

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 1-001

**Poster Title:** Assessing nursing competency on United States Pharmacopeia (USP) 800 recommendations for the safe handling of hazardous drugs (HD)

**Poster Type:** Descriptive Report

**Submission Category:** Administrative Practice/Management/Financial Management/Human Resources

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**Purpose:** The United States Pharmacopeia (USP) has updated and standardized the safe practice of medication procurement and handling to decrease exposure to hazardous drugs (HD) through USP 800. These updates have drastically changed the practice for not only the pharmacy community but also other health professions such as nursing. A competency fair provided for nursing staff at the VA Black Hills Healthcare System (VA BHHCS) was developed to ensure nurses are provided with the knowledge and resources needed to be compliant with the new recommendations.

**Methods:** The USP 800 competency fair was developed for nurses as mandatory training on compliance with USP 800 changes. The previous 2018 USP 800 competency fair was viewed as time consuming to complete. The goal of the 2019 competency fair was to streamline the project with the focus of the fair included topics such as: USP 800 overview, occupational health resources, identifying HD labels, demonstrating knowledge of personal protective equipment, identifying proper disposal of HD, and demonstrating proper responses to HD spills. An interdisciplinary approach with aid from industrial health, waste management, employee health, education, pharmacy, and nursing was used to develop the competency fair's schedule, topics, and presentations. Poster boards with USP 800 information were developed as visual aids to facilitate discussion and learning and updated equipment for USP 800 compliance such as pill crushers, medication mixing devices, and syringes were utilized as demonstration tools. Nurses were expected to attend one of several competency fairs and provide satisfactory performance on all the competency requirements to become fully trained on USP 800 updates.

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The attendees were requested to provide feedback on the competency fair's efficiency and usefulness of provided information.

**Results:** Upon completion of the 2019 competency fairs, it was noted that participation was consistent from 2018 to 2019 with approximately 200 attendees each year. The average amount of time the competency fair took to complete decreased by approximately 75% even with the same amount of posters and presentations attendees were required to complete during the 2018 and 2019 fairs. In 2018 the average time to completion was approximately 60 minutes and the 2019 fair was estimated to take approximately 20 minutes. Additionally, feedback and overall knowledge of USP800 was noted to be much improved from 2018 to 2019.

**Conclusion:** The efforts put forth during the 2018 competency fairs was realized during the 2019 fairs as the presentations changed to a discussion and review about the updates and changes for 2019. This showed the baseline knowledge that was gained during the 2018 competency fairs was carried throughout the year. The interdisciplinary team work and provision of education and resources exemplified the VA BHHCS culture of maintaining a safe and efficient work environment for employees and patients.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 1-002

**Poster Title:** Safety and efficacy of direct oral anticoagulants (DOACs) at GLWACH

**Poster Type:** Case Report

**Submission Category:** Ambulatory Care

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**Purpose:** Oral anticoagulation, either in the form of Vitk antagonist or direct oral anticoagulants (DOAC), is the recommended therapy for stroke prevention in atrial fibrillation and treatment of venous thromboembolism. The major safety concern while receiving oral anticoagulation is hemorrhage, and recurrent thromboses. This Study aim to determine risk factors associated with recurrent thrombi using DOACS.

**Method:** this pilot, retrospective case-control analysis was conducted at GLWACH (internal medication clinic only) . Patients with an active outpatient order for Apixaban, Rivaroxaban, or Dabigatran for at least 360 days with a medication possession ratio of at least 80 percent, plus documented of hospitalization of thrombi event. a recurrent thromboses event is defined as either an admission or discharge associated any diagnosis code for recurrent thrombosis The chosen variable of evaluation were: age 40 or older, kidney dysfunction (ESRD), gender, BMI more than 35 kg/m<sup>2</sup>, Hypoalbuminemia, and liver disease (Child - Pugh Score Class B and C). **Result:** a total of 12 recurrent thrombi event was discover. Baseline demographic information was evaluated across the type of DOAC the patient received. In general, there were not significant differences amongst the various DOACS. Univariate analysis identified the following is significant possible predictors: BMI is equal to or higher of 40 kg/m<sup>2</sup>

**Conclusion:** This is the first independent trial to analyze the predictive role of various factors on recurrent thrombosis events in patients receiving a DOAC. BMI at 40 kg/m<sup>2</sup> or greater was associated with recurrent thrombosis event in patients receiving a DOAC. The results of this analysis may aid in identification of factors associated with higher thrombi rates in patients receiving DOACS

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 1-003

**Poster Title:** Assessment of the proper utilization of the inhaler devices among asthmatic patients

**Poster Type:** Evaluative Study

**Submission Category:** Ambulatory Care

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**Purpose:** Asthma, one of the most common non-communicable diseases, is characterized by bronchial hyper-responsive and inflammatory hyperactive airway disorder. Asthma disease is hindered by trigger factors as environmental exposures and inappropriate utilization of the devices. Ensuring effective and appropriate use of the inhalers in asthmatic patients is a cornerstone in the therapeutic treatment and optimizing treatment outcomes. The purpose of this study was to evaluate the practice of the use of the various types of inhalers as metered dose inhaler (MDI), dry powder inhaler (DPI), turbuhaler, and accuhaler among asthmatic patients.

**Methods:** This is a prospective multicenter study conducted on patients from schools, community pharmacies, and physician clinics across different Lebanese geographic areas from February till May 2019. Patients diagnosed with asthma and are self-dependent to effectively use the inhaler devices by themselves are enrolled in the study. Patients with psychiatric or mental disorders are excluded from the study. Eligible patients are interviewed by trained pharmacists through face-face contact to assess the practice of the inhaler use and a point is given to each correct step providing a total score to classify the study subjects as “poor”, “intermediate” or “good” inhaler users. The study is approved by the institutional review board and written informed consent obtained from each enrolled participant. Data analysis is performed using statistical package for social sciences (SPSS) version 21.0.

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**Results:** A total number of 172 asthmatic patients are enrolled in the study with a mean age of  $31.79 \pm 20.92$  years and 55.8% are females. The majority of the patients 89 (51.7%) use MDI, 14 (8.1%) MDI plus spacer, 31 (18.0%) turbuhaler, 32 (18.6%) accuhaler users and 6 (3.5%) DPI. Around 36% of the MDI and 3.1% of the accuhaler patients are classified as “bad users”. And about 19.1% of the MDI and 66.7% of the DPI patients are classified as “good users”. Concerning MDI, the commonly encountered errors are 63.4% for not shaking the device before use and 62.4% for not holding the breath for 5 to 10 seconds after use. As for MDI with spacer, around 50% don’t exhale before nor hold the breath for 5 to 10 seconds after use. For the turbuhaler, accuhaler, and DPI mainly not holding the breath for 5 to 10 seconds is the most commonly reported pitfall among the patients.

**Conclusion:** Patient education program should be implemented to incorporate patient’s awareness about avoidance of asthma triggers and ensure adequate education tailored for the appropriate use of devices according to the inhaler type. The findings show that patients aren’t fully oriented about the accurate steps to follow when using the inhalers. The results highlight the need for pharmacist counseling and follow-up to ensure patient education and optimize therapeutic outcome.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 1-004

**Poster Title:** Effects of glucagon-like peptide-1 agonists and sodium-glucose cotransporter-2 inhibitors on HbA1c, weight, and total daily dose of insulin in uncontrolled diabetics

**Poster Type:** Evaluative Study

**Submission Category:** Ambulatory Care

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**Purpose:** Treatment with insulin therapy is often limited by concerns of hypoglycemia and weight gain. The low risk of hypoglycemia and potential weight loss associated with glucagon-like peptide-1 (GLP-1) agonists and sodium-glucose cotransporter-2 (SGLT2) inhibitors suggests possible benefits when added to insulin therapy. At this time, published data directly comparing these agents is lacking. The objective of this study was to compare A1c reduction, weight loss, and changes in total daily dose (TDD) of insulin in patients with uncontrolled diabetes on insulin started on GLP-1 agonists or SGLT2 inhibitors.

**Methods:** A retrospective cohort study was conducted at a single VA health care system. Patients on insulin who were initiated on a GLP-1 agonist or SGLT2 inhibitor between January 1, 2014 and June 30, 2018 were analyzed. Eligible patients included those 18-89 years of age with a baseline A1c  $\geq 8\%$  within 1 month prior to initiation, and a follow up A1c within 20-52 weeks following initiation. Those with prior use of either class of medication within the previous 24 weeks were excluded. Endpoints assessed included HbA1c reduction, achievement of documented HbA1c goal, weight change, changes in oral antidiabetic agents, change in total daily dose of insulin, adverse drug events, and rate of discontinuations. Continuous data was evaluated using two-sided t-test and categorical data with chi-squared test. This study was approved by the institutional review board at the VA Saint Louis Health Care System.

