

**University of Georgia College of Pharmacy Research Day**  
**Presented by the Student College of Clinical Pharmacy**  
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**Resistance of Escherichia coli urinary isolates in patients with community-acquired urinary tract infections treated in the emergency department of a community hospital**

*Devin Lavender, Rachel Wilkes, William Justin Moore, Angelina Cho, Virginia Fleming*

**Purpose:** Urinary Tract Infections (UTIs) are commonly treated in the Emergency Department (ED) and are frequently caused by Escherichia coli (E.coli). Fluoroquinolones are often prescribed for outpatient UTI treatment, but E.coli resistance is increasing. Our hospital antibiogram reported high E.coli resistance to these agents but is cumulative of a diverse patient population. This study was performed to determine resistance of E.coli urinary isolates to commonly prescribed oral antibiotic therapies in ED-treated patients with community-acquired UTIs (CA-UTI). Additionally, we compared resistance rates of the CA-UTI population to those of a prior study performed in 2011 of ED-treated CA-UTI patients.

**Methods:** A retrospective medical record review of culture-positive patients treated for urinary tract infections in the emergency department of a 200-bed community hospital from January 1, 2015 to June 14, 2015 was performed. Adult patients with urinary isolates of >100,000 cfu/ml with documented intention to treat were included. Patients who were hospitalized, pregnant, under 18 years of age, with < 100,000 cfu/ml on urine culture, or who did not have documented intention to treat were excluded. For patients who returned to the ED within 7 days of the initial visit, only the first encounter was included. Patients with risk factors for healthcare-associated urinary infection were assessed in a separate review. Healthcare associated risk factors included residence in long term care facility or nursing home, presence of an indwelling urinary catheter, immunosuppressive disease or therapy, hospital admission for 2 or more days in the previous 90 days, urologic procedure in the previous 90 days, and chronic dialysis in the previous 30 days. Information regarding other potential risk factors for drug resistance such as previous recent antibiotic treatment and history of prior or recurrent UTIs was also recorded. Resistance rates were compared to both the cumulative hospital antibiogram and to data from a 2011 study of E.coli resistance in ED-treated patients at the same institution. Causative bacteria, drug susceptibilities, and antimicrobial therapy were recorded for evaluation.

**Results:** Of the 385 patients screened, 277 were included in our evaluation. Of the 277 patients included, 83.4 percent (n=231) of included patients were classified as community-acquired UTI (CA-UTI) and 16.6 percent (n=46) of patients had at least one risk factor for a healthcare-associated pathogen. The most common causative pathogens were E.coli (76.1 percent) and Klebsiella species (12.5 percent). Nineteen patients grew multiple pathogens, representing 6.9 percent of the evaluated population. The most commonly prescribed antibiotics were nitrofurantoin (37.7 percent), cephalexin (36.4 percent), levofloxacin (4.8 percent), and sulfamethoxazole/trimethoprim (8.7 percent). For community-acquired patients, resistance of E.coli was 15.9 percent to levofloxacin, 26.1 percent to trimethoprim-sulfamethoxazole, 5.7 percent to nitrofurantoin, and 3.4 percent to cephalexin. Causative pathogens were susceptible to empiric therapy in 88.1 percent of cases. E.coli resistance rates to levofloxacin in the community-acquired ED UTI patients were lower than those reported on the cumulative hospital antibiogram (15.9 percent vs 27 percent, ED vs antibiogram respectively). From 2011 to 2015, resistance of E.coli to levofloxacin increased in community-acquired ED UTI patients (9.2 percent vs 15.9 percent). Also, a noticeable decrease in fluoroquinolone use and an increase in cephalexin and nitrofurantoin use was seen when compared to the 2011 data set results.

Conclusion: Fluoroquinolones remain potential options for ED-treated patients with CA-UTI based on the resistance rates reported in our study. Despite exceeding the 10 percent threshold in the 2011 guidelines, E.coli resistance was lower than reported on the hospital antibiogram and comparable to other oral therapy options--though resistance to levofloxacin has increased from 9.2 percent to 15.9 percent since 2011. Recently, the FDA has recommended that fluoroquinolone use be limited when other alternatives exist due to risk of side effects and potentially overly-broad spectrum. Because of this, further study on resistance rates for other oral antibiotics for ED-treated CA-UTI patients is needed.

### **Limitations to leading: Student pharmacists' perceptions of leadership opportunities during the third professional year in a 2+2 program**

*Alyssa Elrod, Ashley N. Hannings, Barrett A. Darley, Linda D. Logan*

Purpose: The Accreditation Council for Pharmaceutical Education (ACPE) Standards emphasize personal and professional development for student pharmacists. Colleges of pharmacy are becoming more invested in assessing student leadership potential and involvement. In addition, many colleges of pharmacy now have satellite campuses, adding additional advantages and challenges for student leadership development. The purpose of this study was to identify limiting factors for student pharmacists in the participation of leadership opportunities during the third professional (P3) year at a college of pharmacy with a 2+2 program.

Methods: This study utilized a research protocol and instrument previously approved by the University of Georgia (UGA) Institutional Review Board. This project was a supplement to the original study and was determined to be exempt from full review. Data collection occurred during a one-week period in September 2016. The Qualtrics survey was initially emailed to the UGA College of Pharmacy Class of 2017 (n=144) via the class listserv with two reminders requesting participation. Leadership opportunities were defined at the beginning of the survey. Students were asked to reflect back to leadership opportunities available during their P3 year.

Results: A total of 21 students completed the survey. Only two out of four campuses were represented with one being the main campus. The majority of respondents (86%) planned to pursue leadership opportunities during their P3 year. Respondents were asked to identify limitations to participating in leadership opportunities, selecting all limitations that applied. The limitations identified included school responsibilities (81%), work responsibilities (62%), perceptions of their own leadership abilities (57%), hobbies (33%), relationships (29%), campus location (24%), and family responsibilities (14%). Two respondents did not identify limitations to participation (9%). When asked to rank the identified limitations from most to least limiting, 38% of respondents selected school responsibilities, 15% selected hobbies, and 15% selected campus location as the most limiting factor.

Conclusion: This study identified multiple limitations to student participation in leadership opportunities during the P3 year. While some factors were personal, other barriers identified may be minimized by college initiatives. For example, for the students who identified perceptions of their own leadership abilities as a limitation, the College could offer leadership development programming to increase students' confidence in their abilities. Campus location was also noted as a limitation. The College continues to examine equality of personal and professional development opportunities among all campuses. However, input is needed from all four campuses to adequately address student needs.

