10 minutes following intubation
   C. A blood pressure drop from 104/70 to 92/60
   D. A blood pressure drop from 104/70 to 92/60 mmHg 2 minutes following intubation

Answer: C
EVALUATING ADHERENCE TO PRACTICE GUIDELINES AND TREATMENT OUTCOMES IN PHARMACIST-BASED MANAGEMENT OF PATIENTS WITH HEPATITIS C. Kelsey Morris, Evan Gahan, Patrick Spoutz, Lauri Witt, and Jamie Guyear, Kansas City Veterans Affairs Medical Center, 4801 Linwood Blvd., Kansas City, MO 64128. kelsey.morris@va.gov

Expanding the role of clinical pharmacists in the ambulatory clinic setting has been demonstrated to improve access to care as well as enhance clinical and economic outcomes. While clinical pharmacists have been providing direct patient care in a variety of areas for over a decade, their role and utility continue to expand. Currently, there is limited literature evaluating the impact of pharmacists in treating hepatitis C. Therefore, the primary objective of this research is to evaluate the rate at which clinical pharmacists in the pharmacy-based hepatitis C clinic at the Kansas City Veterans Affairs Medical Center adhered to practice guidelines outlined by AASLD/IDSA, to assess the role of pharmacists in the management of patients with hepatitis C, and evaluate the impact of pharmacists on the treatment outcomes of cumulative SVR rates, drug-drug interaction avoidance, and medication adherence.

A retrospective chart review of pharmacist interventions involving drug-drug interaction management and avoidance, assessment of hepatitis A and B immunity status, adherence rates and completion of laboratory parameters was performed. Data was obtained through the Computerized Patient Record System, which was extracted through Structured Query Language. A time frame of December 1, 2014 to December 31, 2015 was selected based on the initial fill of hepatitis C medication. Patients were selected based on treatment therapy with ombitasvir/paritaprevir/ritonavir/dasabuvir or ledipasvir/sofosbuvir and included only those with HCV genotype 1 that were managed by a pharmacist.

It is expected that the utility of clinical pharmacists in the treatment of patients with hepatitis C will be demonstrated.

Learning Objective:
1) Describe the impact of clinical pharmacists in the management of drug-drug interaction avoidance with hepatic C treatment regimens

Self Assessment Question:
1) Which of the following commonly used medications can decrease the efficacy of ledipasvir/sofosbuvir if taken incorrectly?
   A. diphenhydramine
   B. omeprazole
   C. loratadine
   D. acetaminophen

Answer: B

EVALUATION OF TIME TO THERAPEUTIC ANTICOAGULATION BEFORE AND AFTER IMPLEMENTATION OF A MODIFIED HEPARIN DRIP PROTOCOL. Molly Mortenson, Jodi Wendte and Alicia Thole, 1325 South Cliff Avenue Sioux Falls, South Dakota 57117-5045. molly.mortenson@avera.org

The standard heparin drip protocol utilized at Avera McKennan Hospital is based on the 2008 CHEST guidelines. CHEST describes heparin resistance as a condition in which patients require greater than 35,000 units per day of heparin to achieve therapeutic anticoagulation. While the guidelines provide a definition of the condition, there are no specific recommendations on how to adapt heparin infusion rates for patients exhibiting heparin resistance and there is very little literature on how to overcome heparin resistance utilizing a modified heparin drip protocol to ensure timely therapeutic anticoagulation. Therefore, the pharmacy department at Avera McKennan developed a modified heparin drip protocol for use in patients that have not achieved therapeutic anticoagulation at 24 hours despite following the institution’s standard protocol. This study evaluates for therapeutic anticoagulation at 24 hours and 48 hours. The group of patients prior to September 2015 were treated following Avera McKennan’s standard heparin drip protocol. The patients after September 2015 will follow the same protocol, but if therapeutic heparin levels have not been achieved at 24 hours, the pharmacist will recommend implementing Avera McKennan’s modified heparin protocol. The aim of this study is to evaluate the effectiveness of the modified heparin protocol in improving the time to therapeutic anticoagulation particularly in those patients that meet the definition of heparin resistance.

The results of this study will provide evidence to either support continued use of the modified heparin protocol as described in this study or identify the need for further evaluation or adjustments to the protocol.

Learning Objective:
1) Describe the management of a continuous heparin infusion to ensure timely therapeutic anticoagulation.

Self-Assessment Question:
1) Ensuring therapeutic anticoagulation from a continuous heparin infusion requires:
   A. Heparin infusion rate changes
   B. Heparin bolus doses
   C. Laboratory monitoring
   D. A & C
   E. All of the above

Answer: E
INPATIENT ALCOHOL WITHDRAWAL TREATMENT: A RETROSPECTIVE COHORT COMPARISON OF LORAZEPAM ALONE OR IN COMBINATION WITH GABAPENTIN. Marie Moser, Matt Schaecher, Teri Gabel, Amanda Herdzina, Michaela Hrdy, Donald Klepser. Veterans Affairs Nebraska-Western Iowa Health Care System, 4101 Woolworth Avenue, Omaha, NE 68105. Marie.moser@va.gov

The current standard of care for the treatment of alcohol withdrawal syndrome includes the use of benzodiazepines. The Alcohol Withdrawal (AW) Protocol at the Veterans Affairs Nebraska-Western Iowa Health Care System (VA NWIHCS) utilizes lorazepam as the primary benzodiazepine for symptom management through a titrated or tapering schedule based on the severity of symptoms.

In 2013, the VA NWIHCS AW Protocol was changed to include adjunctive gabapentin in addition to lorazepam with the intent to decrease benzodiazepine use and the severity of alcohol withdrawal symptoms. The primary objective of this study is to determine if adding gabapentin to lorazepam in the management of alcohol withdrawal symptoms decreases inpatient treatment duration and overall length of stay. The secondary objectives of this study are to determine if the addition of gabapentin decreases the quantity (in milligrams) of lorazepam utilized for the treatment of alcohol withdrawal symptoms, to analyze the magnitude of change, if any, in the alcohol withdrawal scale when adding gabapentin, and to determine if a patient’s response to treatment varies with multiple admissions.

A retrospective chart review and analysis was conducted from 1/1/2010 to 8/31/2015, using ICD-9 codes: 303 (alcohol dependence), 303.0 (intoxication), or 305.0 (abuse). The following data was collected and assessed: patient characteristics, length of stay, duration of treatment with the alcohol withdrawal protocol, quantities of lorazepam (in milligrams) utilized, and average change in alcohol withdrawal symptom score.

The results of this study will be utilized to evaluate clinical efficacy of the current AW protocol at VA NWIHCS.

Learning Objective:
1) Describe the significance of adding gabapentin to lorazepam in the treatment of alcohol withdrawal.

Self-Assessment Question:
1) What are the major concerns associated with benzodiazepine use in patients who require alcohol withdrawal treatment?
   A. The potential for abuse
   B. The ability to decrease the effects of alcohol upon re-initiation of drinking
   C. The requirement for hepatic metabolism in patients at an increased risk of liver damage/cirrhosis
   D. Both a and c

Answer: D

EVALUATION OF THE CONTRIBUTORY RISK FACTORS OF PATIENTS PRESENTING WITH ANTICOAGULATION RELATED ADVERSE EVENTS. Jill Mutziger, Ondrea Levos, HealthEast Care System St. John’s Hospital, 1575 Beam Avenue, Maplewood, MN 55109. jmmutziger@healtheast.org

Warfarin is a safe and effective anticoagulant for a majority of the patient population. However, patients on warfarin therapy continue to present to the emergency department or are directly admitted from the ambulatory care setting with significant bleeding or clot related events. Anticoagulants, including warfarin, consistently appear as one of the most common medication classes associated with adverse events in the HealthEast Care System. Currently, HealthEast Anticoagulation Clinic manages outpatient warfarin therapy for over 2500 patients. The purpose of this project is to identify patients who are managed by the HealthEast Anticoagulation Clinic that experience an anticoagulation related event which instigates hospital care and evaluate contributory variables that may have affected this therapy. Additionally, data will be assessed for trends that can target opportunities for improvement such as renewed prescriber education or increased communication between the inpatient and outpatient setting.

The study design will utilize a retrospective chart review of patients who presented to the emergency department or were directly admitted to a HealthEast hospital. Criteria will exclude patients who are not followed by the HealthEast Anticoagulation Clinic. Data collection will begin September 1, 2015 and end after 50 patients have been identified or after 6 months, whichever occurs first. The results of this data collection will be reviewed to determine if there are quality improvements that can be made to increase patient safety across the continuum of care.

Learning Objective:
1) Identify common risk factors associated with anticoagulation related adverse events

Self-Assessment Question:
1) Which of these medications have a known drug-drug interaction with warfarin?
   A. Amiodarone
   B. Ciprofloxacin
   C. Omeprazole
   D. Only A and B
   E. All of the above

Answer: E
Fluid resuscitation therapy (FRT) is designed to optimize stroke volume or preload to maximize perfusion and reduce organ failure. Although FRT is recommended in treating most types of shocks, there are no guidelines or recommended best practices that define optimal length of therapy or parameters to guide discontinuation. Surviving Sepsis Campaign recommends crystalloids 30ml/kg for resuscitation but provides no guidance on maintenance fluids therapy and duration. Studies have shown prolonged fluid administration results in increased mortality and morbidity in critically ill surgical and trauma patients; and is an independent risk factor for mortality in severe sepsis. Approaches used to monitor hemodynamic management and assess fluid status, such as central venous pressure (CVP), base deficit and transcardiopulmonary thermodilution, are currently limited due to either inaccurate results or complications. The optimal length of fluid therapy in critical care patients remains controversial and is not based on evidence-based medicine.

The purpose of this study includes examining the prescribing pattern of IV fluids maintenance therapy and duration. Studies have shown prolonged fluid administration results in increased mortality and morbidity in critically ill surgical and trauma patients; and is an independent risk factor for mortality in severe sepsis. Approaches used to monitor hemodynamic management and assess fluid status, such as central venous pressure (CVP), base deficit and transcardiopulmonary thermodilution, are currently limited due to either inaccurate results or complications. The optimal length of fluid therapy in critical care patients remains controversial and is not based on evidence-based medicine.

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Learning Objectives:

1) Describe risk of volume overload on ICUs mortality and morbidity
2) Discover prescribing pattern of IV fluids maintenance therapy and its complications on ICUs populations

Self-Assessment Question:

1) Studies show that prolonged fluid administration with positive fluids balance in ICUs populations can lead to:
   A. Improved outcomes and reduce risk of acute kidney injury
   B. Reduced duration of ICU stay and improved population outcome
   C. Increased use of diuretics but reduced ICU stay and complications
   D. Increased risk of mortality and prolonged ICU stay

Answer: D

Self-Assessment Questions:

1) All of the following are potential opportunities to improve severe alcohol withdrawal protocol compliance EXCEPT:
   A. Minimum dose requirements for first-line therapy prior to protocol escalation
   B. Targeting lower SAS goals of ≤2 to ensure patients are not agitated
   C. Staff education for those directly involved in patient care
   D. Maximum duration of therapy for second line agents (i.e. dexmedetomidine), with pharmacy monitoring and follow-up

2) What are the potential consequences of not following a written protocol for the treatment of severe alcohol withdrawal?
   A. Longer length of ICU stay
   B. Increased cost of patient care
   C. Inadequate or over-sedation of the patient
   D. All of the above

Q1 Answer: B  Q2 Answer: D

Evidence-based guidelines for the prevention or treatment of severe alcohol withdrawal syndrome (SAWS) in critically ill patients are currently lacking. Benzodiazepines (BZDs) are generally accepted as the cornerstone of therapy, while agents such as phenobarbital and dexmedetomidine are reserved for BZD-refractory patients. Previous research collected at our community hospital indicates that adjunctive therapies are often employed before adequate trials of BZDs.

The primary objective of this study is to improve SAWS protocol adherence through targeted order-set interventions, provider education, and enhanced electronic safeguards. Secondary objectives include decreasing ICU length of stay (LOS) and reducing early or inappropriate use of second-line agents.

Medical records of 66 patients admitted to the ICU at our hospital and treated for SAWS from August 2011 to October 2013 were reviewed in phase one data analysis. Patients' hospital course, medical management, and sedation and agitation scores were documented. Revisions to the SAWS protocol were then made and education was provided prior to the start of phase two. At the completion of phase two data collection, a comparison of phase one and phase two results will be conducted to assess changes in prescribing practices, order-set adherence, and dexmedetomidine use.

Preliminary results from phase one data show that, of the sixty-six patients evaluated, 35 (53%) received dexmedetomidine for SAWS. Of those 35 patients, 21 (60%) did not receive concomitant BZDs during dexmedetomidine administration. Patients who received dexmedetomidine had longer ICU and hospital LOS versus those who did not (9.8 vs. 3.9 days and 18.3 vs. 9.3 days, respectively).

Learning Objectives:

1) Identify strategies to encourage protocol adherence for patients undergoing severe alcohol withdrawal.
2) Assess effectiveness of targeted order-set interventions for improving protocol adherence in patients undergoing severe alcohol withdrawal.

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USE OF PROCALCITONIN AS A BIOMARKER OF BACTERIAL INFECTIONS IN NEURO-INSULT PATIENTS.

Breaer Neff and Scott Taylor. Via Christi Hospitals Wichita, Inc., 929 N. St. Francis, Wichita, KS 67214. Breaer.Neff@viachristi.org

Critically ill patients commonly display signs and symptoms of systemic inflammatory response syndrome (SIRS) that can make it difficult to determine if a bacterial infection is present. Patients with a neurological injury can be a particular challenge in the diagnosis of septic complications. Procalcitonin (PCT) has been studied as a prospective novel biomarker for bacterial infections in general critical care patients; however, the usefulness of PCT in the neurocritical care arena has not been well established.

To determine if PCT can be utilized as a reliable indicator of bacterial infections in patients with neuro-insult.

A retrospective study based on data collected from routine hospital records at Via Christi Hospitals Wichita, Inc. from June 1, 2014 to May 31, 2015. Neuro-insult patients are defined as patients admitted to the neuro-critical intensive care unit and/or the surgical intensive care unit with intracranial hemorrhage, ischemic stroke, and/or diffuse axonal injury. The primary endpoint will determine if PCT levels drawn ≥ 48 hours after admission in patients with neuro-insult can be used as a reliable indicator for bacterial infection. Bacterial infection is defined as positive bacterial blood and/or respiratory culture. A PCT level < 0.25 mcg/L will be considered to correctly rule out a negative bacterial infection. The researcher’s hypothesis is that a PCT level > 0.25 mcg/L drawn ≥ 48 hours after admission will indicate a bacterial infection in patients with neuro-insult.

Results: Pending

Conclusion: Pending

IMPLEMENTATION OF PHARMACISTS IN DISCHARGE MEDICATION RECONCILIATION.

Joe Nekola, Michael Koraleski, Nebraska Methodist Hospital, 8303 Dodge St. Omaha, NE 68114. joe.nekola@nmhs.org

With the passing of the Affordable Care Act in 2010 and creation of the Hospital Readmission Reduction Program, hospitals have reallocated their focus to decreasing patient readmission rates while continuing to improve patient care. With the complexity of medication profiles in patients with multiple comorbidities such as COPD, diabetes, and cardiovascular disease, an opportunity for improvement exists to reduce medication errors and decrease readmission rates.

A pharmacist lead discharge medication reconciliation pilot was implemented at Nebraska Methodist Hospital telemetry unit to determine if involving pharmacists in discharge medication reconciliation could prevent medication errors and reduce hospital 30 day readmission rates.

Pharmacists conducted a multi-week study focusing on reviewing the appropriateness of patient medications upon discharge. Patients who received this service were discharged from the hospital’s telemetry unit during the month of January 2016 (n = 60). The discharge medication reconciliation process included patient assessment, medication review, patient interview/education, and clarification with providers. The study endpoints included 30 day readmission rates and medication discrepancy rates.

During the study, medication discrepancies were discovered and corrected in 25% of the study population (n =15). Patient readmission data will be analyzed once available.

Learning Objective:

1) Describe the reasoning behind including pharmacists in discharge medication reconciliation.

2) Report the occurrence rate of pharmacist lead interventions found in this study.

Self Assessment Questions:

1) What was the rate of medication discrepancies found in the study?
   A) 10%
   B) 15%
   C) 25%
   D) 40%

2) What is the primary reason behind including pharmacists in discharge medication reconciliation in our study?
   A) Decreasing inpatient medication errors
   B) Decreasing hospital readmission rates
   C) Improving patient satisfaction scores
   D) Providing patients with outpatient medications prior to discharge

Q1 Answer: C  Q2 Answer: B
Oral chemotherapy utilization is increasing and monitoring has become more complex. Patients in the hospital taking oral chemotherapy agents for non-oncology indications may require close monitoring. Prior to December 2013, the process for administering oral chemotherapy medications for non-oncology indications was not defined at Fairview Southdale Hospital. There were no clear policies on administration and lab monitoring for oral chemotherapy medications being utilized for non-oncology indications. A previous study at the hospital showed resources were not used consistently when verifying and administering oral chemotherapy medications to patients with non-oncology indications, potentially compromising patient and nurse safety. As a result, learning modules were created and a new administration process policy was implemented for oral chemotherapy medications. A reference tool was also created to help with lab monitoring and drug administration for oral chemotherapy agents.

The primary objective of this follow-up study is to evaluate if the policy on the administration and monitoring of oral chemotherapy agents for non-oncology indications is being followed. This will be assessed through the use of electronic health records (EHR) to determine if the correct labs were obtained compared to those required in the reference tool prior to drug administration and that appropriate administration procedures were utilized by nursing staff based on EHR documentation for oral chemotherapy agents. Based on the administration and monitoring data found, we will evaluate if labs were ordered appropriately and if there is further need for education to ensure administration of oral chemotherapy medications for non-oncology indications is done appropriately.

**Learning Objective:**

1) Discuss the impact of a policy on the appropriateness of administration procedures and monitoring of oral chemotherapy medications for patients receiving oral chemotherapy for non-oncology indications.

**Self-Assessment Question:**

1) Which of the following is not a limitation to the evaluation of appropriate oral chemotherapy administration?

A. Small sample group for data collection.
B. No permanent documentation for nurse administration of oral chemotherapy agents.
C. No permanent documentation of lab monitoring by pharmacists.
D. No permanent documentation of pharmacist verifying appropriateness of oral chemotherapy agents.

**Answer:** B.

**Learning Objective:**

1) Identify potential benefits of using an evidence-based decision algorithm for using the procalcitonin laboratory test

**Self-Assessment Question:**

1) Which of the following is CORRECT regarding the procalcitonin laboratory test as it pertains to its use to determine the likelihood and severity of infection?

A. PCT is cheaper to run in the lab than the other biomarkers
B. PCT is not affected by autoimmune conditions or glucocorticoid therapies
C. PCT has been extensively studied in the United States
D. PCT has been shown to be an accurate biomarker in all types of infection

**Answer:** B.
The presence of cancer is a well-recognized independent risk factor for venous thromboembolism (VTE). The risk for VTE also depends on the type of cancer with malignant brain tumors, hematologic malignancies, and adenocarcinomas representing the greatest risk for VTE. Although rivaroxaban has been found to be non-inferior to warfarin for the treatment of VTE, published medical literature only includes a small population of patients with active cancer. This is a single-center retrospective chart review conducted on patients with active cancer who were initiated on treatment with either rivaroxaban or enoxaparin between January 1, 2012 and August 31, 2015 for treatment of VTE. The purpose of the analysis is to determine the rates of recurrence of VTE in cancer patients being treated with rivaroxaban. The primary endpoint is a comparison of the rate of recurrent VTE in patients initially treated with rivaroxaban versus enoxaparin. The secondary endpoints include a comparison in the rates of major and minor bleeding. This study has been approved by the local institutional review board. Data collection and analysis are in progress.

Learning Objectives:

1) Explain current recommendations for treatment of VTE in cancer patients from the American Society of Clinical Oncology (ASCO) and National Comprehensive Cancer Network (NCCN).
2) Describe the need for further research with rivaroxaban in cancer patients for treatment of VTE.

Self-Assessment Questions:

1) What is the current recommendation from the ASCO and NCCN for treatment of VTE in cancer patients?
   A. Warfarin is recommended and has shown to be superior to LMWH in cancer patients
   B. Warfarin, rivaroxaban, apixaban, dabigatran, and edoxaban are all appropriate choices for treatment of VTE in cancer patients
   C. LMWH is recommended for the initial 5-10 days of treatment of established VTE in cancer patients as well as for long-term secondary prophylaxis for at least 6 months
   D. Rivaroxaban is the preferred agent for treatment of VTE in cancer patients

2) Why is further investigation of safety and efficacy of rivaroxaban for treatment of VTE in cancer patients necessary?
   A. Trials evaluating the rivaroxaban for use in treatment of VTE either excluded or only included a small number of patients with cancer
   B. Cancer patients have a higher rate of recurrence of VTE compared to non-cancer patients
   C. Use of rivaroxaban as a treatment option may lead to increased adherence due to once daily dosing and could be an option for those who are averse to injections
   D. All of the above

Q1 Answer: C  Q2 Answer: D
RISK FACTORS ASSOCIATED WITH IMMUNIZATION-RELATED ADVERSE EVENTS IN PREMATURE INFANTS IN A NEONATAL INTENSIVE CARE UNIT. Linda Nong and Carla Christensen, CHI Health Creighton University Medical Center-Bergan Mercy, 7500 Mercy Rd, Omaha, NE 68124 linda.nong@alegent.org

To evaluate risk factors associated with immunization-related adverse events in the neonatal intensive care unit (NICU).

Premature infants in the neonatal intensive care unit may require immunizations that are often delayed due to perceived worsening medical conditions following administration. These delays or omissions may be exposing them to preventable infections later in infancy and childhood. Acetaminophen dosing before vaccination may prevent reactions, yet this practice is currently not recommended. Defining risk factors associated with these vaccines will benefit patients by safely maintaining recommended immunization schedules. Additionally, clinicians will be more comfortable and informed when prescribing and administering immunizations.

A retrospective chart review study of NICU infants was completed. Inclusion criteria was infants less than or equal to 37 weeks gestation and with a length of stay greater than or equal to 45 days. Exclusion criteria included neutropenia, congenital anomalies, and discharge from hospital within the 48 hours of receiving immunizations. Data was collected for infants given immunizations while admitted to CHI Health Bergan Mercy from May 2007 through October 2015. Data collected consisted of gestational age, sex, birth weight, postmenstrual age and weight at time of immunization, and vaccines administered. Sepsis evaluations, concurrent and previous medical diagnoses, concurrent medication therapy, as well changes in respiratory status, vital signs, and route of feedings, were assessed within a data collection window of 24 hours before and 48 hours following immunization for a total window of 72 hours. Trends for risk factors associated with the immunizations will be determined through logistic regression analyses.

Learning Objective:

1) Identify risk factors associated with immunization-related adverse events in the NICU, if any.

Self-Assessment Question:

1) A perceived adverse event from immunizations given to premature infants that would cause a clinician to delay therapy is:
   A. Bleeding
   B. Rash
   C. Respiratory decompensation
   D. Weight loss

Answer: C

EVALUATION OF THE EFFICACY OF AN INPATIENT ELECTROLYTE REPLACEMENT PROTOCOL. Thomas Nowak, Kelly McMonigal. University of Minnesota Medical Center, Pharmacy Services F3 West Building, 2450 Riverside Ave., Minneapolis, MN 55454 tnowak2@fairview.org

Electrolyte replacement protocols are often implemented in the inpatient setting to ensure patient’s electrolyte levels are maintained within a predetermined, specified range. Often times, protocol-driven electrolyte replacement will decrease the time to replacement and improve the time a patient’s electrolytes will be within range, thus leading to decreased adverse events. Additionally, these order sets have the benefit of decreasing pharmacist and physician workload, allowing them to focus their time on more acute issues.

Electrolyte order sets may vary in intensity (low, medium, high), depending on how aggressive the physicians would like to be. Lower intensity regimens will only have replacement given when a patient’s electrolyte level reaches critically low levels. Conversely, higher intensity regimens are aimed at repleting electrolytes when they are only slightly below a desired level.

The objective of this retrospective study is to review electronic medical records to determine the efficacy of various electrolyte replacement protocols utilized in an inpatient setting. The primary objective will be to determine the percentage of time the patient remains within a predetermined range. Additionally, we aim to measure the amount of time the patient will be within range, the number of electrolyte orders a patient receives in a day, and to determine the time from lab value result to electrolyte replacement.

Learning Objective:

1) List the advantages to implementing an electrolyte protocol for both patients and healthcare providers.

Self-Assessment Question:

1) Electrolyte protocols are designed to:
   A. Decrease the time from a lab value results until replacement is given
   B. Increase the amount of time healthcare providers write for and spend verifying orders
   C. Increase the amount of time a patient’s electrolyte level is maintained within a specific range
   D. Both A and C

Q1 Answer: D
Heparin-induced thrombocytopenia (HIT) is a life-threatening, immune-mediated, prothrombotic condition affecting 0.2% to 5% of patients exposed to heparin. Accurate and prompt identification of HIT is essential in the setting of thrombocytopenia as there is a 5% daily risk of thrombosis if initiation of non-heparin anticoagulation is delayed. However, an early and definitive diagnosis is limited by the lack of implemented protocols, inter-rater variability of clinical prediction tools, the relatively low specificity of immunologic assays, and the technical complexity of platelet functional assays. Previous pharmacoeconomic research has revealed considerable costs associated with the overall management of HIT, but has not formally evaluated the potential cost implications of non-compliance with evidenced-based diagnostic practices.

The objective of this study is to estimate the costs associated with inappropriate utilization and interpretation of HIT diagnostics in critically ill patients with suspected HIT. Costs will be determined by calculating laboratory and medication expenses associated with deviation from an accepted HIT diagnostic pathway at one of three pre-defined steps. Secondary outcomes include the overall compliance with an evidenced-based HIT diagnostic pathway, the dose and duration of alternative anticoagulation therapy, bleeding events, thrombotic events, need for surgical intervention, ICU length of stay (LOS), hospital LOS, prevalence of hematology consultation, and appropriate presence or absence of heparin allergy in the electronic health record after final diagnostic results.

The results of this study will be used as a basis for policy implementation to guide HIT diagnosis and potentially reduce the overall economic burden of suspected HIT in the ICU.

Learning Objective:

1) Describe trends associated with inappropriate utilization and interpretation of HIT diagnostics in critically ill patients with suspected HIT.

Self-Assessment Question:

1) Which of the following is the most specific marker for diagnosis of heparin-induced thrombocytopenia?
   A. Platelet count fall > 50 percent with no other apparent causes for thrombocytopenia present
   B. A calculated 4-T’s score ≥ 6 points
   C. Detection of anti-platelet factor-4 (PF4)/heparin antibodies in patient serum
   D. Detection of platelet serotonin release in the presence of patient serum and heparin

Answer: D
Postoperative atrial fibrillation (POAF) is a potential complication common in surgical patients. It is most frequently seen in cardiac surgeries where the incidence of POAF is as high as 60%; however, POAF also occurs after non-cardiac surgeries with an estimated incidence of 0.3 to 13% depending on the type of surgery. Complications associated with POAF include stroke, death, and increased length of hospital stay. To date, strategies to optimize and standardize care of POAF for non-cardiac surgical patients have not been evaluated. An order set for the management of POAF following non-cardiac surgery was developed in 2014 to provide guidance and to standardize therapy at Mayo Clinic Rochester based on the most recent evidence.