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**Results:** A total of 81 patients were included in this study. Fifty-five patients were initiated on GLP-1 agonists and 26 patients were initiated on SGLT2 inhibitors. GLP-1 agonists showed a non-statistically significant higher reduction in HbA1c. (1.30 vs. 1.03; p-value= 0.27). A higher percentage of patients prescribed GLP-1 agonist achieved their HbA1c goal as established by their diabetes provider (34.5% vs. 11.5%; p-value=0.03). The GLP-1 agonist group had more weight loss, but the difference did not reach statistical significance (2.40kg vs. 1.13kg; p-value= 0.22). Patients taking GLP-1 agonists had a significant reduction in TDD of insulin, while SGLT2 inhibitors had an increase in TDD of insulin and significantly higher rates of oral medications added to achieve HbA1c goal. [(TDD: -12.4% vs + 5.51% respectively; p-value= 0.01; oral medications added: 3.6% vs 19.2% respectively; p-value= 0.02)].

**Conclusion:** In this retrospective cohort comparing effects of GLP-1 agonists and SGLT2 inhibitors when added to insulin, GLP-1 agonists demonstrated more weight loss, larger A1c reduction, and a statistically significant larger reduction in TDD of insulin. The results of this analysis highlight the potential benefits of GLP-1 agonist compared to SGLT2 inhibitor use in patients on intensive insulin regimens.

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**Session-Board #** - 1-005

**Poster Title:** Medication use evaluation of antidiabetic agents within a VA healthcare system

**Poster Type:** Evaluative Study

**Submission Category:** Ambulatory Care

**Primary Author:** Amy Lynn, Sheridan VA Healthcare System; **Email:** amy.lynn@va.gov

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**Purpose:** According to the 2017 VA/DoD Clinical Practice Guidelines for the Management of Type 2 Diabetes Mellitus, pioglitazone, glucagon-like peptide-1 (GLP-1) agonists, dipeptidyl peptidase-4 (DPP-4) inhibitors, and sodium-glucose cotransporter-2 (SGLT-2) inhibitors are considered second line agents when non-pharmacological therapy, metformin, and/or insulin has not achieved adequate A1c reduction. The VA Pharmacy Benefits Manager (PBM) has developed criteria for use to ensure that these agents are being used properly. This medication use evaluation (MUE) was conducted to assess if antidiabetic agents have achieved expected A1c reduction, are being used safely, and renewal criteria for use have been met.

**Methods:** A patient list was generated from Microsoft SQL that included all Veterans within the Sheridan VA Healthcare System (SVAHCS) with active prescriptions for pioglitazone, GLP-1 agonists, DPP-4 inhibitors, and SGLT-2 inhibitors issued between 01/01/2018 – 11/27/2018. Education was provided to pharmacists regarding appropriate use of second line antidiabetic therapy. Retrospective chart reviews were performed for each patient using the electronic medical record. Patients were excluded upon chart review if it was determined they were no longer taking second line antidiabetic therapy. The following data were collected: age; sex; race; pertinent laboratory values including serum creatinine, A1c, lipid panel, and liver/kidney function; allergies; current antidiabetic medications being used; and adverse effects. Recommendations for continuation or discontinuation of antidiabetic therapy and future monitoring were provided to prescribers through documentation entered into the patient's chart.



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**Results:** There were 109 patients identified with active prescriptions for second line antidiabetic agents including pioglitazone (n = 41), GLP-1 agonists (n = 25), DPP-4 inhibitors (n = 41), and SGLT-2 inhibitors (n = 2). Only 36% of patients were followed in the pharmacotherapy clinic. After initiation of second line agents, the average A1c reduction observed was 1% (pioglitazone and GLP-1 agonists), 0.7% (DPP-4 inhibitors), and 0.2% (SGLT-2 inhibitors). In patients receiving pioglitazone, there were 4 reports of edema and 1 report of a fracture. These patients had an average weight gain of 2.35 kg. In patients receiving GLP-1 agonists, there were 2 reports of cholelithiasis and 4 gastrointestinal adverse events documented. These patients also had an average weight loss of 4.4 kg and a 75 mg/dL decrease in triglycerides. There were reports of pancreatitis (n = 2), arthralgia (n = 1), heart failure (n = 2), and infection (n = 7) in patients taking DPP-4 inhibitors. There were no adverse events reported in patients receiving SGLT-2 inhibitors. It was determined that 49% of patients on DPP-4 inhibitors, 44% of patients on GLP-1 agonists, 76% of patients on pioglitazone, and 0% of patients on SGLT-2 inhibitors met renewal criteria for use.

**Conclusion:** The results of this MUE were presented to the Pharmacy and Therapeutics Committee. Clinical education was provided to prescribers and pharmacists regarding the need for reassessment of second line antidiabetic agents upon renewal. In patients not currently meeting renewal criteria, it was recommend to providers to consider a consult to the pharmacotherapy clinic.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 1-006

**Poster Title:** Effect of sociodemographic factors on CHA2DS2-VASc score among lebanese community patients

**Poster Type:** Descriptive Report

**Submission Category:** Ambulatory Care

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**Purpose:** Non-communicable diseases, the major cause of death and disability, are vulnerable to many risk factors, some of which are modifiable and others non-modifiable. Atrial fibrillation increases the risk of stroke by 4-5 times and causes cardiovascular mortality. The CHA2DS2-VASc scoring system has been widely adopted as a stroke risk stratification tool in AF patients. This study was conducted to assess the association between the different sociodemographic factors and the past medical history on the CHA2DS2-VASc score among patients with atrial fibrillation.

**Methods:** A cross-sectional, conducted between January and June 2018, recruited patients from Lebanese community pharmacies chosen randomly from the list of pharmacies provided from the Lebanese Order of Pharmacists. Participants with a previous physician diagnosis of atrial fibrillation and documented on medical files were enrolled in this study.

**Results:** Out of 800 questionnaires distributed in community pharmacies, 524 (65.5%) were enrolled in the study (mean age=58.75 ± 13.59 years). The most common past medical diseases were hypertension (77.5%) and hyperlipidemia (66.8%). The majority of the patients had high risk for stroke defined with CHA2 DS2 VASc score. The results showed that both advanced age and female gender were significantly associated with higher CHA2 DS2 VASc score. In addition, retired individuals were significantly associated with higher CHA2 DS2 VASc score only when comparing compared moderate to low risk score.

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**Conclusion:** This study highlights the fact that CHA2 DS2 VASc score is affected by the presence of concomitant disease in addition to some sociodemographic characteristics. The findings show the vital screening for all factors that can augment the high risk of cardiovascular progression among patients with atrial fibrillation.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 1-007

**Poster Title:** Use of continuous glucose monitoring in a military outpatient clinic setting

**Poster Type:** Descriptive Report

**Submission Category:** Ambulatory Care

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**Purpose:** In April 2018, we started using a continuous glucose monitoring product in 12 diabetic patients, the majority of which are Type 2. After seeing the preliminary results, we expanded the amount of patients in using this technology to approximately 45. We aimed to decrease Hemoglobin A1C levels and insulin use in our patients as well as increase our clinic's metrics for percentage of patients with a Hemoglobin A1C under 7% and under 8%.

**Methods:** A physician champion saw the vast majority of our patients in the continuous glucose monitoring program and was responsible for ordering the readers, sensors and any diabetes medication the patient needed. Nursing staff was available to teach the patients how to use their devices and sensors and alert the physician champion when patients needed refills. Pharmacy staff dispensed the readers, sensors, any associated medications and tracked data for each individual as well as on the aggregate. Patients were also given the opportunity to attend a 90 minute long diabetes class once every two weeks, which was suggested but not required. This class was taught by the physician champion and covered various topics as well as an extensive question and answer session at the end of each class.

**Results:** We were able to increase our percentage of patients with a Hemoglobin A1C under 8% by 12.9% and under 7% by 13.5% in 9 months. This allowed our clinic to improve from well below average when compared to other Air Force clinics to well above average. We also had significant Hemoglobin A1C reductions in individual patients, as well as decreases in the amount of basal and mealtime insulins used.

**Conclusion:** Due to multiple reasons, we have found continuous glucose monitoring to be an integral part of our diabetes practice for both our Type 1 and Type 2 diabetics. First, we have found this technology to be helpful in identifying time of the day when a patient's glucose is high and develop strategies to target these points. Second, we have found that the on-demand nature of the technology allows a patient to more closely meet dietary goals. Lastly, we believe

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that the technology motivates patients who no longer fear judgment from a provider about their diabetes control.