## **Retrospective evaluation comparing a non-benzodiazepine versus benzodiazepine based sedation strategy during targeted temperature management following non-traumatic cardiac arrest in critically ill adults**

*Natalie Chong, Jake Davis, Anthony Hawkins*

**Purpose:** Targeted temperature management (TTM) following non-traumatic cardiac arrest is a therapeutic approach intended to improve neurologic outcomes. Complications associated with TTM include shivering and hypotension. Current guidelines suggest a non-benzodiazepine strategy over benzodiazepines, although this is derived from data targeting light sedation. The need for and choice of sedative agents are not known in patients requiring TTM. Side effects associated with various sedatives may affect complication of TTM. The purpose of this study is to compare non-benzodiazepine and benzodiazepine sedation strategies in critically ill adults during TTM.

**Methods:** This was a single-center retrospective observational cohort study conducted at a large community teaching hospital. It was approved by the institutional review board with waived consent. All patients over 18 years old admitted to the medical, surgical, or cardiac intensive care units (ICU) who underwent TTM between October 1, 2015 and July 31, 2016 were eligible for inclusion. Patients were excluded if TTM was initiated for any indication other than non-traumatic cardiac arrest or if they did not receive any sedative agents. Patients were divided into two groups for comparison based on the choice of sedative received for deep sedation: non-benzodiazepines (i.e. propofol) and benzodiazepines (i.e. midazolam or lorazepam). Demographic characteristics, type and amount of analgesic and sedative medications, incidence of adverse effects, and mortality were extracted from the electronic medical record. The primary outcome of the study was the need for neuromuscular blocking agents (NMBA). Secondary outcomes included the need for vasopressor support and in-hospital mortality. Descriptive statistics were used to analyze the data.

**Results:** A total of 19 patients were evaluated for inclusion. Five patients were excluded for TTM indication other than non-traumatic cardiac arrest (n equals two) and no use of sedative agent (n equals three), leaving 14 patients to be included for analysis. Twelve patients received a non-benzodiazepine based strategy, and two patients received a benzodiazepine sedation strategy. No patients received lorazepam in the benzodiazepine group. Demographic characteristics including age and admission weight were similar at baseline between the two groups. Severity of illness determined by a Sequential Organ Failure Assessment (SOFA) score appeared to be similar, with a SOFA score of 11.8 in the non-benzodiazepine group and 10.5 in the benzodiazepine group. The need for NMBA occurred in six (50 percent) patients in the non-benzodiazepine group compared with two (100 percent) patients in the benzodiazepine group. Vasopressors were required in ten (83.3 percent) patients in the non-benzodiazepine group compared with two (100 percent) patients in the benzodiazepine group. Eight (66.7 percent) patients and one (50 percent) patient died in the hospital in the non-benzodiazepine and benzodiazepine groups, respectively.

**Conclusion:** The interim analysis showed the need for NMBA to be more profound in the benzodiazepine group. This finding may suggest that side effects from a benzodiazepine approach may impact complications of TTM such as shivering more so than a non-benzodiazepine approach. However, the preferred sedative agent for deep sedation in TTM remains uncertain. Further investigations are warranted to assess the safety and efficacy of these sedation strategies.

## **Effectiveness of a call-back system for follow-up of culture results in patients treated for urinary tract infection in the emergency department of a community hospital.**

*William Justin Moore, Angelina Cho, Devin Lavender, Rachel Wilkes, Virginia H. Fleming*

**Purpose:** Urinary tract infections are often treated in the emergency department (ED). Urine cultures are commonly collected from patients even if they are discharged from the ED without requiring admission. In these cases, empiric antibiotic prescriptions are given based on treatment guidelines and local resistance patterns. When resistant cultures return, a process for contacting patients must be in place to allow providers to change antimicrobial therapy. This pilot study evaluated the current process at our institution for follow-up on urine culture results in patients treated for urinary tract infection in the ED and discharged prior to pathogen results.

**Methods:** A retrospective medical record review of culture-positive patients treated in the emergency department of a 200-bed community hospital from January 1, 2015 to June 14, 2015 was performed. Patients with urinary isolates of greater than 100,000 cfu/ml and intention to treat by prescriber were included. Causative pathogens, antibiotic therapy prescribed, risk factors for drug-resistant pathogens, and drug susceptibilities were recorded. For patients with cultures resistant to prescribed therapy, medical records were reviewed for documentation of call back attempt(s), success/failure, and if change of therapy or course of action occurred. Patients were also classified as community-acquired or healthcare-associated UTI based on presence of specific risk factors for drug-resistant pathogens. Healthcare-associated risk factors included residence in long term care facility or nursing home, presence of an indwelling urinary catheter, immunosuppressive therapy or disease, hospital admission for 2 or more days in the previous 90 days, urologic procedure in the previous 90 days, and chronic hemodialysis in the previous 30 days. Risk factors for drug resistance such as previous recent antibiotic therapy or history of previous or recurrent urinary tract infections were also collected. Evaluation of risk factors for impact on infection with a drug-resistant pathogen (resistant to empiric therapy prescribed in the ED) was performed and descriptive information about causative pathogens isolated, local resistance patterns, and frequency of various antibiotic agents prescribed was reported.

**Results:** Of 385 patients screened, 277 were included in the study, with 83.4 percent of patients being classified as community-acquired and 16.6 percent with healthcare-associated UTI. The most common pathogens isolated on urine culture were *Escherichia coli* (72.5 percent) and *Klebsiella* species (14.1 percent). Frequently prescribed antimicrobials were nitrofurantoin (36.4 percent) and cephalexin (35.7 percent). Cultures reported pathogens that were resistant to initial empiric antibiotic therapy for 21 percent of the ED-treated population. Attempted call-back to patients with resistant cultures was documented for 79 percent of those. Successful contact with patient was documented for 65.2 percent of call-back candidates. For the patients not initially reached by phone, messages were left for 15.2 percent while 19.6 percent of patients were unable to be successfully contacted. Follow-up calls were performed on an average of 3.9 days after cultures were drawn. Therapy was modified via phone in 52 percent of cases and 6.5 percent of patients were referred to another physician upon call-back. Of note, 13 percent of call-back patients achieved clinical cure, which was determined through directed questioning and no change was made despite culture-reported resistance to the prescribed antibiotic therapy.

Conclusion: Evaluation of the follow-up methods of resistant cultures in ED-treated UTI patients showed inconsistency in practice of how call-backs are performed and documented. A considerable number of patients contacted were left messages or not reached successfully. With effective communication, practitioners were able to determine clinical success or need for therapy modification via phone questioning. An implemented follow-up call-back system with UTI patients discharged from the ED before culture results return can be an effective method for ensuring clinical success but is limited by the ability to consistently contact the patient. Staff education and further study is needed.