The goal of this study is to retrospectively analyze the impact of this order set on management of non-cardiac surgical patients who develop POAF, particularly assessing the incidence of heart rate control at 24 hours after the initiation of atrial fibrillation therapy. Descriptive statistics will be calculated. Pearson’s chi-square test will be used to compare the percentage of patients having a controlled heart rate between groups. Other outcomes to be assessed include the incidence of cardiology consults, intensive care unit transfers, length of hospital stay and compliance with the order set.

The results of this study may help expand physician use of the POAF order set and optimize care of POAF. This study would add to the body of primary literature for management of POAF, specifically in the non-cardiac surgery patient population.

**Learning Objectives:**

1) Describe the impact of postoperative atrial fibrillation (POAF) in non-cardiac surgical patients
2) Review strategies for managing POAF following non-cardiac surgery

**Self-Assessment Questions:**

1) Which of the following have been associated with postoperative atrial fibrillation (POAF) in patients following non-cardiac surgery?
   A. Increased risk of stroke 30 days after surgery
   B. Increased length of hospital stay
   C. Decreased incidence of congestive heart failure
   D. Both A and B

2) Which of the following is NOT a part of the management of POAF in a non-cardiac surgery patient?
   A. Check electrolyte labs
   B. Diltiazem infusion is the preferred pharmacologic treatment agent for POAF in a patient with systolic heart failure
   C. The goal heart rate for the rate control strategy for atrial fibrillation management is between 80 and 100 beats per minute
   D. If atrial fibrillation lasts longer than 48 hours, anticoagulation should be considered

**Q1 Answer:** D  **Q2 Answer:** B

**Effects of Initiating Long-Acting Injectable Antipsychotics on Hospitalization Rates**

Schizophrenia is a psychiatric disorder associated with poor social and health-related outcomes and requires lifelong medical treatment. There is an established correlation between medication non-compliance and hospitalization rates among schizophrenic patients. It has been postulated that long-acting injectable antipsychotics may address noncompliance in this population. Several studies have examined the effects of long-acting injectable antipsychotic formulations on hospitalization rates with mixed results.

To determine the effect of long-acting injectable antipsychotics on schizophrenia-related hospital admissions.

A retrospective chart review will be done to identify patients who had their first dose(s) of long-acting injectable antipsychotics during a hospital admission at Mosaic Life Care between January 1, 2015 and July 31, 2015. Further review will be done to determine the number of schizophrenia-related hospital admissions in the 6 months before and after this admission. Records of hospitalization will come from our institutional electronic medical record as well as the Lewis and Clark Information Exchange (LACIE) database. Hospitalization rates from 6 months before admission will be compared to the 6 months after admission in a mirror-image study design. The primary outcome will be the difference in hospitalization rates before and after initiation of a long-acting injectable antipsychotic.

**Learning Objectives:**

1) Understand the role of long-acting injectable antipsychotics in the treatment of schizophrenia
2) Summarize the literature regarding the effects of long-acting injectable antipsychotics on schizophrenia-related hospitalization rates

**Self-Assessment Questions:**

1) Which schizophrenic patient would likely benefit most from initiating a long acting injectable antipsychotic?
   A. A patient who is stable on oral antipsychotics and hates needles.
   B. A patient admitted to an inpatient facility for first occurrence of psychosis.
   C. A patient with frequent relapses of schizophrenia who is known to self-discontinue oral antipsychotics

2) Which statement is the most accurate regarding literature about the effect of long acting injectable antipsychotics on schizophrenia-related hospitalization rates?
   A. There is strong evidence that long acting injectable antipsychotics have an effect on hospitalization rates
   B. There is weak evidence that long acting injectable antipsychotics have an effect on hospitalization rates, but studies with a longer period detected more differences than shorter term studies
   C. There is no evidence that long acting injectable antipsychotics have an effect on hospitalization rates

**Q1 Answer:** C  **Q2 Answer:** B
Learning Objective:

1) Describe the efficacy and safety differences between mycophenolate and azathioprine when used as maintenance immunosuppressive therapy following lung transplantation.

Self-Assessment Question:

1) Robust data from prior studies in lung transplant patients have established mycophenolate to be superior to azathioprine in regards to which of the following outcomes:
   A. Rates of rejection
   B. Rates of graft survival
   C. Rates of infection
   D. None of the above

Answer: D
FREQUENT PHARMACIST MEDICATION REVIEW IN A LONG TERM CARE FACILITY TRANSITIONAL CARE UNIT. Jenna Pakala, Mark Dewey, Lake Region Healthcare, 712 Cascade Street South, Fergus Falls, MN 56537. Jenna.Baumler@ndsu.edu

Upon discharge from the hospital, it is common for patients to be admitted to transitional care units (TCUs) of long term care facilities (LTCFs) where they receive skilled nursing services before returning to the community. Pharmacists perform a drug regimen review on these patients every 30 days as required by CMS. For some residents, the length of stay in the TCU may be shorter than one month. Therefore, residents may be discharged before having their medications reviewed by a pharmacist. Medication discrepancies are common upon hospital discharge and studies have shown that pharmacist services are beneficial in reducing medication errors.

The purpose of this study is to evaluate the frequency and type of nursing and provider recommendations made with weekly versus monthly medication reviews completed by a pharmacist in the TCU of one nursing facility. A secondary purpose is to determine how many patients are discharged from the TCU before receiving the monthly drug regimen review from a pharmacist. Data were collected for the 25 residents admitted to the TCU during the four month period prior to the study. The average length of stay for residents in the TCU was 31.76 days and 32% of residents were discharged before receiving the monthly pharmacist medication regimen review.

These objectives will be assessed weekly by a pharmacist in one nursing facility for all TCU patients over a 4 month time period.

The results of the study will be used to provide more information on pharmacy services in LTCFs.

Learning Objective:
1) Identify medication errors upon discharge from an institution to a LTCF

Self-Assessment Question:
1) Which of the following best describes a medication error resulting from a care transition?
A. A patient is discharged from the hospital on Apixaban 2.5 mg BID, but the LTCF medication administration record indicates Apixaban 2.5 mg daily
B. Ibuprofen is ordered for a resident with an NSAID allergy after a provider visit at the LTCF
C. A resident is discharged home after staying in the TCU and becomes non-adherent to several medications
D. A resident in the TCU develops increased drowsiness after a dose increase in their antidepressant medication

Answer: A

IMPLEMENTATION OF A PHARMACIST IN AN OUTPATIENT PSYCHIATRIC CLINIC. Amanda Owen, Tonya Gross, Anne Morstad, Avera McKennan Hospital & University Health Center, 1325 S. Cliff Avenue, P.O. Box 5045, Sioux Falls, SD 57117 amanda.owen@avera.org.

The primary objectives of this study are to develop and measure the impact of a pharmacist in an outpatient psychiatric clinic, and to justify the funding of a full time employee (FTE) pharmacist position in an outpatient psychiatric clinic.

This study is a prospective cohort evaluating adults admitted to Avera Behavioral Health Center (ABHC) from October 19th, 2015 through February 19th, 2016. Patients are evaluated on admission and discharge for meeting criteria of “high risk” for readmission. Within the collaborative practice agreement for inpatient psychiatrists, a pharmacist will meet with all patients who are considered “high risk” for readmission on discharge to schedule an appointment. The patient will then have an appointment within 7 days of discharge in order to meet the National Committee for Quality Assurance (NCHQA) guidelines for follow up appointments. During the pharmacist clinic visit, a pharmacist assesses suicidality using screening tools, reviews the discharge medication list with the patient to evaluate side effects, compliance, and efficacy, consults with physicians to make medication changes if needed, and encourages compliance with future follow up appointments. The clinic summary is documented within the patient’s electronic medical record (EMR) for the psychiatrists to view. The analysis will focus on pharmacist interventions, evaluating cost savings through the pharmacist clinic, and 30 day readmission rates.

The results from this study will be used to determine if a full time pharmacist position can be implemented in the outpatient psychiatric clinic at ABHC to reduce readmission rates and improve patient compliance.

Learning Objectives:
1) Identify patients who meet criteria of “high risk” for readmission.
2) Discuss the impact of implementing a pharmacist in an outpatient ambulatory psychiatric clinic.

Self-Assessment Questions:
1) Which of the following criteria qualifies a patient as “high risk” for readmission?
A. Readmitted within 90 days of discharge
B. Two admissions in the past year
C. New start on an antipsychotic
D. Patient utilizing multiple pharmacies

2) What guidelines does a pharmacist impact in an outpatient ambulatory psychiatric clinic?
A. National Committee for Quality Assurance (NCHQA)
B. Better Outcomes by Optimizing Safe Transitions (BOOST)
C. Center for Medicare & Medicaid 30-day readmission
D. A & C

Q1 Answer: C Q2 Answer: D
Alcohol withdrawal is a potentially life-threatening complication of alcohol abuse requiring pharmacological management. Patients who receive the Adult Alcohol Withdrawal protocol are subjected to potentially unnecessary therapy with five days of scheduled benzodiazepines. This practice may lead to serious adverse effects as well as increases in intensive care unit (ICU) and hospital length of stay (LOS). Phenobarbital exhibits characteristics of an effective alternative or adjunct agent for the treatment of alcohol withdrawal and has been shown to reduce the amount of benzodiazepines required. Reducing the amount of benzodiazepines administered can reduce adverse drug events and improve patient safety.

The purpose of this study was to evaluate the use of intravenous (IV) phenobarbital as adjunct treatment for alcohol withdrawal in the emergency department (ED) and its impact on benzodiazepine administration throughout hospital admission. The primary outcome was cumulative dose of benzodiazepines administered and the secondary outcomes were ICU admission, ICU LOS, and hospital LOS.

Patients were identified via the Healthcare Enterprise Repository of Ontological Narration (HERON) database. Eligible patients were included if they received IV phenobarbital or IV lorazepam in the ED and had the Adult Alcohol Withdrawal protocol ordered between October 1, 2012 and October 1, 2015. Exclusion criteria included age less than 18, pregnancy, and the administration of a continuous infusion benzodiazepine.

The results of this study will be used to evaluate how the treatment of alcohol withdrawal in the emergency department impacts benzodiazepine administration throughout hospital admission.

Learning Objectives:

1. Describe the characteristics of phenobarbital that are advantageous for treatment alcohol withdrawal.
2. Identify the potential benefits of phenobarbital in the management of alcohol withdrawal.

Self Assessment Questions:

1. Which of the following characteristics of phenobarbital are advantageous for the treatment of alcohol withdrawal?
   a. More extensive hepatic metabolism compared to benzodiazepines
   b. Rapid onset and short half-life
   c. Sedative, hypnotic, and anticonvulsant properties
   d. B and C
2. Phenobarbital use in the treatment of alcohol withdrawal has been show to impact which of the following outcomes?
   a. Decreased ICU length of stay
   b. Decreased amount of benzodiazepines required
   c. Increased hospital length of stay
   d. Increased ICU admission

Q1 Answer: C  Q2 Answer: B

Learning Objective:

1) Recognize gaps that exist in current transitions of care services.

Self Assessment Questions:

1) Which of the following represents a significant gap in many transitions of care processes?
   A. Availability of outpatient care centers
   B. Communication between unaffiliated healthcare institutions
   C. Follow-up on new medications prescribed at discharge
   D. Both B and C.

Answer: D
IMPLEMENTATION OF A MULTIDISCIPLINARY PAIN MANAGEMENT BUNDLE IN ADULT INTENSIVE CARE PATIENTS AT A COMMUNITY HOSPITAL. Micaela Pamplin, Steven Blanner, and Maggie Hitzeman, Salina Regional Health Center, 400 S Santa Fe, Salina, KS 67401, mpamplin@srhc.com

Adult intensive care unit (ICU) patients routinely experience pain, both at rest and with routine ICU care. The current pain, agitation, and delirium (PAD) guidelines address the appropriate management of adult ICU patients and recommend best practices to improve clinical outcomes in these patients. The primary objective of this study is to optimize pain management in adult ICU patients at Salina Regional Health Center (SRHC).

Implementation of the multidisciplinary pain management bundle will include providing nursing education regarding current PAD guidelines, building the appropriate pain assessment tools into Meditech, requiring assessment of pain at least four times per shift, and updating current Meditech Critical Care Admit and Ventilator Bundle order sets to include appropriate pain management medications. Current practice at SRHC will be compared to practice after implementation of the pain management bundle by measuring percent of time patients are monitored for pain greater than four times per shift, compliance with appropriate pain assessment tools, percent of time patients are in significant pain, percent of time pain treatment is initiated within 30 minutes of detecting significant pain, percent usage of order sets, ICU length of stay, and hospital length of stay.

The results of the study will be used to implement changes at SRHC to improve pain management and outcomes in adult ICU patients.

Learning Objective:
1) Describe optimal pain management in adult ICU patients

Self-Assessment Question:
1) Which of the following are considered valid and reliable bedside assessment tools to measure pain in adult ICU patients according to the PAD guidelines?
   A. Numeric Pain Scale
   B. FACES Pain Scale
   C. Behavioral Pain Scale
   D. All of the above

Answer: D

MEDICATION RECONCILIATION QUALITY IMPROVEMENT PROJECT: A MULTIPHASE, MULTIDISCIPLINARY APPROACH TO IMPROVE TRANSITIONS OF CARE AND IDENTIFY HIGH RISK PATIENTS FOR MEDICATION THERAPY MANAGEMENT. Alison Parker, Rachelle Kunde, Andrew Willuweit, Justin Hartman, Toni Strand, Dodie Derynck, Cheryl Verschelde, Vickie Abel, Avera Marshall Regional Medical Center, 300 S Bruce St., Marshall, MN 56258. alison.parker@avera.org

Medication reconciliation is an important part of medication safety and transitions of care. Pharmacists have the ability to perform high-quality medication reconciliation, and pharmacist involvement in the process can help improve patient safety. In order to appropriately manage time and resources, risk stratification tools may be utilized to define the extent of pharmacist involvement. Identifying high risk patients during medication reconciliation also provides a unique opportunity to identify patients who may benefit from Medication Therapy Management (MTM) services. The purpose of this quality improvement project is to improve the accuracy of medication histories obtained upon admission, and to assess the possibility of using risk stratification to identify patients for outpatient MTM referral.

Medication histories obtained by nurses were audited for three weeks. A pharmacy resident obtained a best possible medication history, reviewed the home medication list obtained by the nurse, and documented any unintended discrepancies found in the home medication list. Upon review, 18 out of 22 medication histories (81.8%) contained one or more errors. The primary endpoint of this study is percent reduction in medication histories with one or more error(s). Secondary endpoints are type of error in the medication history, and percent increase in MTM appointments attributed to pharmacist referral during medication reconciliation.

Results of this study may show improved accuracy of inpatient medication histories by providing education and identifying high risk patients for pharmacist consult. Risk stratification may also increase referrals to MTM services.

Learning Objectives:
1) Discuss how to obtain a best possible medication history.

Self-Assessment Question:
1) Which of the following is considered a reliable source of information when obtaining a best possible medication history?
   A. Pill bottles
   B. A bystander who brings a patient to the emergency room after witnessing him/her fall
   C. Patient/caregiver
   D. A and C

Answer: D
The 2013 American College of Critical Care Medicine guidelines for the management of pain, agitation, and delirium in ICU patients provide a backbone for developing evidence-based protocols for management of sedation in mechanically-ventilated patients. Current practice at Saint Luke’s Health System includes an analgesia/sedation order set which helps drive the ordering of appropriate medications, but provides no uniform direction on how to conduct sedation vacations or for titration of these medications based on patient wakefulness.

The purpose of this study is to evaluate the effects of a new sedation protocol that will be implemented in mechanically-ventilated ICU patients.

This study has been approved by the Saint Luke’s Health System Institutional Review Board. A newly designed sedation vacation and titration protocol will be implemented in two health system ICUs at separate sites. The protocol provides nurses with specific instructions in regards to sedation vacations and titrations based on recorded Richmond Agitation and Sedation Scale (RASS) scores. This observational cohort will compare four month periods of data from pre- and post-implementation of the protocol. Data collected will include recorded RASS scores, duration of mechanical ventilation and ICU stay, cumulative usage of each medication, the rate of self-extubations, and compliance with each step of the protocol. A survey of the nursing staff’s opinions about the protocol will also be conducted at the completion of the study.

The results of this study will be used to evaluate the effects of implementing sedation vacation and titration protocols for mechanically-ventilated ICU patients.

Learning Objective:

1) Describe the impact of sedation vacation and titration protocols in mechanically-ventilated intensive care unit patients.

Self-Assessment Question:

1) Sedation vacation and titration protocols are:
   A. used in attempt to improve clinical outcomes such as duration of mechanical ventilation and duration of ICU stay
   B. used to further sedate patients to prevent wakefulness during the ICU stay
   C. used to increase documentation of sedation scores and usage of sedatives
   D. A and C

Answer: D
APPRAISAL OF ALTERNATIVE IMMUNOSUPPRESSION REGIMENS IN INTESTINAL TRANSPLANT RECIPIENTS: A SINGLE CENTER EXPERIENCE. Raksha Patel, Megan Keck, Dean Collier, and Mary Vacha, Nebraska Medicine, 981090 Nebraska Medical Center, Omaha, NE 68198, rpatel@nebraskamed.com

Since transplant centers individualize immunosuppression, the optimal regimen for intestinal transplant recipients is unknown. The standard protocol at Nebraska Medicine for intestinal transplant recipients consists of maintenance therapy with tacrolimus and corticosteroids. There are patients who are changed to alternative regimens, which may include cyclosporine, an antiproliferative agent, or an mTOR inhibitor.

The objective of this study was to evaluate outcomes in intestinal transplant recipients on alternative immunosuppression regimens. This was a retrospective review including those transplanted between January 2004 and December 2014. Patients were included if they received an isolated intestinal or a multivisceral transplant and were on initiated on our standard maintenance therapy. The primary outcome was the incidence of acute cellular rejection, and secondary outcomes included incidence of intestinal graft loss and mortality.

There were 222 intestinal transplant recipients included in the analysis. There was a significant difference in the incidence of acute cellular rejection in patients who were maintained on the standard immunosuppression regimen compared to patients that were converted to an alternative regimen (31% vs 47%, p = 0.013). Intestinal graft loss and mortality, however, were similar between both groups (16% vs 17%, p = 0.749 and 39% vs 41%, p = 0.755).

Patients who require immunosuppression regimen changes due to intolerance of tacrolimus and corticosteroids may have an increased incidence of acute cellular rejection but similar clinical outcomes in terms of intestinal graft loss and mortality.

Learning Objective:
1) Describe outcomes in intestinal transplant recipients receiving alternative maintenance immunosuppression regimens.

Self-Assessment Question
1) Alternative immunosuppression regimens in intestinal transplant recipients showed:
   A. No difference in outcomes related to acute cellular rejection, intestinal graft loss, and mortality
   B. An increased incidence in acute cellular rejection
   C. An increased incidence in intestinal graft loss
   D. A decreased incidence in mortality

Answer: B

EVALUATION OF A PHARMACY-DESIGNED ORDER SET FOR USE OF BLOOD FACTOR PRODUCTS TO REVERSE ORAL ANTICOAGULANTS. Roshni Patel, Teresa Cooper, Amanda Hembree, and Jacyntha Sterling, Saint Francis Hospital, 6161 S. Yale Ave., Tulsa, OK 74136, rpatel@saintfrancis.com

Novel oral anticoagulants (apixaban, dabigatran, edoxaban, or rivaroxaban) are widely used yet there is a lack of guidelines regarding optimal use of blood factor products for bleeding management. In contrast, warfarin has standardized guidelines to outline treatment of major bleeding events. Due to the limited and inconsistent information available for novel oral anticoagulants, there is a wide variety of prescribing practices for these products leading to confusion in emergent situations. Fortunately, the approval of idarucizumab has helped with this issue; however, factor products are still used for the other novel agents.

The primary objective of this study is to evaluate the impact of an order set designed to guide prescribing of factor products for the use of anticoagulant reversal in patients who are bleeding, at risk of bleeding, or require emergent surgery. A secondary objective is to evaluate anticoagulant therapy and hospital demographics.

A retrospective and prospective chart review was performed to assess which patients received factor products. Qualifying patients were divided into two groups based on whether the order set was used for prescribing. Data was collected on factor products, phytonadione, and adjunct treatments used for anticoagulant reversal. Times and doses of each factor product, idarucizumab, or phytonadione administered was collected. Doses were considered appropriate based on published recommendations.

The results of this study will be used to evaluate the efficacy of the implemented order set.

Learning Objective:
1) Report the occurrence of serious injuries due to oral anticoagulants.

Self-Assessment Questions:
1) Which of the following is true?
   A. Dabigatran and warfarin have an equal number of serious injury reports.
   B. Dabigatran has a fivefold higher risk of death than warfarin.
   C. Warfarin has a lower number of serious injury reports compared to rivaroxaban.
   D. Rivaroxaban has fivefold higher risk of death than warfarin.

Answer: B
Hospital readmissions cost the health care system $12.44 billion annually. The Affordable Care Act has established the Hospital Readmission Reduction Program which reduces payments to hospitals with excess readmissions. Conditions in the payment algorithm include: acute myocardial infarction (AMI), heart failure (HF), pneumonia, chronic obstructive pulmonary disease (COPD), and elective total hip/knee arthroplasty (THA/TKA).

The objective of this study is to determine if community pharmacist involvement in the transitions of care (TOC) process reduces readmission rates to the hospital for patients with AMI, HF, pneumonia, COPD, or THA/TKA.

This is a prospective, pilot-study involving Red Cross Pharmacy (RCP) patients discharged from Fitzgerald Hospital with a diagnosis of AMI, HF, COPD, pneumonia, or THA/TKA. TOC patients meet with a RCP pharmacist within 72 hours of discharge. During this encounter, the pharmacist provides a comprehensive medication review and disease state management education. The pharmacist follows up 7 days after the initial encounter to evaluate for side effects, drug related problems, adherence, and asks the patient for key information recalled from the previous visit. Patients are contacted on the 30th day after discharge to assess for hospital readmissions/ED visits and are asked to complete a satisfaction survey. Additional information is gathered related to the reasoning for any hospital readmissions identified.

Based on data collected from this study, RCP may promote incorporation of pharmacists in the TOC process and expand services to additional pharmacy locations and health systems.

**Learning Objective:**

1) Identify the five conditions included in the Hospital Readmission Reduction Program algorithm.

**Self-Assessment Question:**

1) Which of these is not included in the Hospital Readmission Reduction Program algorithm?
   A. Elective Total Hip Arthroplasty  
   B. Diabetes Mellitus  
   C. Chronic Obstructive Pulmonary Disease  
   D. Acute Myocardial Infarction

**Answer:** B

**Learning Objectives:**

1) Identify factors that affect hemoglobin A1c (HbA1c) values in end-stage renal disease
2) Discuss causes for re-admissions following renal transplantation

**Self-Assessment Questions:**

1) Which of the following statements is correct?
   A. HbA1c is a reliable marker of diabetes control in end-stage renal disease  
   B. HbA1c is not a reliable marker of diabetes control in end-stage renal disease due to high albumin  
   C. HbA1c is not a reliable marker of diabetes control in end-stage renal disease due to low albumin  
   D. HbA1c is a reliable marker of diabetes control regardless of renal function

2) Which of the following have been identified as causes for re-admission following renal transplantation?
   A. Fluids/electrolytes  
   B. Nephrolithiasis  
   C. Cardiovascular  
   D. Both A and C

**Q1 Answer:** C  **Q2 Answer:** D
INTEGRATION OF PHARMACY SERVICES INTO AN OUTPATIENT SPECIALTY CLINIC. Stephanie Paul, Ryan Baker, Alyssa Laurich, April Risner, and Jodi Flynn, CoxHealth, 1423 N Jefferson Ave, Springfield, MO 65802. stephanie.paul@coxhealth.com

Specialty pharmacy focuses on high cost, high touch medication therapy for patients with complex disease states. These patients often need additional support and resources to overcome barriers such as medication cost, coverage, and complexity. New pharmacy practice models involve interdisciplinary teams of physicians, nurses, and pharmacists and provide improved patient compliance, accessibility, convenience, and patient confidence. CoxHealth recently implemented a new interdisciplinary specialty clinic to improve specialty patient care. The overall objective of this study is to examine the integration of specialty pharmacy services into this outpatient clinic and determine the impact on patient, provider, and service-based metrics.

This single-center, service-based quality improvement study will evaluate outcomes including patient satisfaction, provider satisfaction, medication adherence, type and frequency of pharmacist intervention, recommendation acceptance rate, and disease-state specific measures. Participants included are adults 18 and older who are participants of the CoxHealth insurance plan and have received care at the specialty clinic. Chart review and satisfaction surveys will be conducted to obtain outcome data.

Preliminary data has been assessed for 20 eligible multiple sclerosis patients. Average age is 47.1 years and 60% are female. 19 patients have relapsing remitting MS and one has secondary progressive MS. Outcome data will be used to assess the value of having a pharmacist involved with the specialty medication process and patient care. We hope to use the findings from this pilot study to advocate for pharmacist involvement in outpatient specialty clinics.

Learning Objectives

1) Describe the opportunities available for pharmacist involvement in specialty medication

Self-Assessment Questions and Answers

1) Pharmacists can be involved in which of the following specialty services?
   A. Adherence Check-In
   B. Patient Education
   C. Medication Coverage
   D. All of the Above

Q1 Answer: D

DESIGN AND PROPOSAL FOR IMPLEMENTING A DISCHARGE MEDICATION DELIVERY SERVICE IN A COMMUNITY HOSPITAL. Betsy Pederson, Linda Radke, Steve Romans, Maggie Hitzeman, SRHC, 400 S Santa Fe, Salina, KS 67401. epederson@srhc.com

Hospital reimbursements are linked to quality metrics with the enactment of the Affordable Care Act of 2010. New services are being developed with a goal of positively impacting 30-day readmission rates and patient satisfaction scores.

The objective of this project is to assess interest and design a proposal to implement a discharge medication delivery service with the intention of improving patient transitions of care, reducing readmissions, and improving patient satisfaction.

A literature review was performed on medication bedside delivery and its potential benefits. An eight-question survey was developed to assess patient interest in utilization of the service. The survey was performed at the patient bedside by a pharmacist or pharmacy medication reconciliation technician. Any patient greater than 18 years of age admitted to the surgical, cardiac, or internal medicine units met inclusion criteria. Inpatients in the intensive care unit and patients with cognitive impairment were excluded.

A total of 100 patients completed the survey. Ninety-two percent of patients responded that they would be very likely (62%) or somewhat likely (30%) to use a discharge medication delivery service if available. Seventy-five percent of patients indicated this service would increase their understanding of medications and sixty-three percent indicated the service would increase their overall satisfaction with the hospital.

Based on the survey results supporting patient interest in a bedside discharge prescription service, a formal proposal for implementation of the service is in process and will be presented for administrative and board review.

Learning Objective:

1) Identify patient interest in and potential benefits of developing a bedside medication delivery service

Self Assessment Question:

1) Which of the following statements are correct?
   A. There is no benefit of developing a hospital based bedside medication delivery service.
   B. Only the patient benefits from a hospital based bedside medication delivery service.
   C. Only the hospital benefits from a hospital based bedside medication delivery service.
   D. Identifying drug interactions, resolving dosing questions, and recommending more cost effective therapies are a few of the many potential benefits of developing a hospital based bedside medication delivery service.

Q1 Answer: D
In 2012 rural adults in the US had a lifetime depression point in time prevalence that was significantly higher than their urban counterparts (18.4% vs. 15.9%). Patients who live in rural areas in the US have decreased access to relevant healthcare when compared to urban patients with mental health issues including depression. Little research has examined if there are differences in treatment patterns for depression between rural and urban adults diagnosed with the condition.

