Use of Intravenous and Intrapulmonary Recombinant Factor VIIa for Diffuse Alveolar Hemorrhage Secondary to Disseminated Strongyloides Infection: A Case Report

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Case Report:

Diffuse alveolar hemorrhage (DAH) is a rare, severe and life-threatening condition that can be caused by infection, rheumatic diseases, various medications or illicit drugs, autoimmune disorders, malignancies, and other immunosuppressive states. It is associated with a high mortality rate, based on underlying conditions. Standard treatment for DAH depends on underlying cause, which can include cessation of implicated drugs, treatment of infection, and reversal of anticoagulation. Inflammatory causes are often treated with high-dose corticosteroids and potentially cyclophosphamide or plasmapheresis if caused by capillaritis or vasculitis. We report a case of a patient with recurrent lung cancer on chemotherapy who presented with severe anemia and worsening shortness of breath. On hospital day four, she was intubated and bronchoalveolar lavage (BAL) was performed, which showed DAH. It was decided to give 90mcg/kg recombinant factor VIIa (rFVIIa) intravenously once. BAL serology revealed Strongyloides and ivervmetin treatment was started. Despite aggressive blood transfusion, the patient’s hemoglobin continued to decline. Therefore, repeat dosing of rFVIIa was deemed necessary. Due to presence of systemic thrombi visualized during central line insertion, repeat dosing of rFVIIa 50mcg/kg was given via jet nebulizer. On hospital day six, a repeat bronchoscopy was performed and rFVIIa 50mcg/kg was given intrabronchially. Despite intravenous, nebulized and intrabronchial administration of rFVIIa, DAH persisted. Hypoxemia continued to worsen despite aggressive acute respiratory distress syndrome therapy. On hospital day nine, the decision was made to withdraw support and the patient expired. To our knowledge, there are no case reports discussing the use of rFVIIa in DAH secondary to disseminated Strongyloides. Therefore, this case report discusses the use of intravenous, nebulized and intrabronchial administration of recombinant factor VIIa for diffuse alveolar hemorrhage caused by disseminated Strongyloides infection.

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Evaluation of Four-Factor Prothrombin Complex Concentrate (4-factor PCC) for Bleeding Treatment and Anticoagulation Reversal within a Community Hospital

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Purpose: Four-factor Prothrombin Complex Concentrate (4-factor PCC) is a combination of blood coagulation factors II, VII, IX, X, as well as proteins C and S. It is indicated for the treatment of bleeding associated with vitamin K antagonist (VKA) therapy. The small administration volume, quick onset of action and lack of antidotes for direct acting oral anticoagulants (DOACs), makes off-label 4-factor PCC use an attractive therapy decision. The purpose of this study is to evaluate the use of 4-factor PCC within Northeast Georgia Medical Center.

Methods: A retrospective and concurrent chart review was performed on all patients who received at least one dose of 4-factor PCC during a pre-specified time period. Patient demographics, dose, timing of administration, repeat dosing, anticoagulant, and indication for 4-factor PCC were assessed. Coagulation parameters collected included INR for warfarin patients and PT or PT-P for patients taking a DOAC. Other data points included blood product administration, bleed location, intravenous vitamin K administration, thromboembolic event within 30 days, and mortality.

Results: Charts were reviewed for 176 patients that received at least one dose of 4-factor PCC. There were 91 patients (52%) that received 4-factor PCC for the on-label use of VKA reversal. 4-factor PCC was administered to 64 patients (36%) for treatment of bleeding associated with DOACs, and 15 patients (8%) received 4-factor PCC without prior anticoagulant therapy. Other secondary outcomes are represented in the data collected.

Conclusion: 4-factor PCC was used for the FDA labeled indication in the majority of patients. There were several instances of off-label use, with varying degrees of success based on coagulation parameters used to evaluate the extent of reversal.

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Timing and Efficacy Of Two Prothrombin Complex Concentrate Reversal Strategies In Patients With Warfarin-Associated Intracranial Hemorrhage

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Purpose: Despite the recent approval of target specific oral anticoagulants, warfarin continues to be prescribed for the prevention and treatment of venous thromboembolic disease. One of the most devastating adverse effects of warfarin is intracranial hemorrhage (ICH). Prothrombin complex concentrates (PCC’s) are becoming part of first line international normalized ratio (INR) reversal strategies at many hospitals for patients with warfarin associated ICH. To date, however, data comparing regimens that contain a three factor PCC (3F-PCC) vs a four factor PCC (4F-PCC) are limited. The purpose of our study was to compare the time to and extent of INR reduction following the use of a 3F- or 4F-PCC reversal strategy in patients with a warfarin associated ICH.