## **Extended-Interval Aminoglycoside Dosing in Pediatric Patients with Cystic Fibrosis Exacerbations**

*Shannon Alexander, Kalen Manasco*

Purpose: Optimal dosing of aminoglycoside antibiotics in pediatric cystic fibrosis (CF) patients has long been debated. Arguments have been made in favor of traditional multiple daily dosing (MDD) as well as extended-interval, or once daily dosing (ODD). The Cystic Fibrosis Foundation endorses and recommends extended-interval dosing. ODD of aminoglycosides has concentration-dependent bactericidal activity, less drug accumulation that causes renal and vestibular toxicity, a post-antibiotic effect, and decreased risk of adaptive resistance. The purpose of this study was to determine if ODD of aminoglycosides in pediatric CF exacerbation patients reached and maintained therapeutic serum drug concentrations.

Methods: Pediatric patients (defined as 18 years or younger upon admission) who were admitted for CF exacerbations between September 2015 and September 2016 and received ODD of an aminoglycoside were included in this evaluation. ODD is recommended in ages 5 years and older, so patients under 5 years were excluded. Patients meeting inclusion criteria received extended-interval dosing of tobramycin, the aminoglycoside of choice per institution-specific susceptibilities. Patients were started on a dose of 10 mg/kg administered intravenously once daily. If a patient had previous admission(s) with tobramycin treatment, they were started at the dose that was last found to achieve therapeutic serum drug levels. Levels were drawn 3 hours and 12 hours after the start of the second dose. Therapeutic serum drug levels were defined as those giving a calculated 30-minute post-dose peak of 8-10 times the MIC of the suspected organism(s) (based on institution antibiogram and/or patient history of susceptibility) and a calculated trough of < 2 mcg/ml. The primary endpoint of this evaluation was the percent of patients who achieved therapeutic drug levels with initial dose selection. Secondary endpoints included the number of dose adjustments required to achieve therapeutic drug levels in patients who did not reach it initially. The institutional review board approved this retrospective drug-use evaluation.

Results: The evaluation population included 23 total patients (n equals 23). This population included 11 females and 12 males ranging from 6 to 18 years of age (average 11.5 years). Of the 23 patients included in this evaluation, 16 patients (70 percent) achieved therapeutic serum drug levels using initial dosing strategies. Of the 7 patients who were found to be outside of the therapeutic range, 6 were subtherapeutic and 1 was suprathreshold. Of these 7 patients, 2 required 3 dose adjustments and 5 required only 1 dose adjustment to achieve therapeutic levels.

Conclusion: Extended-interval dosing of aminoglycoside antibiotics achieved therapeutic serum drug levels in the majority pediatric cystic fibrosis patients admitted for CF exacerbations requiring antibiotic treatment. Furthermore, the majority of patients who do not achieve therapeutic levels with initial dosing strategies only required one dose adjustment to be within the therapeutic range. This evaluation supports once daily or extended-interval dosing of aminoglycosides in this patient population, and shows that it can be a reliable and efficacious approach to treatment.

### **Risk of lactobacillus infection in critically ill adults receiving lactobacillus probiotics**

*Zachary Ruege, Andrea Newsome*

Purpose: Probiotics have been advocated in critically ill patients to mitigate risk for developing *Clostridium difficile* infection and ventilator associated pneumonia. Critically ill patients display suppressed immune response of the intestinal mucosa and increased digestive tract permeability increasing the likelihood that probiotic bacteria may translocate into the blood and cause opportunistic infection in this population. Published case reports and case series describe lactobacillus bacteremia following administration of probiotics. The purpose of this retrospective, observational medication use evaluation is to determine the incidence of lactobacillus infections in critically ill patients that were prescribed probiotics during their intensive care unit (ICU) stay.

Methods: This study is a single-site, retrospective, non-randomized, observational medication use evaluation from January 1st 2014 and December 17th 2015. Adults greater than 18 years of age admitted to an ICU who received at least one dose of Culturelle probiotic (*Lactobacillus rhamnosus* GG, NDC 49100-0363-74) were included. The primary endpoint was the incidence of culture positive lactobacillus infection following probiotic administration. Secondary endpoints included both characterization of Culturelle use and clinical outcomes. Medical records were reviewed to collect information regarding patient demography, past medical history, location of care, probiotic dosing, and clinical outcomes. Descriptive statistics were performed. This study received approval from the institutional review board.

Results: A total of 99 critical care patients received at least one dose of Culturelle during the evaluation period. The population was 53.5 percent female with a mean age of 46 years old (standard deviation 29.7). Clinicians prescribed Culturelle once daily in 37.4 percent, twice daily in 60.6 percent, and three times daily in 2.0 percent of patients for a mean 22 days (standard deviation 4.95). The surgical unit admitted 37.4 percent, medical unit 43.4 percent, trauma unit 10.1 percent, and neurology unit 9.1 percent of patients for a median ICU length of stay of 32 days (standard deviation 15.6). Hospitalizations lasted for a mean 41 days (standard deviation 2.83) with a 13.1 percent in-hospital mortality. Four patients developed infections with positive cultures for *Lactobacillus* spp. while concurrently on Culturelle (4.04 percent). All patients with positive cultures were admitted to the surgical unit for a median 84 days ICU days with total length of hospitalization lasting a median 101 days. Of patients that received probiotics and treated in the SICU, 10.81 percent had a positive culture for *Lactobacillus* spp. Of those with positive cultures, there was a 50 percent in-house mortality rate.

Conclusion: A total of four patients developed infections with culture positive *Lactobacillus* spp. for a rate of 4.04 percent per hospitalization. All patients that had positive cultures were admitted to the surgical ICU. In 2013, Simpkins, et, al. conducted a comparable single-site retrospective review. A rate of 0.17 percent (2 out of 1176) per patient hospitalization was reported to describe risk of developing a *Lactobacillus* spp. related infection. This less frequent incidence may be explained because this study did not exclusively evaluate critically ill patients. The relatively high infection rate observed in critically ill, surgical patients requires further investigation.

## **Pharmacy interns' perceptions of Spanish-speaking patients**

*David Kim, Barrett A. Darley*

Purpose: The Hispanic population of the United States is the nation's largest ethnic minority. The U.S. Department of Health and Human Services has published guidelines to promote equal access to health care for diverse populations. According to these standards, culture and language have a significant impact on how patients access and respond to health care services. This project conducted at the University of Georgia College of Pharmacy (UGA COP) was designed to provide insight into pharmacy interns' perceptions of Spanish-speaking patients.

Methods: The institutional review board at the University of Georgia approved this survey-based study. During a 4-week data collection period in August 2016, a questionnaire was emailed to all pharmacy interns at the UGA COP through college listservs, with three reminder emails sent requesting participation. The survey was divided into 4 sections: demographics of pharmacy students, language assistance services available at pharmacy interns' pharmacies, attitudes of interns towards counseling Spanish-speaking patients, and cultural sensitivity of pharmacy interns. Descriptive statistics were utilized to analyze study results.