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**Session-Board #** - 1-008

**Poster Title:** Impact of implementing a mandatory computerized prescriber order entry set for oral fluoroquinolones on outpatient prescription rates in a rural VA health care system

**Poster Type:** Evaluative Study

**Submission Category:** Ambulatory Care

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**Purpose:** The appropriate usage of fluoroquinolones has increasingly been an area of focus. Widespread usage has fueled higher resistance rates. In May 2016 the FDA recommended their use be restricted in uncomplicated infections based on an increasing awareness of rare but serious adverse reactions. The purpose of this quality improvement project was to assess how implementation of a forced electronic order set impacted outpatient fluoroquinolone prescription rates in a rural VA healthcare system.

**Methods:** In this retrospective analysis, outpatient oral fluoroquinolone prescription rates at a rural VA health system were analyzed prior to and after implementation of a mandatory electronic order set. Prior to initiation, prescribers could select a fluoroquinolone unrestricted from our outpatient medication list. After implementation, all oral fluoroquinolones were removed from this list and prescribers were required to use an order set which mandated documentation of patient education on fluoroquinolones.

**Results:** The order set was implemented June of 2014. Annual usage rates of oral outpatient fluoroquinolone prescriptions (Rx/1000 pts) from 2013 to 2018 declined steadily from 1,778 to 567 showing an overall reduction of 68%. Over the same period the average overall reduction in our regional VA network was 37%.

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**Conclusion:** Implementing a mandated order set for outpatient oral fluoroquinolones requiring patient education was correlated with a significant reduction in prescription rates of oral outpatient fluoroquinolones in a rural VA healthcare system. This reduction significantly outpaced average regional peer group rates of decline. This intervention may be a useful tool to bolster antimicrobial stewardship and decrease the inappropriate usage of fluoroquinolones.

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**Session-Board #** - 1-009

**Poster Title:** Setting up a flu clinic for health professional students on a university campus

**Poster Type:** Descriptive Report

**Submission Category:** Ambulatory Care

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**Purpose:** On a yearly basis, a university pharmacy noticed an influx of students during flu season trying to get the flu shot. This pharmacy provides services for health professional students who are required to get a flu shot before going on rotations. With no additional staffing or support during this time, the pharmacy decided to host a flu clinic, advertise it widely to the health professional students and encourage them to get a flu shot on the set clinic dates. This would help alleviate the burden of administering a flu shot during workflow at the pharmacy.

**Methods:** The university pharmacy hosted its first ever flu clinic lead by pharmacists and assisted by pharmacy students. Pharmacists set one flu clinic date two weeks after the start of fall semester classes. This would still be early flu season and enough time for students to get a flu shot before going on rotation sites. Location of the flu clinic was chosen as a central area on campus with adequate space for set-up and administration. Fourth year pharmacy students as well as pharmacy residents and other pharmacists were recruited as immunizers for each of the flu clinic dates. Health professional college students received advertising via college listservs. Pharmacy personnel prepared all needed supplies in anticipation of a few hundred students. Flu clinic hours were from 9am-4pm with at least 6 immunizers throughout the day.

**Results:** All volunteers were educated about their role during the flu clinic via email and live in-service. Each volunteer was given a specific role with oversight from pharmacists that organized the event. Three immunizing stations were set-up with two immunizers at each table. Each immunizer had needed supplies at their station and a pharmacist overseeing any additional



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requests that may arise. The total number of students getting immunized during flu clinic was over 700. Students receiving the flu shot were represented from all healthcare professional colleges. With the large turn-out for the flu clinic event, extra supplies were borrowed from other pharmacies to continue to meet the demand. Fortunately, since there were enough volunteers at the event, there was no delay in providing services. Students showing up for the flu clinic had an overall positive response to the event.

**Conclusion:** Holding a flu clinic event on a university campus was very successful. This ensured students were able to receive their flu shot in a timely manner and minimize disruption in the pharmacy workflow during the busy flu season. Support from the pharmacy department as well as health professional colleges helped to market the flu clinic event and encouraged students to attend. Volunteers at the flu clinic helped to ensure a seamless and safe environment to receive a flu shot. Holding a flu clinic event also increased the number of flu shots given to students at the university campus.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 1-010

**Poster Title:** Medication use evaluation of non-evidence-based beta blockers in heart failure with reduced ejection fraction within a VA healthcare system

**Poster Type:** Evaluative Study

**Submission Category:** Ambulatory Care

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**Purpose:** Beta blockers (BBs) serve a critical role in managing heart failure with reduced ejection fraction (HFrEF). In particular, metoprolol succinate, carvedilol, and bisoprolol have been shown to reduce morbidity and mortality in these patients. Appropriate utilization of these medications improves symptoms, reduces hospitalizations, and increases survival. Other BBs have not been proven to provide these same benefits. Previously at the Sheridan VA Healthcare System (SVAHCS), an automatic conversion of non evidence-based BBs to metoprolol succinate was approved. This medication use evaluation will serve to ensure BB conversion has been completed and to evaluate the facility's use of these agents.

**Methods:** A patient list was generated from Microsoft SQL that included all Veterans within the Sheridan VA Healthcare System (SVAHCS) with active prescriptions for atenolol or metoprolol tartrate and a HF diagnosis. Retrospective chart reviews were performed for each patient using the electronic medical record. The following data were collected: age; sex; race; weight, blood pressure, pulse; cardiac medication regimen; NYHA HF class, HF related hospitalizations, ejection fraction (EF); and safety information. Recommendations for conversion of non-evidenced-based BB to metoprolol succinate were provided to prescribers through documentation entered into the patient's chart.

**Results:** There were 54 patients identified with active prescriptions for metoprolol tartrate (n = 47) and atenolol (n = 7). Only 63% had a HF diagnosis listed on the problem list, with 27.8% being listed elsewhere in the electronic health record and the remaining 9.2% having no mention of HF. The NYHA class was only documented in 5 patients. Twelve patients had a

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hospitalization related to HF within the past year. Regarding concurrent cardiac medications, use of a diuretic was most common (n = 44). Other cardiac medications included ACE-I/ARB (n = 37), aldosterone antagonist (n = 8), isosorbide mononitrate (n = 4), diltiazem (n = 2), digoxin (n = 2), and amlodipine (n = 1). A majority of patients had EF greater than 40% indicative of HF with preserved ejection fraction (n = 37). Seven patients had no documented and EF and the remaining 10 had an EF less than or equal to 40%. Of those with an EF less than or equal to 40%, 3 had a questionable HF diagnosis and 3 had a more recent EF greater than 40%. Four patients were found to be appropriate for conversion to metoprolol succinate and 3 were successfully converted.

**Conclusion:** The results of this MUE were presented to the Pharmacy and Therapeutics Committee. Clinical education was provided to prescribers and pharmacists regarding appropriate use of BB in patients with HFrEF and the importance of consistent documentation within the electronic health record.

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**Session-Board # - 1-011**

**Poster Title:** Comparison of tobacco cessation therapies provided by pharmacist vs. non-pharmacist prescribers in a veterans population

**Poster Type:** Evaluative Study

**Submission Category:** Ambulatory Care

**Primary Author:** Ivy Tonnu-Mihara, VA Long Beach Healthcare System; **Email:** ivy.tonnu-mihara@va.gov

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**Purpose:** Tobacco use is the #1 cause of preventable death and disease in the U.S. It is also a chronic relapsing condition that often requires repeated interventions. At VA Long Beach Healthcare System, recent changes in the care system allow both pharmacists and non-pharmacist (e.g. physicians, nurse practitioners, physician assistants) to be tobacco cessation providers and in the different care settings. This study aims to describe the similarities and differences in patients who received tobacco cessation products (e.g. Nicotine replacement products of different forms, bupropion for tobacco cessation and varenicline) prescribed by the pharmacists and the non-pharmacist providers.

**Methods:** This is an Institutional Review Board approved, retrospective database review study. The study period was from October 1, 2018 to April 30, 2019. All patients who were issued an outpatient prescription on any of the tobacco cessation product listed above were included. Collected data were demographic characteristics (age, gender, race, ethnicity), body mass index at baseline and 6 months after first prescription issue date, history of tobacco cessation product(s) used, evidence of comorbidities (e.g. cardiovascular diseases, stroke, lung diseases, cancer, diabetes, hypertension, hyperlipidemia and mental health) within a year from first prescription issue date, hospitalization and mortality during the study period. Descriptive statistics, chi-squared, and t tests were utilized to compare between pharmacist prescribers vs. non-pharmacist prescribers. Logistic regression was conducted to identify potential factors that were different in the pharmacist vs. non-pharmacist prescribers' cohorts.