Methods: This was a retrospective, multi-center, chart review at three academic medical centers. Patient charts were reviewed between January 2011 and December 2014 and included if they received 3F- or 4F-PCC for a warfarin associated ICH.

Results: A total of 91 patients were included in the study. Fifty patients received 3F-PCC and 41 received 4F-PCC. The initial INR (mean ± SD) for the 3F-PCC and 4F-PCC groups was 3.44 ± 1.99 and 3.86 ± 2.50, respectively (p=0.509). Concurrent reversal agents included intravenous vitamin K (88% 3F-PCC vs 98% 4F-PCC; p=0.053), FFP (82% 3F-PCC vs 44% 4F-PCC; p=0.001), activated factor VII (8% 3F-PCC vs 0% 4F-PCC; p=0.064), and aminocaproic acid (10% 3F-PCC vs 5% 4F-PCC; p=0.362). Thirty-four of 50 patients (68%) receiving 3F-PCC and 38 of 41 patients (93%) receiving 4F-PCC had an initial INR of < 1.5 following administration (p < 0.003). The time to first INR following PCC administration was 217 ± 247 minutes and 208 ± 187 minutes for 3F- vs 4F-PCC, respectively (p=0.329).

Conclusion: Significantly more patients achieved a target INR of < 1.5 within 4 hours following a 4F-PCC vs 3F-PCC reversal strategy.

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Pharmacist Intervention to Improve Febrile Neutropenia Prophylaxis in Patients Undergoing Chemotherapy

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Purpose: Febrile neutropenia (FN), a common adverse effect of myelosuppressive chemotherapy, is associated with increased costs and poor patient outcomes. Guidelines recommend primary prevention with granulocyte colony-stimulating factors (GCSF) when FN risk is greater than 20% and when risk is 10-20% in patients with additional risk factors. Antimicrobial prophylaxis is indicated when absolute neutrophil count is expected to be less than 100,000 neutrophils/ml for greater than 7 days. Secondary prophylaxis with GCSF is indicated if the patient previously experienced FN. Despite recommendations, FN prophylaxis use is inconsistent with up to 96% of GCSF usage identified as inappropriate. The purpose of this study is to determine if pharmacist intervention can improve compliance with FN guidelines at Northside Hospital.

Methods: During phase one, charts were reviewed for patients who received chemotherapy between January 2011—January 2016. Data review included chemotherapy regimen FN risk and utilization of GCSF/antimicrobial prophylaxis. Phase two involves prospective patient monitoring and interventions for appropriate FN prophylaxis, communicating with outpatients providers after patient discharge for follow-up, and creating a chemotherapy FN risk database for use by pharmacy. The impact of interventions will be observed and compared to phase one data.

Results: Retrospective data analysis identified opportunities for intervention in 30 of 50 patients reviewed. Prophylactic GCSF use was inappropriate in 32% of cases with 20% of patients receiving GCSF when not indicated and 12% not receiving prophylaxis when indicated. Antimicrobial prophylaxis was inappropriate in 34% of cases with 2% of patients receiving antimicrobials unnecessarily and 32% failing to receive guideline based prophylaxis.

Conclusion: Phase one data shows opportunity to improve FN prophylaxis, with focused emphasis on improving antimicrobial prophylaxis.
Impact of an Emergency Department Community-Acquired Urinary Tract Infection Antibiotic and Suggested Treatment Algorithm on Changes in Antibiotic Susceptibility Patterns

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Purpose: To assess changes in antibiotic susceptibility patterns after implementation of an Emergency Department community-acquired urinary tract infection (CA-UTI) antibiotic and suggested treatment algorithm.

Methods: This multi-center, retrospective observational analysis identified adults treated in the ED between May 2014 and May 2015 who were prescribed an antibiotic for a CA-UTI.

Results: Four hundred seventy-two patients from the initial list of 4,037 patients met inclusion criteria. Escherichia coli was the most common bacteria grown with 319 cultures. Sensitivities from the previous antibiotic improved in both ciprofloxacin and trimethoprim/sulfamethoxazole with 79% vs 87% and 75% vs 79% susceptibility respectively. Since implementation of the first ED specific antibiotic and recommended treatment algorithm at SJC, the primary antibiotic prescribed changed from trimethoprim/ sulfamethoxazole to cephealexin. Cephalexin was prescribed most commonly (55%) followed by ciprofloxacin (19%).

Conclusion: Pharmacy directed initiatives for empirically treating CA-UTI may have influenced physician prescribing and thus improved susceptibility patterns. Of the 300 urine samples randomly selected, 240 patients grew cultures that showed sensitivities to their respective empiric antibiotic prescribed upon discharge. The most common bacteria, Escherichia coli, had improved sensitivities since the previous antibiotic and recommended treatment algorithm were implemented.