The aim of this study was to establish the psychotherapy, pharmacotherapy, and combined therapy patterns for treating depression comparing rural and urban patients presenting to primary care clinics.

National Ambulatory Medical Care Survey (NAMCS) 2012 data was analyzed using bivariate and multivariate techniques. Psychotherapy, pharmacotherapy and combined therapy were the dependent variables for three logistic regression models tested. The covariates were: patient age range, patient race/ethnicity, insurance status, patient sex, and geographic local of provider.

Logistic regression analysis yielded that patients seeing providers located in urban rather than rural locales had higher odds of receiving all treatment modalities: pharmacotherapy, psychotherapy and/or combined therapy. The results of this study demonstrate disparities and deficits of treatment found in US adult patients with depression overall, but most specifically in patients seeing providers in rural versus urban geographic locales.

Learning Objective:

1) Evaluate current treatment patterns regarding rural versus urban patients with depression as seen in primary care clinics.

Self-Assessment Question:

1) The prevalence patterns found that:
   A. Combined therapy was more prevalent than pharmacotherapy in treating all patients for depression.
   B. Combined therapy was found more in urban patients than those in rural primary care clinics.
   C. Urban patients had higher odds of receiving all treatment modalities (pharmacotherapy, psychotherapy and/or combined therapy) as compared to their rural counterparts.
   D. Both B and C

Answer: D

Learning Objectives:

1) Describe the current state of pharmacogenomics within the United States.
2) Identify pharmacogenomic resources that are available to pharmacists.

Self-Assessment Questions:

1) Pharmacogenomic information is currently available in the FDA approved package insert in which section?
   A. 12.5 Pharmacogenomics
   B. 13.5 Pharmacogenomics
   C. 12.6 Pharmacogenomics
   D. 13.6 Pharmacogenomics

2) Which of the following is a credible resource for Pharmacogenomic Information?
   A. CDC website
   B. FTC website
   C. CPIC Guidelines
   D. SPIC Guidelines

Q1 Answer: A   Q2 Answer: C
Antimicrobial therapy is indicated for asymptomatic bacteriuria only in patients either pregnant or undergoing a genitourinary procedure with high bleed risk. More than 15% of patients over 75 years of age and up to 50% of patients in residential facilities have asymptomatic bacteriuria. Nonetheless, studies show that nearly 50% of asymptomatic bacteriuria is inappropriately treated with antimicrobial therapy. The purpose of this study is to determine new criteria for when a urine culture is completed following abnormal urinalysis results to reduce treatment of asymptomatic bacteriuria.

The electronic medical record will identify patients with a positive urinalysis prompting reflex culture of urine bacteria at an 802-bed community hospital. A pharmacist will conduct a retrospective chart review of these patients to identify treatment rate of asymptomatic bacteriuria and urinalysis results predictive of acute cystitis or pyelonephritis. The following data will be collected: patient age, location, urinalysis results, culture results, physical examination findings, and antimicrobial therapy. Patients will be categorized as symptomatic versus asymptomatic based on provider progress notes. Criteria of the urinalysis prompting reflex culture will be adjusted accordingly to better provide clinicians with bacteria susceptibilities only for patients with indication for antimicrobial therapy. A post-intervention analysis will be done to determine change in antimicrobial use for asymptomatic bacteriuria. This study was approved by the Institutional Review Board.

Learning Objective:

1) Describe the relationship between urinalysis results and indication for treating urinary tract infection.

Self-Assessment Question:

1) Which of the following statements is correct?

A. Patients with urinalysis results positive for leukocyte esterase and nitrite should be treated with antibiotics because they have a urinary tract infection.

B. Patients with urinalysis results positive for leukocyte esterase, nitrate, WBC >20, and + bacteriuria should be treated with antibiotics because they have a urinary tract infection.

C. Squamous cells present in a urinalysis indicate the sample is contaminated and the urinalysis results should not be used for diagnostic purposes.

D. Urinalysis results should not be used as the only diagnostic tool when evaluating a patient for possible urinary tract infection.

Answer: D

Stress ulcer prophylaxis is a commonly prescribed therapy in the critical care unit that is often inappropriately continued beyond the critical care stay. Current literature shows a pharmacist led SUP management program results in a decrease of inappropriate prescribing. The objective of this project is to look at the frequency of inappropriate SUP and the impact of pharmacist intervention at transitions of care in critical care patients at a community hospital.

This program evaluation project consists of a retrospective chart review collecting a cohort of patients admitted to the critical care unit (CCU) with either a proton pump inhibitor (PPI) or histamine-2 receptor antagonist (H2RA) ordered during CCU stay. Patient age, gender, admission diagnosis, CCU length of stay, preadmission use of PPI or H2RA, and risk factors prompting the need for SUP will be collected. Data will be collected to determine if such therapy was appropriate during the patient’s CCU stay. Pharmacist intervention will be done according to defined project protocol. Preadmission use of acid suppressing therapy will be assessed for an appropriate indication. New orders for H2RA or PPI will be assessed for SUP criteria based on risk factors defined by ASHP SUP guidelines. Reassessment of SUP use will be done when patient is transferred out of the CCU. Rates for the development of Clostridium difficile or nosocomial pneumonia will be compared for pre and post pharmacist intervention.

The results of the study will be used to improve SUP prescribing in the critical care unit of a community hospital.

Learning Objectives:

1) Discuss the impact of a pharmacist led stress ulcer prophylaxis management program.

Self-Assessment Questions:

1) Pharmacist intervention in stress ulcer prophylaxis management:

A. Decreases inappropriate prescribing

B. Increases costs

C. Increases use beyond the critical care unit

D. Both A and C

Answer: A
PRE-EMPTIVE MONITORING VERSUS PROPHYLACTIC TREATMENT OF CYTOMEGALOVIRUS (CMV) FOLLOWING TREATMENT OF ACUTE REJECTION IN RENAL TRANSPLANT RECIPIENTS. Jeffrey Pilz, Aditi Gupta, Amna Ilahi, Pooja Budhiraja, Jennifer Loucks, The University of Kansas Hospital (TUKH), 3901 Rainbow Boulevard MS4040, Kansas City, KS 66160. jpliz@kumc.edu

Cytomegalovirus (CMV) is a common complication following renal transplantation which may result in clinical illness, graft loss, and/or death. There are two common approaches to preventing CMV after transplantation: pre-emptive monitoring and prophylactic therapy. Pre-emptive monitoring consists of testing CMV titers at designated intervals, whereas prophylactic therapy utilizes antiviral medications for several months post-transplant at the time of highest immunosuppression. Prophylactic therapy has been compared to pre-emptive monitoring in numerous studies immediately following organ transplant, yielding contradictory results.

Although international guidelines include recommendations for CMV prevention after acute rejection, there is a paucity of data comparing different modalities in this setting. Results of studies in the immediate post-transplant setting have been subsequently applied to the post-rejection setting. The purpose of this retrospective review was to compare prophylactic therapy versus pre-emptive monitoring of CMV infection and disease after treatment of acute rejection in renal transplant recipients at a large academic medical center.

Patients who received treatment for acute rejection with agents other than steroid monotherapy were analyzed for CMV infection and/or biopsy-confirmed disease within a minimum follow-up period of six months. The primary outcome was the rate of CMV development in patients treated with prophylactic antiviral therapy compared to those who were pre-emptively monitored following acute rejection. Results from this study will be used to evaluate and modify current antiviral protocols for renal allograft recipients following treatment of acute rejection.

Learning Objective:

1) Identify the risks and benefits of both prophylactic antiviral therapy and pre-emptive monitoring for CMV in renal transplant recipients following treatment of acute rejection.

Self-Assessment Question:

1) Which of the following is true regarding pre-emptive monitoring to prevent CMV in renal transplant recipients following treatment of acute rejection?
   A. Pre-emptive monitoring will increase the rate of viral resistance in the community
   B. Frequent lab assays are not required for patients who reside in rural communities
   C. Pre-emptive monitoring has a high out-of-pocket expense for antiviral medications
   D. Frequent clinical monitoring will occur during the time(s) of highest immunosuppression

Answer: D

ANALYSIS OF POSITIVE URINE CULTURES AND HOW THEY ARE MANAGED IN ADULT HOSPITALIZED PATIENTS. Ryan Platz, Carrie Sorenson, Dan McPherson, Adam L. Johnson, CHI St. Alexius Medical Center, 900 E. Broadway Ave., Bismarck, ND 58503. rtplatz@primecare.org

The Infectious Disease Society of America (IDSA) has guidelines for the management of urinary tract infections (UTI) and asymptomatic bacteriuria (ASBU) in order to reduce unnecessary antibiotic use and costs. There is increasing emphasis on antimicrobial stewardship programs to prevent use of unnecessary antibiotics, reduce development of resistant bacteria, lower healthcare costs associated with unnecessary treatment, and avoid adverse effects. Pregnancy or recent/upcoming urologic procedures that may cause bleeding are the two situations with evidence to support treatment of ASBU. An electronic record system will be used to identify at least 100 adult patients over age 18 that have positive urine cultures and were admitted to the hospital. The patient charts will be reviewed prospectively to collect data on their current medical state, medical history, labs, antibiotics, and urine culture data.

The primary objective of this study is to determine the rate of inappropriate management of UTIs and ASBU. Secondary objectives include evaluation of the antibiotic cost of inappropriate treatment of ASBU, and evaluation of possible adverse effects associated with inappropriate management of UTIs and ASBU. The results will be used to direct the need for physician education at our institution and the possible need for a treatment protocol.

Learning Objectives:

1) Define when treatment of asymptomatic bacteriuria is appropriate
2) Describe some problems associated with the overprescribing of antibiotics

Self-Assessment Questions:

1) When is it appropriate to treat asymptomatic bacteriuria (select all that apply)
   A. Recent pregnancy
   B. Patient is planning to become pregnant soon
   C. Patient is currently pregnant
   D. Recent/upcoming total knee arthroplasty
   E. Recent/upcoming urologic procedure

2) What problem may arise from overprescribing antibiotics in a patient that does not require them?
   A. Increase in antibiotic resistance
   B. Recurrent UTIs
   C. Clostridium difficile infection
   D. Both A and C

Q1 Answer: C and E    Q2 Answer: D
Intravenous (IV) diltiazem is routinely used to control ventricular rate in patients presenting with atrial fibrillation (AF) with a rapid ventricular rate (RVR). Several recent anecdotal reports at CHI-CUMC suggest the use of IV diltiazem in AF have been unsuccessful when used for this indication.

The primary objective of this retrospective analysis is to determine if the efficacy and safety of IV diltiazem at CHI – CUMC are comparable to previously published studies with IV diltiazem used for rate control in AF with RVR. Efficacy endpoints will include (1) the proportion of patients with AF and RVR who achieve a ventricular rate ≤100 BPM and 2) the percentage of patients who spontaneously convert to sinus rhythm. The primary safety endpoints will include the proportion of patients who develop hypotension (systolic blood pressure (BP) <90 mmHg) or bradycardia (heart rate (HR) < 60 bpm). The percentage of patients achieving these endpoints at CHI-CUMC will be compared to randomized, controlled studies of IV diltiazem identified through a literature search. For all endpoints, a two-proportion z-test will be used to compare the observed sample success rates to the pooled success rates observed in the literature. The comparison of observed and pooled endpoints will be used to evaluate our hospital’s use and outcomes associated with IV diltiazem in AF with RVR.

All participants will have been treated with IV diltiazem in patients with AF and a HR > 100 bpm for a minimum of 6 hours. Patient data will be collected from the electronic health record to identify the HR and BP from baseline and then at 0.25, 0.5, 1, 6, 12, and 24 hours after initiation of IV diltiazem. Results will be used to identify differences, if any, between CHI – CUMC’s and previous studies IV diltiazem use for potential quality improvement.

Learning Objectives:

1) Identify the recommended intravenous diltiazem infusion rates
2) Report findings on how diltiazem infusions manage our patients with atrial fibrillation accompanied by rapid ventricular rate

Self-Assessment Questions:

1) What infusion rates are recommended for IV diltiazem?
   A. 5mg/hr
   B. 10mg/hr
   C. 15mg/hr
   D. All the above

2) How does the data gathered from CHI-CUMC differ from that gathered in previously published studies with IV diltiazem in the treatment of AF with RVR?
   A. Dosing
   B. Efficacy endpoints
   C. Safety endpoints
   D. B & C

Q1 Answer: D  Q2 Answer: D
Sepsis guidelines recommend prompt treatment of patients who meet sepsis criteria, including the administration of antibiotics within one hour of presentation. Mercy Medical Center – Des Moines is implementing a sepsis alert that will help facilitate quick care of severe sepsis and septic shock patients. The objective of this study is to evaluate the impact pharmacist participation on a sepsis alert team has on time to initial broad-spectrum antibiotic administration.

Coding data from the electronic medical record identified a historical group diagnosed with severe sepsis/septic shock before the sepsis alert implementation. This is our baseline group. After sepsis alert implementation, severe sepsis/septic shock patients were identified in a similar fashion to the historical group. This is our experimental group. Data collected for each group: Patient age, gender, ethnicity, admission/discharge date, length of stay in ICU, time of sepsis diagnosis, time sepsis alert initiated, type of infection, antibiotics used, antibiotics used in 24 hours prior, location at time of sepsis alert, pharmacist attendance at sepsis alert, mortality.

After the rapid response team determines a patient meets severe sepsis/septic shock criteria, a sepsis alert is called. The pharmacist will respond, order initial antibiotics using patient allergy information and a protocol approved by the institutional pharmacist will respond, order initial antibiotics using patient allergy information and a protocol approved by the institutional Medical Executive Committee, and facilitate delivery to the patient.

Time to antibiotics from time zero of sepsis diagnosis will be the primary endpoint, with clinical success defined as broad-spectrum antibiotic administration.

Urinary tract infections (UTIs) account for approximately 8-10 million visits to healthcare providers each year in the United States. Empiric antimicrobial selection for UTIs has become more challenging due to the increasing incidence of infections caused by multidrug resistant bacterial uropathogens among patients in both the hospital and community settings. Despite a reported decrease in effectiveness of third-generation cephalosporins in recent years, ceftriaxone is commonly used for empiric treatment of UTIs in hospitalized patients.

The primary objective of this study is to determine risk factors for ceftriaxone-resistant UTIs. The study also aims to describe the prescribing patterns for empiric antibiotic treatment of UTIs. These objectives will be assessed via a retrospective chart review of patients hospitalized at Barnes-Jewish Hospital (BJH) with UTIs between January 1, 2014 and December 31, 2014. Patients aged 18 years or older who were admitted with a positive urine culture (with available susceptibility results) obtained within 48 hours of admission will be eligible for the study.

A multivariable logistic regression analysis will be used to identify risk factors for ceftriaxone-resistant UTIs. Continuous variables will be analyzed using the Student t test or Wilcoxon rank sum test, depending on the validity of the normality assumption. The Chi-squared or Fisher exact test will be used to evaluate categorical data. Descriptive statistics will be utilized to describe the prescribing patterns for empiric antibiotic treatment of UTIs.

The results of this study could potentially be utilized to improve empiric therapy for UTIs at BJH.
Tacrolimus, an immunosuppressive agent, is often used to prevent graft-versus-host disease (GVHD) during allogeneic hematopoietic stem cell transplants. Since tacrolimus suppresses the immune system, posaconazole is often used concomitantly to prevent invasive fungal infections. Posaconazole can increase tacrolimus exposure by inhibiting CYP3A4, however, tacrolimus dose adjustments based on this interaction are not well defined. Furthermore, posaconazole extended-release tablets and oral solution may have differing effects on tacrolimus levels as they vary in pharmacokinetics and recommended dosing. This study will evaluate the pattern of tacrolimus dose adjustments based on blood level monitoring in hematopoietic stem cell transplant patients using posaconazole oral solution or extended-release tablets for invasive fungal infection prophylaxis.

The analysis will focus on the change in tacrolimus blood levels with the start and discontinuation of posaconazole oral solution or extended-release tablets and how such changes led to tacrolimus dose adjustment to maintain therapeutic blood levels. The process will be completed by using the electronic medical record to review patient data for those prescribed both tacrolimus and posaconazole concomitantly from January 1st, 2013 through June 1st, 2015. Furthermore, data will be collected regarding therapy and comorbidities that may contribute to tacrolimus toxicity and adverse effects. These additional data points will be used to define factors that confound the data. In order to analyze the clinical significance of the interaction, the study will observe cases where patients developed GVHD necessitating treatment, indications of treatment failure for GVHD, treatment of tacrolimus toxicities, graft rejection, extended hospital stays, readmissions, and mortality.

**Learning Objectives:**

1) Evaluate the effect of posaconazole oral solution and extended-release tablets on tacrolimus levels.

2) Discuss the clinical relevance and potential application of empiric tacrolimus dose adjustments during concomitant use with posaconazole.

**Self-Assessment Questions:**

1) The initiation of posaconazole during tacrolimus treatment results in _________ tacrolimus blood levels via the __________ enzymatic pathway.
   A. Increased, CYP2C9
   B. Decreased, CYP3A4
   C. Increased, CYP3A4
   D. Decreased, CYP2C9

2) Which of the following is a potential tacrolimus toxicity?
   A. Rheumatoid Arthritis
   B. Serious Systemic Fungal Infections
   C. Systemic Lupus Erythematosi
   D. Bleeding

**Answer Q1:** C  **Answer Q2:** B

**IMPACT OF ANTIMICROBIAL STEWARDSHIP INTERVENTIONS ON THE MANAGEMENT OF URINARY TRACT INFECTIONS AMONG INPATIENT VETERANS.**

Urinary tract infections (UTI) are the fourth leading cause of hospital-acquired infections in the United States. The diagnosis of UTI is multifactorial and includes signs and symptoms as well as the presence of bacteriuria. The distinction between symptomatic and asymptomatic bacteriuria (ASB) is necessary as most cases of ASB do not require treatment with antibiotics per Infectious Disease Society of America (IDSA) Guidelines. Despite what guidelines suggest, the rate of inappropriate treatment for ASB remains excessive and is an area of opportunity for antimicrobial stewardship (AS) efforts.

The purpose of this project is to implement AS interventions for the management of UTIs in the inpatient setting, and evaluate the impact of these interventions.

AS interventions will include monthly educational sessions and handouts provided to medical residents, implementation of a computerized patient record system (CPRS) order menu for UTI which will enable providers to assess symptoms prior to ordering antibiotics, and daily review of positive urine cultures by the AS pharmacist and infectious diseases pharmacy resident to identify ASB patients and provide recommendations for antibiotic discontinuation when appropriate. A retrospective chart review will be conducted at the end of the implementation period and rates of inappropriate treatment for ASB will be compared to a one-year pre-implementation period.

The rate of treatment of asymptomatic bacteriuria in the pre-intervention group was 59%. It is anticipated that the AS interventions will result in decreased treatment of asymptomatic bacteriuria and a subsequent decrease in the negative outcomes associated with antibiotic overprescribing.

**Learning Objective:**

1) Describe the patient populations in which treatment of asymptomatic bacteriuria may be appropriate.

**Self-Assessment Question:**

1) Treatment for asymptomatic bacteriuria is appropriate in which of the following patient populations?
   A. Patients with a urinary catheter in place
   B. Patients over the age of 65
   C. Pregnant patients

**Q1 Answer:** C
The pharmacokinetic and pharmacodynamic properties of drugs can vary from average population values in obese patients, and these differences are clinically significant. Individual parameters like volume of distribution and protein binding should be considered in the pharmacotherapy plans of obese patients, in particular the dosing of medications.

Traditionally, initial doses of vancomycin are based on actual body weight, and aminoglycosides are based ideal body weight or an adjusted body weight. Pharmacokinetic monitoring of these drug levels is a routine pharmacy practice in order to adjust therapy as appropriate. Weight-based dosing recommendations for aminoglycosides and vancomycin are generally intended for non-obese patients, making therapeutic dosing difficult. The primary objective of this study is to evaluate the efficacy of current strategies utilized at the University of Minnesota Medical Center for initial doses aminoglycosides and vancomycin in obese patients. The assessment will be based on whether the initial dose produced serum drug levels within the target range. This will be achieved by retrospective chart review of eligible patients. The secondary objective is to assess how rapidly the therapeutic goals are met, as evidenced by pharmacokinetic drug monitoring and evaluation of the time (in days) until drug levels achieved the therapeutic range. Results of this study will provide the institution with a fair assessment of the efficacy of the current practices for dosing these medications in obese patients.

Learning Objective:

1) Discuss the pharmacokinetic and pharmacodynamic differences between obese and non-obese patients.

Self-Assessment Question:

1) In obese patients, the volume of distribution of drugs like vancomycin tends to be _____ compared to non-obese patients.
   A. Higher
   B. Lower
   C. Unchanged

Answer: A.

The use of oral oncology agents has increased in the recent decade, shifting the prototype for cancer treatment. Oral agents represent approximately 25-35% of all oncology medications currently in development. Treatment strategies for metastatic castrate resistant prostate cancer (mCRPC) have evolved recently with the approval of oral abiraterone acetate and enzalutamide. Despite the fact that oral chemotherapy and targeted therapies offer convenience and increased quality of life, they still pose financial challenges, unique toxicities, and barriers that could impact progression free survival (PFS). With the initiation of complex regimens and monitoring, pharmacist involvement has become a vital role in cancer patients' care in the outpatient setting.

The aim of this study was to evaluate if PFS in mCRPC patients who were prescribed abiraterone acetate or enzalutamide through a pharmacist-staffed academic oncology clinic is consistent with PFS found in the literature. Secondary aims include number and type of pharmacist interventions and appropriateness of medication refills compared to treatment course.

This study was a retrospective, single-institution, chart review of adult male patients with a diagnosis of mCRPC receiving abiraterone acetate or enzalutamide from August 2012 through September 2015. Patients were identified using an electronic medical record report.

This study included 68 adult patients; 34 (50%) of the patient received both therapies while 18 (26%) and 16 (24%) received abiraterone acetate or enzalutamide, respectively. Of the 34 that received both medications, 29 (85%) received abiraterone first and 5 (15%) received enzalutamide first. Outcome results are pending further data collection.

Learning Objectives:

1) Describe the impact of pharmacists in the outpatient setting

Self-Assessment Questions:

1) Pharmacists impact in the outpatient setting:
   A. Have shown financial benefit to patients but not improved clinical outcomes
   B. Have improved patient’s adherence to complex outpatient regimens
   C. Have not improved patient satisfaction
   D. Have not shown any benefit in adherence to medications

Answer: B
EVALUATION OF SAFETY AND EFFICACY OF DIRECT ORAL ANTICOAGULANTS IN PATIENTS WITH CANCER Elizabeth R. Pritchard, Jose R. Murillo, Jr., David Putney, Eleanor C. Hobaugh, Houston Methodist Hospital, 6565 Fannin St., DB1-09, Houston, TX 77030. erpritchard@houstonmethodist.org

Direct oral anticoagulants (DOACs), including direct factor-Xa inhibitors apixaban, edoxaban, and rivaroxaban and direct thrombin inhibitor dabigatran, are FDA-approved for the treatment and prevention of recurrent venous thromboembolism (VTE) and prevention of stroke in patients with non-valvular atrial fibrillation (NVAF). Patients with cancer accounted for only 2.3% to 9.4% of the total study population in clinical trials, limiting applicability of results. Current guidelines do not recommend DOACs for acute and chronic management of VTE in cancer patients. Rather, low molecular weight heparin (LMWH) is preferred, with warfarin as an alternative agent for chronic management. For patients with NVAF, there are no formal recommendations. The goal of this study is to evaluate safety and efficacy of DOACs compared to LMWH and warfarin in cancer patients.

This retrospective, exploratory study utilized data from hospitalized, adult patients with cancer who received both chemotherapy and anticoagulant therapy during a single admission between January 2012 and October 2015. Patients who received anticoagulation therapy indicated for VTE prophylaxis, chemotherapy utilized for non-cancer diagnosis, or chemotherapy as part of conditioning regimen for stem cell transplant were excluded. The primary safety endpoint was incidence of major bleeding. Secondary endpoints include incidence of recurrent VTE, arterial thrombosis, non-major bleeding, and mortality.

258 eligible patients were identified: 80 DOAC patients, 95 LMWH patients, and 83 warfarin patients. Outcomes remain under investigation, with data collection and evaluation currently being conducted.

**Learning Objective:**

1) Discuss pharmacologic therapies for the management of acute and chronic venous thromboembolism (VTE) in patients with cancer.

**Self-Assessment Question:**

1) Based on current literature, what is the preferred agent for the treatment of an acute deep vein thrombosis (DVT) in a cancer patient?

A. Unfractionated heparin
B. Enoxaparin
C. Apixaban
D. Fondaparinux

**Answer:** B

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EVALUATION OF FIDAXOMICIN VERSUS ORAL VANCOMYCIN FOR THE TREATMENT OF CLOSTRIDIUM DIFFICILE INFECTIONS IN HEMATOPOIETIC STEM CELL TRANSPLANT Laura Prohaska, Zahra Mahmoudjafari, Lisa Clough, Leyla Shune, University of Kansas Hospital, 3901 Rainbow Boulevard, Mailstop 4040, Kansas City, Kansas 66160. laurapro@kumc.edu

Clostridium difficile infection (CDI) is a serious concern in patients undergoing hematopoietic stem cell transplantation (HSCT). In addition to possessing common risk factors for CDI, HSCT patients are at increased risk due to high doses of chemotherapy, total body irradiation, presence of mucositis, and prolonged periods of immunodeficiency.

First line treatment for CDI per the Infectious Diseases Society of America is oral vancomycin or metronidazole. In HSCT patients, use of these agents can be limited due to concern for clinical failure and potential emergence of vancomycin resistant enterococci (VRE). Fidaxomicin is a recently approved macrocyclic antibiotic approved for the treatment of CDI and has been associated with sustained response rates and lower rates of recurrent CDI. To date, no randomized controlled trials have compared the use of fidaxomicin to oral vancomycin in the HSCT patient population.

The purpose of this study is to determine clinical cure resulting from full treatment course of fidaxomicin or oral vancomycin for CDI within the first 100 days of allogeneic HSCT. Secondary endpoints include global cure, clinical failure rate, and recurrence rate. The outcomes may also provide a greater understanding of the relationship between CDI and the impact on graft-versus host disease (GVHD).

These results will be obtained through retrospective chart review, and regression analysis will be performed to compare treatment groups. The results of this study will be used to assess the validity of the current treatment algorithm for CDI in allogeneic HSCT patients at the University of Kansas Hospital.

**Learning Objectives:**

1. Report clinical cure rate of CDI comparing the use of oral vancomycin or fidaxomicin as first line treatment options in allogeneic HSCT patients.
2. Discuss potential complications associated with CDI.

**Self-Assessment Questions:**

1. Clinical cure can be determined by resolution of diarrhea requiring no additional treatment ___ days following completion of therapy for CDI.
   
   A. 2
   B. 7
   C. 21
   D. 40

   Q1 Answer: A

2. What complication(s) may occur after completion of therapy for CDI?
   
   A. False negative fecal occult blood tests result
   B. Clinical failure
   C. Recurrent infection
   D. Both B and C

   Q2 Answer: D
The sustainability of ambulatory care pharmacy practices relies on generating revenue from direct patient care services, such as providing medication therapy management (MTM). However, ambulatory care pharmacists often devote time to other functions. Pharmacists may serve on committees, provide drug information, and may also spend time teaching. Although important, these functions do not contribute to financial sustainability. Health systems may evaluate ambulatory care productivity based on percent time spent in direct patient care or by the number of direct patient care encounters.