**Results:** Of the total of 768 patients issued tobacco cessation products during the study period, 458 (59.8%) patients received them from pharmacist providers. In comparing between the

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study cohorts, the average age (years) was 56.4 and 53.1. The majority of patient were white 55.2% vs. 57.4%, with 11.3% and 17.1% were Hispanic, respectively. For both groups, the most prescribed product was nicotine patches, with nicotine patch 7mg dose is of highest percentage (81.0% vs. 73.9%, respectively). Pharmacist prescribers statistically significantly prescribed more nicotine gum and lozenges and varenicline than non-pharmacist prescribers, Odd Ratio (OR): 2.47; 95% Confidence Interval (CI) [1.68 – 3.61]; OR: 1.48, 95% CI [1.11 – 1.99]; and OR 9.54, 95% CI [1.44 – 63.29], while prescribing less bupropion OR: 0.64, 95% CI [0.40 – 1.00], respectively. Logistic regression controlled for demographic characteristics (age, sex, race and ethnicity) and other collected variables (comorbidities, history of tobacco cessation products used, body mass index) suggested that there were no differences between the cohort of the patients seen and prescriptions issue by pharmacists compared to non-pharmacist prescribers (Chi-square = 0.27; R-square = 0.196).

**Conclusion:** It is appeared that all prescribers preferred nicotine patches as the mainstay of tobacco cessation therapy. There were some differences in prescribing patterns between pharmacists and non-pharmacist provider with pharmacist prescribers issued more gums, lozenges and varenicline and less bupropion prescriptions than the non-pharmacist prescribers

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**Session-Board #** - 1-012

**Poster Title:** Assessing the impact of a pharmacist-led pharmacotherapy clinic in veterans with heart failure

**Poster Type:** Descriptive Report

**Submission Category:** Cardiology/Anticoagulation

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**Purpose:** It is projected there will be 8 million Americans with heart failure (HF) in 2030. In the United States, HF costs exceeded \$30 billion in 2012 with direct medical costs totaling 68% of expenses. HF is an ambulatory care sensitive condition (ACSC) and medication optimization is crucial in improving morbidity and mortality, therefore reducing hospitalizations in high risk HF patients. Including pharmacists in patient care teams improves patient outcomes. The primary objective of this project was to develop and implement a pharmacist-led clinic focused on medication titration and optimization in high risk heart failure with reduced ejection fraction (HFREF) patients.

**Methods:** This quality improvement project was approved by the Pharmacy and Therapeutics Committee and did not require IRB approval. A pilot VA ACSC database identified Veterans with a HF diagnosis who were at high risk for hospitalization. Patients were included for enrollment into the pharmacotherapy heart failure clinic (PHFC) if they were identified as having  $\geq 85\%$  chance of hospitalization within the next year and if they had a current/previous ejection fraction (EF)  $\leq 40\%$ . Patients were excluded if they were actively managed by cardiology, were enrolled in home-based primary care (HBPC), were considered inpatient status or hospice care, no longer resided in the catchment area, or if their provider refused clinic referral. Preliminary chart reviews were conducted to assess inclusion/exclusion criteria. Patients who met criteria had consults entered for provider signature to allow for PHFC enrollment. The following data was collected during initial chart reviews: demographics, comorbidities, EF history, laboratory

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data, vital signs, and HF medications. At the completion of the intervention window, a retrospective chart review was conducted to collect vitals, laboratory data, medication changes, and other pharmacist interventions. The primary outcome was the percentage of patients enrolled in PHFC who achieved guideline-directed medical therapy (GDMT). The secondary outcomes were the percentage of patients on target or maximally tolerated doses of angiotensin converting enzyme inhibitors (ACEi)/angiotensin II receptor blockers (ARBs) and beta blockers (BB).

**Results:** Fourteen patients were enrolled in the PHFC, with 6 of these patients carrying a diagnosis of HFrEF that allowed for active management of HF medication regimens. At the completion of the intervention window, 5 patients (83%) were on guideline-recommended ACEi/ARB and BB therapy. Five patients (83%) were on their maximally tolerated BB dose and none of the patients enrolled in the PHFC were able to reach target dose as recommended by the current guidelines. Four patients (67%) were on their maximally tolerated ACEi/ARB dose, with 2 patients (30%) achieving target dose as recommended by the current guidelines. Pharmacist interventions made during the intervention window included lab monitoring (renal function, overdue digoxin monitoring), triage to urgent care, re-titration of BB after unintentional discontinuation by patient, and care coordination with cardiology. Of patients that were excluded, no documentation of  $EF \leq 40\%$  accounted for 82 patients while 35 patients were excluded for reasons outlined above.

**Conclusion:** It appears that the highest risk HFrEF patients identified at our facility were receiving GDMT even prior to the implementation of the PHFC. Despite this, the clinical pharmacy specialist was able to make significant interventions to improve patient care. The pilot VA ACSC database did not appropriately identify the highest risk HF patients at this facility. A small percentage of patients identified had the targeted HFrEF diagnosis which resulted in significantly less patients than anticipated. Despite these limitations, the project demonstrates the potential value of the pharmacist and the need for expanded projects to better target high risk HFrEF patients.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 1-013**

**Poster Title:** Establishment of a virtual centralized anticoagulation services hub

**Poster Type:** Descriptive Report

**Submission Category:** Cardiology/Anticoagulation

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**Purpose:** Creation of a Centralized Anticoagulation Services Hub (CASH) is an important step in the evolution of efficient and effective telepharmacy care to veterans, especially those in rural areas. The initiative is a hub and spoke model that delivers virtual warfarin management services in a highly efficient manner. This model frees up physician and nurse time at facilities where Clinical Pharmacy Specialists (CPS) are not managing warfarin patients. Additionally, it provides efficiencies for facilities without centralized programs and where virtual care isn't optimized. This allows for the redeployment of facility CPS staff into other critically needed gap areas.

**Methods:** The VA Pharmacy Benefits Management Clinical Pharmacy Practice Office partnered with four Veterans Integrated Service Networks (VISN) who are part of the Midwest Consortium to develop the pilot hub. A board of directors was formed to guide the project and provide the vision for future expansion. The staffing for the hub includes both CPS and clinical pharmacy technicians (CPT). The care provided by the hub is 100% telephone/telehealth visits. The hub staff developed a standardized workflow with clearly delineated roles and responsibilities. They also developed and deployed standardized templated materials, operating procedures, note templates, task labor maps, business rules for referrals, along with other processes that create a uniform national structure for future expansion. Finally, a dashboard database was developed to assist with patient identification and efficient daily triaging of workload along with a suite of reports to track metrics and quality monitors.



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**Results:** Patient enrollment began in September 2018. As of June 2019, over 1,000 patients have been enrolled in the hub over an 8-month period of time from three different VA medical centers spread across 6 states. The initial staff hired included three CPS and two CPT with additional staff being hired in the next several months. Workload thus far consists of telephone care for all enrolled patients, consults for all new patients enrolled in the hub, information sharing consults, and sending letters to patients. In May 2019, the CPS completed 799 encounters and the CPT signed 719 notes. Workload will continue to increase as additional patients are enrolled until we reach a predicted patient capacity of ~3,300 patients. The time in therapeutic range (TTR) has been consistently above 70% for the initial sites enrolled and has improved for two of the sites since patients enrolled in the CASH.

**Conclusion:** The CASH, which utilizes a centralized telepharmacy model to build a regional solution to warfarin management services, can free up significant staff time at individual VA medical centers. The project is already achieving its goal to improve access, operational efficiency, clinical outcomes, and lower costs while freeing up providers and CPS to take on roles in areas of high need.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 1-014**

**Poster Title:** Implementation of a discharge solution to improve patient opioid counseling and medication therapy

**Poster Type:** Evaluative Study

**Submission Category:** Clinical Services Management

**Primary Author:** Cari Dillon, Delta County Memorial Hospital; **Email:** cdillon@deltahospital.org

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**Purpose:** An electronic discharge solution has been implemented to track patients on opioid therapy during the hospital stay to provide therapy assessment and patient counseling at the time of discharge. The goal is to reduce the duration of opioid therapy at discharge, identify inappropriate prescribing by providers, standardized patient counseling on the risk associated with using opioid medication and have one central location to document interventions by pharmacists during discharge. The electronic discharge solution was also used to alert the pharmacist of 72 hours post discharge for patient follow up as needed for additional drug information or interventions.

**Methods:** The electronic discharge solution has been integrated with the hospital EHR. Patient will be identified and targeted for discharge counseling if they are going home on opioid therapy. Patient enrolled into the discharge solution and followed throughout their stay. Activities to prepare for discharge counseling is embedded within the discharge solution and is used to alert the pharmacist of scheduled counseling needed at time of discharge. The customized activity template was standardized to facilitate preferred process and used to collect documentation for a successful discharge. The total number of opioid prescriptions at discharge as well as quantity, day supply, prescriber and morphine milligram equivalents will be captured and evaluated. PDMP was also used to analyze opioid refill data at 2 weeks post discharge and electronic reminder schedule for pharmacist to review. A reminder will be made in the discharge system for review of patient survey 72 hours discharge. Patient will be asked about their opioid usage at home and have an opportunity to discuss any medication problems.