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Evaluation of Postoperative Pain Control in Patients Receiving Multimodal Analgesia

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Purpose: Approximately 75% of patients undergoing a surgical procedure report moderate-to-severe postoperative pain. Adequate postoperative pain management is encouraged by The Joint Commission (TJC) and assessed by Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) surveys. In 2012, TJC released a sentinel event alert recommending multimodal therapy as one of several strategies to decrease adverse effects associated with opioid usage. Additionally, the American Pain Society released postoperative pain guidelines supporting perioperative multimodal pain management consisting of pre- and post-operative scheduled non-opioid analgesia. The purpose of this study is to investigate whether patients receiving multimodal analgesia experience less pain and require less opioids. The study also aims to identify potential changes to current postoperative pain management pathways to increase multimodal pain control.

Methods: Data collected from June 2012-June 2015 included age, surgical procedure, use of perioperative non-opioid analgesia, pain scores at 24 hours, total opioid use at 24 hours, adverse reactions, and therapeutic medication duplications. Prospective phase will include implementing order set changes to encourage multimodal pain strategies. The impact of these changes on pain scores and opioid use will be compared to retrospective data.

Results: Retrospective data supports multimodal perioperative pain management. Preoperative non-opioid analgesia was utilized in 48% of patients. Postoperatively, 47% of patients received scheduled non-opioid analgesia. Both groups of patients receiving multimodal therapy reported lower pain scores, fewer instances of constipation, and, on average, less opioids were consumed postoperatively. The most commonly used scheduled non-opioid analgesics in the postoperative period were IV acetaminophen and IV ketorolac.

Conclusion: Preliminary data highlights the opportunity for improvement in postoperative pain management through increased utilization of multimodal therapy.

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Impact of the Emergency Medicine Pharmacist’s Interventions On Outcomes In Patients With Sepsis

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Purpose: Sepsis is a complex disease process which requires a great deal of provider attention. Early recognition and treatment of sepsis is crucial to reduce morbidity and mortality; this has led the Centers for Medicare and Medicaid Services to implement performance measures to evaluate various interventions in the sepsis treatment pathway, including prompt administration of antibiotics. Considering the busy nature of the emergency department and pharmacists’ unique knowledge of optimal medication regimens, emergency department pharmacists are key players in the development of treatment plans and selection of antibiotics. This study aims to evaluate the emergency medicine pharmacist’s impact on time to antibiotic administration, administration and selection of medications, and overall patient outcomes.

Methods: A retrospective, observational study was conducted to evaluate the impact of pharmacist interventions on adult patients (18 years and older) who received a diagnosis of sepsis during their emergency department visit. Patients were assigned to either the intervention group (documented evidence of a pharmacist intervention) or the control group (no evidence of a pharmacist intervention). The primary endpoint was time to antibiotic administration.

Results: Sixty seven patients met criteria for inclusion; 27 in the intervention group and 40 in the control group. There was a statistically significant decrease in time to antibiotic administration in the intervention group compared to the control group (2.52 hours vs. 3.39 hours, p=0.033), as well as an increase in the number of patients with antibiotic administration within 3 hours of presentation (67% vs. 40%, p=0.032). The pharmacist assisted with antibiotic selection in 74% of patients and administration in 41%. There were no significant differences in mortality between the intervention and control groups (15% vs 7.5%, p=0.427).

Conclusion: Emergency department pharmacist involvement in the care of patients with sepsis significantly decreases time to antibiotics and increases instance of antibiotic administration within 3 hours of presentation.
Pharmacy Student Performance Related to Learning Styles in an Integrated Pharmacokinetics Course Delivered by Varying Teaching Methods

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Purpose: Pharmacy students may often consider pharmacokinetics as one of the most perplexing subjects in a pharmacy curriculum and delivering the material in a manner that adapts to all students learning styles poses a remarkable challenge. Within the time frame of this study at our institution, Pharmacokinetics I lecture delivery was solely student driven team-based problem solving. Pharmacokinetics II was delivered by formal lecture by faculty in addition to team-based problem solving. The purpose of this study is to assess for any differences in student performance based on learning styles between Pharmacokinetics I and Pharmacokinetics II after an adjustment in teaching styles.

Methods: Pharmacy students enrolled at South University School of Pharmacy during Quarter 4 and Quarter 6 of the study time frame were asked to participate in the study. Those who consented to participate completed a learning styles survey located at www.educationplanner.org. The students forwarded their results to the primary investigator and they were sorted into groups based upon their predominant learning style. Pharmacokinetics I and Pharmacokinetics II grades were retrospectively analyzed and grouped based upon students' learning styles.