The primary objective of this study is to determine if the percentage of time spent in direct patient care correlates with the number of patients seen in face-to-face encounters over three study periods. The secondary objective is to describe clinical pharmacist activities over time, with a focus on defining the complexity and level of service of MTM encounters.

In 2011, the ambulatory care pharmacy department at Hennepin County Medical Center (HCMC) developed a tool for clinic pharmacists to document time spent in various activities throughout the day. Pharmacists self-reported this data over two weeks. This documentation was repeated in 2013 and 2015. Time reports from all three years will be included for descriptive statistical analysis. MTM encounters spanning each two-week period will be reviewed in order to define overall complexity and level of service.

This study will provide insight into how time is distributed in the provision of ambulatory pharmacy services at HCMC and may impact how ambulatory care pharmacist productivity is evaluated in the future.

Learning Objective:

1) Identify obstacles in evaluating ambulatory care pharmacist productivity.

Self-Assessment Question:

1) Ambulatory care pharmacist productivity:
   A. Is measured in the exact same way across health systems
   B. Can be evaluated using internal and external benchmarking
   C. Should only be measured using pharmacist time spent in direct patient care
   D. Both A and C

Answer: B

COMPLIANCE WITH UPDATED SEPSIS BUNDLES TO MEET NEW SEPSIS CORE MEASURE IN A TERTIARY CARE HOSPITAL. Taylor Ramsdell, April Smith, Eric Kerkhove, Keriann Collmann, CHI Health Immanuel, 6901 N 72nd Street, Omaha, NE 68122 taylor.ramsdell@alegent.org

The Surviving Sepsis Campaign bundles are associated with improved outcomes in patients with severe sepsis and septic shock, yet adherence to these bundles remains inconsistent. Updated three- and six-hour care bundles became a Centers for Medicare and Medicaid Services (CMS) Core Measure in October 2015. Hospital reimbursement is determined by compliance with CMS-mandated core measures.

The objective of this quality improvement project is to assess bundle compliance and patient outcomes before and after the introduction of the new sepsis core measure. The primary outcomes are meeting the three-hour bundle, the six-hour bundle, and the composite of the three- and six-hour bundles. Secondary outcomes include: total length of stay, ICU length of stay, and in-hospital mortality.

The study group will consist of sequential patients with a documented ICD-10 code of severe sepsis from October 1, 2015 through March 31, 2016. The control group will consist of historical patients with a documented ICD-9 code of severe sepsis from April 1, 2015 through September 30, 2015. Patients are excluded if: transferred from another hospital, age younger than 18 years, length of stay greater than 120 days, received intravenous antibiotics for more than 24 hours prior to presentation of severe sepsis, Comfort Care directive prior to or within three hours of severe sepsis presentation or within six hours of septic shock presentation, or expired within three hours of severe sepsis presentation or within six hours of septic shock presentation.

Expected outcome is improved compliance with sepsis care bundles in the study group.

Learning Objective:

1) Distinguish between components of the three- and six-hour sepsis care bundles.

Self-Assessment Question:

1) Which of the following should be completed within three hours of severe sepsis onset?
   A. Administer a 30 mL/kg fluid bolus for patients with septic shock
   B. Initiate broad-spectrum antibiotics
   C. Initiate vasopressors for persistent hypotension
   D. Both A and B

Answer: D
Gram-negative bacteremia is a complication of urinary tract infections (UTIs) that often leads to hospitalization and is usually treated for a minimum duration of 7 days with intravenous (IV) antibiotic therapy. Data is lacking to indicate whether UTI-associated bacteremia treatment could be de-escalated earlier to non-IV-equivalent oral (PO) antibiotics.

The primary objective of this investigation was to compare the clinical and microbiological outcomes of full-course (≥7 days) IV or IV-equivalent antibiotics versus early PO switch ≤5 days after IV treatment initiation to non-IV-equivalent PO antibiotics (beta-lactams or Bactrim) in patients with UTI-associated gram-negative bacteremia.

We conducted a retrospective chart review of patients hospitalized within five Houston Methodist System hospitals between 2010 and 2014. The primary outcome was rate of clinical success at end-of-treatment or discharge. Patients who received at least 72 hours of appropriate IV antibiotic treatment and who met pre-specified IV-to-PO conversion criteria on treatment days 4 or 5 were included. Key exclusion criteria included polymicrobial infection and immunosuppression.

Through a query of the electronic medical record, 1943 patients with positive blood and urine cultures with the same gram-negative bacteria within 72 hours of admission were identified. Out of these patients, 57 cases with early switch to PO antibiotics were included, matched 1:1 with controls based on sequential matching of organism, gender, age, and Charlson comorbidity score. The findings of this investigation may support development of internal clinical pathways or protocol to aid in the management of these infections at Houston Methodist System hospitals.

Learning Objectives:

1) Review the principles of UTI-associated Gram-negative bacteremia treatment.
2) Select appropriate initial antibiotic therapy for UTI-associated Gram-negative bacteremia.

Self-Assessment Questions:

1) What is the standard minimum duration of IV antibiotic therapy for Gram-negative bacteremia?
   A. 3 days
   B. 5 days
   C. 7 days
   D. 14 days

2) A patient presents to the emergency room with dysuria, fever, and both urine and blood cultures grow E. coli, susceptibilities pending. What is the most appropriate empiric antibiotic regimen for this patient, assuming normal renal function?
   A. Bactrim DS 1 tablet PO twice daily
   B. Cefazolin 1 g IV every 12 hours
   C. Piperacillin-tazobactam 3.375 g IV every 6 hours
   D. Nitrofurantoin 100 mg PO four times a day

Q1 Answer: C  Q2 Answer: C
Learning Objective:

1) Identify the important benefits of privileging.

Self-Assessment Question:

1) Which of the following is a benefit of privileging?
   A. To increase health care expenses
   B. To decrease patient satisfaction
   C. To promote the practice of pharmacy at the top of one’s license
   D. To increase patient length of stay

Q1 Answer: C
The overuse and misuse of antibiotics has led to a growing number of antibiotic-resistant infections. To combat this effort, multiple guidelines on methods to decrease antibiotic-resistant infections have been introduced. The purpose of this study is to assess whether the addition of required indications for use on antibiotic orders at an academic medical center led to an increase in appropriate antimicrobial therapy chosen, a decrease in time to order verification, an increase in appropriate dose chosen, and a decrease in time to first dose.

This will be a retrospective study looking at adult patients with antibiotic indications listed in the electronic medical record (EMR) system for hospital-, healthcare-, ventilator-, or community-acquired pneumonia, documented first dose in EMR or on the flow-sheet for patients in the emergency department. Excluded patients are those with concomitant viral or bacterial infections. Timeframe for analysis will be prior to implementation which is October 2013 until January 2014 and after implementation which is October 2014 until January 2015. The following information will be collected by the research team: age, gender, weight, height, vital signs, antibiotics used, serum creatinine, white blood cell count and differentiation if available, serum drug levels if available, allergies, and past medical history as it pertains to antibiotic choices. Researchers will collect the date and time medications were ordered, verified by a pharmacist, administered to patient, and date and time of patient admission.

**Learning Objectives:**

1) Describe the impact of required indications on all antibiotics ordered
2) Express the ways in which antimicrobial stewardship assists in optimizing antibiotic use in a healthcare facility

**Self-Assessment Questions:**

1) The impact of required indications on all antibiotics ordered aids in optimizing antibiotic use because:
   A. Making the information accessible and clear helps clinicians make modifications as needed and/or discontinue medications in a timely manner
   B. It negates the need for establishing an antimicrobial stewardship team in the healthcare facility
   C. It will slow down the verification process to allow pharmacists more time to research the drug and its use
   D. None of the above

2) Ways in which to improve antimicrobial usage in a healthcare facility include all EXCEPT:
   A. Implementing the addition of indications for all antibiotics prescribed
   B. Educating clinicians about resistance and optimal prescribing
   C. Discourage multidisciplinary involvement as it may create confusion
   D. Create pharmacy-driven interventions such as dose optimization and adjustments

**Q1 Answer:** A  **Q2 Answer:** C

A Centers for Medicare and Medicaid Services study found pharmacy services are an added value providing improved clinical outcomes, enhanced patient compliance, and reduced healthcare costs associated with medications. This study focuses on pharmacy-provided education services to assist Missouri Medicaid patients transitioning from inpatient to ambulatory care.

Primary objective is to improve medication compliance rates [medication possession ratio (MPR)] through pharmacy-provided education for Medicaid patients with polypharmacy. Secondary objectives are to reduce 30-day hospital readmission rates, reduce number of emergency room visits, decrease medication discrepancies, report interventions, track the number of contacts per patient for compliance correlation, and address revenue generated by intervention completion.

Adults (≥18 years old) with an inpatient admission on the interprofessional team with Medicaid as primary payer source and polypharmacy will be included. Patients meeting inclusion criteria during hospitalization will be reviewed by the pharmacist for medication related problems and provided pre-discharge education. Post-discharge, billable interventions identified through the Missouri Medicaid MOHealthnet database, including recognized non-compliance, will be addressed by the ambulatory care pharmacy team face-to-face during patient follow-up primary care visits. Interventions will be documented in the medical record and the Medicaid database as appropriate.

The average 90 day MPR for the currently enrolled study patients is 76.6% (range: 48-108%) pre-pharmacy service implementation. Readmission rates for November 2015 extrapolated to a total of approximately 1700 Missouri Medicaid patients were 576 readmissions and 1824 emergency room visits annually ($4,704,000 in healthcare costs). We anticipate an increase in MPR and reduction in readmission rates.

**Learning Objectives:**

1) Identify areas in which pharmacy can improve transitions of care for indigent populations.

**Self-Assessment Questions:**

1) Area(s) in which pharmacy can improve transitions of care include:
   A. Medication reconciliation/documentation
   B. Medication education
   C. Disease state education
   D. Procurement of medications
   E. All of the above

**Answer:** E
PHOSPHODIESTERASE-5 INHIBITOR USE FOLLOWING LEFT VENTRICULAR ASSIST DEVICE (LVAD) IMPLANTATION. Katherine Roberts, Bethany Tellor, and Jerrica Shuster. Barnes-Jewish Hospital, 216 S. Kingshighway Boulevard, Mailstop 90-52-411, St. Louis, MO 63110 katherine.roberts@bjc.org

To examine the impact of phosphodiesterase-5 inhibitor (PDE5i) therapy on the rate of hospital readmission for heart failure, length of stay, and overall survival following left ventricular assist device (LVAD) implantation.

Right ventricular (RV) dysfunction is one of the most common complications following LVAD implantation, with an estimated incidence of 10-40%. The 2013 International Society of Heart and Lung Transplantation Guidelines for Mechanical Circulatory Support state that PDE5i therapy may be considered for management of RV dysfunction following LVAD implantation (Grade IIb, Level C). A retrospective cohort of 318 patients is being evaluated to compare health outcomes between those receiving either sildenafil or tadalafil post-LVAD implantation versus those not receiving PDE5i therapy. The primary outcome measure is the rate of hospital readmission for heart failure at 1 year following LVAD implantation. Secondary outcome measures include the rate of death at 1 year following LVAD implantation, length of hospital and ICU stay, duration of mechanical ventilation, and duration of intravenous inotrope or pulmonary vasodilator therapy. Echocardiographic data regarding peri-operative RV function will also be reported.

Previous evaluations of PDE5i therapy post-LVAD implantation suggest favorable effects on hemodynamic parameters that serve as common surrogate markers for RV dysfunction, such as pulmonary arterial pressure and pulmonary vascular resistance. Given this positive data, investigators hypothesize that PDE5i therapy will be associated with a reduction of hospital readmissions for heart failure and improvement of additional health outcomes in the current study.

Learning Objective:

1) Describe the rationale of phosphodiesterase-5 inhibitor therapy following left ventricular assist device (LVAD) Implantation

Self-Assessment Question:

1) The use of phosphodiesterase-5 inhibitor therapy following left ventricular assist device (LVAD) implantation is associated with:
   A. Reduction of subsequent right ventricular assist device (RVAD) implantation
   B. Improvement of invasive hemodynamic monitoring parameters
   C. Increased exercise tolerance

Answer: B

ASSESSING THE USE OF TEST STRIPS FOR SELF-MONITORING OF BLOOD GLUCOSE (SMBG) IN PATIENTS WITH TYPE 2 DIABETES. Danielle Rowan, Nancie Waterbury, Robert Shaw, Brian Lund, and Jason Egge, Iowa City VA Health Care System, 601 Highway 6 West, Iowa City, IA 52246. danielle.rowan@va.gov

Self-monitoring of blood glucose (SMBG) provides rapid results and serves as a tool to guide therapy in patients with diabetes. While there is an abundance of data supporting the value of SMBG in patients who use insulin, less is known about the value of SMBG in patients who do not use insulin.

The Veterans Affairs Pharmacy Benefits Management (PBM) policy, last updated in 2011, has a varied view on SMBG. The PBM recommends limiting to 50 strips per 150 days (2 strips per week) for patients with type 2 diabetes, not receiving insulin. Allowing SMBG under the following circumstances is suggested 1) new diagnose with ongoing medication adjustments, 2) acute illness, or 3) detection of hypoglycemia.

The purpose of this study is to identify the number of veterans with type 2 diabetes prescribed non-insulin glucose-lowering agents (GLAs) who utilize SMBG in the Veterans Affairs Health Care System (VAHCS). Secondary objectives include describing the characteristics and utilization of test strip use.

This is a retrospective cross-sectional study using national Veterans Health Administration data. Included veterans will have refilled non-insulin GLAs of the same class at least twice during the study. Descriptive statistics will be calculated and chi-square analysis will be conducted to compare groups.

The results will be used to determine the appropriateness of SMBG in patients with type 2 diabetes and educate on judicious use of test strips in the Iowa City Veterans Affairs Health Care System.

Learning Objectives:

1) Describe the benefits of self-monitoring of blood glucose in patients with Type 2 Diabetes
2) Recall the National PBM Policy for test strip use

Self-Assessment Questions:

1) According to the Veterans Affairs PBM policy, which patient would gain the most benefit from self-monitoring of blood glucose?
   A. A 65 y/o male with newly diagnosed Type 2 Diabetes who states hypoglycemia unawareness
   B. An 80 y/o female with well-controlled diabetes on metformin monotherapy
   C. A 58 y/o with a family history of diabetes interested in his BG readings
   D. A 73 y/o male stable on a regimen of glipizide 5 mg BID and metformin 1000 mg BID

2) What does the PBM policy for test strip recommend?
   A. 100 strips per 30 days for patients on sulfonylureas
   B. 50 strips per 150 days for patients on sulfonylureas
   C. 50 strips per 90 days for patients on oral antidiabetic agents
   D. 100 strips per 90 days for patients on oral antidiabetic agents

Q1 Answer: A.     Q2 Answer: B.
As obesity rates rise in the United States, an increasing number of patients are undergoing bariatric surgery. Roux-en-Y gastric bypass (RYGB) is the most commonly performed weight loss surgery. Its restrictive and malabsorptive nature reduces the size of the stomach and bypasses the duodenum and proximal jejunum, which are primary sites of drug absorption. The sleeve gastrectomy (SG) is another common bariatric surgery which is primarily restrictive and maintains gastrointestinal continuity. Malabsorption of nutrients is common after weight loss surgery; however, it is unclear how drug absorption is influenced. Given the alterations in gastrointestinal physiology, anticipated reductions in drug absorption could arise from alterations in gastric emptying time, pH, and a reduction in surface area for drug absorption.

Impaired absorption of oral antibiotics has been described in post-gastric bypass patients; however, no studies evaluating effectiveness of oral antibiotics in this population exist. The primary objective of this study is to compare rates of therapeutic failure of oral antibiotics among patients after RYGB, SG, and non-gastrointestinal resection controls. A retrospective chart review will be performed from April 2008 to April 2015 in patients who meet inclusion and exclusion criteria. Rates of antibiotic failure will be evaluated from the first diagnosis of an eligible infection (community acquired pneumonia, skin and soft tissue infection, or urinary tract infection) after either RYGB or SG. The main outcome of this study seeks to find if there is an association between drug absorption changes post-RYGB and clinical outcomes, such as oral antibiotic failure.

Learning Objective:

1) Describe clinical outcomes after oral antibiotic use in patients post-Roux-en-Y gastric bypass

Self-Assessment Question:

1) Roux-en-Y gastric bypass may reduce bioavailability of oral antibiotics by which of the following mechanisms?
   A. Increasing surface area for absorption in the small intestines
   B. Altering pH throughout GI tract
   C. Increasing drug transporters and efflux pumps
   D. Increasing time for drug dissolution

Q1 Answer: B

Supplementation with recombinant antithrombin III has been reported for treatment of patients with heparin resistance, especially those undergoing cardiopulmonary bypass during surgical procedures. The efficacy and safety of antithrombin III supplementation in patients outside of the operating room is not well defined. The primary objective of this study is to evaluate the effect of supplementation with exogenous antithrombin III on anticoagulation with unfractionated heparin for patients admitted to an intensive care unit (ICU).

This study was a retrospective review of patients admitted to any ICU at Houston Methodist Hospital between January 1, 2010 and August 1, 2015. Patients receiving continuous infusions of heparin, and at least one measured antithrombin III level were considered for inclusion. Included patients receiving antithrombin III supplementation were matched 1:2 by mechanical circulatory support device, baseline antithrombin III level, age, and gender to those not receiving supplementation. The primary outcome was the proportion of patients that achieved therapeutic levels of anticoagulation within twelve hours of supplementation. Secondary outcomes targeting safety were also assessed.

A total of 27 patients that received ATIII supplementation met inclusion criteria for this study. Most patients receiving supplementation had a mechanical circulatory support device (18/27, 66.6%), of those extracorporeal membranous oxygenation (ECMO) was most common (10/27, 37.0%). The proportion of patients achieving therapeutic anticoagulation in the supplemented group was not significantly different from those not receiving supplementation (40.7% vs 37.0%, p = 0.81). Further details to be evaluated include doses of antithrombin III administered, bleeding and thrombosis events, and in-hospital mortality.

Learning Objectives:

1) Describe the impact of supplementation with antithrombin III on anticoagulation with unfractionated heparin

Self-Assessment Questions:

1) Supplementation with antithrombin III showed:
   A. A significantly higher proportion of patients achieving therapeutic anticoagulation within 12 hours
   B. A significantly lower proportion of patients achieving therapeutic anticoagulation within 12 hours
   C. No difference in the proportion of patients achieving therapeutic anticoagulation within 12 hours

Answer: C
To evaluate the impact emergency department (ED) pharmacists can have on decreasing medication errors associated with discharge prescriptions from the ED.

Currently, not all health-systems have ED pharmacists review prescriptions written for patients who are discharged from the ED. It is well accepted that pharmacists have an impact on reducing the number of medication errors in a hospital setting, however there is a lack of published studies that demonstrate the impact pharmacists can have on discharge prescriptions from the ED. The creation of a workflow that allows pharmacists to evaluate prescriptions would lead to improved patient care by reducing the number of medication for patients being discharged on a prescription from the ED.

A retrospective review was completed to serve as a baseline for potential pharmacy interventions. One hundred patients were randomly selected for discharge prescription review during the month of January 2015. A total of 136 prescriptions were written for these patients. Three prescriptions (2.2%) were identified as having the potential to be optimized and twenty-three (16.9%) were identified as being medication errors. An example of a medication optimization includes changing medication strength to decrease pill burden, as compared to a medication error such as pediatric medication being incorrectly doses based of body weight. Antibiotics were the most common class of medications where errors were identified. A prospective study in 2016 of 500-600 prescriptions will look at the impact pharmacists have with the revised ED workflow in which pharmacists review discharge prescriptions prior to the patient leaving the ED.

**Learning Objectives:**

1) Describe the impact pharmacist have on reducing the number of medication errors.

2) Explain how to incorporate pharmacists into the workflow process for discharge prescriptions from the ED.

**Self-Assessment Question:**

1) Which class of medications was identified as having the highest number of errors during the retrospective review:
   A. Antibiotics
   B. Antiemetics
   C. Pain
   D. Skeletal muscle relaxants

**Answer:** A

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**A MULTICENTER EVALUATION OF CARDIOVASCULAR IMPLANTABLE ELECTRONIC DEVICE INFECTION MANAGEMENT.** Jeremiah Saunders, Pamela Foral, Michaela Hrdy, Estella Davis, Katie Packard, Katie Duggins, Christopher Destache. VA Nebraska Western-Iowa Health Care System, 4101 Woolworth Avenue, Omaha, NE 68105. Jeremiah.Saunders@va.gov.

The 2010 update to the American Heart Association (AHA) guidelines serves as the standard of care for treatment of acute Cardiovascular Implantable Electronic Device (CIED) infections. However, given the lack of primary literature available evaluating antimicrobial use in CIED infections, the AHA guidelines provide a higher level of autonomy to the practitioner and allow for a wide variation in CIED infection treatment.

The primary objective of this study is to investigate antimicrobial treatment in patients with CIED infections and assess the level of adherence to the 2010 update to the AHA guidelines. The secondary objective is to compare AHA guideline adherent versus non-adherent patients treated with antimicrobial therapy for a CIED infection to determine the difference(s) in patient outcomes between the two groups.

A retrospective analysis will be conducted from January 2011 through December 2014, using ICD-9 codes 99661 and 99672, to identify study subjects at multiple institutions, including the VA Nebraska Western-Iowa Health Care System, Catholic Health Initiative (CHI)-Creighton University Medical Center, CHI-Bergan Mercy, and Bryan Health. The following measures will be assessed: appropriate duration and selection of antimicrobial therapy based on AHA guideline recommendations, the status of the infected device as either extracted or retained, transesophageal echo results, and if time to new CIED placement was appropriate based on the length of time patient had negative blood cultures.

Anticipated results of this study will expand upon the clinical relevance of the AHA CIED infection guidelines and provide clinicians with further guidance in the treatment of CIED infections.

**Learning Objectives:**

1) Define the goals of treatment for CIED infections based on the 2010 update to the AHA guidelines.

**Self-Assessment Questions:**

1) A pocket-site infection post-CIED removal should be treated with antimicrobials for what duration of time based on the 2010 update to the AHA guidelines?
   A. 10-14 days
   B. At least 14 days
   C. Between 14 days and 4 weeks
   D. At least 4-6 weeks

**Answer:** A
The Avera Health system has grown considerably over the years, and now has numerous different hospitals that vary significantly in size and scope. Variation among the facilities has led to inconsistent practices and workflow among the respective hospitals. The objective of this project is to create and implement a practical, uniform, clinical support tool to guide the Avera Health System.

Currently, Avera Health facilities use different clinical support tools, and these hospitals have different daily workflow and goals. These goals vary based on available personnel, differing procedures, and expertise in specific areas. Working with different pharmacists, administrators, and clinical service lines, this project will create a clinical support matrix that will be used system wide. Using an electronic health record and an alert and outcome system we will attempt to discover the most meaningful outcomes that each facility is hoping to achieve, and incorporate them into this new system. The primary focus of this project will be to direct daily antimicrobial stewardship. Secondary outcomes will include monitoring electrolytes, drug levels, daily susceptibility reports, and intravenous to oral conversion of antibiotics. Ultimately our goal is to improve and standardize patient care and establish better outcomes while promoting pharmaceutical stewardship across the Avera system.

**Learning Objective:**

1) Discuss implementation of a clinical support tool

**Self-Assessment Question:**

2) Name a crucial component required for an effective clinical pharmacy intervention.
   - A. Actionable item
   - B. Leads to an event outcome
   - C. Has a drug and a lab value involved
   - D. Both A and B.

**Answer:** D

Medications with anticholinergic properties are available and recommended for use in various disease states, but their safety and adverse effects in the elderly may outweigh the benefits. Adverse effects are increased with the use of drugs with high anticholinergic activity, as well as in the setting of anticholinergic polypharmacy. Until recently, it was thought that unwanted side effects, particularly cognitive effects, would improve upon dose decrease or discontinuation of the causative agent(s). Recently published literature suggests that the cumulative use of medications with anticholinergic properties may have irreversible effects such as an increased risk for dementia.

A medication use evaluation of anticholinergic polypharmacy and burden was performed to evaluate the prevalence in veterans 75 years of age and older, and to analyze the anticholinergic burden of those patients. At the time of the study, 185 patients were identified with anticholinergic polypharmacy, and 373 patients had an anticholinergic burden of ≥3. Commonly prescribed agents were identified, and educational interventions have been provided to pharmacists, with plans to provide education to physicians and psychiatrists. Interventions were targeted to reduce anticholinergic polypharmacy and anticholinergic burden in patients at risk for increased adverse effects. Pharmacists were provided a patient list and access to a real-time dashboard with patient information necessary to provide a comprehensive medication review and make recommendations for the reduction or discontinuation of anticholinergic agents. Future interventions include the addition of an alert with attached references identifying highly anticholinergic agents, and updating the current dementia consult to include anticholinergic burden.

**Learning Objectives:**

1) Identify commonly prescribed medications with highly anticholinergic effects and their potential impact on cognition.

**Self-Assessment Question:**

1) According to the 2015 Beers Criteria, which of the following is considered highly anticholinergic?
   - A. Tizanidine
   - B. Olanzapine
   - C. Ranitidine
   - D. Alprazolam

**Answer:** B
The Centers for Medicare and Medicaid Services requires prescription plans to offer CMRs to qualifying beneficiaries to improve patient outcomes and reduce healthcare costs. Patient perceptions on preferred methods of contact, desired frequency of CMRs, and follow-up actions post-CMR have not previously been studied.

This study identified patient/caregiver opinions of who offers a CMR, the method by which the offer is made, how often and special circumstances when a CMR is needed, and actions taken by CMR recipients as a result of pharmacists’ recommendations.

A 22-item survey was administered to patients/caregivers who completed a CMR with a Balls Food Stores pharmacist between October 1, 2014 and September 30, 2015. Surveys were administered by telephone or by mail if not reachable by phone. Descriptive statistics were used to evaluate participant demographics. Statistical analyses were performed using SPSS v.22.

Eighty surveys were completed. Respondents were mostly white (86%), female (62%), aged 65 years or older (61%), with an annual income less than $25,000 (65%). Study results determined respondents are more likely to accept a CMR offer from a pharmacist or pharmacy technician they know (100% and 94%, respectively), and a phone call was preferred (24%) to alternate methods of contact (11% at prescription pick-up, 5% via e-mail, 3% via mailed letter). Respondents strongly agreed that CMRs should be completed annually or when medication is initiated for a new diagnosis. The majority (64%) of respondents discussed the pharmacists’ recommendations with their prescriber(s).

Learning Objectives:

1) Identify patients’/caregivers’ preferred people and methods of contact for CMR offers.
2) Identify circumstances in which patients/caregivers believe an additional CMR would be beneficial.