Results: Of 567 interns emailed, 73 completed surveys were returned. Of the respondents, 85.7 percent considered language services effective if they had the service available in their pharmacy. The majority, 62.5 percent, also agreed (somewhat agreed to strongly agreed) that non-Spanish speaking pharmacy interns have a responsibility to counsel those who only speak Spanish. In addition, 80.3 percent agreed (somewhat agreed to strongly agreed) that pharmacy interns have a responsibility to interact and learn the culture/language of their patients. However, 64.3 percent disagreed (somewhat or strongly) or were neutral when asked whether the college's instructional strategies sufficiently prepared students to interact with Spanish-speaking patients.

Conclusion: Study results indicated the majority of pharmacy interns at the UGA COP perceive cultural sensitivity toward Spanish-speaking patients as an important component of successful pharmacy practice. In this survey, most pharmacy interns agreed they have a responsibility to learn about different patient cultures and to counsel Spanish-speaking patients. Overall, they felt language assistance services were effective; however, they did not believe sufficient education in cultural sensitivity was provided during pharmacy school. Efforts to encourage cultural sensitivity and education should continue to be made to ensure equal access to pharmacy services for Spanish-speaking patients.

## **Comparison of in-person vs. telephone anticoagulation appointments with clinical pharmacists in a Veteran's Affairs Medical Center**

*Madeline Burke, Marci Swanson, Deborah Hobbs*

**Purpose:** Due to the complexities of managing warfarin therapy, pharmacists have held an increasing role in the management of anticoagulation. The purpose of this project is to determine whether pharmacist-led anticoagulation clinics are more effective in-person or by telephone. By assessing patients' current INR, goal INR, and percent time in therapeutic range (TTR), we will be able to compare whether patients are more likely to have a greater percentage of TTR within the two types of pharmacist-managed anticoagulation clinics: telephone and in-person.

**Methods:** This project was exempt from the Institutional Review Board. This study was completed at the Carl Vinson VA Medical Center, and it was a retrospective analysis. Veterans that had anticoagulation appointments with two clinical pharmacists either in the telephone-only or in-person clinic, between April 1, 2016 and June 30, 2016 were included. The exclusion criteria included Veterans either being bridged during the time frame or prescribed a target-specific oral anticoagulant (TSOAC). Data was collected from the Computerized Patient Record System (CPRS) and included: indication for anticoagulation, comorbidities, INR, clinic style (telephone vs. in-person), current weekly warfarin dose, time in therapeutic range, age, sex, race, and pharmacist's conclusions on reason for supra or sub therapeutic INR. Percent time in the therapeutic range was calculated for all patients with active warfarin prescriptions, diagnosis of atrial fibrillation or venous thromboembolism, and at least 3 INRs in the last 120 days. The data was de-identified and given to the author. A two-sample t-test with equal variance was used to test for statistical significance of the time in therapeutic range between the two groups. Statistical significance was defined as a  $P < 0.05$  (two-tailed). All analyses were completed using Microsoft Excel.

**Results:** Out of 59 total screened telephone patients, 10 were excluded for taking target-specific oral anticoagulants and 49 were included in the retrospective analysis. There were 78 screened in-person patients, 26 had target-specific oral anticoagulants exclusion, 6 had bridging exclusion, and 46 were included in the retrospective analysis. The mean percent time in therapeutic range for the telephone group was 78.53% compared to the mean percent time in therapeutic range for the in-person group of 61.4%. This was a statistically significant difference ( $p$  equals 0.00142).

**Conclusion:** TTRs above 60% have the greatest benefit in terms of outcomes. Both clinic styles offer effective methods to reach therapeutic targets. The time in therapeutic range for telephone over in-person appointments was statistically significant. A potential explanation for this difference between groups is that Veterans with telephone appointments are more likely to be stable. Telephone appointments may be a more viable option depending on length of treatment, INR stability, and transportation needs of each patient. Future research should show if type of appointment has effect on other measures of safety and efficacy for warfarin, such as stroke or major hemorrhage.



## **Pharmacist's contribution to Diabetic Care at a 200-Bed Community Hospital**

*John Stevick, Titus Gates, Robin Southwood*

**Purpose:** Diabetes is a common comorbidity encountered in the hospital setting. Diabetes care teams are commonly used to provide patient education, medication management, and positive treatment outcomes for diabetes. The benefits of a pharmacist as a component of the diabetes care team are poorly documented. This poster describes the contributions of a pharmacist as a member of a diabetes care team.

**Methods:** IRB approval was obtained. A Microsoft Access database stored on a secure network drive was used to store data on diabetes team interventions over a span of three years and 8 months (January 2013 through September 2016). The pharmacist contribution to these activities was separated and analyzed. This data included various activities ranging from drug therapy recommendations (insulin adjustments, protocol initiation, and medication changes). Pharmacists patient education activities were also recorded. Educational activities included discussing disease progression, risk factors, blood glucose monitoring, insulin dosing, and medication usage. Pharmacy students also contributed to the diabetes care team interventions under the direct supervision of the pharmacist. The student data was also analyzed in the same manner as previously mentioned and reported elsewhere. Discharge therapy from pre-pharmacist team membership in 2008 was compared to discharge data from 2016 to assess impact of pharmacist upon discharge therapy in patients with an A1c value greater than 8%.

**Results:** Pharmacist initiated 1318 diabetic protocols and documented 1812 educational patient encounters/interactions. Pharmacist also recommended 1976 insulin adjustments and 280 medication changes. 1316 of these recommendations were directed related to reducing risk of both hyperglycemia and hypoglycemia. Pharmacist also completed 29 hospitalist consults and made 2 dietary consult orders. Students under the supervision of the pharmacist suggested 2395 additional interventions. Data collected during the two comparison periods (September-October 2008/June 2016-September 2016) were compared using the Chi-Square test. The data was found to have 2 degrees of freedom, suggesting a moderate association. Analysis of discharge data indicates a significant impact of pharmacist involvement upon discharge therapy.

**Conclusion:** Pharmacist involvement was shown significant improvement in the care of patients with diabetes in a community hospital. Pharmacists may also improve prescribing of home medications for hospitalized patients with diabetes.

## **Evaluating the use of a Candida panel**

*Paige Wallace, Emily J. Murray, Sonal Patel, Jere R. May*

**Purpose:** Early identification of pathogens is essential to assure patients are receiving optimal therapy as early as possible. The goal of the Candida panel, implemented in April 2016, is to be able to quickly detect if patients have invasive candidiasis. These results, available within 3 to 5 hours, allows for antifungal stewardship. The goal of this study is to evaluate the use of the Candida panel by monitoring adherence to the candidiasis algorithm, a prompt start of antifungal therapy in those with positive results, and quick discontinuation of antifungal in those with a negative result.