Results: 114 students were included in the IRB approved study and the majority (49%) were visual learners, with 16% auditory, 17% tactile, 6% auditory/visual, 5% auditory/tactile, and 7% visual/tactile learners. Auditory and visual learners displayed a significant improvement in performance in Pharmacokinetics II.

Conclusion: Based upon our findings, auditory and visual learners performed best in an environment that consists of formal lecture and problem based learning activities.

Comparison of Atracurium and Cisatracurium in Patients with Acute Respiratory Distress Syndrome

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Purpose: Acute respiratory distress syndrome (ARDS) is defined as rapidly-developing, severe hypoxemia associated with non-cardiogenic pulmonary edema. Literature has shown mortality benefits with use of cisatracurium in ARDS. Both the structure and pharmacokinetics of cisatracurium and atracurium are similar; however, atracurium has not been studied in patients with ARDS. At St. Joseph’s/Candler, atracurium is the preferred neuromuscular blocker (NMB), including in the management of ARDS. The purpose of this study was to determine if atracurium is non-inferior to cisatracurium.

Methods: Retrospective chart reviews were performed on patients who received atracurium infusion for the management of ARDS in the intensive care unit (ICU) at either facility. This data was compared to a cisatracurium historical control group. The primary outcomes were hospital and ICU mortality.

Results: Groups were similar at baseline; however patients in the atracurium arm had increased exposure to steroids, propofol, and neuromuscular blockade. There was no statistical difference in the primary outcomes of hospital and ICU mortality. For secondary outcomes, cisatracurium was associated with increased ICU-acquired weakness, while atracurium was associated with increased barotrauma.

Conclusions: Atracurium is not associated with a higher ICU or hospital mortality in comparison to cisatracurium; however, it was associated with an increased occurrence of new barotrauma. While there were several limitations to the study, it appears that the mortality benefits associated with cisatracurium in the literature may be extended to atracurium in patients with ARDS. However, this assumption would have a higher grade of recommendation with further, more robust studies.

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4-Factor Prothrombin Complex Concentrate Drug Use Evaluation

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Purpose: Kcentra, a 4-Factor Prothrombin Complex Concentrate (4F-PCC), contains the vitamin K-dependent coagulation factors. Use at Athens Regional Medical Center (ARMC) is restricted to warfarin-induced life threatening bleeding and reversal of warfarin therapy due to urgent surgery. As warfarin is commonly used and 4F-PCC is expensive, it is important to maximize the efficacy and safety of its use, which was the goal of this evaluation at ARMCh.

Methods: Retrospective chart review of patients receiving 4F-PCC at ARMCh from April 2014 through October 2015. Information collected included patient demographics, anticoagulant indication, baseline labs, type of bleed or surgery, dose given, concomitant therapies, outcomes, and discharge details.

Results: Chart review was performed on 28 patients. 25% (7 of 28 patients) of 4F-PCC use did not meet ARMC restriction criteria. 3 patients were on a novel oral anticoagulant. 2 patients received 4F-PCC before planned surgeries. 2 patients had bleeds that were not life threatening. All target doses (mg/kg) were correct based on patient’s INR and actual body weight. 21.4% (6 of 28 patients) of doses were rounded incorrectly based on ARMC protocol. One patient did not receive Vitamin K along with 4F-PCC. There were 2 cases of thrombosis and 2 cases of in hospital mortality documented after 4F-PCC use. ARMCh total excess cost was $27,875.

Conclusion: More education is needed for providers and surgeons on appropriate use and rebound thrombosis risk associated with 4F-PCC. Simplifying the ARMCh 4F-PCC rounding policy would eliminate errors. Educating pharmacists to adhere to ARMCh policy when verifying 4F-PCC orders would be beneficial to prevent inappropriate use in the future.

Comparison of Atracurium and Cisatracurium in Patients with Acute Respiratory Distress Syndrome

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Systemic Implementation of Core Antimicrobial Stewardship Strategies at a Community Hospital

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Purpose: The increasing prevalence of antimicrobial resistance renders stewardship a pivotal healthcare topic. Mounting resistance primarily results from inappropriate antibiotic use, and the CDC estimates up to 50% of antibiotics prescribed in U.S. hospitals are unnecessary or inappropriate. Over the past two years, pharmacist intervention-based stewardship pilots on select units at Northside Hospital demonstrated a reduction in inappropriate antibiotic use, length of stay, and healthcare costs. The purpose of this study is to implement systematic strategies to further reduce unnecessary or inappropriate antibiotic exposure, improve pharmacists’ ability to monitor antimicrobial therapy, and optimize dosing throughout all Northside Hospital units.