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**Results:** Currently 85% of all patients leaving the hospital are counseled by a pharmacist prior to discharge. These included patients going home on opioid therapy. The discharge solution helped to organize and provided focused counseling and enhance the discharge process for patients discharged on home opiate therapy. The total number of opioid prescription, the quantity and day supply of opioid as well as morphine milligram equivalents have to be taken into account. Interventions done during this process will be captured and evaluated for effectiveness. Currently, post discharge follow-up with patient are being done by a nurse 72 hours post discharge with pharmacy questionnaire regarding pain therapy regimen and questions. The pharmacist will review follow-up documentation from nursing for potential intervention. A patient survey will be used to document and verify expected added value of discharge counseling.

**Conclusion:** Patients leaving the hospital on opioid therapy has to be a main focus for the facility. Having a mechanism to identify patients on opioid therapy while they are in the hospital provides a way to ensure they received focused counseling at discharge and post discharge. We were able to develop achievable standardized process using discharge solution and activity based workflow.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 1-015

**Poster Title:** Cost per responder analysis of ustekinumab and adalimumab in patients with moderate-severe psoriasis after failure to etanercept

**Poster Type:** Evaluative Study

**Submission Category:** Clinical Services Management

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**Purpose:** With multitude of biological therapies available for the treatment of moderate-severe psoriasis, different studies have aimed to improve the efficacy and safety of them. However, there is some controversy about which is the best therapeutic option after an anti-TNF<sup>α</sup> biological first. The main objective of the present work has been evaluate the efficacy of adalimumab and ustekinumab in patients with moderate-severe psoriasis (MSP) previously treated with etanercept.

**Methods:** An observational, retrospective and unicenter study of 24 month was carried out. Patients with MSP who received treatment with ustekinumab or adalimumab and previously treated with etanercept were included.

Effectiveness of each treatment, evaluated as PASI75 and PASI 90, was analyzed at 16 and 96 weeks of treatment. As secondary objective the cost per responder (total cost/PASI75 or PASI90) of each treatment was analyzed at week 16 and 96. Pharmacological cost was calculated based on the PVL of the medications considered, with the corresponding deduction of 7.5% on the PVL established by Royal Decree 8/2010 2017 and expressed in 2017 euros. The study was clasified for the AEMPS as EPA-OD with the code UST\_ADA\_2017.

**Results:** 34 patients were included, 44% received adalimumab and 56% received ustekinumab. In week 16, 84.2% of patients treated with ustekinumab achieved PASI75 vs 46.6% in the group

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treated with adalimumab ( $p = 0.02$ ); No differences were found in the percentage of patients who achieved PASI90 in both groups (73.7% vs 40% ( $p = 0.107$ )). In week 96, no differences were observed between treatments (63.1% vs 40.0% for both scores). The cost per responder at week 16 of ustekinumab was € 8,466 (PASI75) and € 9,672 (PASI90); while in week 96 it was € 33,890. These results imply a differential cost with respect to adalimumab of -657 € and -956 € (PASI75 / PASI90 respectively) in week 16 and -18.191€ at week 96.

**Conclusion:** Our results suggest that ustekinumab is more cost-effective than adalimumab for patients previously treated with etanercept; showing only effectiveness differences in the PASI 75 at week 16. This results provides a tool for choosing best treatment option in this kind of patients.

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**Session-Board #** - 1-016

**Poster Title:** Clinical and economic impacts of the reimbursement for cognitive pharmaceutical services for hospital-acquired infections in an intensive care units (ICUs) in Taiwan

**Poster Type:** Evaluative Study

**Submission Category:** Clinical Services Management

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**Purpose:** Cognitive pharmaceutical services have been considered as one of the sustainable interventions by the efficient use of resources with the provision of satisfied outcomes for patients with complicated conditions, such as hospital-acquired infections in ICU worldwide. To encourage the comprehensive engagement by the pharmacists, the fee for cognitive pharmaceutical services in ICU have been covered by the reimbursement trial scheme for the first time in Taiwan on 2019/01. The purpose of this study was to elucidate whether the new reimbursement improves the patient and financial outcomes via clinical pharmacists' performances in an ICU level from the hospital perspective in Taiwan.

**Methods:** A Markov decision model with six different states, including (1) critical patients in ICU  $\geq 2$  days, (2) HAI in ICU (transit state), (3) adverse drug reactions (ADR) in ICU, (4) ward patients, (5) discharge with out-patient services, (6) death, was developed to model the HAI among critically-ill patients, transferred from ICU to ward, in a Taiwanese medical center. Because of the clinical consideration, each cycle for this Markov decision model is 7 days and run for a year (52 cycles). The comparative probabilities and effects, such as mortality rate (12.78% and 9.62%), HAI (0.36% and 0.32%), length of stay (6.91 days and 7.32 days) and ADR (7.01% and 7.04%), were received from the Database of Taipei Veterans General Hospital (VGHTPE) between 2018/01-03 and 2019/01-03. The numbers of medication errors, ADR and types of pharmacy notes were evaluated as clinical pharmacists' performances. In addition, both of the direct and indirect medical costs were received from the National Health Insurance Administration (NHIA), Taiwan. All costs and effects were discounted at a rate of 3%. The

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Incremental Cost Effectiveness Ratio (ICER) for the new reimbursed cognitive pharmaceutical services compared to previous services. The Microsoft Excel 2019 is used to build the model.

**Results:** A cost-effectiveness analysis was performed for comparison between the new reimbursed cognitive pharmaceutical services and previous services for critical patients stayed in ICU more than 2 days. During the surveyed period of time, our pharmacists have increased their volume of bed-side services by documenting pharmacy notes in our electronic medical record system by 4 times with structured format as SOAP (n1=36 vs. n2=144). The medication problems, including medication errors and ADRs, that can be prevented by reimbursed cognitive pharmaceutical services (11 NTD per ICU patient-day) were about 6 cases during the surveyed period of time. After we evaluated the ICER, it showed that in order to prevent a medication problem by involving the clinical pharmacists in an ICU level would cost around 1157.6 NTD, which is significantly lower than the willing-to-pay threshold in Taiwan. In addition, when the clinical pharmacists are involved in the integrated medical team in ICU, patient outcomes can also be significantly improved by reducing the mortality rate from 12.78% to 9.62% as well as the HAI risk from 2.51% to 2.38%.

**Conclusion:** The Reimbursement for the cognitive pharmaceutical services is a successful strategy to enhance patient safety and to achieve sustainably cost-effective intervention for critically-ill patients in an ICU level. With aggressively approaches by the clinical pharmacists, it can significantly improve the patients' clinical outcomes from mortality rates, risk of HAI and also the financial burden to the hospital. Thus, based on the experiences in VGHTPE, it should be taken in account as a regular reimbursement for these services in the future.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 1-017

**Poster Title:** Assessment of post discharge medication prescription among stroke patients

**Poster Type:** Descriptive Report

**Submission Category:** Critical Care

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**Purpose:** After a stroke, effective secondary prevention strategy provides significant gains in the form of reduced disability and mortality. This strategy is the adherence with the clinical guidelines for post-discharge medication prescription. The purpose of this study was to investigate the degree of physician adherence with the international guidelines for post-stroke discharge medications among Lebanese hospitals.

**Methods:** This was a retrospective observational study conducted at three Lebanese hospitals between January 2016 till December 2017. Adult inpatients with ischemic stroke diagnosis were eligible for study enrollment. Excluded were patients admitted with hemorrhagic stroke. The assessment of physician post discharge prescription pattern adherence with the international guidelines was based upon the prescription antihypertensives, lipid lowering, and antihyperglycemic drugs.

**Results:** Out of 200 patients with stroke, 64.7% were males. The difference of systolic blood pressure from baseline, 2 hours, and after 24 hours showed significant decrease by mean value  $25.18 \pm 33.45$  (P value < 0.001), and  $6.44 \pm 22.11$  (P value=0.019) respectively. Also diastolic blood pressure showed significant decrease between baseline and after 24 hours by a mean value  $12.17 \pm 13.63$  (P value < 0.001). Concerning post discharge medications adherence, antithrombotic drugs showed the highest percentage (73%) followed by antihypertensive and lipid lowering agents by comparable results (47.5%, 40.7% respectively). The physician adherence for the three medications together showed (30.4%).