Self-Assessment Questions:

1) Patients/caregivers prefer to be contacted by _______ via ________.
   A. I - their physician; II-conversation in-person
   B. I - an unknown pharmacist; II-phone call
   C. I - an insurance company representative; II-letter
   D. I - a known pharmacist; II-phone call

2) Under which of the following circumstances do patients/caregivers believe a CMR would be beneficial?
   A. After a medication change
   B. After hospital discharge
   C. After a new diagnosis requiring medication
   D. After a clinic, urgent care, or ED visit

Answer: D

Q1 Answer: D  Q2 Answer: C
Learning Objective:

1) Define patient characteristics that are associated with inaccurate point-of-care glucose measurements in critically ill patients

Self-assessment question:

1) Which theory correctly identifies why a patient on vasopressors could potentially have inaccurate point-of-care blood glucose measurements?
   A. Vasopressors cause vasoconstriction and decreased capillary blood flow
   B. Vasopressors cause vasodilation and increased capillary blood flow
   C. Vasopressors cause an increase in insulin sensitivity
   D. Vasopressors cause a decrease in insulin sensitivity

Answer: A

EVALUATION OF CEPHALOSPORIN AND PENICILLIN USE IN BETA-LACTAM ALLERGIC PATIENTS: A PHARMACY-LED INITIATIVE TO REDUCE UTILIZATION OF NON-PREFERRED ANTIBIOTICS IN SURGERY AND OBSTETRICS. Lydia Seger, Heidi Calvin, Rudd Hetrick, Larry Segars, Shawnee Mission Medical Center, 9100 W 74th St, Shawnee Mission, KS 66204. Lydia.seger@shawneemission.org

Historically it was reported that patients with penicillin allergies had a 10 percent chance of cross-reactivity to cephalosporins. Recent research suggests the rate of cross-reactivity is closer to 1 to 4 percent, yet prescribers still avoid using cephalosporins in penicillin-allergic patients. Beta-lactam-allergic surgical and obstetric patients commonly receive non-preferred antibiotics. Shawnee Mission Medical Center (SMMC) implemented a protocol to decrease non-preferred antibiotic use and provide guidance for appropriate antibiotic selection.

The purpose of this study was to determine if the initiative reduced use of non-preferred antibiotics in surgical and obstetric patients. A secondary outcome was the rate of allergic reactions in patients who received a beta-lactam.

This was an IRB-approved retrospective single-center cohort analysis. Potential subjects were identified using the electronic medical record. Subjects included surgical and obstetric patients ≥18 years old with a documented beta-lactam allergy who received at least one dose of an antibiotic during admission. The time periods prior to and after implementation were compared. Demographic variables and study outcomes were compared using Chi-squared analyses.

The proportion of patients given beta-lactam antibiotics was significantly greater after implementation of the initiative (84% vs 29%, p<0.001). Vancomycin and clindamycin use decreased substantially (85% and 89% relative decreases, respectively). No reactions to beta-lactam antibiotics were documented.

Initiative implementation was associated with decreased utilization of non-preferred antibiotics in beta-lactam-allergic surgical and obstetric patients. There were no documented allergic reactions to beta-lactams post-implementation. Finally, this pharmacist-led initiative impacted prescribing habits and led to increased compliance with surgical and obstetric antibiotic guidelines.

Learning Objective:

1) Describe the impact of the pharmacist-led initiative on antibiotic selection in beta-lactam allergic patients.

Self-Assessment Question:

1) The pharmacist-led beta-lactam antibiotic initiative was associated with:
   A. Increased use of beta-lactam antibiotics in patients with beta-lactam allergies
   B. No impact on prescribing habits in patients with beta-lactam allergies
   C. Decreased use of non-preferred antibiotics in patients with beta-lactam allergies
   D. Both A and C

Answer: D
The development of an alcohol withdrawal protocol and impact of dexmedetomidine use at North Memorial Medical Center a community level 1 trauma center. Kelly Sennett, Mary Foss, Jennifer Marquart, James Bischoff, Scott Seaburg, Amy Fredkove, Emily Herstine, North Memorial Medical Center, 3300 Oakdale Ave. N Robbinsdale MN, 55422. Kelly.sennett@northmemorial.com

Alcohol abuse and dependence are prevalent health problems in the United States, affecting 6% to 8% of the population. Abrupt cessation of alcohol leads to the over activation of the central nervous system. Symptoms may vary in severity ranging from palpitations, and diaphoresis, to seizures, delirium tremens and/or death. Close monitoring and prevention of severe symptoms are important to the management of withdrawal, most significantly in the first 48 to 96 hours. Benzodiazepines are an important component of alcohol withdrawal management and have shown a reduction in mortality risk.

The purpose of this study is to determine a safe and effective benzodiazepine regimen and adjunctive therapy for the development of an alcohol withdrawal protocol. The second purpose of this study is to determine the impact of dexmedetomidine specifically on ventilator days in mechanically ventilated withdrawal patients.

These objectives will be assessed through a review of current literature and critical comparison of protocols at surrounding hospitals. The use of dexmedetomidine will be assessed through a retrospective chart review. This review will include 130 subjects in a 1:1 ratio of patients receiving a benzodiazepine versus those who received a benzodiazepine and dexmedetomidine to provide a power of 80%, using a two-sided test at the 5% level, to detect a mean difference of one ventilation day, and standard deviation of ±2 days.

The results of this study will be used to implement a new alcohol withdrawal protocol at North Memorial Medical Center and improve the appropriate usage of dexmedetomidine in critical ill patients.

Learning Objectives:
1) Describe the key aspects of drug therapy management of alcohol withdrawal.
2) Explain the impact of dexmedetomidine on alcohol withdrawal management.

Self-Assessment Questions:
1) Benzodiazepines are beneficial for alcohol withdrawal because:
   A. Excitatory GABA receptor effect
   B. Seizure protective effect
   C. Short elimination half life
   D. Blood pressure lowering

2) Dexmedetomidine should not be used as a sole agent because:
   A. No seizure protective effects
   B. Decreased overall benzodiazepine use
   C. No need for mechanical ventilation with sedation
   D. Incidence of hypotension

Q1 Answer: B  Q2 Answer: A

EVALUATION OF CLINICAL EFFECTIVENESS UTILIZING ADJUSTED BODY WEIGHT FOR DAPTOMYCIN DOSING. Shelby Shemanski, Nicholas Bennett, Sara Boyd, Mark Woods, and Kevin Kennedy. Saint Luke’s Hospital, 4401 Wornall Road, Kansas City, MO 64111 sshemanski@saint-lukes.org

The purpose of this study is to compare outcomes using daptomycin dosing with actual body weight (ABW) and adjusted body weight (AdjBW).

Daptomycin dosing based on ABW has been the long standing dosing method, but it is unclear if this strategy results in a higher risk of toxicity for certain populations, particularly in obesity. The aim of this study is to determine if AdjBW dosing provides similar clinical outcomes while also minimizing risk of adverse effects due to higher total doses and drug exposure.

The SLHS Pharmacy & Therapeutics Committee approved a revision to the daptomycin collaborative drug therapy management agreement (CDTM) which allows dosing to be based on AdjBW if patients are >130% of their ideal body weight. The study included all patients who are ≥18 years old who received daptomycin therapy for at least 72 hours or 3 doses. A retrospective group using ABW dosing was compared to AdjBW group through chart review within the electronic medical record.

Data collection for the control group began in October 2014, while prospective data collection began after the implementation of the revised daptomycin CDTM, between the time period of October 15,2015-March 2016. The study evaluated clinical, microbiologic, and safety outcomes for AdjBW daptomycin dosing.

At the time of abstract submission, prospective data collection was still ongoing. The results of this study will be used to determine if AdjBW is a safe and effective method for dosing obese patients.

Learning Objectives:
1) Describe the adverse events related to daptomycin exposure
2) Explain the benefits to utilizing adjusted body weight for daptomycin dosing

Self-Assessment Questions:
1) The concern with higher total doses of daptomycin include:
   A. Myositis and myalgias
   B. Nephrotoxicity
   C. Elevated creatine phosphokinase
   D. Both A and C

2) Available evidence suggests alternative daptomycin dosing strategies may result in:
   A. Similar clinical success rates
   B. Lower rates of microbiological success
   C. Significantly lower in-hospital mortality
   D. Increased risk of toxicity and adverse events

Q1 Answer: D  Q2 Answer: A
EMBEDDING PHARMACISTS IN PRIMARY CARE CLINICS: FACTORS INCREASING PROVIDER ACCEPTANCE AND UTILIZATION OF NEWLY-ESTABLISHED COLLABORATIVE DRUG THERAPY MANAGEMENT (CDTM) SERVICES. Denver Shipman, Lyndsey Hogg, Meghan Haftman, and Wesleigh Bishop. Via Christi Hospitals Wichita, Inc., 929 N St Francis, Wichita, KS, 67214. Denver.Shipman@ViaChristi.org

Current literature on medication management details community pharmacists’ interaction with primary care physicians or pharmacists in mixed practice sites and is of qualitative nature. There is limited literature detailing ambulatory care pharmacists embedded in primary care clinics and their interactions with clinic providers. With continual expansion of ambulatory care clinical pharmacy services, more data is needed to make implementation of new programs seamless. The purpose of this study is to determine activities which build provider trust and confidence in pharmacist skills and knowledge to increase utilization of collaborative drug therapy management (CDTM) services provided by ambulatory care pharmacists.

A survey was distributed to primary care physicians and advanced practice providers at clinics where pharmacists have recently begun offering collaborative drug therapy management (CDTM) services. Participants include family medicine, internal medicine, and pediatric physicians and advanced practice providers. The survey consists of three domains. Non-identifiable demographic information for each provider surveyed was first collected. Providers then rated their degree of confidence in CDTM services both prior to and four months after new service availability. Next, providers gave feedback regarding the relationship between individual activities performed by the pharmacist and provider’s corresponding confidence in and utilization of CDTM services. The survey also allowed for open ended comments regarding establishment of CDTM services. Results will be used to guide future ambulatory care pharmacy services.

Learning Objective:

1) Describe components of Collaborative Drug Therapy Management (CDTM)

Self-Assessment Question:

1) Collaborative drug therapy management involves:
   A. Allocation of patient care tasks to a clinical pharmacist under direct oversight of a physician
   B. Collaborative practice agreement between physician(s) and pharmacist(s) within a defined protocol
   C. Pharmacists as sole providers of patient care
   D. Contractual agreement between a hospital(s) and pharmacist(s)

Answer: B

INFLUENCE OF BODY WEIGHT ON MELPHALAN DOSING IN AUTOLOGOUS STEM CELL TRANSPLANTATION. Kendall Shultes, Christopher Arp, Keith Stocker-Goldstein, Sean DeFrates, Barnes-Jewish Hospital, 425 S. Euclid Ave., 2-IOH, St. Louis, MO 63110. kendall.shultes@bjc.org

The American Society for Blood and Marrow Transplantation (ASBMT) recently published guidelines regarding transplant conditioning chemotherapy dosing for obese patients and recommended that melphalan be dosed utilizing actual body weight.1 At Barnes-Jewish Hospital (BJH) practice has been to dose melphalan using a corrected body weight when patients weigh greater than 120% their ideal body weight. Given the variability in dosing and the limited literature, we find this to be an important issue both locally and nationally.

This study aims to compare clinical outcomes of melphalan ASCT for multiple myeloma between non-obese and obese populations who are dosed using ideal and corrected body weights respectively. The primary outcome is 3-year event free survival (EFS). Secondary outcomes include response 100 days post-transplantation, 5-year overall survival (OS), treatment-related mortality (TRM), time to engraftment, and hospital length of stay.

Institutional review board approval was granted for this single-center, retrospective, non-inferiority study. 394 adult patients from January 1, 2009 – December 31, 2012 undergoing their first ASCT with melphalan conditioning at BJH were identified via a query of BJH’s transplant database. Of these, 273 patients met study eligibility. Patient specific characteristics and outcomes surrounding the ASCT were collected. The primary outcome of 3-year EFS will be assessed using a non-inferiority margin of 7%. Descriptive statistics, multivariate analyses, and Kaplan-Meier curves will be utilized for comparison among body weights.

Results from this study will add to the current literature surrounding dosing of melphalan and could provide evidence to support or refute dose adjusting melphalan in future guidelines.

Learning Objective:

1) Describe the current recommendations for dosing melphalan that exist in the literature.

Self-Assessment Question:

1) What body weight should be utilized for dosing obese patients with melphalan?
   A. No recommendations exist for dosing melphalan in the obese patient population.
   B. Per ASBMT’s transplant conditioning chemotherapy guideline, a corrected body weight should be utilized.
   C. Per ASBMT’s transplant conditioning chemotherapy guideline, actual body weight should be utilized.
   D. Per ASBMT’s transplant conditioning chemotherapy guideline, ideal body weight should be utilized.

Answer: C
Mechanically-ventilated patients in the intensive care unit (ICU) have varying sedation needs. Meeting these requirements, although vital for patient recovery, is not always optimally managed. Problems arise when patients are over- or under-sedated, which has been linked to increased morbidity and mortality, as well as increased hospital length-of-stay and cost. Furthermore, current guidelines recommend optimization of analgesia prior to initiation and/or increase in dose of sedative agents in mechanically ventilated patients in order to prevent or minimize risk of ICU delirium. Additional guideline recommendations and recent literature also supports daily sedation "holidays" or "vacations", which involves decreasing or withholding sedation in certain patients to prevent accumulation of sedative agents, to facilitate neurological status assessment, and facilitate awakening and weaning from the ventilator.

The purpose of this study is to evaluate current sedation practices in critically ill patients at Abbott Northwestern Hospital (ANW), specifically to determine appropriateness of analgesic and sedative agent selection. A secondary objective will be to present findings to intensivists and other providers. A final objective is to determine if order set standards should be applied.

The results of the study will be used to implement changes in the ANW intensive care units (ICUs) to improve patient outcomes.

Learning Objectives:

1) Discuss 2013 SCCM guideline recommendations regarding optimization of analgesia and sedation
2) Compare the role of bolus dose administration to continuous infusions of analgesic and sedative agents

Self-Assessment Questions:

1) According to the 2013 SCCM Pain, Agitation, and Delirium Guidelines, which agent(s) have been identified as a potential risk factor for development of delirium?
   A. Dexmedetomidine
   B. Lorazepam
   C. Propofol
   D. Midazolam
   E. B and D

2) Which of the following has been associated with continuous benzodiazepine infusion?
   A. Unpredictable awakening
   B. Improved patient outcomes
   C. Decreased length of stay (LOS)

Q1 Answer: E  Q2 Answer: A
Learning Objectives:

1) Explain potential drawbacks for using empiric double antipseudomonal coverage in HCAP patients.
2) Discuss study methods and results.

Self-assessment Questions:

1) What is a potential drawback for using empiric double antipseudomonal coverage in HCAP patients?
   A. Synergist activity
   B. Increased coverage
   C. Prevention of resistance
   D. Increased risk of drug toxicities

2) Which of the following is the primary outcome of this study?
   A. Thirty day readmission rates
   B. Incidence of acute renal failure
   C. Time until IV to PO antibiotic switch
   D. Adequate coverage of empiric regimen

Q1 Answer: D  Q2 Answer: D

Learning Objectives:

1) Describe the importance of identifying risk factors of flumazenil use in benzodiazepine oversedation events.
2) Identify triggers of flumazenil use that can be used to explore opportunities to reduce the frequency of oversedation events related to benzodiazepines.

Self-Assessment Questions:

1) What complications may result as a result of benzodiazepine oversedation?
   A. Respiratory Depression
   B. Hypoglycemia
   C. Hemodynamic Instability
   D. A and C

2) A trigger is generated within the electronic medical record when flumazenil is ordered and administered. In what instance, would the trigger merit recording the event in the systems’ online adverse drug event (ADE) monitoring system? If upon review of the trigger:
   A. It is determined that the prescriber utilized the reversal agent to rule out problems related to possible benzodiazepine overdose, is ordered and administered. At each hospital within the system, a review of each flumazenil administration is performed to determine if its use is related to a benzodiazepine. Prescribers often utilize the reversal agent in unresponsive patients to rule out problems related to possible benzodiazepine overdose, despite limited guidance in primary literature as to the appropriate use of reversal agents in these instances; however, if it is determined that the use of flumazenil is related to a benzodiazepine adverse drug event (ADE), the event is recorded in the systems’ online ADE monitoring system.

The primary objective of this study will be to determine the risk factors of benzodiazepine ADE’s requiring the use of the reversal agent, flumazenil, in our health system. Methods will include a retrospective chart review of patients with reported events between 2010 and 2015, to identify and understand the common causes contributing to the events. The intent is to explore opportunities for system process improvement to optimize patient care and reduce the frequency of oversedation events related to benzodiazepines.

Q1 Answer: D  Q2 Answer: B
OPTIMIZATION OF CENTRAL PHARMACY PROCESSES WITH TARGETED TRAINING MODULES. Mark Skildum and Jay Christenson, United Hospital Part of Allina Health, 333 N Smith Ave, Saint Paul, MN 55102 mark.skildum@allina.com

To analyze the effect of targeted training modules on inpatient pharmacy processes in a community hospital.

Ongoing training, competency assessments and detailed standard operating procedures have been shown to reduce error rates and increase job satisfaction across many industries. Surveys of pharmacy directors have shown a need for more highly skilled pharmacy technicians. To address this need targeted training modules were designed for several processes in the central pharmacy of a community hospital. Modules included video tutorials, standard operating procedure tips sheets and competency assessments. Attitudes towards training and error rates were measured before and after the implementation of the training modules. Deviation from standard operating procedures was also measured through observations and error logs before and after the implementation of the training modules.

Data collection and analysis is ongoing.

Targeted training modules have the potential to reduce error rates, optimize processes, and increase the skill level of an inpatient central pharmacy staff.

Learning Objectives:

1) Describe the use of targeted training modules.
2) Review possible activities for targeted training modules.

Self-Assessment Questions:

1) Targeted training modules are:
   A. Training aimed at low performing employees
   B. Training aimed at specific skills or processes
   C. A way to ensure all staff members have adequate physical fitness for the job
   D. Used for new employees only

2) An appropriate activities for a targeted training module is:
   A. Watching a video outlining appropriate unit dose re-packaging technique
   B. Reading the employee handbook
   C. Demonstrating competency in compounding an alteplase bolus and infusion using a training kit
   D. Both A and C

Q1 Answer: B   Q2 Answer: D

INCORPORATION OF A VANCOMYCIN NOMOGRAM INTO A STANDARD VANCOMYCIN DOSING PROTOCOL AT A COMMUNITY HOSPITAL: EFFECT ON VANCOMYCIN TROUGHS AND NEPHROTOXICITY. Andy Snyder, Melissa Steenhoek, Tayo Bakare, and JK Sturgeon, CoxHealth Systems, 3801 S. National Ave., Springfield, MO 65807 andrew.snyder@coxhealth.com

To evaluate the rates of goal trough achievement and nephrotoxicity before and after implementation of a vancomycin nomogram.

Pharmacists are consulted to dose greater than 90% of vancomycin orders at our institution. Our current practice requires pharmacists to select initial vancomycin doses using time-consuming population-based pharmacokinetic equations. An equally efficacious but streamlined method of dosing vancomycin was desired. Nomograms have been studied as an alternative dosing method for initial regimens. We selected and modified an existing, validated nomogram to fit our current dosing practices.

For this retrospective cohort study, we evaluated 150 patient charts prior to, and after incorporation of a vancomycin nomogram (n = 300). The electronic medical record was reviewed to identify patients who received vancomycin therapy and had at least one vancomycin trough level drawn. Exclusion criteria were patients with a diagnosis of cystic fibrosis, a baseline creatinine clearance below 30 mL/min, or age less than 18 years. Data collection for both pre- and post-implementation included indication for vancomycin, trough level(s), therapy duration, baseline and serial serum creatinine, and exposure to concomitant nephrotoxins.

Pre-nomogram data suggested that initial vancomycin goal trough achievement rates were approximately 31% at our institution, with an additional 11% of patients falling within 1 mcg/mL of the goal range. The incidence of nephrotoxicity for patients receiving vancomycin without concomitant nephrotoxins was 4.5%, which is similar to the 5-7% rate described in previous studies.

Learning Objectives:

1) To illustrate the effect of nomogram implementation on the rate of goal trough achievement among patients receiving vancomycin
2) To describe the effect of nomogram implementation on the nephrotoxicity rate among patients receiving vancomycin

Self-Assessment Questions:

1) Did implementation of a vancomycin nomogram for empiric dosing adversely affect goal trough achievement rates?
2) Did implementation of a vancomycin nomogram for empiric dosing adversely affect nephrotoxicity rates?

Q1 Answer: No   Q2 Answer: No
The introduction of the direct-acting antiviral agents (DAA) over the last several years has revolutionized the treatment of hepatitis C. Though highly effective, not all DAAs treatments are effective in allowing patients to achieve sustained viral response (SVR) after a single course of therapy. Although several factors such as viral load and prior liver dysfunction have been associated with lower SVR rates, additional factors potentially influencing SVR rates remain to be quantified.

For example, pharmacokinetic data suggests that proton-pump inhibitors (PPIs) will lower the concentration of ledipasvir/sofosbuvir (LDV/SOF), demonstrating that the clinical import of a variety of drug-drug interactions requires further exploration. Our primary objective is to evaluate the effect between concomitant PPI utilization and SVR rates after the treatment with second generation direct-acting antivirals by comparing SVR rates between patients exposed to PPIs, treated with LDV/SOF, and those not exposed to PPIs. Our secondary objective is to evaluate the effect of acid-reducing agents on SVR rates in patients receiving other DAAs. This retrospective data analysis will use data from the VA, on a cohort of Veterans Affairs patients, complemented by manual chart reviews for data validation. Descriptive statistics and a student’s t-test will be conducted for continuous variables and a chi-square will be utilized for categorical variables. Logistic and linear regression analysis will use data from the VA, on a cohort of Veterans Affairs patients, complemented by manual chart reviews for data validation. Descriptive statistics and a student’s t-test will be conducted for continuous variables and a chi-square will be utilized for categorical variables. Logistic and linear regression will be used to identify impact of variables on PPI-treated patient compared to controls. The results of this study will be useful in guiding the management of potentially important drug interactions when treating patients with hepatitis C.

Learning Objectives:

1) Describe the effect of PPIs on SVR rates in patients who received LDV/SOF.
2) Discuss the implications of these potential drug interactions on therapy selection for future hepatitis C patients.

Self Assessment Questions:

1) What is the proposed mechanism of the drug interaction between LDV/SOF and PPIs?
   A. Increasing the pH lowers the solubility of the sofosbuvir component.
   B. Increasing the pH lowers the solubility of the ledipasvir component.
   C. Decreasing the pH lowers the solubility of the sofosbuvir component.
   D. A higher pH increases the vulnerability of LDV/SOF to chelation by other minerals within the intestinal system.

2) Based on these results (and the previously published literature), the best approach to a patient taking a PPI daily who is a candidate for LDV/SOF is:
   A. Never give these medications simultaneously
   B. Switch the PPI to an H2RA, a class of medications which will not exhibit this interaction.
   C. Monitor viral load every two weeks for the duration of DAA therapy to verify an adequate response.
   D. Consider holding the PPI for the duration of DAA therapy if the dose is higher than the equivalent of 20 mg per day of omeprazole.

Q1 Answer: B  Q2 Answer: D
ENHANCEMENT OF PATIENT SAFETY BY REDUCING CLINICALLY INSIGNIFICANT SMART PUMP ALERTS. Michael Starling, Olathe Medical Center, 20333 West 151st Street, Olathe, Kansas 66061. michael.starling@olathehealth.org

Adverse drug events have been shown to be one of the highest contributors to patient complications in the hospital setting. Among all adverse drug events, intravenous medications account for a sizeable portion of all medication errors. Intravenous medications are often considered high-alert medications and are more likely to cause patient harm if an error occurs. The adoption of smart infusion pumps has been proven to decrease the frequency of medication errors and adverse drug events related to administration of intravenous medications. However, the capacity of smart pumps to maintain patient safety is limited by the individual utilizing the smart pump and the need for a continuous quality improvement strategy to assess and manage the technology.

The purpose of this project was to optimize our institution specific drug library in order to generate an overall lower number of clinically insignificant alerts. Additionally, we aim to demonstrate that optimizing the drug library can improve patient safety through adherence to upper and lower limits, and improving indicators of clinician alert fatigue.

These objectives will be assessed through collecting data from the CareFusion Infusion Analytics Service and Knowledge Portal. Data is reviewed at regular intervals for potential changes to the drug library data set. The results from this study could be used to show that optimizing smart pump drug libraries can result in greater patient safety through decreased adverse drug events and potential adverse drug events.

Learning Objectives:

1) Describe how smart infusion pump data can be analyzed to improve smart pump utilization.

2) Identify potential intravenous infusion administration errors that may occur despite the use of smart infusion pumps.

Self Assessment Questions:

1) An efficient infusion pump drug library has the potential to:
   A) Increase medication errors
   B) Enhance patient safety
   C) Increase nursing alert fatigue
   D) Be a an extra burden for nursing

2) Nurses have the ability to override which of the following:
   A) Selected drug
   B) Soft Max
   C) Hard Max
   D) Nurses cannot override any alert

Q1 Answer: B  Q2 Answer: B

IMPACT OF RAPID DETECTION OF RESPIRATORY VIRUSES IN ADULT INPATIENTS ON ANTI-INFECTIVE USE. Kathryn Stecklein, Jennifer Schmitz, Todd Schroeder, and Scott Taylor. Via Christi Hospitals Wichita, Inc., 929 N. St Francis, Wichita, KS 67214 kathryn.stecklein@viachristi.org

Acute respiratory infections are the most common illness experienced by people of all ages worldwide. Respiratory viral and bacterial infections are often indistinguishable based on presentation. Antibiotics do not impact the resolution of viral respiratory infections, and excessive antibiotic use has contributed to antibiotic resistance. Data regarding the effects of viral diagnostics on antibiotic prescribing for hospitalized adults is limited.

The purpose of this study is to evaluate the impact of a multiplex respiratory viral polymerase chain reaction (PCR) assay on anti-infective utilization in adult inpatients.

In a retrospective chart review conducted over the course of two consecutive respiratory seasons, researchers will collect data from inpatients on whom a multiplex PCR respiratory viral panel (RVP) was completed. All patients age eighteen years or older admitted to Via Christi Hospitals Wichita, Inc. during season one, October 1st 2014 to February 28th 2015, and/or season two, October 1st 2015 to February 29th 2016, with a RVP result on their electronic health record will be included. Immunocompromised patients, patients admitted on antibiotics, and prisoners will be excluded. The primary outcome measure is to compare the number of antibiotic days in patients with a positive RVP result versus those with a negative RVP result. Secondary endpoints include antiviral days, in-house mortality, and incidence of Clostridium difficile infection.

Results of this study will be used to determine if rapid viral panels impact the number of antibiotic and antiviral days experienced by adult inpatients.

Learning Objective:

1) Describe the impact of overuse of antibiotics

Self-Assessment Question:

1) Increase in incidence of Clostridium difficile infection is associated with which of the following?
   A. Number of antivirals
   B. Antibiotic duration
   C. Class of antibiotics
   D. Both B and C

Answer: D
IMPACT OF PHARMACIST COMPLETED FOLLOW-UP TELEPHONE CALLS ON PATIENT SATISFACTION AND READMISSION RATES. Abigale Steele, PharmD and Deborah Klein, PharmD, BCPS, United Hospital, part of Allina Health, 333 North Smith Avenue, Saint Paul, MN 55102. abigale.steele@allina.com.

Follow-up phone calls after hospital discharge have been shown to decrease 30-day readmission rates and increase patient satisfaction. Post-discharge phone calls by a pharmacist within 24-48 hours of discharge provides an opportunity for medication education and improved medication adherence during transitions of care. As medication experts, pharmacists are well positioned to identify barriers to medication adherence, including the recognition of patients’ medication understanding and areas of concerns or discrepancies.

The objectives of this study are to assess the impact on patient satisfaction and 30 day readmission rates as a result of pharmacist completed follow-up phone calls within 24-48 hours to patients who have been discharged home from an inpatient telemetry unit. Additionally, patients’ responses to questions asked by the pharmacist will be recorded, as well as those asked by the patients to the pharmacist, for purposes of assessing trends that could identify potential opportunities for improvements in discharge care plans.