**Methods:** Our institutional review board approved this retrospective study. Our microbiology lab generated a list of patients with orders for the Candida panel. All patients listed were included in the study. Patients' medical records were reviewed for the following information: service that ordered the test, results of the test, and if the Candida panel algorithm was followed. The algorithm starts with patients being on broad-spectrum antibiotic coverage for greater than or equal to 72 hours and still febrile or showing signs of clinical deterioration. These patients must also have presumptive candidiasis, defined by a Candida score greater than or equal to three (one point for the following: total parental nutrition, surgery on intensive care unit admission, multifocal Candida colonization and two points for severe sepsis). If the test results were negative, charts were evaluated to determine what antifungal therapy was prescribed, when it was prescribed, and when it was discontinued. Patients whose test was positive, evaluation was done to see how long before antifungal therapy was started and which agent was chosen. Additionally, medical records were reviewed to determine if antifungal therapy was started before or after the test was drawn and how many hours before or after the test was drawn was the therapy started. The data was placed into an Excel spreadsheet to determine trends and if the Candida panel is being used properly.

**Results:** One hundred and thirty three patients were included in this study. Of these, only 23 percent followed the algorithm for ordering the Candida panel. Seventy-one percent of patients not following the algorithm did not have presumptive candidiasis (i.e. algorithm score less than three) making this the most common reason for improper use of the test. Additional reasons included, 44 percent of patients being on antifungal therapy prior to ordering the test, or 7 percent not being on empiric antimicrobial therapy for 72 hours. However, of the 103 patients who did not follow the algorithm, 17 percent of the tests were ordered per recommendations by the Infectious Disease team. Only 5 of the 133 test had positive results, all for *Candida albicans*/ *Candida tropicalis*. For those with negative tests, only 52 percent discontinued antifungal therapy, taking an average of 41 hours to discontinue therapy ranging from 1 to 146 hours. Twenty-five patients started on antifungal therapy at the time the Candida panel was ordered which is consistent with the algorithm. Of all the patients on antifungal therapy either before or after the test was ordered, 51 percent were on micafungin, an infectious disease approved drug, and 47 percent were on fluconazole.

**Conclusion:** The newly implemented Candida panel has not been integrated into therapy as intended. The benefit of the test is to prevent patients from being placed on antifungals when it is unnecessary. Currently the majority of patients receiving the test are still taking unnecessary antifungal therapy. This creates risk for antifungal resistant organisms and added expense to the patient and hospital. Further education needs to be done involving appropriate patient choice, not starting antifungals until Candida panel is ordered, and promptly discontinuing antifungals if a negative result is received.

## **Assessing the impact of a pharmacotherapy clinic in veteran patients with type 2 diabetes**

*Ife-atu Anachebe, Danielle Ouellette*

**Purpose:** Type 2 diabetes mellitus can result in increased morbidity and mortality if uncontrolled. Veteran patients with uncontrolled diabetes, hypertension, and hyperlipidemia can be referred to a pharmacotherapy clinic to have therapeutic regimens optimized and to receive more frequent follow up by a clinical pharmacist. The purpose of this study was to evaluate the impact of a clinical pharmacist on achieving favorable outcomes in diabetes, hypertension, and hyperlipidemia in an ambulatory care setting.

**Methods:** This retrospective chart review was determined to be institutional review board exempt as a quality improvement project. In this study, the patients' data at baseline served as the control. Inclusion criteria included a diagnosis of type 2 diabetes at baseline and enrollment in the clinic between November 1, 2015 and September 1, 2016. The exclusion criteria included a baseline hemoglobin A1c (HbA1c) of less than 8.00 percent, less than two clinic appointments, or only one HbA1c lab since the initial visit. The primary outcome measure was a change in HbA1c from baseline. Secondary outcomes included the number of patients at goal for hypertension and hyperlipidemia. Patients with diabetes were considered at goal for hypertension if the systolic blood pressure was less than 140 mmHg and the diastolic blood pressure was less than 90 mmHg. Hyperlipidemia was considered at goal if patients were on the appropriate statin therapy based on the four statin benefit groups.

**Results:** Out of the 88 patients who had been seen in pharmacotherapy clinic during the study period, 42 patients were excluded, leaving the final sample size to be 46 patients. The mean HbA1c at baseline was 9.64 percent, with a standard deviation of 1.64 percent. The range HbA1c at baseline was between 8.00 and 14.10 percent. At the conclusion of the study period, the mean HbA1c had decreased to 7.93 percent, with a standard deviation of 1.06 percent. The range HbA1c at the conclusion of the study period was between 6.30 and 11.10 percent. A decrease in HbA1c was observed in 41 patients, while an increase in HbA1c was observed in four patients. One patient did not experience a change in HbA1c. For hyperlipidemia management, 35 patients were considered at goal at baseline compared to 45 patients at the conclusion of this study. For hypertension management, 36 patients were at goal at baseline compared to 42 patients at the completion of the study.

**Conclusion:** Patients enrolled in the clinical pharmacist-driven pharmacotherapy clinic for diabetes management had an improvement in glucose control, demonstrated by a decrease in HbA1c. Additionally, the majority of patients being followed by the pharmacotherapy clinic were at goal for hypertension and hyperlipidemia management. This suggests that clinical pharmacists at the clinic can make important contributions to chronic disease state management for diabetes, hypertension, and hyperlipidemia.

## **Evaluation of therapeutic duplication for inpatients prescribed as needed antihypertensive medications at an academic medical center**

*Sarah Clements, Stephanie Lively*

**Purpose:** In efforts to provide highest-quality patient care, healthcare professionals must collaboratively ensure that medication orders are clear and accurate. Pharmacists, in particular, play a critical role in reviewing the appropriateness of all medication orders. Therapeutic duplication is a component of this review and is defined by this institution as the presence or use of multiple medications for the same indication without clarification or a specified sequence of administration. The primary objective of this study was to assess the occurrence of therapeutic duplication for antihypertensive medication orders with as needed frequency.

**Methods:** A retrospective chart review was conducted for a random sample of patients admitted to this academic medical center between January 1, 2016 and June 30, 2016 who were prescribed two or more as needed antihypertensive medications during a single admission. These medications included clonidine, hydralazine and labetalol. Data collection included patient location and medical service, name and dosage of the medication ordered, start and stop time of each medication order, route of administration and presence of order comments indicating parameters and/or sequence for use. Descriptive statistics were used to analyze the data. This project was part of the institution's Medication Use Evaluation and Improvement Program, which has been reviewed by the Institutional Review Board and determined not to be human subject research.