Methods: During phase one, medical records were reviewed for internal medicine, surgical and intensive care patients receiving antibiotics from October-December 2015. Antibiotic orders were evaluated for appropriate dose, duration, and indication documentation. Phase two involves implementing the following core systemic elements: 1) indication requirement with antibiotic orders 2) “time out” after 48-hours of antibiotic therapy 3) real-time, unit-based electronic reports to facilitate pharmacist monitoring. The impact of these implementations on antibiotic usage will be evaluated and compared to phase one data.

Results: Retrospective data analysis revealed an average each patient received 1.3 antibiotics per day and 5.6 inpatient days of antibiotic therapy. The average length of levofloxacin, vancomycin, and piperacillin-tazobactam therapy was 4.3, 5.2, and 5.7 days respectively. Antibiotic orders reviewed showed 37 of 42 (88%) with a pharmacy dosing consult compared to 60 of 76 (79%) without a consult were appropriately dosed. In addition, 101 of 119 (86%) antibiotic orders lacked an indication.

Conclusion: Preliminary data demonstrates opportunities to optimize antimicrobial usage and dosing through enhanced systemic monitoring and indication documentation.
The Evaluation of Pharmacy Technician Readiness to Engage in and Discuss Medication Therapy Management Services with Patients

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Purpose: This study evaluates pharmacy technicians’ readiness to participate and contribute to medication therapy management services. Medication therapy management services help patients utilize and understand their prescriptions and over the counter medications, identify duplicate therapies, and detect disease states that may be untreated. Pharmacy technicians may be advantageously positioned to assist in these medication therapy management services under the supervision of their pharmacist in impactful ways.

Methods: This study received Mercer University’s Institutional Review Board’s approval, and Kroger Pharmacy also contributed. The study utilized two electronic surveys, the first was sent to technicians who participated in a training session about medication therapy management services, and the second survey was distributed ten weeks later. Each survey required approximately five minutes and utilized rating scales and short essay responses to gauge the participant’s understanding and attitude of medication therapy management services that may be offered to patients. The participants were Kroger Pharmacy technicians based in the Kroger Atlanta Marketing Area, which includes the states of Georgia, South Carolina, and Alabama. Over 100 technicians qualified for the study were recruited shortly after they completed their medication therapy management training. All responses were collected via SurveyMonkey.com and, comparisons have been made to note changes of understanding and attitude in time.

Results: There were 100 respondents for the first survey and 31 respondents for the follow up survey. The results showed that technicians became increasingly aware of MTM services and became more receptive to their role in the services. Additionally, the data also showed that their belief that their participation benefited the patient increased over time. However, it was clear in the free response section, that many still do not understand what MTM services are.

Conclusion: Pharmacy Technicians are ideally placed in the community setting to help in clinical services and the data here shows they are ready to participate in a greater capacity.

A Retrospective Analysis of the Treatment of Asymptomatic Bacteriuria in Internal Medicine Patients

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Purpose: The purpose of this study is to identify occurrences of inappropriate treatment of asymptomatic bacteriuria in patients. Asymptomatic bacteriuria is common in the elderly, children, and females, but often misdiagnosed as a urinary tract infection. Patients could be improperly treated and receive unnecessary antibiotics, leading to antimicrobial resistance and adverse drug reactions.

Methods: This retrospective chart review analyzed the treatment of asymptomatic bacteriuria in patients admitted to three different Internal Medicine teams from January to March in 2014. Patients were identified by having a urinalysis drawn during the specified time frame and given a diagnosis of a UTI. Results of the urinalysis, urine culture, and antibiotics were assessed. Adequate use of antibiotics was determined based upon documentation in their electronic medical record for signs and symptoms, pregnancy, and urologic procedures.

Results: Retrospective analysis identified 36 patients who were diagnosed with a UTI; 11 patients had documented signs and symptoms of urinary tract infections, 21 patients were positive for leukocytes, and 16 patients had positive urine cultures. Only 4 patients had all positive criteria. However, 30 patients received antibiotics for their UTI, but 18 also had other indications for antibiotics.

Conclusions: The results demonstrate a need to correct the misuse of antibiotics for patients with asymptomatic bacteriuria, the misdiagnosis of UTIs, and the lack of documentation of signs and symptoms. Pharmacist driven education could greatly benefit prescribers and patient outcomes, and is being conducted as part of a larger project.

Novel Oral Anticoagulants Compared to the Standard of Care for the Chronic Management of Recurrent Venous Thromboembolism in Oncology Patients

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Purpose: There is limited data for the use of novel oral anticoagulants (NOAC) for the chronic management of venous thromboembolism (VTE) in oncology patients. The prescribing of NOACs have steadily increased due to the perceived benefits compared to the standard of care. The aim of this study is to evaluate the prescribing habits of NOAC use compared to the standard of care for the chronic management of VTE in oncology patients.