This is a single-center pilot quality improvement project. The results of this study will be used to identify opportunities for quality improvement during transition of care.

Learning Objective:
1) Identify trends in questions asked by patients to a pharmacist during follow-up telephone calls

Self-Assessment Question:
1) What are common types of questions asked by patients to a pharmacist during follow-up phone calls after hospital discharge to home?
   A. None, patients never have questions for pharmacists
   B. Questions regarding medication side effects
   C. Questions regarding medication interactions
   D. Both B and C

Answer: D

IMPACT OF PHARMACIST TELEPHONE FOLLOW-UP CALLS ON PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE DISCHARGED FROM HOSPITAL TO HOME. Luma Succar, Rejena Azad, Kayode Giwa, Katherine K. Perez, April Moretto, Rafael Felippi. Houston Methodist Hospital, 6565 Fannin Street, DB1 09, Houston, TX 77030. ln Succar2@houstonmethodist.org

Chronic Obstructive Pulmonary Disease (COPD) represents a major public health problem that is both preventable and treatable. In 2015, the centers for Medicare and Medicaid Services (CMS) established a payment penalty for unplanned 30-day readmissions for patients with COPD. In recent years, there has been increased interest in the benefits of continuity of care (COC) related to reducing complication risks, increasing compliance and patient satisfaction, improving preventive care, and decreasing medical care costs and hospitalizations. Pharmacists play a major role in such interventions through promotion of appropriate therapy, medication reconciliation, and education. In an effort to address COC in patients suffering from COPD, our institution has implemented a pharmacist-led telephone based discharge follow up support program.

The purpose of this study is to characterize the types and frequencies of interventions and discrepancies that occur at transition of care in Medicare-insured COPD patients contacted by pharmacists post-discharge.

Patients with a COPD related hospitalization discharged from Houston Methodist Hospital System between January 2014 and May 2015 will be reviewed and analyzed. A minimum of 350 patients will be screened for eligibility. All patient demographics, baseline characteristics, and the outcomes of medication discrepancies and interventions will be summarized using descriptive statistics for continuous variables and counts and percentages for categorical variables.

The results of our study will potentially be utilized by the department of pharmacy to advise healthcare professionals at Houston Methodist Hospital system on actions to take during the hospital discharge process to optimize patients’ safety and outcomes.

Learning Objective:
1) Describe the impact of pharmacist-conducted post-discharge follow up telephone calls on COPD patients

Self-Assessment Question:
1) Pharmacist conducted follow-up telephone calls:
   A. Allow detection of interventions/discrepancies that occur during discharge
   B. Cause a decrease in readmission rates of COPD patients
   C. Play a major role in the continuity of care (COC) model
   D. A and C

Answer: D
IMPROVING APPROPRIATE PROTON-PUMP INHIBITOR USE IN PATIENTS ON DUAL ANTIPLATELET THERAPY

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This study investigates pharmacy intervention in improving the evidence-based use of proton-pump inhibitors (PPI) to reduce the risk of gastrointestinal bleeding (GIB) in post percutaneous coronary intervention (PCI) patients requiring dual antiplatelet therapy (DAPT) at Truman Medical Center-Hospital Hill.

This study has been approved by the Institutional Review Board. The study will be an observational study, with a historical control and post intervention study group. Both groups’ data will be collected retrospectively. Patients included are patients who were discharged after PCI on DAPT from 1/1/15-3/30/15 in the control group and from 1/1/16-4/15/16 in the post intervention group. Patients were excluded if they were deceased at time of discharge or left against medical advice. Based on recent guidelines and consensus documents, PPI therapy is deemed appropriate if: patients have history or GIB, H. Pylori infection, concurrent NSAID, corticosteroid, or anticoagulant use, or are ≥60 years of age, and the regimen avoids omeprazole and clopidogrel interaction. Interventions used to improve appropriate use include: 1) physician education, 2) updating the DAPT prescriber’s decision tree, and 3) pharmacy staff screening and intervention.

Preliminary results for the historical control are available. Sixty patients met inclusion/exclusion criteria. Thirty-seven (61.2%) met appropriate use parameters. In all 15 patients had missed indications for a PPI, clopidogrel was prescribed with omeprazole and an H2RA was prescribed in place of a PPI in 3 patients each, and 2 patients were prescribed a PPI without indication.

Learning Objectives:
1) Identify the risk factors that qualify a patient on dual antiplatelet therapy for GI prophylaxis

Self-Assessment Questions:
1) Which of the following is not a risk factor requiring GI prophylaxis in patients on dual antiplatelet therapy?
   A. Age > 60 years old
   B. Prolonged dual antiplatelet therapy (>1 year)
   C. Concurrent corticosteroid or anticoagulant use
   D. History of GI bleed

Answer: B

EFFECTS OF HOME ANTIPSYCHOTIC REINITIATION IN ICU PATIENTS WITH A HISTORY OF MENTAL ILLNESS.

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Abrupt discontinuation of antipsychotics may lead to complications including acute mental destabilization. Psychiatric decompensation can worsen medical outcomes, pose a risk to the patient and staff, and increase the requirement for PRN agitation medications. Usage of medications such as benzodiazepines has been associated with increased rates of ICU delirium. Therefore, strategies to prevent agitation and decrease benzodiazepine usage should be considered.

The primary objective of this study is determine the effect antipsychotic reinitiation has on the degree of agitation experienced by patients with mental illness in the ICU. Secondary objectives include comparison of as needed benzodiazepine and antipsychotic utilization between patients restarted on home antipsychotics and those who were not.

ICU patients with a history of mental illness and home antipsychotic use who had PRN benzodiazepines or antipsychotics ordered for agitation were identified using the electronic medical record. Patients with a history of seizures, active substance abuse, detoxification protocols ordered, or benzodiazepine infusions ordered were excluded. Charts were evaluated to discern whether or not a home psychotropic regimen was present. One hundred random patients were then further separated based upon whether or not home antipsychotics were restarted.

Results from this study will be used to develop an educational in-service for critical care staff regarding safe usage of antipsychotics in the ICU. It is expected that home antipsychotic reinitiation will be associated with a reduction in the number of agitation episodes and dose requirements of PRN benzodiazepines and antipsychotics.

Learning Objectives:
1) Discuss the potential advantages of continuing home antipsychotics in the intensive care unit (ICU)

Self-Assessment Questions:
1) What is one potential advantage of restarting home antipsychotics upon admission to the ICU?
   A. Increased length of stay
   B. Decreased use of benzodiazepines
   C. Increased use of PRN antipsychotics
   D. Decreased use of non-benzodiazepine sedatives

Answer: B
In 2012, the Centers for Medicare and Medicaid Services passed the Hospital Readmissions Reduction Program, which allows reduced reimbursements to hospitals with excessive readmission rates. Medicare reimbursement rates are also tied to the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) patient survey results and many questions are related to disease state education and medication counseling. Pharmacists have a strong background in therapeutics and can provide medication reconciliation services, disease state education, and telephone reinforcement post-discharge. Numerous evidence-based care models have shown that the addition of a clinical pharmacy patient education service at discharge can improve patient outcomes and decrease congestive heart failure (CHF) readmissions.

The purpose of this study is to analyze the impact of the addition of a pharmacist to the CHF discharge process on 30-day readmission rates and medication-related HCAHPS scores. The pharmacist will provide medication reconciliation services, disease state and medication education, and telephone reinforcement of the discharge plan. The 30-day readmission rate will be calculated for all patients included in the study. A comparison to baseline statistics will evaluate the overall effectiveness of the addition of a pharmacist to the discharge process. Patient responses to HCAHPS survey questions will also be collected through delivery of a questionnaire and compared to the baseline patient satisfaction scores. Descriptive statistics will be calculated and used to compare groups. The results of this study will be used to support the need for the addition of a transitional care pharmacist to UAMS Medical Center.

Learning Objectives:
1) Describe the importance of pharmacist interventions in hospitalized patients with Congestive Heart Failure (CHF).
2) Identify the critical roles of discharge that should involve a pharmacist.

Self-Assessment Questions:
1) The addition of a pharmacist to the CHF discharge process can:
   A. Improve medication-related patient satisfaction scores
   B. Reduce CHF readmission rates
   C. Increase overall healthcare costs
   D. Both A and B

2) The roles of a discharge pharmacist should include:
   A. Medication reconciliation
   B. Disease state and medication education
   C. Telephone reinforcement of the discharge plan
   D. All of the above

Q1 Answer: D  Q2 Answer: D

Hypotension and bradycardia are associated with morphine-induced histamine release that may potentially be problematic in the critically ill population. Morphine conjugates to 6-glucuronide (M6G), a metabolite that is renally eliminated and has an analgesic potency 4-6 times that of its parent compound. Hydromorphone, a morphine derivative, may be a safer choice for patients in the intensive care units (ICUs) who may already have hemodynamic abnormalities and/or renal dysfunction due to its lack in M6G metabolite and minimal effect on blood pressure.

This is a retrospective, single center, cohort study. Adult patients admitted to an ICUs who received at least one intravenous (IV) dose of either IV morphine or IV hydromorphone were included in the study. Primary outcome is the difference in proportion of patients with hypotension after the first dose of IV morphine or IV hydromorphone. Secondary outcomes are the percent difference in mean arterial pressure (MAP) and heart rate (HR) before and after IV morphine or hydromorphone administration. Expected outcome of this study is that patients who received IV hydromorphone will have a lower incidence of hypotension than those received IV morphine due to the lack of M6G metabolite.

The results of this study will help evaluate the role hydromorphone may play in ICU patients.

Learning Objective:
1) Recognize the potential benefits of using hydromorphone instead of morphine in critically ill patients

Self Assessment Question:
1) Which of the following is a potential benefit of using hydromorphone over morphine in critically ill patients?
   A. Minimize the incidence of hospital-acquired infection
   B. Minimize the incidence of hemodynamic abnormalities
   C. Shorter intensive care unit length of stay
   D. Lower the rate of readmission

Answer: B
Despite ubiquitous use over the past 50 years, controversy remains regarding the most optimal dosing and monitoring strategy for vancomycin. The vancomycin monitoring consensus guidelines published in 2009 recommend vancomycin troughs as the most practical monitoring parameter for clinical practice, while recognizing evidence showing that 24-h area-under-the-curve over minimum-inhibitory-concentration (AUC/MIC) targets of 400–550 are associated with positive patient outcomes. Furthermore, recent research has shown vancomycin troughs correlate poorly with clinical outcomes. The problem persists that AUC is difficult to obtain routinely in practice. We seek to develop and clinically validate a vancomycin dosing nomogram targeting AUC/MIC with the goal of also keeping serum trough levels within generally accepted norms (10–20mg/L). This nomogram will be applied prospectively to hospitalized adult patients with stable renal function (CrCl >30ml/min) and protocolized by pharmacy-driven consults to dose vancomycin. AUC target attainment in this cohort will be compared to a retrospective cohort of patients to assess the efficacy of the nomogram.

Expected outcomes include AUC/MIC target attainment, trough levels between 10-20mg/L, and in-hospital mortality.

AUC/MIC has been shown to be the parameter that correlates with treatment outcomes. This study will potentially provide a practical tool for vancomycin dosing using AUC/MIC in the clinical setting.

Learning Objective:

1) Discuss different monitoring strategies for vancomycin

Self-Assessment Question:

1) Which of the following vancomycin monitoring strategies has been shown to better correlate with clinical outcomes?

A. Peaks only
B. Peak and trough
C. Troughs only
D. 24-hour area-under-the-curve over minimum-inhibitory-concentration

Answer: D

This is a quality improvement study, assessing the effectiveness and share a process utilized by a healthcare organization to provide continuity of care to reduce hospital readmission rate. The study further strives to identify specific population groups at high risk of readmission that could benefit from different public health intervention.

Patients ≥18 years admitted with LACE (Length of stay, Acuity of the admission, Co-morbidities and Emergency department visits) score of ≥10 between 08/01/15 and 03/31/16 at three acute care hospitals, and discharged to home or assisted living facilities were included. The goal of the study is to evaluate if receiving complete visit with primary care provider and medication therapy management with a pharmacist or medication review by registered nurse within 7 days of discharge reduces overall readmission rate. The primary end point of all cause readmission within 30 days of discharge is analyzed using chi-square test. Due to the recent implementation of the program, sample size in the complete visit group is expected to be low making generalization difficult. Thus, to further understand the benefit of complete visit after discharge, the study conducts a separate analysis that includes patients with complete visit up to 14 days. Further, samples will be stratified based on age, sex, nationality, primary language and admission diagnosis to identify risk factors related to increased readmission rate.

Data is currently being collected. At the end the study will help understand and contribute to available literature about methods to facilitate transition of care and prevent hospital readmission.

Learning Objective:

1) Report the result of utilizing LACE score and multidisciplinary team approach to reduce hospital readmission

Self-Assessment Question:

1) LACE score is defined as:

A. Length of Stay, Acuity of the admission, Co-morbidities and Emergency department visits
B. Length of Stay, Acuity of the admission, Cost of admission and Emergency department visits
C. Length of Stay Cost, Acuity of the admission, Cost of admission and Emergency department visits
D. None of the above

Answer: A
INCIDENCE OF ACUTE KIDNEY INJURY BEFORE AND AFTER THE IMPLEMENTATION OF AN EXTENDED INTERVAL INFUSION FOR PIPERACILLIN-TAZOBACTAM AND A STANDARDIZED VANCOMYCIN DOSING PROTOCOL.

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To determine the incidence of AKI before and after changes to the infusion time of piperacillin-tazobactam, and the changes in dosing protocols for vancomycin.

A vancomycin protocol that was created by Creighton University was initiated at St. Elizabeth’s in October of 2015 through March of 2016, and will compared to a year of vancomycin data prior to the protocol initiation (October 2014-September 30th, 2015). Zosyn data was collected prior to the initiation of the 4-hour extended infusion interval (8/2011-8/2013), and then compared to 2 years after the change in interval was made (9/2011-9/2013). Data collection will include serum creatinine, blood urea nitrogen (BUN), creatinine clearance, and occurrence of acute kidney injury (AKI).

Learning Objectives:

1) Review the occurrence of renal toxicity with vancomycin.
2) Understand whether an extended interval infusion of piperacillin-tazobactam causes renal toxicity.

Self-Assessment Questions:

1) What is the incidence of vancomycin renal toxicity?
   A. 5%
   B. 20%
   C. 4-40%
   D. 2%

2) What is the incidence of renal toxicity with piperacillin-tazobactam?
   A. 2%
   B. 4%
   C. 11%
   D. 20%

Q1 Answer: C   Q2 Answer: C

ANALYSIS OF PROPHYLACTIC ANTIBIOTIC TREATMENT IN VETERAN PATIENTS UNDERGOING CYSTOSCOPIC PROCEDURES

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Cystoscopic procedures are one of the most commonly performed urological procedures and can be a risk factor for developing post infections. Current guidelines provided by the American Urological Association do not recommend antibiotic prophylaxis for negative urine culture growth for simple cystoscopy but do recommend antibiotic prophylaxis in all cystoscopies with further manipulation. Guidelines collaborated by The Infectious Disease Society of America (IDSA) for surgical prophylaxis state that efficacy for antimicrobial prophylaxis in clean procedures (including cystoscopy) amongst patients with low risk of complications is variable. More evidence demonstrating the role of antibiotic prophylaxis in veterans undergoing cystoscopic procedures may be beneficial for treatment guidance in this population.

To determine the necessity of antibiotic prophylaxis to prevent severe infections including sepsis after cystoscopic procedures.

Retrospective chart review conducted on 1000 cystoscopies from 504 veterans. Veterans included were males and non-pregnant females 18 years and older who had a cystoscopy completed in the past 10 years at the Fargo Veterans Affairs Health Care System (VAHCS).

From the 1000 cystoscopies, 217 had urine analysis and/or urine culture completed post-cystoscopy. In this selected cohort, a total of 189 cystoscopies had antibiotic therapy on the day of or within three days prior to procedure and 28 did not. There were 24 (12.7%) cystoscopies that met criteria for suspected sepsis with antibiotic prophylaxis and 2 (7.1%) that met suspected sepsis criteria without antibiotic prophylaxis (P value=0.54).

There was no significant difference in the rate of sepsis with or without prophylactic antibiotic therapy.

Learning Objective:

1) Recognize if there is clinical relevance for antibiotic prophylaxis in veterans undergoing cystoscopic procedures

Self-Assessment Question:

1) This study demonstrates there is __________ evidence for recommending antibiotic prophylaxis with cystoscopic procedures in veterans.
   A. Very strong
   B. Strong
   C. Moderate
   D. Limited/No

Answer: D
Acute exacerbation of chronic obstructive pulmonary disease (AECOPD) is a common cause of admission among patients at Barnes-Jewish Hospital (BJH). The management of this disease state at BJH was recently the subject of a retrospective study. The results of the initial study were used to create and implement an order set to guide the management of AECOPD in non-critical care areas of BJH.

The purpose of this study is to assess adherence to the 2016 Global Initiative for Chronic Obstructive Lung Disease (GOLD) Guideline recommendations in the management of patients admitted to non-critical care areas of BJH in the post-order set implementation period. This will be assessed through a retrospective chart review of patients admitted to BJH from December 10, 2015 to April 1, 2016 who receive a medication or test ordered through the AECOPD Order Set. Descriptive statistics will be used to characterize the data. Specific areas of interest include: appropriate patient selection for order set use, guideline-concordant antibiotic use, total cumulative dose of corticosteroids, and appropriate obtainment of pulmonary function tests.

The results of the study will be used to assess for any necessary changes in the order set or to identify areas where additional education to prescribers is warranted. A larger study evaluating the impact of the order set on patient outcomes is needed.

Learning Objectives:

1) Identify findings from the original study which are targeted by the AECOPD Order Set.

Self Assessment Questions:

1) Which of the following practices is/are targeted by the BJH AECOPD Order Set?
   a. Increase use of nebulized bronchodilator medications
   b. Guide the ordering of corticosteroids to guideline-concordant doses and durations
   c. Encourage education of patients on proper use of metered dose inhalers
   d. Both B and C

Answer: B
ACHIEVING TARGETED VANCOMYCIN TROUGH CONCENTRATIONS WITH EMPIRIC DOSING. Jing (Grace) Tian, Mary Ullman, Pamela A. Pawloski, Regions Hospital, 640 Jackson St, St Paul, MN 55101, jing.x.tian@healthpartners.com

Vancomycin has been widely used in clinical practice for over five decades. Consensus guidelines published in 2009 recommended achievement of a goal trough of 15-20 mg/L for improved clinical outcomes. Regions Hospital pharmacists do not currently utilize a consistent approach to achieve this higher trough goal. In addition, clinical evidence supporting an empiric dosing practice is based primarily on patients with normal renal function and average body weight. Further, an increased serum trough concentration has been linked with a higher incidence of nephrotoxicity in some studies.

The objective of this study is to assess the current vancomycin dosing practice of empiric dosing in achieving the target range of vancomycin trough levels in the overall patient population, including obese patients and those with renal impairment. Secondarily, we will assess whether there is an association between higher vancomycin trough concentrations and increased incidence of nephrotoxicity.

A retrospective chart review will be conducted using the electronic health record (EPIC). The frequency of the initial vancomycin trough level within goal range and the frequency of nephrotoxicity will be described.

The results of this study will be used to evaluate current vancomycin dosing inform our current practice of empiric vancomycin dosing and monitoring.

Learning Objective:
Assess the incidence of achievement of the targeted vancomycin trough concentration with empiric dosing.

Self-assessment Question:
Based on the current vancomycin dosing literature, what is the frequency of getting to the vancomycin goal trough of 15-20 mg/L with a dosing strategy of 25mg/kg loading dose followed with a maintenance infusion of 15-20 mg/kg?

A) <30 %  B) 30-50%  C) 50-60%  D) > 60%

Answer: C

INDUCED HYPOTHERMIA AND SHIVERING: AN EVALUATION OF TWO MANAGEMENT STRATEGIES IN AN URBAN HEALTH SYSTEM. Lauren Titterington, Charles Hayes III, and Marci Ebberts, Saint Luke’s Hospital of Kansas City, 4401 Wornall Road, Kansas City, MO, 64111. ltitterington@stlukes.org

Survivors of out-of-hospital cardiac arrest have a high risk of poor neurologic outcome. Clinical trials have demonstrated that moderate hypothermia improves neurologic outcomes in patients with coma after resuscitation from out-of-hospital cardiac arrest. Shivering can prolong the time to reach target temperature and reduce the neurologic benefits of therapeutic hypothermia (TH). The optimal medication regimen to prevent and treat shivering during TH is not well established. The purpose of this study is to compare the efficacy of two different shivering management strategies utilized for patients undergoing TH following cardiac arrest at Saint Luke’s Health System (SLHS).

The investigators will perform a chart review of patients who meet the inclusion/exclusion criteria receiving TH following cardiac arrest admitted to SLHS during the study time period. The primary endpoint will be the incidence of shivering, defined by the Bedside Shivering Assessment Scale (BSAS). The investigators will compare the incidence of shivering between two different order sets utilized for induced hypothermia post cardiac arrest. Shivering rates at SLHS will be compared to those reported in clinical trials. The following will be collected: reason(s) for cardiac arrest, if bystander cardiopulmonary resuscitation (CPR) was performed, time from arrest to return of spontaneous circulation (ROSC), time from ROSC to target temperature, medications given from the order sets, BSAS, Cerebral Performance Category score, and neurological outcomes. The major differences between the two shivering management strategies include: use of neuromuscular blockers during induction and the use of dexmedetomidine or magnesium continuous infusions throughout the induction, maintenance, and rewarming phases.

Learning Objectives:
1) Describe the impact of therapeutic hypothermia following out-of-hospital cardiac arrest.
2) Compare incidence of shivering between two different order sets utilized for induced hypothermia post cardiac arrest.

Self-Assessment Questions:
1) The most common reason for discontinuation of dexmedetomidine continuous infusion was:
   A. Hypotension
   B. Bradycardia
   C. Hypertension
   D. Seizures

2) Which of the following have no proven evidence for the prevention of shivering?
   A. Propofol
   B. Magnesium
   C. Hydromorphone
   D. Lorazepam

Q1 Answer: B  Q2 Answer: C
COMPARISON OF ACUTE KIDNEY INJURY IN THE NEONATAL POPULATION BETWEEN TREATMENT WITH PIPERACILLIN/TAZOBACTAM OR PIPERACILLIN/TAZOBACTAM PLUS VANCOMYCIN

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Piperacillin/tazobactam (PT) is often utilized in the neonatal setting for the treatment of systemic infections such as bacteremia, early-onset sepsis, and intra-abdominal infections. It is frequently employed in the neonatal intensive care unit at Wesley Medical Center (WMC) for rule out infections. Recent data in adult studies suggests PT therapy may be an inciting factor in the onset of acute kidney injury (AKI).

The purpose of this study is to determine the difference in the rates of AKI, as defined by a SCr ≥ 1.3 mg/dL, between patients treated with either PT or PT combined with vancomycin. Secondary outcomes for this study include time to AKI from initiation of therapy and time to AKI resolution. This retrospective analysis compared patients in the neonatal nurseries that received PT versus patients that received vancomycin in addition to PT. Patients will be matched in a 2:1 fashion based upon gestational age (same week), birth weight (within 50 grams), and age (3-10 days, 10-30 days, > 30 days). A sample size of 160 patients will demonstrate 90% power with a two-sided α of 0.05 to detect a difference of 22% in incidence of AKI.

The results of this study will help to evaluate the role PT may play in AKI in the neonatal population and potentially implement changes in the institution’s protocol for neonatal sepsis.

Learning Objective:

1) Identify risk factors for AKI in the neonatal population.

Self-Assessment Question:

1) Which of these characteristics has the greatest impact on the renal function of a neonate?
   A. Gender
   B. Birth weight
   C. Ethnicity

Answer: B

A SURVEY OF PHARMACISTS’ PREPAREDNESS FOR PROVIDER STATUS IMPLEMENTATION

Erica Tolle, William Doucette, Ali Azeez Ali Al Jumali, Scott Egerton, Stevie Veach, Christine Catney, Randy McDonough, 2306 Muscatine Ave. Iowa City, IA 52240, erica-tolle@uiowa.edu

Legislation to recognize pharmacists as providers was introduced into the US House and Senate January 2015. The goal of this legislation is to increase Medicare beneficiaries’ access to pharmacists in underserved areas. Little is known about the preparedness of pharmacists to practice as providers, but it is important to consider the implications of such legislation on the profession of pharmacy.

The objective of this study was to assess pharmacists’ perceived preparedness for provider status implementation with respect to individual pharmacists, pharmacy sites, patients, prescribers and payers.

This was a cross-sectional study design. A 25 question Qualtrics survey was sent to approximately 1,500 Iowa pharmacists. Participants were contacted by means of their membership in Iowa Pharmacists Association, six regional associations and/or the University of Iowa College of Pharmacy alumni office. Pharmacists received an initial contact through email, private groups on social media or respective organizations’ websites requesting participation. Subsequent email reminders were sent once in January 2015. Surveys were completed anonymously, but participants could voluntarily enter into a drawing for a gift card incentive.

132 Iowa pharmacists completed this survey. Participants reported feeling more confident obtaining a medication history and past medical history and less confident obtaining vital signs and providing point of care testing. Participants perceived low confidence in the preparedness of payers to support pharmacist provider status.

Evaluating preparedness for provider status implementation may substantiate a smoother transition to providing clinical services. Results of this study can be used to implement educational programming for pharmacists, patients, providers and payers.

Learning objective:

1) After the completion of this activity, participants will be able to discuss clinical services that may be appropriate to implement in preparation for pharmacist provider status.

Self-Assessment Question:

1) Pharmacist participants reported the lowest level of confidence in providing which clinical service for their patients?
   A. Document an intervention
   B. Individualize treatment
   C. Measure vital signs
   D. Monitor outcomes

Answer: C
Hypertension affects about one in every three adults in America. Adherence to antihypertensive therapy can optimize health outcomes; however, nonadherence is common among patients who take prescription medications chronically. Nonadherence often precedes hospitalization. Some studies suggest that providing patient’s feedback on their level of medication use and having them share in treatment decisions may increase adherence. Motivational interviewing (MI) is a style of patient-centered counseling that is brief, and has demonstrated efficacy in addressing a variety of health issues. It is a nonconfrontational counseling style aimed at helping patients understand and resolve their ambivalence about behavior change.

The purpose of this study is to determine feasibility of coordinating and training APPE students to deliver motivational interviewing education with patients who have hypertension and low medication adherence. A secondary purpose is to assess changes in pre and post measures of blood pressure, medication adherence, and self-efficacy with a motivational interview-intervention.

These objectives will be assessed by piloting a few students on general medicine rotations to screen and consent patients to participate in inpatient counseling as well as outpatient phone follow up. Descriptive statistics will be calculated and chi-square analysis will be conducted to evaluate pre and post differences in self-reported adherence, BP control, and self-efficacy.

The results of the study may be used to contribute to the development and design of future, more costly, primary studies by identifying relevant factors that could create barriers to subsequent study completion and provide concrete estimates of the expected rates of participation and time to follow up.

Learning Objectives:

1) Discuss impact of motivational interviewing on improving patients health outcomes
2) Identify relevant factors that can contribute to the development and design of future primary studies

Self-Assessment Questions:

1) Which of the following statements is not true?
   A. Motivational interviewing has demonstrated efficacy in improving various outcomes measures of medication adherence, substance abuse, smoking cessation, and blood pressure.
   B. Motivational interviewing can be effective in brief counseling sessions.
   C. Motivational interviewing embodies a confrontational counseling style to improve self-efficacy.