**Results:** 155 patient encounters associated with 329 medication orders were evaluated for therapeutic duplication. Two active orders for as needed antihypertensive medications were noted in 91 percent of these patient encounters, three active orders were noted in 5.8 percent of these patient encounters and four active orders were noted in 3.2 percent of these patient encounters. Review of the 329 medication orders revealed that 94.5 percent of orders included a comment defining blood pressure parameters for use and/or clarifying the sequence for administration. 5.5 percent of orders did not contain a comment or clarification. Of the 311 orders with comments, 82 percent of orders included the antihypertensive parameters for use only, while 18 percent of orders defined both blood pressure parameters for use and the sequence for administration. Overall, 83 percent of orders did not contain a comment or did not define both the parameters and sequence and, therefore, were considered duplicate therapy. Therapeutic duplication was most commonly noted in patients admitted to intensive care units, and intravenous hydralazine and labetalol were the most common agents prescribed.

**Conclusion:** Because therapeutic duplication may result in misinterpretation and increase the risk of adverse drug events, it is the responsibility of the prescriber to include pertinent information at the time of order entry and the obligation of pharmacists to seek clarification. The results of this medication use evaluation indicate a need for policy and protocol development related to therapeutic duplication, computerized prescriber order entry modification and staff education.

## **Retrospective Evaluation of Intraoperative Continuous Lidocaine Infusion in Bariatric Surgical Procedures**

*Cayla Sinnemon, Halle Harrison, Mary Beth Marandola-Kenvin*

**Background:** Multi-modal analgesia has gained popularity in an attempt to decrease opioid use in postoperative pain management. The continuous infusion of lidocaine is often utilized intraoperatively as a component of the multi-modal analgesia strategy. However, the volume of distribution and half-life of lidocaine are increased in obesity. This may increase its efficacy in analgesia in bariatric surgery. Therefore, this study aims to evaluate the use of continuous lidocaine intraoperatively in bariatric surgeries and to analyze the impact of continuous lidocaine on length of stay, nausea and vomiting, and post-op opioid use.

**Methods:** This retrospective medication use evaluation compares continuous infusion of lidocaine (n=46) to control (n=83) for post-op pain relief after bariatric surgery. A list of patients who underwent bariatric procedures from January 2016 through June 2016 was generated from the hospital's patient database and resulted in a total of 129 patients. The anesthesia record of each patient was analyzed, and patients who received intraoperative continuous lidocaine infusion were placed into the lidocaine group, and all other patients were placed into the control group. Data collection included age, sex, and BMI, none of which vary significantly between the groups. Primary endpoints include average length of stay, average PACU pain score per patient and average IV morphine equivalents received per patient during stay. Secondary endpoints include incidence of PACU nausea and utilization of various antiemetics. The small sample size results in a confidence level of 80% (+/- 5%), which is a major limitation of this study.

**Results:** Inclusion criteria include males and females over the age of 18 years, BMI greater than 24.9 kg/m<sup>2</sup>, and history of a bariatric procedure. Exclusion criteria include complications requiring immediate subsequent surgery and inability provide verbal pain scores on scale of 0-10. When compared to control, the lidocaine group demonstrated negligible changes in average length of stay ( 34.4 hours in the lidocaine group and 33.2 hours in the control group), average PACU pain scores (2.9 in the lidocaine group and 2.2 in the control group), incidence of PACU nausea (22% of patients in the lidocaine group and 18% of patients in the control group), average total opioid use (28.8 mg IV morphine equivalents in the lidocaine group and 26.6 mg IV morphine equivalents in the control group), and total antiemetic use.

**Conclusions:** While continuous lidocaine infusion does not demonstrate particularly favorable outcomes for bariatric surgery patients, there are not enough patients in this sample population to accurately determine the effect of continuous lidocaine infusion on patients undergoing bariatric surgery. This investigation is ongoing and will include more patients in the next analysis report.

## **Apixaban: examining practice patterns in chronic kidney disease at Augusta University Medical Center**

*Rachel Stephens, Christina E. DeRemer, Dwayne A. Pierce*

**Purpose:** New target specific anticoagulants provide alternative options for anticoagulation in nonvalvular atrial fibrillation, venous thromboembolism, and post-orthopedic prophylaxis indications. However, studies eliminate patients with moderate and severe chronic kidney disease and end stage renal disease making anticoagulation in this patient population limited with regards to evidenced based literature. Currently, apixaban is the only target specific agent approved for use in chronic kidney disease and end stage renal disease. The primary objective of this study is to assess physician prescribing practices of apixaban in the chronic kidney disease population admitted to an academic medical center.

**Methods:** This retrospective chart review was approved by the institutional review board. Patients who are greater than 18 years of age, had an active order for apixaban during hospitalization, had diagnosed chronic kidney disease or a serum creatinine greater than 1.5 mg/dL during the admission were included in this study. Patient records were identified by a targeted drug report using the Cerner discern analytic system to identify all patients who received at least one dose of apixaban in the emergency department or during a hospital stay between the dates of March 3, 2014 to March 3, 2016. Patients were excluded if they did not meet all of inclusion criteria. The primary outcome of the study was to evaluate the physician prescribing practices of apixaban in the chronic kidney disease population by evaluating the indication, dosing, and baseline stroke and bleeding risks. Secondary outcomes included rates of recurrent thrombosis, bleeding, and any barriers of compliance. Since the goal of this study is to evaluate all patients meeting the inclusion criteria, no power analysis was performed.

**Results:** A total of 572 patients received at least one dose of apixaban between March 3, 2014 and March 3, 2016. Of the 572, 181 patients met the inclusion criteria and were analyzed. Of the patients analyzed, 92 were female, 101 were Caucasian, with an average age of 67.3 years. The most frequent indication for anticoagulation was non-valvular atrial fibrillation where n equals 130. Twenty-six patients were prescribed apixaban for off-label indications such as arterial and graft thrombus. One hundred and sixteen patients were dosed with 5 mg twice daily of apixaban. Based on approved renal dosing indications, 143 patients were prescribed the appropriate dose of apixaban based on renal dosing criteria. The average CHADs-VASc2 score was 2.5 and the average HAS-BLED score was 2.1. Eight patients experienced a thrombus and 18 patients experienced a bleed within 1 year of taking apixaban with the most common source of bleeding being a gastrointestinal bleed where n equals 10. Of the 26 patients on apixaban for an off-label indication, 5 experienced an adverse event with 4 of the 5 patients having a thrombus.

**Conclusion:** With apixaban being the only target specific anticoagulant agent with an indication in renal impairment, many prescribers select it in chronic kidney disease and end stage renal disease. The evaluation of apixaban prescribing at Augusta University Medical Center indicates that patients are being prescribed apixaban appropriately based on indication and renal dosing. Comparing bleeding events from the ARISTOTLE trial to this study shows a greater percentage of bleeding events in patients with chronic kidney disease and end stage renal disease, however it would be appropriate to follow patients for longer than one year to see if this trend continues.