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**Conclusion:** Secondary prevention for critical diseases such as stroke appears to be inadequate in the study area. Healthcare professionals need to consider antithrombotics, antihyperglycemics, and antihypertensive therapies for all stroke patients as appropriate.

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**Session-Board #** - 1-018

**Poster Title:** Evaluation of liposomal bupivacaine use for post-surgical analgesia at VA Long Beach Healthcare System

**Poster Type:** Evaluative Study

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** Pain management is a significant component of postoperative recovery. A multimodal analgesic regimen is a main element of Enhanced Recovery After Surgery, which aims to optimize postoperative analgesia while minimizing opioid-related side effects. The efficacy of local anesthetics is limited by a short duration of action. Liposomal bupivacaine is a sustained-release formulation used as part of a postoperative multimodal approach to pain control with the goal of providing a longer duration of analgesia. This project was designed to evaluate opioid use and hospital length of stay following the use of liposomal bupivacaine in comparison to standard bupivacaine.

**Methods:** In this retrospective quality improvement study, patients administered liposomal bupivacaine from July 1, 2018 to December 31, 2018 were matched to a cohort of patients administered standard bupivacaine for comparable surgical procedures from July 1, 2017 to December 31, 2017. Matching was based on age, gender, race, and BMI. Data was collected from transaction reports generated from Automated Dispensing Cabinets specific to anesthesia, and from electronic medical records via chart review. Patients were excluded if they had an active outpatient opioid prescription within 30 days prior to surgery, cases that were converted to open intraoperatively, missing data for time of medication administration, and procedures that could not be matched to those seen in the standard bupivacaine group. The primary objectives were to assess the utilization of liposomal bupivacaine at VA Long Beach and to evaluate opioid use and hospital length of stay in comparison to standard bupivacaine. The secondary objectives compared the time to first opioid, quantity of opioids prescribed at discharge, number of patients prescribed additional opioids within 30 days of discharge,

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number of pain-related emergency department visits or readmissions within 30 days of discharge, and quantity of additional pain medications used. Statistical analysis was performed using Fisher's exact, T-test, and Mann-Whitney test where appropriate.

**Results:** Of the 81 patients with record of liposomal bupivacaine removal from the Automated Dispensing Cabinet, 62 had documentation of medication administration. After exclusion, 47 patients were matched to the standard bupivacaine group. Opioid consumption, measured in milligram morphine equivalents, was significantly less in the liposomal bupivacaine group at each time point of 0-24 hours post-surgery (21.9 vs. 60.2,  $p=0.006$ ), 24-48 hours (7 vs. 16.6,  $p=0.039$ ), and total duration of hospitalization (35.8 vs. 88,  $p=0.004$ ). There was no difference in length of stay (2.21 days vs. 2.23 days,  $p=0.48$ ). There were no significant differences in time to first opioid (3 hours vs. 2 hours,  $p=0.17$ ), quantity of opioids prescribed at discharge (84 vs. 95.7,  $p=0.23$ ), number of patients prescribed additional opioids (4 vs. 8,  $p=0.18$ ), and number of pain-related emergency department visits or readmissions (4 vs. 5,  $p=0.72$ ). Patients in the liposomal bupivacaine group used a significantly greater quantity of gabapentin.

**Conclusion:** Data showed a significant reduction in opioid use in the liposomal bupivacaine group compared to the standard bupivacaine group, with no difference in length of stay. There was a trend towards a longer time to first opioid, reduced quantity of opioids prescribed at discharge, and less patients prescribed additional opioids at follow-up in the liposomal bupivacaine group. Similarities in the quantity of additional analgesic use between groups may suggest better pain control with liposomal bupivacaine. Compared with standard bupivacaine, liposomal bupivacaine reduced postsurgical opioid consumption but did not reduce length of stay.

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**Session-Board # - 1-019**

**Poster Title:** Effect of vitamin D status on rates of sustained viral response in cirrhotic patients treated with sofosbuvir, sofosbuvir/simeprevir, or ledipasvir/sofosbuvir for hepatitis C viral infection

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** Direct acting antivirals for hepatitis C are highly effective but are costly. Prior studies have evaluated patient specific factors that may be associated with treatment success rates, including renal function, presence of cirrhosis, race, and concomitant medications. Vitamin D has been associated with treatment outcomes for other infectious diseases. This study aimed to evaluate the potential association of patient vitamin D status to rates of sustained viral response (SVR) for hepatitis C virus (HCV) treatment with sofosbuvir based therapy.

**Methods:** A retrospective, case-control analysis was completed at a single VA health care system. Patients with a diagnosis of cirrhosis treated with sofosbuvir and ribavirin with or without peginterferon, sofosbuvir and simeprevir with or without ribavirin, or sofosbuvir and ledipasvir with or without ribavirin for HCV between the dates of 1/1/2014 and 12/31/2016 were included in the analysis. Patients must have had a viral load evaluated 11 weeks or later after completion of therapy, documented vitamin d level within one year prior to treatment start or documentation of active supplementation during treatment, and available data to determine baseline creatinine clearance. The primary outcome was SVR defined as documented undetectable viral load 11 weeks or later after therapy completion. Patients with SVR failure constituted the case group and those with SVR success constituted the control group. Vitamin D sufficiency was defined as having a serum level  $\geq 30$  ng/ml or documented

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active supplementation during HCV therapy and vitamin D deficiency as a serum level < 30 ng/mL and no documentation of supplementation. Duration of therapy was grouped by those having a planned 24 weeks of therapy compared to those with fewer prescribed weeks. Univariate analysis of vitamin D status, baseline creatinine clearance > 80 ml/min, and duration of therapy was completed. Variables with a p-value < 0.2 in univariate analysis were included in the regression model.

**Results:** A total of 113 patients were identified for inclusion. The overall treatment success rate was 89.4% (101/113). Successful SVR was reached in 92% of those with vitamin D sufficiency (92/100) versus 69.2% (9/13) of those with vitamin D deficiency (Fisher's Exact,  $p < 0.05$ ). Success rates in those with CrCl < 80ml/min was 88.5% (46/52) compared to 90.2% (55/61) in those with CrCl > or = to 80 ml/min ( $p = 0.77$ ). Those receiving less than 24 weeks of therapy had SVR rate of 92.5% (86/93) versus 75% (15/20) for those receiving 24 weeks of therapy (Fisher's Exact,  $p < 0.037$ ). Duration of therapy and vitamin D status were included in the regression model. Vitamin D status and duration of therapy were independently associated with SVR success with OR for vitamin D status of 6.151 (95% CI, 1.41 – 26.81) and for duration of therapy of 4.85 (95% CI, 1.25 – 18.78).

**Conclusion:** In patients with a diagnosis of liver cirrhosis treated with sofosbuvir based therapy for HCV, vitamin D sufficiency defined as serum level  $\geq 30$  ng/ml or active vitamin D supplementation was independently associated with treatment success. A shorter duration of therapy was also found to be independently associated with treatment success, however likely reflects selection bias based on guideline treatment recommendations for extended treatment durations for patients with potentially more challenging to treat characteristics. Further study of the role of vitamin D status in HCV treatment SVR success rates is warranted.

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**Session-Board #** - 1-020

**Poster Title:** Missed opportunities for HIV diagnosis at a reference hospital in the northwest of Spain

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** Studies of missed opportunities for earlier diagnosis of HIV (MDO) have shown that patients with undiagnosed HIV often present to healthcare settings numerous times before receiving their diagnosis. HIV late diagnosis (LD) (CD4 lymphocytes < 350/ $\mu$ l at diagnosis of the disease), deteriorates the condition of those affected, hinders recovery of immune status and increases the probability of transmission. The objective of the present study was to characterize missed opportunities for earlier HIV diagnosis in our health area.

**Methods:** All HIV patients diagnosed between January 2017 and December 2018 at a reference hospital in the Northwest of Spain were included. Epidemiological, laboratory and MDO (according to Recommendation guidelines for HIV diagnosis in Spain) were recorded. MDO were identified during the 5 years prior to diagnosis of the disease in primary and specialized care of our health area. A statistical analysis was performed using the STATA® 15 software.

**Results:** A total of 45 newly HIV/AIDS diagnoses, mean age 41.3 $\pm$ 11.6 years and 80.0% men. 26.7% with a previous negative serology in the study period. 53.3% (24) with LD criteria and 40.0% (18) with AIDS. Risks factors: sexual contact (men who have sex with men (MSM) (27) and heterosexual (9)), parenteral drugs users (PDUs) (3) and unknown (6). 46 MDO were identified in 343 episodes of contact with the health care system. MDOs were detected in 24/45 patients (range 0-5 per patient), in 14/24 (58.3%) with LD criteria and in

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11/18 (61.1%) with AIDS criteria at diagnosis. Distribution by care patient settings: primary care 20/187 (10.7%); specialist ambulatory consultations 16/65 (24.6%); urgent care 10/87 (11.5%); hospitalization 0/4 (0%).