2) Which of the following statements is not true?
   A. Pharmacy students have the opportunity to use motivational interviewing during hospital rotations
   B. Future studies should allocate two to three hours daily for students to screen and consent eligible patients for participation
   C. The expected rate of participation in patients who are eligible is 50%.

Q1 Answer: C Q2 Answer: C
Behavioral disturbances often occur as a manifestation of dementia, especially in later stages or later onset dementias. In 2005, the FDA issued a black box warning for all atypical antipsychotics based on studies that found increased mortality risk in patients with dementia who used these medications for their symptoms. In 2008 this warning was extended to include typical antipsychotics.

Data from patient charts were collected retrospectively and analyzed to determine whether the receipt of any antipsychotic while inpatient impacted time to readmission or mortality. The comparison groups were (1) patients who were started on, received at least five doses, and were subsequently discharged on any antipsychotic medication and (2) patients with the same diagnosis who were not prescribed an antipsychotic (defined for this study as <5 doses). Information was collected from the databases of two hospital sites in two different cities with a timeframe of 7/1/12 to 5/31/15. The primary outcome studied was a composite of time to readmission or death. The secondary outcome studied was to determine if any specific antipsychotic was more or less likely to result in the primary outcome than any others. Statistical analyses involved included chi-squared statistical testing and Kaplan-Meier plot with log-rank test, as well as chi-squared statistical testing for independent samples.

The results of this study will contribute to available evidence regarding the use of antipsychotics for dementia-related behavioral disturbances. While much of the current evidence is focused on outpatients, the results of this study will be applicable to inpatients.

Learning Objective:

1) Describe the implications of using antipsychotics off-label for the treatment of dementia-related behavioral disturbances.

Self-Assessment Question:

1) Which of the following have been found in outpatient studies to occur in patients with dementia who receive antipsychotics?
   A. Faster cognitive decline.
   B. Decreased risk of death.
   C. Decreased readmission rates.
   D. No effect in treating behavioral dementia

Answer: A
EVALUATION OF A COMMUNITY PHARMACIST’S INTERVENTION TO ATTAIN GUIDELINE RECOMMENDED STATIN THERAPY FOR DIABETIC PATIENTS. Emily Van Klompenburg, Jodi Heins, Surachat Ngorsuraches, Meredith Junker, Alex Middendorf, Deidra Van Gilder, and Paul Sinclair, South Dakota State University and Lewis Drug. Box 2202C, Brookings, SD 57007. emily.vanklompenburg@sdstate.edu

Publication of the 2013 American College of Cardiology/American Heart Association (ACC/AHA) Guideline on the Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults lead to more adults qualifying for statin therapy compared to previous guidelines. The guidelines recommend that all diabetic patients aged 40 to 75 years receive a minimum of a moderate-intensity statin medication.

The objective of this study is to evaluate the effectiveness of a community pharmacist’s facsimile intervention on achieving a minimum of a moderate-intensity statin therapy in all diabetic patients per ACC/AHA guidelines.

All patients were assessed for concurrent diabetic and statin medication use through review of prescriptions filled from October 1, 2015 through December 31, 2015. Patients were divided into those who receive primary healthcare through the local medical group (intervention group) and those who receive healthcare by other providers. Providers in the intervention group with diabetic patients not on guideline recommended statin therapy were sent a facsimile intervention recommending appropriate statin intensity initiation. Non-local providers of diabetic patients not on appropriate statin therapy served as controls. Intervention facsimiles were sent a maximum of two times if initial response was not received within two weeks. Data is currently being collected and analyzed.

The results of the study will be used to understand the impact of this intervention in enhancing adherence to guideline recommendations.

Learning Objective:

1) Define appropriate statin therapy for diabetic patients per ACC/AHA guidelines.

Self-Assessment Question:

1) A 57 year old white male presents to your pharmacy with a prescription for empagliflozin 10mg daily. He also fills metformin 1000mg BID at your pharmacy. Upon counseling on the new medication, you discover that he has never been prescribed a statin. He reports he does not have any known heart disease and his last cholesterol check was “not too bad”. You do not have enough information from the patient to calculate his 10-year ASCVD risk. Which of the following would be most appropriate to recommend to his provider per ACC/AHA guidelines?
   A. Simvastatin 80mg daily
   B. Atorvastatin 20mg daily
   C. Lovastatin 20mg daily
   D. Simvastatin 10mg daily

Answer: B

EVALUATION OF INTRAVENOUS OLANZAPINE IN ADULT CRITICAL CARE PATIENTS. Jennifer Vipond, Jon Cole, Matthew Prekker, Lauren Klein, Haylee Veazey, and Lisa Carlson, Hennepin County Medical Center, 701 Park Avenue RL.120, Minneapolis, MN 55415. jennifer.vipond@hcmed.org

Olanzapine is a second generation atypical antipsychotic initially indicated for psychiatric disorders by the FDA. This medication’s use has been expanded to include non-FDA indications such as the treatment of agitation, nausea and vomiting. Droperidol is a first generation antipsychotic commonly used intravenously for the treatment of agitation, nausea and vomiting in the emergency room setting. During a shortage of droperidol, olanzapine was approved for intravenous use in the emergency department at Hennepin County Medical Center (HCMC). Once olanzapine was approved for use in the emergency department, its off-label use was expanded into the intensive care units. A retrospective cohort study conducted at HCMC showed that intravenous olanzapine was a safe alternative to other antipsychotic medications in the emergency department.

The primary purpose of this study is to evaluate the use of intravenous olanzapine in the adult critical care patient population at HCMC.

The institution’s electronic medical record system was used to collect data from patients who received intravenous olanzapine in the medical and surgical intensive care units from March 1, 2015 to December 31, 2015. Patients included in the study received at least one dose of intravenous olanzapine in the intensive care units for any reason. Any patient under 18 years of age was excluded. Chart reviews were performed to gather pertinent patient demographic information as well as data to analyze the indication, use, effects and safety of intravenous olanzapine.

The initial results indicate that respiratory complications and adverse events, resulting from intravenous olanzapine, appear to be rare.

Learning Objectives:

1) Recall the FDA approved use of intravenous olanzapine.
2) Describe the adverse events commonly reported with the use of intravenous olanzapine.

Self-Assessment Questions:

1) Intravenous olanzapine is FDA approved for:
   A. Agitation
   B. Schizophrenia
   C. Headache
   D. None of the above

2) Which of the following adverse events are commonly caused by intravenous olanzapine:
   A. Orthostatic hypotension
   B. Extrapyramidal reactions
   C. Respiratory depression
   D. None of the above

Q1 Answer: D  Q2 Answer: D
Bloodstream infections are a common infection in the United States and delaying time to appropriate antibiotic therapy in GNB has been associated with increased rates of mortality, hospital length of stay (LOS), and costs. CDSS have demonstrated to improve antibiotic selection, reduce antibiotic costs, and decrease LOS.

The purpose of this study is to compare time to appropriate empiric antibiotic (EA) and targeted antibiotic (TA) therapy in GNB before and after the implementation of a CDSS. This is a retrospective, single site, observational study with a primary outcome of time to ordered appropriate EA and TA. Secondary outcomes include intensive care unit (ICU) and overall hospital LOS.

Pre-intervention (n=50) vs post-intervention (n=33): Thirty-one patients (62%) vs 25 (76%) patients were on appropriate EA therapy prior to positive blood culture (PBC). Of the patients not on appropriate EA prior to PBC, the mean time ± standard deviation (SD) to appropriate EA therapy was 8.64 ± 9.78 hours vs. 1.50 ± 1.05 hours (p = 0.005). Ten (20%) vs. six patients (18%) were on appropriate TA, respectively. Of the patients on inappropriate TA therapy, the mean time ± SD to appropriate TA therapy was 59 ± 22 hours vs 57 ± 26 hours (p = 0.81). No statistical difference was found in hospital and ICU LOS.

At WMC, CDSS made a statistical difference in time to appropriate EA but no difference in time to appropriate TA, overall hospital, or ICU LOS. The decreased time to appropriate EA may improve patient outcomes.

**Learning Objective:**

1) Describe the impact of CDSS on time to antibiotics and length of stay at WMC.

**Self-Assessment Question:**

1) At WMC, CDSS made a significant difference in
   
   A. Time to empiric antibiotics
   
   B. Time to targeted antibiotics
   
   C. Length of overall hospital stay
   
   D. Length of ICU stay

**Answer:** A

**Learning Objectives:**

1) Review reasons for pharmacist order modifications in the context of a multi-hospital system
2) Discuss various methods to improve pharmacist orders throughout a multi-hospital system

**Self-Assessment Questions:**

1) Of the following operational functions listed below, identify the most frequently modified Epic medication order part by a pharmacist per the research study
   
   A. Admin Instructions
   
   B. Package
   
   C. Dose
   
   D. Duration

2) Based on pharmacist modified orders, which of the following is not a quality improvement measure to advance pharmacist efficiency and patient safety?
   
   A. Streamline workflow process through understanding pharmacist order trends in a hospital
   
   B. Align Epic Software operational functions with the hospitals most common medication order trends
   
   C. Data analyze months of the hospital’s medication orders to determine order tendencies
   
   D. Creating more processes for pharmacists to modify medication orders that include intricate, complex verification steps

**Q1 Answer:** B  
**Q2 Answer:** D
JUSTIFICATION OF PHARMACY SERVICES IN THE EMERGENCY DEPARTMENT OF A 54-BED HOSPITAL.
Shawn Voss, Lance Swearingen, Fairview Northland Medical Center, 911 Northland Drive, Princeton, MN 55371. svoss4@fairview.org

The emergency department (ED) is known to be an environment of high-risk where frequent medication errors occur. In response, hospitals have slowly begun to implement clinical pharmacy services in the ED within their facilities. Published literature has shown that when pharmacists are involved on the patient care team there is a decreased number of adverse drug events. The pharmacy department at Fairview Northland Medical Center seeks to justify adding a clinical staff pharmacist to their ED, which has approximately 21,000 patient visits annually. The primary objective of this research project will be to determine the potential role of an ED pharmacist at Fairview Northland Medical Center and to assess the associated cost-benefit analysis of such an addition.

During a four-week period, clinical pharmacy services were piloted in the emergency department. The pharmacist was responsible for performing medication reconciliation, reviewing medication orders, providing patient medication education, responding to trauma and resuscitation codes, consulting with physicians regarding appropriate medication choice, acting as a source of drug information to all ED staff members, making recommendations for renal dosing adjustments, and providing pharmacokinetic dosing consults. These interventions are expected to result in a prevention of adverse drug events and medication errors. All pharmacy-related activities during the pilot were documented using Microsoft Excel. This data will be used to perform a cost-benefit analysis. The results and conclusions to be presented at the Midwest Pharmacy Residents Conference.

Learning Objective:

1) Describe the potential role of a pharmacist in the emergency department at Fairview Northland Medical Center.

Self-Assessment Question:

1) Which of the following roles were not performed by the pharmacist during the pilot program?
   A. Performing patient medication reconciliation for patients likely to be admitted to the hospital
   B. Providing medication education to patients
   C. Reviewing daily medications for all hospital inpatients
   D. Performing pharmacokinetic services when consulted by the physician

Answer: C

EVALUATING THE IMPACT OF SANFORD USD MEDICAL CENTER’S ANTIMICROBIAL STEWARDSHIP PROGRAM ON MICROBIAL, ANTIMICROBIAL, PATIENT AND FINANCIAL OUTCOMES. Jessica Wahl, Beth Loecker, Kimberly Messerschmidt, Sanford USD Medical Center, 1305 W 18th St, Sioux Falls, SD 57117. Jessica.wahl@sanfordhealth.org

To determine the impact of a recently implemented Antimicrobial Stewardship Program (ASP) on microbial, antimicrobial, patient and financial outcomes.

An ASP was implemented at Sanford USD Medical Center in March of 2015. An infectious disease pharmacist reviews flagged adult patients twice weekly. Patients are flagged for ASP review based on the use of targeted antibiotics, restricted antibiotics, duplicate therapy, bug-drug mismatches, and positive cultures. If the pharmacist encounters an issue they would take care of as standard practice, such as dosage adjustments for renal function, they handle it as they otherwise would when working decentralized. For more complicated issues, such as an opportunity to de-escalate therapy, the pharmacist meets with an infectious disease physician to review the patients. They are then able to send a best practice alert (BPA) to the managing physician with their recommendation.

This retrospective chart review was conducted to examine the impact of the ASP at Sanford USD Medical Center. Antimicrobial utilization and expenditures will be compared between a pre-implementation control and a post-implementation cohort. Other endpoints include length of stay, 30 day readmission, cost of care, infection rates, and organism resistance rates. A framework for future assessment will also be created.

Results of this study will be used to validate the recent implementation of the ASP at Sanford USD Medical Center.

Learning Objective:

1) Identify the main purpose of antimicrobial stewardship programs in health care settings

Self-Assessment Question:

1) What should be the ultimate goal of an antimicrobial stewardship program?
   A. Reduce antimicrobial utilization
   B. Reduce antimicrobial expenditures
   C. Improve patient outcomes
   D. Reduce overall cost of stay

Answer: C
IMPACT OF A RESIDENT LED PAIN STEWARDSHIP PROGRAM ON A MEDICAL/SURGICAL UNIT. Michael Wankum, Maria Zarambo, Abbott Northwestern Hospital, Pharmacy, 800 E. 28th Street – MR 11321, Minneapolis, MN 55407 Michael.Wankum@allina.com

Determine how a resident led pain stewardship program would impact patient satisfaction scores on a medical/surgical unit at a large, community hospital.

A resident reviewed select patients on a medical/surgical unit of our institution on Mondays and Wednesdays. The resident used a ‘Pain Management Medication’ report built into Epic® to identify potential patients. The report pulled in patient name, room number, age, pain consult status, home analgesic use, blood pressure, O2 saturations, serum creatinine, pain scores, and last pain intervention. Once potential patients were identified using the report, the resident reviewed all patients meeting any of the following criteria: use of long acting opioids while in the hospital, use of greater than 50% use of prn opioids in a 24 hour period, a pain score > 5/10 in the last 24 hour period, or any patient by nurse/physician request. Patients were excluded if they had either pain or palliative care consult or outpatient methadone treatment for opioid dependence. The pharmacist attended multi-disciplinary rounds on Monday and Wednesday to offer pain management recommendations; recommendations unable to be made during rounds were communicated via the ‘Dear Doctor’ note function in Epic® or by paging the attending physician.

A resident led pain stewardship program on a medical surgical unit may raise patient satisfaction scores tied to reimbursement for services provided by our hospital for patients. Additionally, the findings of the study may result in the potential expansion of pharmacists’ roles at our institution to include an aspect of pain stewardship in selected patients.

Learning Objectives:

1) Discuss some of the patient specific barriers encountered while managing pain
2) Describe how patients were identified for further review by the resident

Self-Assessment Questions:

1) What patient specific barriers were encountered when trying to manage pain?
   A. Renal/hepatic dysfunction
   B. History of drug seeking behavior
   C. PCA shortages
   D. Answers a and b

2) How were patients identified for review by the resident?
   A. By running the ‘Pain Management Medication’ report built in Epic®
   B. All patients in the unit were reviewed by the resident
   C. By request from a nurse or physician
   D. Answers a and c

Q1 Answer: D Q2 Answer: D

IMPLEMENTATION OF A PHARMACY-MANAGED BASAL/BOLUS INSULIN DOSING PROTOCOL. Caleb Warner, Dana McDougall, Adam Wilcox, Arlene Wright, Covenant Medical Center, 3421 W 9th Street, Waterloo, Iowa 50702. caleb.warner@wfhc.org

Current guidelines recommend the combination of basal and bolus insulin as the preferred method of controlling blood glucose in hospitalized diabetic patients. Despite this, monotherapy with sliding scale insulin is still used and basal/bolus insulin is not titrated as necessary when ordered. With the advent of electronic health records, pharmacists have access to information necessary to optimize glucose control. The objective of this study is to determine whether a pharmacist-managed insulin protocol can improve the percentage of blood glucose readings within range without significantly increasing episodes of hypoglycemia.

Blood glucose data from the 1/1/15-10/15 will be obtained from the laboratory and values isolated for patients on general medicine floors. From this data, the following will be extracted: incidences of severe hypoglycemia (less than 40mg/dl), hypoglycemia (less than 70mg/dl), hyperglycemia (greater than 180mg/dl) and percent of values within range (70-180mg/dl). This will serve as the control for patients treated with the pharmacy-managed basal/bolus protocol. Pharmacy may be consulted for glycemic control by physicians for any patient not meeting these exclusion criteria: diabetic ketoacidosis, hyperglycemic hyperosmolar state, pregnancy, receiving parental nutrition, currently in ICU, or when very tight control is desired (ie: 80-110mg/dl). The primary outcome will be percentage of blood glucose readings within range and key secondary outcomes will be episodes of hypoglycemia and severe hypoglycemia.

Potentially, this study will show that pharmacists can manage inpatient insulin equal to or better than physicians without increasing the risk of patient harm due to hypoglycemia. Data collection is ongoing.

Learning Objective:

1) Explain the roles of basal, bolus, and correctional insulin in the management of inpatient diabetics.

Self-Assessment Question:

1) Which of the following insulins should be held if a patient becomes NPO?
   A. Basal
   B. Bolus
   C. Correctional
   D. A and B
   E. B and C

   ANSWER: B
EVALUATING THE EFFICACY OF A HEPARIN PROTOCOL AT A COMMUNITY TEACHING FACILITY. Ashley J Weber, Jan Howard, Hennepin County Medical Center, 701 Park Ave., Minneapolis, MN 55415. ashley.weber@hcmed.org

The deep vein thrombosis (DVT)/pulmonary embolism (PE) treatment order set at Hennepin County Medical Center, in Minneapolis, MN, consists of a heparin loading dose, infusion, and titration. The infusion should be adjusted by sliding scale until the antiXa level is therapeutic at a goal of 0.3-0.7 International IU/mL. The titration order via the protocol requires monitoring of antiXa levels every six hours after any dose change. There have been several incidences where the first antiXa level was elevated. Because of this, it was decided that an evaluation of the protocol was needed to determine if these were isolated incidences or common findings indicative of a larger problem with the protocol.

The primary objective of this project is to evaluate the efficacy and safety of the current heparin protocol by assessing antiXa levels and infusion adjustments. Evaluation of antiXa levels and possible causes will be used for assessment of efficacy. Evaluation of bleeding or clotting will be used for assessment of safety.

This project will retrospectively review hospitalized patients using heparin from January 1, 2014 to June 30, 2015. Evaluation will include root-cause outliers and will look at both initial starts of heparin infusion as well as re-initiations after holding for procedures. One hundred thirteen charts will be reviewed.

By evaluating this protocol, appropriate changes can be implemented to improve patient care if needed. Benefits may include potential avoidance of inappropriately high or subtherapeutic doses of heparin for DVT or PE treatment.

Learning Objective:

1) Discuss the monitoring of AntiXa levels in patients receiving heparin infusions via an infusion protocol.

Self-Assessment Question:

1) The goal therapeutic antiXa level for the treatment of DVT or PE is:
   A. 0.3-0.7 International Units(IU)/milliliter(mL)
   B. 0.2-0.4 International Units(IU)/milliliter(mL)
   C. 0.27-0.63 International Units(IU)/milliliter(mL)

Answer: A

ASSESSMENT FOR APPROPRIATE OSTEOPOROSIS SCREENING IN MALES ON HIGH-RISK MEDICATIONS AT A VA MEDICAL CENTER. Michael Wegner, Julie Stading, Veronica Kuhlmann. VA Nebraska-Western Iowa Healthcare System-Lincoln Division, 600 S. 70th St Lincoln, Ne 68510 Michael.Wegner1@va.gov

We hypothesize osteoporosis screening in males on high-risk medications is low at the Lincoln VA. Both VA guidelines and the National Osteoporosis Foundation recommend screening in male patients taking high-risk medications.

The purpose of this study is to determine if male patients taking long-term oral glucocorticoids, androgen deprivation therapy, or certain anticonvulsants for greater than 2 years have been appropriately screened for osteoporosis. A secondary purpose is to determine if a clinical reminder is needed to aid and identify high-risk patients in need of screening.

A retrospective chart review of all male patients over the age of 50 receiving high-risk medications from 12/1/14 to 12/1/15 will be evaluated to determine if they have received screening and treatment for osteoporosis. The chart review will look at diagnosis codes for osteoporosis, osteopenia, low trauma fracture, vertebral compression fracture and DXA results. Descriptive statistics will be calculated to determine the screening rate for included patients and chi-square analysis will be conducted to compare screening for osteoporosis between the medication cohorts.

The results of this research will provide insight as to whether patients on high-risk medications are being appropriately screened for osteoporosis at the Lincoln VA.

Learning Objectives:

1) Describe appropriate screening methods for osteoporosis.
2) Identify classes of medications that put males at risk for the development of osteoporosis.

Self-Assessment Questions:

1) Osteoporosis is defined as a t-score of:
   A. -1 or higher
   B. Between -1 and -2.5
   C. Less than -2.5
   D. Both B and C

2) Which of the following is considered a high risk medication for the development of osteoporosis?
   A. Alendronate
   B. Carbamazepine
   C. Denosumab
   D. Teriparatide

Q1 Answer: C  Q2 Answer: B
IMPLEMENTATION OF A COMPUTER SURVEILLANCE PROGRAM AMONG CLINICAL PHARMACY STAFF TO IMPROVE ANTIMICROBIAL PRESCRIBING PRACTICES AT MERCY MEDICAL CENTER—NORTH IOWA Jarod Weidner, Angie Fouts: Mercy Medical Center—North Iowa, Pharmacy Department, 1000 4th St SW, Mason City, IA, 50401. jarod.weidner@mercyhealth.com

Computerized surveillance programs have been shown to be an effective way to improve antimicrobial stewardship as well as decrease antibiotic-related costs. Surveillance programs generate customizable daily alerts to notify the user of potentially inappropriate drug therapy. The Trinity Health system is piloting such a program at many of its facilities, including Mercy Medical Center—North Iowa (MMC-NI). The primary objective of this project is to implement surveillance software (MedMined Surveillance Advisor; CareFusion) among the clinical pharmacy staff at MMC-NI as a tool to assist in optimizing antimicrobial use. Secondary objectives include measuring the impact of de-escalation alerts on ciprofloxacin and piperacillin/tazobactam use before and after implementation.

Our clinical pharmacists (approximately ten) have been trained on the usage of the surveillance software including how to view and resolve alerts and document interventions. Examples of alerts that generate daily include recommendations for antibiotic de-escalation, renal dosing recommendations, drug-culture mismatch, drug level reminders, and certain laboratory results. Two months of pre- and post-implementation de-escalation alerts will be audited by chart review to determine if alerts impacted time to de-escalation, drug costs, or patient length of stay.

Alerts have been customized based on pharmacist feedback and on the unique needs of our site. Pharmacist acceptance of the software and ease of integration into daily workflow will be measured by survey. The results of this study may help to guide other sites wishing to incorporate similar surveillance programs into their departments.

Learning Objectives:

1) Describe antimicrobial stewardship alerts that can be generated by computer surveillance programs.
2) Recognize the potential impact of computer surveillance programs on antimicrobial stewardship.

Self-assessment questions:

1) Stewardship alerts that were generated at Mercy Medical Center—North Iowa included:
   A. Potential for antibiotic de-escalation
   B. Renal dosing recommendations
   C. Notification that a patient was on an antibiotic
   D. Both A and B

2) Surveillance programs have been shown to have which of the following effects on antimicrobial usage?
   A. Decreased drug costs
   B. Guarantee appropriate antimicrobial use
   C. Increased hospital length of stay and mortality
   D. The impact of computer surveillance programs on antimicrobial stewardship has not been studied

Q1 Answer: D Q2 Answer: A

INPATIENT HYPOGLYCEMIA MONITORING: PAST AND PRESENT Eric Weldon, Robert Kozlowski, Davina Dell-Steinbeck, SSM Health St Mary’s Hospital, 6420 Clayton Rd, Richmond Heights, MO 63117. eric_weldon@ssmhc.com

Hypoglycemia, defined as a blood glucose of less than 50 mg/dL, has been reported to occur in 2.8% of all patient days and 7.7% of all admissions. It has been associated with mortality and morbidity including cardiovascular, cerebrovascular, and patient fall events. To address hypoglycemia events, a collaboration was forged between pharmacy and CDEs to reduce recurrent hypoglycemic events. Pharmacists monitor hypoglycemic events though a trigger report and verify their occurrence. Verified events are communicated to the CDEs and a joint effort is undertaken to modify the patient’s diabetes therapy regimen to avoid recurrent hypoglycemia.

Verified hypoglycemic events prior to and following this collaboration were retrospectively collected from the electronic health record system and recorded in an Excel-based report. All events were reviewed, recurrent events were identified, and an error reporting team objectively concluded which were preventable recurrent events. Preventable recurrent events are those events which transpire subsequent to a previous hypoglycemic event in the absence of an intervention initiated through this pharmacy/CDE collaboration.

The purpose of this study is to identify the incidence of preventable recurrent hypoglycemia before and after the collaboration. The second purpose is to identify the prevalence of various risk factors which may contribute to hypoglycemic incidence. Hypoglycemic events will be evaluated through descriptive analysis.

This study will be used to assess the effect of the collaboration between pharmacy and CDEs. Additionally, the incidence of various risk factors will be reviewed to determine how they may potentially be addressed to prevent future events.

Learning Objective:

1) Identify the blood glucose threshold for a hypoglycemic event

Self-Assessment Questions:

1) What blood glucose cutoff was utilized to identify hypoglycemic events during this study?
   A. < 70 mg/dl
   B. < 60 mg/dl
   C. < 50 mg/dl
   D. < 40 mg/dl

Answer: A
In-hospital venous thromboembolism (VTE), including deep vein thrombosis (DVT) and pulmonary embolism (PE), causes significant morbidity and mortality in hospitalized patients. This study aims to determine the time to in-hospital VTE based on baseline risk stratification.

A retrospective analysis was performed on all patients aged 18 years or older admitted to Houston Methodist Hospital who developed a VTE from September 2011 to June 2015. Patients were identified using ICD-9 codes for upper extremity DVT, lower extremity DVT, and PE not present on admission. Risk assessment was performed retrospectively by study investigators using a specific risk assessment tool at the time of admission and at the time of VTE development. Patients were divided into low (0-1 points), moderate (2 points), high (3-4 points), or highest (5 or more points) risk groups based on the number of risk factors present.

The cohort includes 400 patients, 56% male, with an average age of 63 years. VTE events were as follows: lower extremity DVT (n=230, 57.5%), PE (n=92, 23%), and upper extremity DVT (n=78, 19.5%). The average risk score at admission was 5.1, compared to 8.5 at the time of VTE. The average time to VTE was 10.2 days, which was significantly different between risk groups (low risk 14.4 days, moderate risk 12.9 days, high risk 10.7 days, highest risk 9.1 days, p=0.026).

Patients in the highest risk group develop VTE earliest. Performing risk stratification at baseline and reassessment throughout hospitalization may allow for increased identification of high risk groups.

**Learning Objectives:**

1) Describe the time to in-hospital VTE based on baseline risk stratification

**Self-assessment Questions:**

1) Which of the following patients would develop a VTE while hospitalized in the shortest duration of time?
   A. A 20 year old female with no risk factors for VTE (low risk)
   B. An 80 year old male who is immobile after a major neurological surgery (highest risk)
   C. A 45 year old male with a BMI of 35 (moderate risk)
   D. A 65 year old female with a PICC line (high risk)

**Answer:** B

**Learning Objective:**

1) Describe the benefits and risks of postnatal steroids in very low birth weight (VLBW) neonates.