## **Mental health follow-up appointment adherence for long- acting injectable antipsychotic continuation after discharge from a psychiatric unit at a community teaching hospital in a rural area**

McKinley King, Lauren E. Singletary, Jennifer M. Hafling, Stephanie V. Phan

**Purpose:** Patients with mental illness have a decreased likelihood of adherence to oral psychotropic therapies. Rates of adherence to treatment may be lower in rural communities. Long-acting injectable antipsychotics (LAIA) are intended to improve patient adherence and may be associated with shorter hospitalizations and relapses, however, benefits may not be realized if patients do not continue therapy. This study aims to identify rates of adherence to LAIA and follow-up appointments at a local mental health center post-discharge from a community teaching hospital in a rural area. Continuation of LAIA up to one year post-discharge was also evaluated.

**Methods:** This study is a retrospective, chart review of patients presenting at two facilities. Patients at least 18 years of age, discharged from the acute inpatient psychiatric unit at a community teaching hospital and initiated on a LAIA during hospitalization with follow-up appointments scheduled at the local county mental health center (MHC) were included in this study. Data obtained from patient charts included demographic data (age, sex, ethnicity, date of discharge, length of stay, diagnoses, insurance provider, marital status, legal status on admission, mode of arrival to psychiatric unit, living with children 18 years or younger, and employment status), the discharge medication list, 30-, 60-, and 90-day readmission status and emergency room presentation, documented nonadherence, date and time of follow-up appointments at the MHC, and adherence to appointments. Subsequent LAIA appointments and medication information for up to one year post-discharge was also obtained. The primary outcome was to examine rates of adherence to follow-up LAIA appointments by evaluating the frequency in percent at which patients received their next scheduled LAIA dose. Factors describing patients based on LAIA adherence were characterized. Descriptive statistics were used to analyze patient demographics and the chi-square test was used to compare rates of adherence in patient subsets. This study was approved by the University and Hospital's institutional review board.

**Results:** Of 140 patients discharged between July and December 2014 with follow-up to the MHC, 26 patients received a LAIA during hospitalization. The average age was 41.7 years, with many patients being male, black, single, and diagnosed with psychotic disorders. This was not the first psychiatric hospitalization for approximately 75 percent of patients. Approximately 70 percent of all patients on LAIA had prior medication nonadherence documented. Forty percent of patients discharged on a LAIA received their first follow-up dose from the outpatient MHC. All patients were maintained on the same antipsychotic medication at their first appointment, and over half were maintained on the same dose. Of those continuing injections over a one-year time period post-discharge, an average of 8.7 injections were given and patients continued for an average of 8.5 months. Though patients were frequently maintained on the same medication, the dose and dosing frequency changed approximately 50 percent of the time. Over 90 percent of patients received haloperidol decanoate. Approximately 80 percent of patients were also discharged on oral medications in addition to the LAIA with an average of 1.6 oral medications. The overall average and median number of medications on discharge for all patients was 3.5 and 3, respectively.

Conclusion: Of patients discharged from a psychiatric unit at a community hospital on a LAIA with follow-up appointments at the county MHC, less than half of patients received the next LAIA dose. Of those who did continue LAIA therapy, none had their medication changed by the outpatient provider, though the dose may have been adjusted. Patients receiving the first outpatient LAI dose continued therapy for an average of 8 subsequent months over a year period. Further research should be conducted to identify barriers to adherence, including reasons for nonadherence, which may differ in rural areas, and effective strategies to target nonadherence.

### **Does insurance type alter the pharmacy-based health system resources required to access 17 alpha-hydroxyprogesterone (17OHP), a women's health specialty medication?**

Nitya Simon, Tracy Souvannasing, Rebekah Hanson, Rebecca Stone

Introduction: Specialty medications are those requiring special handling, administration, or monitoring, and are usually high cost. Specialty medications require health system resources to overcome access barriers such as prior authorizations. Delay in access to time-sensitive specialty medications, such as 17 alpha-hydroxyprogesterone (17OHP) for prevention of preterm birth, may be detrimental to patient care. Pharmacists and pharmacy students are pharmacy-based health system resources, and often play a vital role in acquiring specialty medications. This study investigates variance in utilization of pharmacy-based health system resources required among different insurance types to access 17OHP.

Methods: This retrospective cohort evaluation includes patients prescribed brand 17OHP (Makena®) for prevention of preterm labor at the University of Illinois at Chicago between September 1, 2013 and April 1, 2016. Patients were identified by 17OHP administration records. Pharmacist or pharmacy student interventions were documented as standard 17OHP ordering procedure, and included submission of prior authorization(s) and communication with healthcare staff. Primary outcomes include the number of interventions over a therapy course. Secondary outcomes include number of days from ordering to 17OHP initiation. Data was extracted from 17OHP pharmacist ordering records and the electronic medical record using a Redcap standardized data collection sheet. SPSS software was used for descriptive statistics and ANOVA analysis.

Results: A total of 152 patients were evaluated; 63 (41%) were insured by traditional Medicaid, 60 (39%) were covered under a Medicaid managed care organization (MCO), and 29 (20%) had non-Medicaid insurance. There was a difference in the total number of documented interventions between groups (mean  $11.7 \pm 5.0$  vs.  $11.9 \pm 5.2$  vs.  $14.7 \pm 4.0$ ,  $p=0.021$ ). No difference was found between the groups in days to 17OHP initiation (mean  $15.1 \pm 14.3$  vs.  $17.0 \pm 16.6$  vs.  $17.6 \pm 7.4$ ,  $p=0.677$ ).

Conclusion: The number of pharmacist or pharmacy student interventions is a surrogate marker for the pharmacy-based health system resources required to overcome access barriers associated with 17OHP. Significantly more pharmacy based health system resources were required to access of 17OHP for non-Medicaid insurances compared to traditional Medicaid and MCOs. While non-Medicaid insurance required more interventions to access 17OHP, number of days to initiation remained consistent between the groups.



## **Identification of risk factors associated with low medication adherence in pregnant patients receiving care in a high risk obstetrics clinic**

Rebecca Stone, Dimitrios Mastrogiannis, Katherine Breese, Enela Aliaj, Jennifer Lee, Kelly Kawabata, Melissa Badowski

**Introduction:** Women who do not take their chronic medications during pregnancy are at increased risk of uncontrolled disease and associated adverse outcomes. Understanding reasons for low medication adherence may help target patients for medication counseling.

**Objective:** To quantify chronic medication adherence rates and identify factors associated with self-reported low adherence during pregnancy in a predominantly urban, Medicaid population.