Classification by MDO: 21/46 infections associated with HIV infection (sexually transmitted diseases, herpes zoster, tuberculosis...); 5/46 risk behaviors (toxic substances consumption/abuse, PDUs...); 3/46 symptomatology associated with HIV infection (chronic idiopathic diarrhea, unwarranted weight loss); 2/46 pathologies associated with HIV infection (peripheral neuropathy); 1/46 test that requires a prior serology. 14/46 were classified as nonspecific (symptomatology not indicative of HIV infection but which, associated with the baseline characteristics of the patients (age, MSM...), were considered MDO (recurrent infections, dermatological pathologies...)).

**Conclusion:** At least one MDO was detected in the 5 years prior to diagnosis in 53.3% of newly diagnoses. Of these, more than half of the patients were LD and 45.8% AIDS at diagnosis. The specialist ambulatory consultations were the place with the highest proportion of MDO followed by urgent and primary care.

A high MDO rate was observed in our health area with important implications in the immunological status of the patient and the consequent risk of HIV transmission over time. Greater efforts will be necessary to implement and improve HIV screening in routine practice.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 1-021

**Poster Title:** Influence of pharmacist intervention to reduce the percentage of readmission in HIV patients who are at high risk of hospital readmission

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** The purpose of this study was to determine the effectiveness of a coordinated, intensive, programmed and structured pharmaceutical intervention, based on pharmaceutical care concepts: capacity, motivation and opportunity (CMO model) to reduce the percentage of readmission in HIV patients who are at high risk of hospital readmission.

**Methods:** Prospective, randomized, single-center study of a structured health intervention with HIV+ patients who were admitted to hospital between mar/2017 and mar/2018. Patients were eligible if they were over 18 years of age, had been taking antiretroviral treatment for more than six months, had signed the informed consent and had a high risk of readmission. The risk of readmission was calculated with published tools (Montes-Escalante et.al EJHP-2016). The selected patients were randomized 1:1 to a control group (usual pharmaceutical care) or intervention group (intensive pharmaceutical care based on CMO model). This model consisted of stratification of patients according to risk-stratified model for pharmaceutical care in HIV-patients of Spanish-Society-of-Hospital-Pharmacy; motivacional interviews to improve adherence, complexity, cardiovascular risk and lifestyle habits; and the use of new technologies. The primary end point was the percentage of readmission at one year of follow-up in each of the groups. Other secondary objectives included the following: percentage of patients who increased adherence to HIV and non-HIV treatments and who achieved optimal virological control; absolute mean reduction in the Medication-Regimen-Complexity-Index



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(MRCI) and in cardiovascular risk (COMVIH-COR); rates of patients who stopped smoking, alcohol and drugs. To compare whether there were measurable differences in the main numerical variables between the intervention/control groups, the Student t-test was calculated. In the case of qualitative variables, Pearson's  $\chi^2$ -test (for independent samples) and McNemar-test (for dependent samples) was used.

**Results:** A total of 39 patients were included in the study. Of which 23 patients completed follow-up study (14 in the intervention group and 9 in the control group). Of the patients who did not complete follow-up study, 4 were lost to follow-up (all in the control group), and 12 died (6 in the intervention group and 6 in the control group). In all, 82,60% were male, with a mean age of  $55,19 \pm 11,00$  years. Baseline characteristics of the study population were similar for both groups. Regarding the main outcome, in the intervention group, 21,43% (n=3) of patients were readmission at one year of follow-up versus 66,66% (n=6) in the control group ( $p=0,042$ ). In the intervention group, the percentage of patients who increased adherence to HIV and non-HIV treatments was 42,85% ( $p=0,031$ ) while it worsened in the control group; the percentage of patients who achieved optimal virological increased by 21,42% ( $p=0,250$ ) while it worsened in the control group. The mean decrease in absolute in the MRCI was 1,57 points for the intervention groups while it worsened in the control groups; 1,43 versus 1,11 for cardiovascular risk. In the intervention group 7,14% of patients were stopped smoking and 7,14% stopped alcohol.

**Conclusion:** Conclusions: A tailored pharmaceutical care based on risk stratification, motivational interviewing, and new technologies might lead to reduce readmission hospital and improved health outcomes in HIV+ patients at high risk of hospital readmission.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 1-022

**Poster Title:** Reducing antibiotic prescribing for acute respiratory tract infections in a rural veterans affairs health care system

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** In 2014, over 250 million outpatient prescriptions were written for antibiotics with approximately 50 percent of those prescriptions being inappropriately prescribed. Inappropriate outpatient prescribing of antibiotics leads to increase antibiotic resistance, adverse events and clostridium difficile infections. National organizations developed plans to combat antibiotic resistance by reducing inappropriate antibiotic prescribing by 50 percent. In October 2017, the Veterans Affairs (VA) began an antimicrobial stewardship campaign for Acute Respiratory Tract Infection (ARI). The objective of this outpatient antibiotic stewardship initiative was to reduce inappropriate antibiotic prescribing for uncomplicated ARI in VA outpatient-based clinics while ensuring appropriate antibiotic selection when appropriate.

**Methods:** The Acute Respiratory Tract Infection (ARI) clinical initiative was approved by the VA Veterans Integrated Service Network (VISN) and the local Pharmacy and Therapeutics Committee. The facility goal was to reduce antibiotic prescribing for ARI to less than thirty percent and to improve appropriate antibiotic selection to ninety percent. The facility utilized a multi-prong approach to facilitate this initiative, which included: education to medical provider group and individual providers; education to primary care and call center nursing staff; approval of non-antibiotic medications for symptomatic relief of ARI in outpatient clinics; development of computerized order sets for non-antibiotic medications; “what’s got you sick?” posters in patient waiting rooms and provider offices; and quarterly provider specific metrics by utilizing “superhero” reports. Facility leadership support allowed quick turnaround time for order set approval, development and implementation. Outpatient Medical Providers were educated in Grand Rounds as well as individual Provider education and metric review. Providers also provided input on non-antibiotic medications for symptomatic relief and patient education

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letter on ARI. Non-antibiotic medications included medications for pain, nasal congestion or rhinorrhea, throat discomfort, cough and wheezing. Metrics were de-identified and utilization of a superhero name for each provider engaged competition and improved provider performance.

**Results:** The facility implemented the outpatient antimicrobial stewardship ARI strategies in Fiscal Year 2018 (FY18) Quarter one (Q1) which correlates to October to December 2017. The overall antibiotic prescribing rate for uncomplicated ARI decreased from 44.8 percent in FY17Q4 (July to September 2017) to 22.2 percent in FY18Q3 (March to June 2018). The preferred antibiotic selection for uncomplicated pharyngitis went from zero percent in FY17Q4 to 100 percent in FY18Q3 and for uncomplicated rhinosinusitis went from 60 percent to 67 percent in the same time frame. Eighty percent of prescribers with overall antibiotic prescribing rate greater than 60 percent for uncomplicated ARI reduced their prescribing rate to less than 30 percent in the one year time frame. Unfortunately, several new Primary Care Providers started in July and August 2018 without proper education on the ARI clinical initiative which increased the overall prescribing rate for uncomplicated ARI to 52.2 percent.

**Conclusion:** Outpatient antimicrobial stewardship strategies can reduce inappropriate antibiotic utilization and improve antibiotic selection, dosing and duration for acute uncomplicated respiratory tract infections. Although Provider buy-in, tracking metrics, and order sets are vital to a successful antimicrobial stewardship program, availability of supportive non-antibiotic medications and patient education are imperative to ensure patient satisfaction with ARI management. Continued Provider education, especially to new Providers, and metric tracking will ensure sustainment in antimicrobial stewardship activities.

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**Session-Board #** - 1-023

**Poster Title:** Effect of vancomycin restriction on duration of therapy in pneumonia patients

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** The primary objective is to assess the effect of vancomycin restriction on duration of therapy of vancomycin in pneumonia patients. We assessed the duration of therapy of vancomycin before and after the implementation of the policy. The secondary objective is to determine the predictive value of MRSA nares surveillance for MRSA pneumonia at VA Long Beach Healthcare System (VALBHS). We evaluated the results of MRSA nares screenings and respiratory cultures in pneumonia patients to assess whether positive or negative nares screening was predictive of MRSA pneumonia.

**Methods:** This is a retrospective, chart-review, quality-improvement study. Data was collected from the Computerized Patient Record System (CPRS) for patients treated with intravenous vancomycin for pneumonia between July 1, 2017-December 31, 2017 (pre-policy) and July 1, 2018-December 31, 2018 (post-policy). Statistical analysis was performed using chi-square and Mann-Whitney for the primary outcome. The secondary outcome analysis included sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), positive likelihood ratio (PLR), and negative likelihood ratio (NLR).