**Self-Assessment Question:**

1) How can the risks of neurodevelopmental delay, caused by dexamethasone, be minimized in the neonatal population?
   A. Using high-dose, short duration dexamethasone
   B. Using low-dose, short duration dexamethasone
   C. Using high-dose, long duration dexamethasone
   D. Using low-dose, long duration dexamethasone

**Answer:** B

The objective of this study is to determine how a unit-specific order set affected prescribing patterns for bronchopulmonary dysplasia prevention (BPD) in very low birth weight neonates.

Very low birth weight (VLBW) infants born with significantly underdeveloped lungs are most susceptible to respiratory distress syndrome (RDS), which often exposes them to prolonged intubation and a high risk of developing bronchopulmonary dysplasia (BPD). Postnatal steroid use in these infants has been shown to decrease intubation duration with a possible decrease in the risk of developing BPD. However, evidence of neurologic impairment associated with prolonged and excessive steroid exposure has created a need for developing specific prescribing indications and procedures to best achieve beneficial gains. Consequently, the Mayo Clinic neonatal intensive care unit (NICU) providers developed a neonatal steroid order set to guide providers when ordering steroid medications for these vulnerable neonates at high risk of developing BPD.

The purpose of the current study is to assess the effect the order set has had on steroid prescribing patterns in VLBW neonates compared to an equivalent pre-order set time epoch. We will conduct a single-center, retrospective chart review for all VLBW neonates from October 2011 - April 2013 (pre-order set) and April 2014 - October 2015 (post-order set) and compare steroid exposure specifics when prescribed for BPD prevention.

The results of the study will be used to implement changes in the Mayo Clinic NICU to optimize the fragile balance of the benefits versus the risks of steroids in the neonatal population.
Patients with cancer are at an increased risk of venous thromboembolism (VTE) compared to those without cancer. American Society of Clinical Oncology guidelines recommend the use of low molecular weight heparin (LMWH) over warfarin for initial and long term treatment of VTE. There is little published evidence for the use of novel oral anticoagulants in this population. There was a subset analysis of patients with cancer in the EINSTEIN trials, which found a nonsignificant reduction in the risk of VTE in patients treated with rivaroxaban compared to warfarin and found no significant difference in major or nonmajor clinically relevant bleeding. To our knowledge, there have been no studies published comparing rivaroxaban to LMWH in this population. Rivaroxaban is an appealing option due to its short half-life compared to warfarin and ease of administration compared to LMWH.

The purpose of this study is to evaluate the safety and efficacy of rivaroxaban compared to LMWH in patients with cancer. The primary outcome is the rate of recurrent VTE, including deep vein thrombosis, pulmonary embolism, or both. Secondary outcomes include rates of major and nonmajor clinically relevant bleeding and all-cause mortality.

Data was collected through retrospective manual chart review. Outcomes will be assessed by parametric and nonparametric comparative statistical tests. Results of this study will be used to evaluate the safety and efficacy of rivaroxaban for the treatment of VTE in patients with cancer. Additional prospective studies will be necessary to further identify rivaroxaban's place in therapy.

Learning Objectives:

2) Identify characteristics of rivaroxaban that make it an appealing option for the treatment of VTE in patients with cancer.

Self-Assessment Questions:

1) First line recommendations for the long term treatment of VTE in patients with cancer include:
   A. Warfarin
   B. Low molecular weight heparin
   C. Novel oral anticoagulants
   D. Both A and B

2) Compared to warfarin, rivaroxaban is an appealing option for the treatment of VTE in patients with cancer because:
   A. Rivaroxaban has a shorter half-life than warfarin
   B. Rivaroxaban has fewer drug and food interactions than warfarin
   C. Rivaroxaban requires less monitoring than warfarin
   D. All of the above

Q1 Answer: B Q2 Answer: D
In recent years there has been an upward trend for overprescribing opioids. This raises concerns due to their potential for misuse, abuse, and diversion. The costs of prescription opioid abuse, dependence and misuse represent a substantial and growing economic burden; U.S. estimates of these costs were $55.7 billion in 2009. Opioid prescribing is further complicated as some argue that pain management is a human right, and opioids are the current drug of choice for the treatment of moderate to severe pain. Few studies have examined opioid prescribing patterns and patient characteristics of adults presenting to U.S. emergency departments (EDs) for injury. This study sought to examine the differences in prescribing trends of opioids for injury by adult patient characteristics in U.S. EDs. National Hospital Ambulatory Medical Care Survey (NHAMCS) data from 2011 were examined using bivariate and multivariate techniques. The study population for this research was U.S. adults 18 years of age and older who presented to an ED for injury. The dependent variable for the multivariate analysis was opioid prescription at discharge. The results yielded that patients presenting with injury to urban EDs had greater odds of being prescribed an opioid, whereas non-Caucasians presenting with injury had lesser odds of being prescribed an opioid. We also found disparities in opioid prescribing patterns regarding adults presenting to an ED with injury, particularly regarding race/ethnicity and geographic locale of the hospital. These results demonstrate a potential stereotype of avoiding opioid prescribing for injury to non-Caucasians and to patients in rural hospitals.

**Learning Objectives:**

1) Describe appropriate use of opioids in pain management for injured patients and the issues regarding overprescribing

2) Explain national trends in opioid prescribing and ways to improve upon such trends from a pharmacy perspective

**Self-Assessment Questions:**

1) Opioids are most appropriate for use in which of the following severities of pain:
   A. Mild
   B. Moderate
   C. Severe
   D. All of the above
   E. Two of the above

2) Which age group had the greatest odds of receiving an opioid compared to patients 75 years and older:
   A. 18-24 years
   B. 25-44 years
   C. 45-64 years
   D. 65-74 years

Q1 Answer: E  Q2 Answer: C

The Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America endorse guidelines for developing antimicrobial stewardship programs with a goal of optimizing clinical outcomes while avoiding unintended consequences of antimicrobials. The primary objective of this study is to implement and evaluate a formal, multi-disciplinary antimicrobial stewardship committee at Mercy Medical Center - North Iowa. Secondary objectives include increasing the percentage of affirmative responses to the Centers for Medicare and Medicaid Services (CMS) and Centers for Disease Control (CDC) surveys, implementing a 48-hour timeout for antimicrobial therapy, establishing a days of therapy metric, manipulating the institutional antibiogram, and observing infection and resistance patterns.

First, infectious disease medical leadership was identified. Next, antimicrobial oriented services already offered through the acute care pharmacy were compiled. Committee members were identified, invited to participate, and assigned duties. The committee charter was written and approved as a sub-committee of the Pharmacy & Therapeutics (P&T) committee. Meetings consisted of discussions regarding antimicrobial formulary, protocols, infection prevention trends, hospital antibiogram, as well as drug utilization evaluations. The committee will be evaluated by comparing the percentage of affirmative answers to the CMS and CDC surveys before and after implementation of the committee, tracking the days of therapy metric throughout the year, and reviewing and updating the antibiogram through use of automated pharmaceutical surveillance software. Committee actions throughout the year will help solidify a foundation for future improvements in antimicrobial stewardship at Mercy Medical Center - North Iowa.

**Learning Objectives:**

1) Identify the goals of antimicrobial stewardship

2) Describe the steps in implementing a formal antimicrobial stewardship committee

**Self-Assessment Questions**

1) What are the goals of antimicrobial stewardship?
   A. Optimize clinical outcomes
   B. Avoid unintended consequences of antimicrobial use
   C. Increase antimicrobial resistance
   D. A & B

2) Which of the following is a step in implementing a formal antimicrobial stewardship committee?
   A. Identify infectious disease medical leadership
   B. Do not gather information on antimicrobial services already offered at the hospital
   C. Identify committee members and define duties
   D. A & C

Q1 Answer: D  Q2 Answer: D
Headache is the fourth leading cause of emergency department (ED) visits in the United States, accounting for an estimated 7.7 million visits annually. Migraine is the most common primary headache disorder for which patients seek emergent medical treatment. Previous studies have shown suboptimal migraine management in the ED, with the majority of cases utilizing opioids as first-line agents in contrast to the American Academy of Neurology guideline recommendations. Additionally, a number of alternative therapies are employed in the ED, including but not limited to intravenous magnesium, valproate, propofol, ketamine and intranasal lidocaine and ketamine.

This study is a retrospective cohort examining prescribing practices in the ED. Patients included were those seen in the ED at Nebraska Medicine between July 2013 and July 2015 with a diagnosis of migraine between the ages 19 and 65 years. Excluded patients include those who were pregnant, breastfeeding, febrile, present to the ED in relation to trauma, or experienced a trauma within 24 hours prior to presentation.

The primary objective of this study is to characterize prescribing practices of ED providers for the treatment of acute migraine. Secondary outcomes include: length of ED stay, return ED visits for migraine treatment within 7 days of initial visit, time to maximal pain relief, number of migraine therapies per ED encounter, admission rate for migraine pain control, number of encounters utilizing opioids, percentage of patients prescribed opioids at discharge, and incidence of adverse reactions related to migraine medication therapy.

Data collection is completed with analysis pending.

**Learning Objectives:**

1) Describe our institution’s prescribing patterns in the treatment of patients with acute migraine in the emergency department (ED).

2) Quantify the incidence of opioid use for the treatment of acute migraine during the ED encounter.

**Self-Assessment Questions:**

1) What is the most commonly used treatment for migraines in patients presenting to the emergency department?
   A. Sumatriptan
   B. Dihydroergotamine nasal spray
   C. Normal saline, intravenous ketorolac, metoclopramide, and diphenhydramine
   D. Intravenous propofol

2) What percentage of ED encounters for migraine treatment utilized an opioid?
   A. 11.6%
   B. 31.5%
   C. 42.3%
   D. 55.2%

**Q1 Answer:** C  **Q2 Answer:** B

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**ASSESSMENT AND INTERVENTION IN THE TREATMENT OF CLOSTRIDIUM DIFFICILE IN A SMALL COMMUNITY HEALTHCARE SYSTEM.** Amber Wood, Mark Dewey, Lake Region Healthcare, 712 Cascade Street South, Fergus Falls, MN 56537.  Amber.Wood.2@ndsu.edu

In reviewing six months of *Clostridium difficile* infection (CDI) rates within Lake Region Healthcare facilities, it was noted that 44% of all reported *Clostridium difficile* (C. diff) cases were related to recurrence. To improve patient care and potentially reduce recurrent CDIs, pharmacy became involved in developing an antibiotic stewardship program (ASP) specific to *C. diff.*

To compare the appropriateness of antibiotic prescribing in an outpatient setting for the treatment of *C. diff* infections prior to and after implementing a pharmacy lead ASP and measuring the impact on infection rates.

Data were collected for the 6 months prior to implementing an ASP at three affiliated clinics. Collected information included history of CDIs, predisposing factors, and antibiotic appropriateness based on current severity-based treatment guidance. At initiation of the ASP, a severity-based treatment algorithm was distributed to all providers. Pharmacists make recommendations on prescribing practices based upon these algorithms. Data will be collected for approximately 4 months after ASP implementation.

Prior to ASP implementation, data were collected on 13 patients with CDIs, 5 with recurrent infections. Of these patients' antibiotics, 47% were inappropriately prescribed based on drug and dose and 41% of inappropriate duration. For those with CDIs, 54% were taking proton pump inhibitors and 50% were exposed to antibiotics within the past 3 months. These data will be compared to data collected while utilizing the aforementioned ASP.

**Learning Objectives:**

1) Describe methods used in pharmacist-lead antibiotic stewardship programs designed to decrease *Clostridium difficile* infection rates.

2) Identify appropriate antimicrobial treatments for *Clostridium difficile* infections based on a severity-based treatment algorithm.

**Self-Assessment Questions:**

1. Which of the following are methods currently used in *Clostridium difficile* focused antibiotic stewardship programs?
   A. Restricting antibiotic use
   B. Provider education
   C. Restricting PPI use
   D. Assessing prescribing practices
   E. All of the above

2. Which of the following is an inappropriate antimicrobial regimen for treatment of a mild-to-moderate CDI?
   A. Metronidazole 500 mg orally three times daily for 10 days
   B. Vancomycin 125 mg orally four times daily for 10 days
   C. Vancomycin 500 mg orally four times daily for 10 days
   D. Vancomycin 500 mg intravenously four times daily for 10 days

**Q1 Answer:** E  **Q2 Answer:** D
Medication adherence is defined as the extent to which a patient takes their medications according to the prescribed dose, frequency, and time. A misunderstanding or miscommunication in any of the previously mentioned is termed as medication non-adherence. Pharmacists can serve as a valuable connection between the prescriber and the patient in order to decrease the incidence of non-adherence. Medication synchronization is the act of adjusting a patient’s medication profile with the goal that all future prescription refills can be processed at the same time on each refill date. When combined with scheduled telephone calls and face-to-face meetings, the pharmacist is not only improving the pharmacy workflow efficiency, but also building rapport with the patient.

The purpose of this study is to assess the impact of implementing a medication synchronization program on chronic maintenance medication adherence in community pharmacies. The primary outcome of this study is the effect medication synchronization has on patient medication adherence.

The objectives will be assessed through the proportion of days covered (PDC) calculation and the Morisky 8-Item Medication Adherence Scale (MMAS-8). Enrolled patients will be followed over the course of 6 months and the PDC calculation will be performed at the end of this time. Descriptive analysis will also be done on the results of the MMAS-8 Survey to assess the change in patient self-perceived medication adherence.

The results of this study will be used to implement a successful long-term medication synchronization program at both CUMC Clinic Pharmacy and CHI Health Pharmacy—Florence locations.

Learning Objectives:
1) Define medication adherence
2) Describe the impact of medication synchronization

Self Assessment Questions:
1) The definition of medication adherence is:
   A. The continuous intake of chronic maintenance medications
   B. The continuous intake of short-term medications
   C. Taking medications according to the prescribed dose, frequency, and time
   D. Taking medications according to schedule

2) Medication synchronization is:
   A. Adjusting prescription refills so that they can all be processed at the same time
   B. Adjusting prescription refills so that they can be processed on different days
   C. A way of organizing a patient’s medication profile
   D. Both A and C

Q1 Answer: C Q2 Answer: D

NEW ATRIAL FIBRILLATION PATIENTS’ PERSPECTIVE REGARDING ORAL ANTITHROMBOTIC THERAPY AT A 426-BED COMMUNITY HOSPITAL. Jenny Xiong, Anne Shullo Feulner, Joanne Schneider, and Bruce Burnett. Park Nicollet Methodist Hospital, 6500 Excelsior Blvd, St. Louis Park, MN, 55426 jenny.xiong@parknicollet.com

Studies have demonstrated significant gaps in patients’ understanding of atrial fibrillation and its management. To help improve patients’ understanding, the 2014 ACC/AHA/HRS guideline for managing atrial fibrillation provided a class I recommendation for utilizing shared decision making.

This project seeks to provide insight into patients’ perspective of the decision making process regarding oral antithrombotic therapy. The objectives are to delineate decision making needs for patients with atrial fibrillation, to evaluate the decision making process, and to develop strategies to achieve shared decision making.

A retrospective chart review was conducted for 20 patients admitted between November 2015 and January 2016. Those who met inclusion criteria (age ≥ 18 years, new diagnosis of atrial fibrillation, and initiation of oral thrombotic during hospitalization) were interviewed prior to discharge. Those switching between oral antithrombics and/or those with prior use of oral antithrombics were excluded.

Information about the safety and cost of oral antithrombics were identified as decision making needs for patients (53% and 40%, respectively). As for decision making, 87% of patients received information about their new oral antithrombotic therapy. However, initiation of an antithrombotic without clinician-patient discussion of the antithrombotic options occurred in 60% of patient cases. Also, doctors made the final decision regarding antithrombotic therapy for 80% of patients. This evidence implies a lack of shared decision making for this patient population. Strategies to achieve shared decision making may include 1) educating patients and providers; 2) providing patients with additional resources regarding the risks and benefits of their oral antithrombotic options.

Learning Objectives:
1) Describe the Shared Decision Making Model
2) Discuss patients’ perspective regarding the decision making process for oral antithrombotic therapy

Self-Assessment Questions (each question to address each objective above):
1) Which of the following statements best describes the Shared Decision Making Model?
   A. Clinician reviews medical situation and makes the decision about treatment
   B. Clinician makes decision about treatment after considering the patient’s preferences and values
   C. Clinician discusses the medical situation with the patient with a final treatment decision made by the patient with clinician collaboration
   D. Clinician provides information about all available treatment options to patient and leaves the final decision completely to the patient

2) Who did the majority of patients view as the figure(s) who made the final decision regarding oral antithrombotic therapy?
   A. Patients’ doctors  C. Patients themselves
   B. Patients’ family members  D. All of the above

Q1 Answer: C Q2 Answer: A
IMPACT OF EVIDENCE BASED THERAPY ON UNSCHEDULED HEALTHCARE CONTACTS IN ACUTE CORONARY SYNDROME PATIENTS TREATED WITH PERCUTANEOUS CORONARY INTERVENTION. Stanislav Yavid, Daniel Hilleman, Aryan Moos, Venkata Allia, and Ryan Walters, CHI Health - Creighton University Medical Center, 601 N 30th St, Omaha, NE 68131 Stanislav.Yavid@alegent.org

The ACC/AHA guidelines recommend patients with acute coronary syndrome (ACS) be treated with evidence-based therapy (EBT) consisting of dual antiplatelet therapy, statin, beta-blocker, and ACE inhibitor or angiotensin receptor blocker for long-term cardiovascular risk reduction. The use of EBT drugs in conjunction with an assessment of the achievement of EBT target doses following PCI has not been thoroughly evaluated at CHI-CUMC.

This study is designed to determine the long-term impact of the use and achievement of target doses of EBT on unscheduled healthcare contacts.

This retrospective study includes patients with ACS treated with PCI. Electronic health records were used to identify patients, the use of EBT and to determine the frequency of unscheduled healthcare visits (hospital or emergency room) during the 12 months following the index admission for ACS. Data collection included patient demographics, comorbidities, EBT medication history, and healthcare contact history. The ACC/AHA guidelines were used to identify optimal EBT and EBT target doses. Statistical analysis was conducted to evaluate the relationship between EBT use, use of EBT target doses, and the number of unscheduled healthcare contacts during the 12 months admission for ACS. Additionally, the rate of within-class medication changes from discharge to first unscheduled healthcare contact will be evaluated. The results of this study will be used to evaluate the relationship between the use EBT, target doses of EBT, and the frequency of unscheduled healthcare contacts. These results may be valuable in identifying areas where EBT therapy in the management of ACS is not adequately utilized.

Learning Objective:

1) Discuss the medication classes beneficial in ACS patients treated with PCI.

Self-Assessment Question:

1) Which of the following EBT regimens includes all recommended medication classes on discharge post ACS?
   A. Aspirin, spironolactone, metoprolol, clopidogrel, atorvastatin
   B. Aspirin, lisinopril, metoprolol, clopidogrel, atorvastatin
   C. Aspirin, lisinopril, amlodipine, clopidogrel, atorvastatin
   D. Warfarin, lisinopril, metoprolol, clopidogrel, atorvastatin

Answer: B

Bacterial infections in patients with hematologic cancers during the period of chemotherapy induced neutropenia are a major cause of treatment complications and death. Fluoroquinolones as infection prophylaxis in neutropenic patients has been associated with decreased incidence of febrile neutropenia, bacterial infections, and mortality. Despite the demonstrated benefits of fluoroquinolone prophylaxis use, side effects, drug-drug interactions, and the concern for drug resistance with widespread use remains imminent therefore the need for alternative therapies is becoming pertinent and necessary.

The primary objective is to compare the incidence of febrile neutropenia episodes from Acute Myeloid Leukemia (AML) patients receiving fluoroquinolones to those receiving oral 3rd generation cephalosporins as antimicrobial prophylaxis during chemotherapy induced neutropenia. Secondary objectives are to compare the incidence of bacterial infections while also analyzing species and susceptibility profiles of microorganisms recovered. This study is a retrospective chart review that will evaluate incidence of febrile neutropenia and documented infection information of AML patients treated at a single center in Minnesota between 2006 and 2015. These findings will be the first to attempt a direct comparison of oral 3rd generation cephalosporins to fluoroquinolones and will contribute to the growing body of literature surrounding agent utilization as infection prophylaxis during chemotherapy-induced neutropenia.

Learning Objectives:

1) Identify the outcomes in neutropenic patients who receive fluoroquinolone antimicrobial prophylaxis.
2) Describe the trend of increased drug-resistant Gram-negative bacilli infections in cancer patients.

Self-Assessment Questions:

1) Fluoroquinolone prophylaxis has been associated with a decreased incidence in which of the following?
   A. Incidence of bacterial infections
   B. QTc prolongation
   C. Tendon rupture
   D. Seizure

2) Which of the following is the most documented organism in blood stream infections in cancer patients?
   A. Klebsiella pneumonia
   B. Escherichia Coli
   C. Pseudomonas aeruginosa
   D. Haemophilus Influenza

Q1 Answer: A   Q2 Answer: B
Hospital based bedside delivery (also known as Meds-to-Beds) allows for unique benefits to patients, prescribers, and pharmacies. A Meds-to-Beds program was initiated in a single unit of Children’s Mercy Kansas City in December 2014 and expanded to a second unit in January 2015. Discharge medications are filled by our outpatient pharmacy and then delivered directly to the patient’s bedside by a pharmacist or pharmacy intern who provides medication counseling. We hypothesize the direct patient counseling favorably impacts patient readmission rates.

Preventable hospital readmission is an area of national focus due to concerns of unnecessary healthcare expenditure and clinical failure of healthcare systems. Readmission data for adults has been the subject of substantial research; however, data for pediatric hospitals have received far less attention. The Children’s Mercy inpatient-to-inpatient 30-day readmission rate from July 1, 2013 to June 30, 2014 was 13.57% which is higher than Children’s Hospital Association reported average of 12.99%.

The purpose of this study is to evaluate the impact of pharmacy-led counseling, through the Meds-to-Beds program, on readmission rates.

The objective will be assessed through retrospective chart review of patients admitted to units participating in the Meds-to-Beds program. A comparative group of patients who were admitted pre-implementation of the Meds-to-Beds program will also be assessed. Descriptive statistics will be calculated and chi-square analysis will be conducted to compare groups.

The results of the study will be used to identify if additional studies evaluating pharmacists’ impact on patient outcomes may be warranted on the basis of readmissions rate reductions.

Learning Objectives:

1) Explain advantages of Meds-to-Beds programs.
2) Describe readmission rates at acute care pediatric hospitals.

Self-Assessment Questions:

1) Meds-to-Beds programs lead to:
   A. Increased cost for patient
   B. Improved patient care and services
   C. Decreased time commitment for pharmacy department
   D. Decreased revenue for pharmacy department

2) Pediatric readmission rates are:
   A. Equivalent to adult readmission rates
   B. Consistent among patient conditions and hospitals
   C. Limited in the literature to overall readmission data
   D. Shown to be affected, in the literature, by pharmacist counseling

Q1 Answer: B  Q2 Answer: C

EVALUATING THE UTILIZATION OF CONFUSION ASSESSMENT METHOD FOR THE INTENSIVE CARE UNIT ON DELIRIUM MANAGEMENT. Brianna Zinser, Erin Pender, Truman Medical Center 2301 Holmes Street, Kansas City, MO 64108. brianna.zinser@tmcmed.org

The primary objective of this study is to evaluate the use of the confusion assessment method in the intensive care unit (CAM-ICU) and the management of delirium. The retrospective, observational, chart review will evaluate patients for CAM-ICU monitoring in the intensive care unit. It will also evaluate the management of delirium for patients with positive CAM-ICU scores. Patient profiles will be examined to determine if delirium assessments were performed and if positive, what management strategies were performed. The assessment of delirium management will be measured within 24 hours of a positive CAM-ICU. The hypothesis of this study is that suboptimal delirium monitoring and management occurs in the intensive care unit.

The study will collect data for all patients admitted to the intensive care unit between February 1, 2015 and April 30, 2015. To evaluate the first objective, utilization of the CAM-ICU assessment tool, patients greater than 18 years of age admitted to the intensive care unit will be included. Patients will be excluded with ICU admissions less than 24 hours. The second objective, evaluation of delirium management, will include all patients greater than 18 years of age, admitted to the intensive care unit, mechanically ventilated and with positive CAM-ICU scores. Patients will be excluded for ICU admissions less than 24 hours, patients receiving clinical institute withdrawal assessment for alcohol (CIWA) protocol, and present or past medical conditions causing cognitive impairment.

The results of the study will be used to implement changes to optimize monitoring and treatment of ICU delirium.

Learning Objectives:

1) Identify risk factors of ICU delirium
2) Recognize the importance of proper monitoring and treatment for ICU delirium

Self-Assessment Questions:

1) What is the medication or medication class most commonly linked to ICU delirium by the literature and guidelines?
   A. Propofol
   B. Opioids
   C. Benzodiazepines
   D. Dexmedetomidine

2) What is the primary objective of this study
   A. Establish the occurrence of delirium in the intensive care unit
   B. Evaluate proper monitoring for ICU delirium with the CAM-ICU tool
   C. Identify the best treatment options for ICU delirium
   D. Investigate patient outcomes for new therapy options for ICU delirium

Q1 Answer: C  Q2 Answer: B
Atypical antipsychotic use is associated with an increased risk for developing metabolic complications including diabetes, dyslipidemia, and weight gain. Studies indicate that patients may not be adequately evaluated or treated for these metabolic complications. Evaluation and treatment of metabolic complications should ideally be the responsibility of the prescribing physician; however, psychiatrists may not feel comfortable initiating or modifying the necessary therapies. This study aims to evaluate psychiatrist response to pharmacist recommendations regarding initiation or modification of statin therapy in psychiatric inpatients.

Retrospective chart review was conducted to identify patients age 40 to 64 admitted to Avera Behavioral Health Center between May 1 and November 30, 2015 who received scheduled atypical antipsychotics during the admission. During this time period, pharmacists began more regularly calculating atherosclerotic cardiovascular disease (ASCVD) risk and recommending initiation or modification of statin therapy based on the 2013 American College of Cardiology and American Heart Association (ACC/AHA) Guidelines. Psychiatrist response to pharmacist recommendations was documented in the electronic medical record as one of the following: statin therapy initiated or modified, decision deferred to inpatient internal medicine service, decision deferred to outpatient primary care provider, or no action taken. Data collected included baseline demographics, smoking status, most recent lipid panel results, admission and discharge medication lists, ASCVD risk, and psychiatrist response as described above. Results will be utilized to determine if psychiatrist response varies based on intensity of statin recommended or type of recommendation made and evaluate pharmacist impact on management of metabolic complications.

Learning Objectives:
1) Review appropriate monitoring parameters for patients receiving scheduled atypical antipsychotics
2) Describe the pharmacist’s role in antipsychotic monitoring and management of adverse effects

Self-Assessment Questions:

1) According to the ADA/APA, how often should a lipid panel be monitored in patients receiving a scheduled atypical antipsychotic?
   A. Every 6 months
   B. Yearly
   C. Every 2 years
   D. Every 5 years

2) Pharmacists can improve medical management of psychiatric inpatients with which of the following interventions?
   A. Recommending statin initiation in patients with elevated ASCVD risk
   B. Modification of intensity of statin therapy
   C. Monitoring lipid panels per ADA/APA guidelines
   D. All of the above

Q1 Answer: D  Q2 Answer: D