**Study Design:** Prospective cross-sectional study, initiated February 2016 in the High Risk Obstetrics Clinic at University of Illinois at Chicago. Participants were  $\geq 24$  weeks pregnant and prescribed at least one chronic medication.

**Methods:** Informed consent was obtained, patients completed a survey including the Morisky 8 medication adherence score (MMAS-8), medication adherence reasons scale (MARS), the rapid estimate of adult literacy in medicine (REALM-SF). Patient demographic and medication data was collected from the EMR. Student's t-test or Chi square analyzed differences between patients with low versus moderate or high adherence.

**Results:** Of 69 patients 42% reported low medication adherence, 38% moderate, and 20% high via MMAS-8. Women with low adherence had a higher mean number of medications ( $5.28 \pm 2.5$  vs  $4.08 \pm 2.3$ ,  $p=0.044$ ), and were more likely to drink alcohol prior to pregnancy (52% vs 28%,  $p=0.040$ ). Women with low adherence had a trend toward more missed obstetric appointments ( $0.45 \pm 0.7$  vs  $0.90 \pm 1.0$ ,  $p=0.056$ ) and marijuana use prior to pregnancy (21% vs 5%,  $p=0.060$ ). Among all patients, 60% were unplanned pregnancies, 45% had  $\leq 8^{\text{th}}$  grade health literacy. Reasons for missed doses include "simply missing" (25), "busy schedule" (19), "problems forgetting things in daily life" (12), and "concern about possible effects on the baby after it is born" (11).

**Conclusions:** Similar to other studies, over a third of pregnant women self-report low medication adherence. In this patient population, women with greater than 5 prescription medications and alcohol use prior to pregnancy may be at increased risk for low medication adherence.

## **Impact of host interferon-stimulated-gene-product 15 biodiversity on the deISGylase function of coronavirus Papain-like proteases**

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Coronaviruses are single-stranded, positive sense RNA viruses whose members have severe impact on human health and cause significant economic hardships. Some pertinent examples include severe acute and Middle East respiratory syndromes (SARS-CoV; MERS-CoV), porcine epidemic diarrhea virus (PEDV), and porcine deltacoronavirus (PD-CoV). Intriguingly, these viruses possess a Papain-like protease (PLpro) that is suggested to have the dual functions of facilitating replication through processing of the polypeptide and down regulation of the host immune system. For the latter, this protease appears to reverse post-translational modification of proteins ubiquitin (Ub) and Ub-like interferon stimulated gene product 15 (ISG15). Surprisingly, Ub has been found to be completely conserved among eukaryotes suggesting these proteases catalytic effectiveness would not vary from one species to another. However, ISG15 is highly divergent with sequence identities as low as 55% among mammals and even lower when a broader range of animals is compared. This may suggest that PLpros from certain coronaviruses may be more effective at cleaving certain species ISG15 conjugates, playing a role in defining these viruses' zoonotic potential. To gain insight into this possible phenomenon, the activity of PLpros from SARS-CoV, PEDV, PD-CoV, and MERS-CoV as well as others were assessed against Ub as well as ISG15 originating from an assortment of species. Excitingly, this revealed an array of different preferences among PLpros whose underpinnings were further clarified through ITC and the structural elucidation of SARS PLpro in complex with either a mouse, or human ISG15 domain. Furthermore, the first non-human full length ISG15, full length mouse ISG15, was solved, which opened up new insight on the dynamic movement of ISG15 during a binding event. These structures and associated biophysical information not only revealed key interactions, or lack there of, that may drive a protease to prefer one specie's ISG15 over another, but also the marked difference in how PLpro accommodates ISG15 versus its other substrate ubiquitin.

# University of Georgia College of Pharmacy

## Research Day

Presented by the Student College of Clinical Pharmacy

January 5th, 2017

Booth #	Presenter(s)	Title	Category
1	Shannon Alexander	Extended-Interval Aminoglycoside Dosing in Pediatric Patients with Cystic Fibrosis Exacerbations	Drug-Use Evaluation
2	Ife Anachebe	Assessing the impact of a pharmacotherapy clinic in veteran patients with type 2 diabetes	Ambulatory Care
3	Madeline Burke	Comparison of in-person vs. telephone anticoagulation appointments with clinical pharmacists in a Veteran's Affairs Medical Center	Ambulatory Care
4	Natalie Chong	Retrospective evaluation comparing a non-benzodiazepine versus benzodiazepine based sedation strategy during targeted temperature management following non-traumatic cardiac arrest in critically ill adults	Critical Care
5	Sarah Clements	Evaluation of therapeutic duplication for inpatients prescribed as needed antihypertensive medications at an academic medical center	Drug-Use Evaluation
6	Alyssa Elrod	Limitations to leading: Student pharmacists' perceptions of leadership opportunities during the third professional year in a 2+2 program	Leadership
7	David Kim	Pharmacy interns' perceptions of Spanish-speaking patients	General Clinical Practice
8	McKinley King	Mental health follow-up appointment adherence for long-acting injectable antipsychotic continuation after discharge from a psychiatric unit at a community teaching hospital in a rural area	Small and Rural Pharmacy Practice
9	Devin Lavender	Resistance of Escherichia coli urinary isolates in patients with community-acquired urinary tract infections treated in the emergency department of a community hospital	Infectious Disease
10	Justin Moore, Angelina Cho	Effectiveness of a call-back system for follow-up of culture results in patients treated for urinary tract infection in the emergency department of a community hospital.	Infectious Disease

11	Zach Ruege	Risk of lactobacillus infection in critically ill adults receiving lactobacillus probiotics	Drug-Use Evaluation
12	Cayla Sinnemon	Retrospective Evaluation of Intraoperative Continuous Lidocaine Infusion in Bariatric Surgical Procedures	Surgery
13	Rachel Stephens	Apixaban: examining practice patterns in chronic kidney disease at Augusta University Medical Center	Cardiology/ Anticoagulation
14	Dr. Rebecca Stone	Does insurance type alter the pharmacy-based health system resources required to access 17 alpha-hydroxyprogesterone (17OHP), a women's health specialty medication?	Clinical Services Management
15	Dr. Rebecca Stone	Identification of risk factors associated with low medication adherence in pregnant patients receiving care in a high risk obstetrics clinic	Women's Health
16	John Stevick	Pharmacist's contribution to Diabetic Care at a 200-Bed Community Hospital	Practice Research
17	Paige Wallace	Evaluating the use of a Candida panel	Infectious Disease
18	Courtney Daczkowski	Impact of host interferon-stimulated-gene-product 15 biodiversity on the deISGylase function of coronavirus papain-like protease	Pharmaceutical and Biomedical Sciences