Methods: This study is a retrospective review of cancer patients treated by participating oncologists from July 1, 2013 to January 1, 2016. Data assessed included baseline demographics, VTE diagnosis, prescribed anticoagulant, duration of treatment, recurrence of VTE, time in therapeutic range for warfarin, documented bleeds, and risk factors for recurrent VTE as defined by the NCCN guidelines.

Results: Interim analysis indicates that NOACs may be more effective in preventing recurrent VTE but exhibits a higher bleeding risk. The NOAC group contained a 6.7% VTE recurrence rate compared to a 20% VTE recurrence rate in the standard of care group. The frequency of bleeds were higher in the NOAC group at 13.3% versus the standard of care group at 6.7%. Concomitant hormone therapy appears to be associated with an increased risk of recurrent VTE. The p-values for the rate of recurrent VTE and bleeding risk were not significantly different between NOACs and the standard of care.

Conclusion: Data from this analysis indicates that the use of NOACs in oncology patients is effective but holds an increased bleeding risk compared to the standard of care.

Evaluation of Phosphorus Replacement in Hematopoietic Stem Cell Transplant Patients at an Academic Medical Center

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Purpose: Hypophosphatemia following hematopoietic stem cell transplant (HSCT) is seen clinically in many of our patients at Georgia Regents Medical Center (GRMC). Patients undergoing HSCT can experience hypophosphatemia due to rapid cell synthesis post-HSCT. The primary objective is to evaluate the amount of supplemental phosphorus HSCT patients require in the pre-engraftment phase after transplantation. Lento and colleagues have proposed a maximum intravenous dose of 0.24 mmol/kg/dose in the general medicine patient population, which is the current hospital protocol. However, doses in critically ill patients up to 0.64-1 mmol/kg have been reported.

Methods: This single-center, retrospective chart review was conducted on patients who received a autologous or allogeneic stem cell transplant at GRMC from June 2013 to May 2015. Information was collected including patient and transplant demographics, amount of phosphorus received per day with serum levels, and amount of calcium received per day with serum levels (when applicable). The total and weight-based dose of phosphorus given through intravenous and oral routes was assessed for each day. Data on adverse effects related to hyperphosphatemia including arrhythmia, rhabdomyolysis, and seizures were collected.

Results: Data has been recorded for all patients who underwent HSCT from June 2013 to May 2015, which included 30 autologous transplant patients and 55 autologous transplant patients. Data analysis showed no clear evidence that aggressive repletion decreased number of days to normal levels. 68% of repletion doses were given during pre-engraftment phase with 21% of patient received ≥ 0.24 mmol/kg intravenous phosphate replacement as a first dose. No patients experienced high phosphorous levels post-repletion, rhabdomyolysis, or seizures. 3.7% of patients developed arrhythmia.

Conclusion: This chart review showed inconsistencies with phosphate repletion dosing. A standardized protocol could benefit this population. It is reasonable to consider using higher doses in HSCT patients to minimize additional bolus and oral doses given throughout the day.
Impact of a North American Pharmacist Licensure Examination (NAPLEX) Review Course during Advanced Pharmacy Practice Experiences (APPEs) on First-Time Pre-NAPLEX and NAPLEX Pass Rates

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Purpose: The Accreditation Council for Pharmacy Education (ACPE) uses NAPLEX results as a quality measure to assess pharmacy programs. Incorporation of formalized NAPLEX reviews is not required but frequently utilized by pharmacy programs. At one school of pharmacy, a NAPLEX review course was implemented during APPEs to prepare students for the NAPLEX. The purpose of this study is to compare first-time pass rates on the pre-NAPLEX and NAPLEX between pharmacy students who completed a NAPLEX review course during APPEs versus those who did not.

Methods: Class of 2016 students were required to complete the RxPrep® online NAPLEX course during their APPEs. The pre-NAPLEX was administered between the third and fourth rotation. A survey was also administered to evaluate student perception of the course. Class of 2016 first-time pre-NAPLEX scores were compared to de-identified scores from the classes of 2014 and 2015 students who did not complete the course. First-time NAPLEX scores between 2016 graduates versus 2014 and 2015 graduates will be compared.

Results: There was no statistically significant difference in first-time pre-NAPLEX scores between students who completed one-third of the RxPrep® course versus those who did not complete the course. Perception survey results demonstrated a majority of students appreciated the RxPrep® course and felt the course contributed to their confidence in being prepared for the NAPLEX.

Conclusion: Pre-NAPLEX and NAPLEX pass rates provided insight into the pharmacy program’s preparation of students and graduates. Students’ survey responses favored a NAPLEX review course.

Impact of Rapid Diagnostics and a Pharmacist Driven Physician Reporting Program on Outcomes of Patients with Positive Blood Cultures

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Purpose: This study will ascertain whether the Biofire FilmArray rapid diagnostic tool combined with a pharmacist driven reporting program will improve clinical outcomes compared to traditional cultures with nurse driven reporting.

Methods: Patients included in the study were adults treated in St. Joseph’s hospital from 1/1/15-3/31/15 and 1/1/16-3/31/16 with a positive blood culture. The pre-intervention comparison arm included positive blood cultures identified by conventional protocols, followed by microbiology notifying the nurse. The intervention arm included positive blood cultures identified by Biofire, followed by microbiology notifying the pharmacist. The primary outcome was time to optimal antimicrobial therapy.

Results: The study demonstrated that time to optimal therapy is achieved sooner in the rapid diagnostic intervention group. The rapid diagnostic intervention group did not show any benefit in ICU or hospital length of stay, or hospital mortality. A pharmacist recommendation was requested 37.5% of the time, with a 100% acceptance rate.

Conclusion: The study was limited by population size, particularly in the prospective arm. While the sample size was small, the data correlates with recent studies assessing rapid diagnostic tools achieving optimal antimicrobial therapy sooner.
Purpose: To evaluate urine samples from a putative depression model for biomarkers associated with type 2 diabetes mellitus (T2DM) and non-alcoholic fatty liver disease (NAFLD) using urinary dipsticks for rapid screening.

Methods: Samples were obtained from two previous studies using adolescent chronic restraint stress (aCRS) to model depression in adult female Sprague-Dawley (SD) rats. Urine was passively collected between 8-10 am at the beginning and end of the Restraint and Treatment periods. Urine samples were transferred from the floor of the chamber by pipet and stored at -80°C. Samples were thawed and briefly vortexed to resuspend sediments. 15 μL urine was pipetted onto select sections of the Accutest Urine reagent strips (JANYS pharmaceutical Corporation, Encino, CA). At 30, 30, 40, and 60 seconds, sections for glucose, bilirubin, ketones, and protein were visually compared to the standards diagram on the test strip package and the associated values were recorded. Data was analyzed using Excel to perform t-tests and expressed as the mean ± standard error of the mean (SEM), significance set a priori at p<0.05.

Results: aCRS rats displayed significantly greater change in urinary bilirubin vs non-restrained rats after the Restraint period (p=0.029). No differences were found in protein, ketone, or glucose between treatment groups.

Conclusion: aCRS does not elicit urinary glucose detectable by this rapid screening method, but aCRS rats may be vulnerable to NAFLD.

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Evaluating Antimicrobial Administration Times in the Emergency Department

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Purpose: The 2013 Surviving Sepsis Campaign Guidelines recommend initiation of intravenous antimicrobials within the first hour of identification of severe sepsis or septic shock as part of early goal-directed therapy. A study completed at MUMC in 2015 identified that 6.5% of the patients in the study received their first antimicrobial agent within the first hour after the identification of sepsis. These findings led to increased awareness on the timeliness of antibiotic administration in septic patients. The purpose of this study is to measure outcomes resulting from increased awareness regarding time to administration of antimicrobials for septic patients in the emergency department.

Methods: This study is a single-centered, retrospective chart review and has been approved by the institutional review board. All patients admitted to MUMC between May 1st and December 31st 2015 with suspected sepsis were screened against exclusion criteria. Patients that were less than 18 years old, pregnant, transferred from another facility, or meeting less than 2 of 4 SIRS criteria upon admission were excluded. Data was analyzed with descriptive statistics. The primary outcome was the time from the initial triage to the administration of the first antimicrobial.

Results: Of 348 identified patients, 185 were included in the study. The average time to administration of antimicrobials was 3.32 hours with a standard deviation of 0.083 hours and a median of 2.72 hours. 54% of patients received antibiotics within 3 hours, while 5% of patients received antibiotics within 1 hour.

Conclusion: The results of this study show that there is still room for improvement in administering antimicrobials to septic patients in a timely manner.

Evaluating the Rabies Immunoglobulin and Vaccine for Post Exposure Prophylaxis in the ED

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Purpose: Rabies is a zoonotic RNA virus that enters the CNS of the host typically through saliva from a bite. If untreated, the virus causes a fatal acute, progressive encephalomyelitis. Patients often present to the ED after suspected exposures. The goal of this study was to evaluate the appropriateness of post exposure prophylaxis (PEP) treatment at Memorial University Medical Center (MUMC) based on the ACIP rabies workgroup recommendations. The aim of this study was to reduce medication costs and promote optimal therapy.

Methods:Patient profiles were retrospectively reviewed using the electronic medical record system. PEP treatment includes human rabies immunoglobulin (HRIG), dosed the same as all ages, and the four series rabies vaccine. Assessment of PEP treatment appropriateness was done by evaluating the type of exposure and animal species. Patients included were persons that received HRIG or the vaccine in the ED from September 1, 2014 to September 31, 2015. Immunocompromised and pregnant patients were excluded. Primary outcome was appropriateness, as defined by animal, of the use of HRIG and the vaccine per guidelines. Secondary outcome was potential cost avoidance.

Results: A total of 57 patients were enrolled. Incidences reported were 31.6% stray, 33.3% wild, 28.1% domestic, 1.8% travelling, and 5.3% unknown. Type of injuries were 64.9% bite, 22.8% exposure, and 10.5% scratch. Incidences were further defined by being passive or provoked. There was a 50.9% compliance rate for the vaccine. No adverse events or readmissions were reported. Based on the ACIP recommendations, 31.8% of PEP treatment incidences were deemed inappropriate. This yields a potential cost savings of $49,501.80 per year.

Conclusions: Appropriate treatment with PEP for a rabies exposure presents a potential opportunity. However, risks must certainly be weighed against benefit. Ultimately, a protocol is currently being developed for implementation in the ED to help utilize PEP more efficiently and appropriately.

Evaluating the Safety and Efficacy Of Using Actual Versus Ideal Body Weight For Daptomycin Dosing

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Purpose: Daptomycin is FDA approved for the treatment of cSSTIs, bacteremia, and endocarditis utilizing dosing regimens of 4-8mg/kg. The manufacturer of daptomycin recommends using actual body weight (ABW) for dosing calculations. However, some small studies and the pharmacokinetic profile of daptomycin suggest that using ideal body weight (IBW) for dosing calculations should not compromise the therapeutic effectiveness of daptomycin, and may reduce adverse effects associated with higher doses. The purpose of this study is to evaluate the safety and efficacy of using ABW versus IBW when dosing daptomycin.

Methods: This study evaluated patients who received daptomycin based on ABW versus IBW during the time frames of 7/14-12/14 and 2/15-7/15 respectively. Admitted adult patients who received at least 72 hours of daptomycin were included in the study. Exclusion criteria included patients with ABW less than IBW, and patients who received daptomycin at an outside location within 24 hours of admission. The primary endpoints include 1) clinical cure rate of daptomycin dosing in each group, and 2) the rate of adverse effects in each group. The secondary endpoint includes the cost comparison between the weight-based groups.

Results: A total of 149 patients were screened in which 28 patients were included in the ABW group and 35 patients were included in the IBW group. The clinical cure rate in the ABW and IBW groups were 92.9% and 97.1% respectively. The safety events were similar in both groups (ABW of 6.8%, IBW of 5.7%).

Conclusion: Daptomycin dosing based on IBW may not be associated with a decreased rate of clinical cure. Safety events were similar in both groups.

Evaluating Outcomes Of Poractant Alfa Versus Calfcaltant In Neonates

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Purpose: In premature infants, pulmonary surfactant production is diminished, leading to increased surface tension and Respiratory Distress Syndrome (RDS). Marketed surfactants are used to mitigate these negative sequelae. However, there is no definitive data directly comparing poractant alfa and calfactant. The purpose of this study is to retrospectively evaluate safety and efficacy outcomes of using poractant alfa as compared to calfactant for the treatment and prevention of RDS.

Methods: Included patients were neonates (500-2000g) born before 34 weeks gestation receiving one or more doses of calfactant (3/15-9/15) or poractant alfa (3/15-9/15) at MUMC for RDS developing within 15 hours of life. The following data was collected: time and date of birth, gestational and postnatal age, gender, weight, Appgar severity score, surfactant used and dose, time of all administered doses, total number of doses and redoses, days on ventilator, diagnosis of RDS, length of neonatal ICU stay, inpatient mortality, documented reflex, and cost of each surfactant. Primary outcomes include time on ventilator and length of stay. Secondary outcomes are mortality, number of redoses, and cost of surfactant.

Results: There were 94 patients enrolled with 47 receiving poractant alfa and 47 receiving calfactant. Average hospital length of stay was 57.43 days in the poractant alfa group and 66.13 days in the calfactant group, while average days on ventilator was 8.82 and 9.87, respectively. Poractant alfa demonstrated a re-dose rate of 25.53% and calfactant a rate of 40.4%. It cost $7537.88 more for poractant alfa during this period. No results were statistically significant.

Conclusion: Poractant alfa may be associated with favorable outcomes such as shortened length of stay and days of ventilation, but these results were not statistically significant.