**Results:** 87 patients were included in the study, 44 in the pre-policy group and 43 in the post-policy group. The average duration of therapy of IV vancomycin in the pre-policy group was 5.55 days and 3.7 days in the post-policy group ( $p=0.02$ ). MRSA nares surveillance at VALBHS has a sensitivity of 88.33% (95% CI 35.88-99.58), specificity of 88.89% (95% CI 75.95-96.26), PPV of 50% (95% CI 28.89-71.11), NPV 97.56% (95% CI 86.95-99.59), PLR 7.5 (95% CI 3.05-18.46), and NLR 0.19 (95% CI 0.03-1.13).

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**Conclusion:** This quality improvement study validated that the vancomycin restriction policy was able to successfully reduce vancomycin utilization. The low PPV indicates that a positive MRSA nares screen has a low likelihood of predicting a positive MRSA pneumonia and should not be used as a tool to determine empirical coverage for MRSA. The high NPV indicates that a negative MRSA nares screen will likely not result in MRSA pneumonia and would be a useful tool to de-escalate therapy.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 1-024

**Poster Title:** Implementation of an infusion center patient tracking board to enhance efficiency and communication

**Poster Type:** Descriptive Report

**Submission Category:** Informatics/Technology/Automation

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**Purpose:** Sustaining quality and access while maintaining cost is a challenge for many organizations. This can be overcome by enhancing efficiency using technology. The expansion of a large infusion center from ten to 18 chairs with minimal staffing increase resulted in the need to ensure workflow efficiency. This project was designed to implement an infusion center patient tracking board to enhance efficiency and communication.

**Methods:** A team of pharmacists researched how infusion centers across the country are tracking infusion center patients and explored the system's electronic health record (EHR) capability. The team obtained approval from the Medical Informatics Steering Team (MIST) to build a tracking board and collaborated with information technology, EHR, pharmacy and nursing teams for implementation plan. Once the board was created and tested, nursing and pharmacy staff were trained on its use. The team evaluated workflow pre- and post-implementation to assess effectiveness.

**Results:** The team identified an academic center using the same EHR platform with tracking board technology, then evaluated the board features and customized a board to align with workflow. The team presented the need and development plan to MIST for approval, then partnered with multiple disciplines to develop three customized tracking boards for pharmacy and nursing with 18 patient specific notifications. Fifteen nurses and twenty-one pharmacy staff completed training on the new tracking board workflow. An average of 535 phone calls per month were eliminated, totaling 36 hours per month of nursing and pharmacy time saved, equal to \$22K in annual cost avoidance. Over 70 nursing hours monthly were saved with real time notification when medication ready, equal to \$36K in annual cost avoidance. Safety

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improved with less phone call interruption and real-time tracking of patient status. Communication improved through notification of infusion chair status; location of patient; identification of assigned nurse; identifiable fall risk, allergies, provider, and weight; two-way communication for nursing and pharmacy; and patient's length of stay.

**Conclusion:** Implementation of an infusion center tracking board resulted in enhanced efficiency and improved communication.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 1-025

**Poster Title:** Investigation of oxLDL-induced damage in human induce pluripotent stem cells-differentiated retinal pigment epithelial cell and establish retina degeneration animal model

**Poster Type:** Evaluative Study

**Submission Category:** Investigational Drugs

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**Purpose:** Among retina degeneration disease, Age-related macular degeneration (AMD) is an important cause of blindness in elder people over 65 years old. AMD can be classified into dry or wet type based on the lesion of drusen accumulation or choroid neovascularization (CNV), respectively. Understanding the mechanism that modulate the early stage of retinal pigment epithelium (RPE) dysfunction is strongly required for development of early detection and treatment of AMD. Oxidative stress was a well-known stress to induce AMD. Therefore, we chose oxidative low-density lipoprotein (oxLDL) as a stress source to treat with RPE.

**Methods:** The differentiation of human induced pluripotent stem cells to retinal pigment epithelial cell was modified according to Buchholz 's paper. To evaluate the purity of RPE cells derived from hiPSCs, the specific markers of RPE cells such as retinal pigment epithelium-specific 65 kDa, Zonula occludens-1 (ZO-1) were measured by immunofluorescence and functional marker such as microphthalmia-associated transcription factor (MITF), tyrosinase were measured by western blot. We used MTT assay to distinguish the different effects between LDL and oxLDL. We added 100 and 300 µg/ml LDL or oxLDL then observed 24-72hrs. To clarify the plausible mechanisms involved in oxLDL caused RPE death, we used immunofluorescence to detect whether the apoptotic signaling molecules presented in the damaged RPE cells. To confirm whether oxLDL could induce RPE cell to secrete more VEGF, we used VEGF ELISA kit to measure the supernatant concentration of VEGF releasing from 100 and 300 µg/ml oxLDL treated RPE cells. To generate retina degeneration animal model, we Intravitreal injected VEGF at 100 ng/10µl combined with the retrobulbar injected oxLDL 500µg/50µl and then followed up for 2-4 weeks. Then we used fundus to check the phenotypes of



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whole eyes and optical coherence tomography (OCT) and fluorescein angiography (FAG) to confirm the integrity of retinal layers as well as determine whether the choroidal neovascularization was occurred.

**Results:** We observed our RPE had hexagonal morphology and pigmentation under microscope. To confirm RPE was successfully differentiated from hiPSCs, specific markers such as RPE65, ZO-1 were detected by immunofluorescence. We found the level of MITF and tyrosinase were highly expressed in RPE cells. These results suggest that RPE cells had been differentiated from hiPSCs successfully. Treatment of LDL had no effect on cell viability in RPE cells. Stimulation of oxLDL reduced cell viability dramatically and enhanced caspase-3 activation in RPE cells. Also, we observed that oxLDL stimulation increased AMD markers, Hsp 90, expression in RPE cells. These results suggest that oxLDL is a stress to induce RPE damage. On the other hand, the highly expressed level of VEGF secreted from 300  $\mu\text{g}/\text{ml}$  oxLDL was also detected. It was match with wet type AMD. Therefore, we Intravitreal injected VEGF at 100 ng/10 $\mu\text{l}$  combined with the retrobulbar injected oxLDL 500 $\mu\text{g}/$  50 $\mu\text{l}$  to mimic a stress damage. Hemorrhage and neovascularization was detected by fundus, OCT and FAG. Therefore, we can confirm the effects of oxLDL on retina impairment and choroidal neovascularization.

**Conclusion:** Oxidative stress was a well-known stress to induce AMD. Therefore, we chose oxLDL as a stress source to treat with RPE. We successfully differentiated RPE and confirmed the specific markers expression. We also observed oxLDL could elevate a series of factors which were corresponded to lysosome dysfunction, or even apoptosis. Because of oxLDL induced VEGF secretion, it was a good source to induce wet type AMD-like animal model. In conclusion, oxLDL could induce the RPE morphological change, apoptosis, secret more VEGF and could be a stress to induce retina damage.

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**Session-Board #** - 1-026

**Poster Title:** Current clinical practice patterns of managing adult febrile neutropenia during cancer chemotherapy in tertiary care hospital in the United Arab Emirates

**Poster Type:** Evaluative Study

**Submission Category:** Oncology /Hematology

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**Purpose:** Febrile neutropenia is the development of fever in patients with low numbers of neutrophil granulocytes. It results from bone marrow suppression, often associated with cancer chemotherapy side effects and the cancer itself, radiation or a combination of events. Due to the low neutrophil count, patients are at risk of life-threatening infections, and thus, the occurrence of febrile neutropenia is a medical emergency. The purpose of this study is to evaluate the current practices in the management of febrile neutropenia in the adult cancer population in Tawam Hospital, a tertiary care hospital in the United Arab Emirates.

**Methods:** A retrospective observational chart review for all adult cancer patients who were admitted to the Tawam hospital with a diagnosis of febrile neutropenia in the study period of January 2017 to September 2018. This study was approved by the institutional review board. The epidemiological data of the patients were initially recorded, including age, gender, type of cancer, stage and phase/cycle of chemotherapy and the use of granulocyte colony stimulating factors (GCSF). Management protocols of febrile neutropenia were reviewed and evaluated different parameters including the; duration of treatment and hospital stay, the presence of antibiotic allergy, selection of antibiotic considering dose adjustment for renal and hepatic impairment and the need for ICU admission. The data obtained from the medical charts were used to assess the adherence of the clinicians to the international guidelines for the management of the condition.

**Results:** One hundred ninety nine medical charts were reviewed, and it was found that 78 patients met the inclusion criteria for having febrile neutropenia. Seventy-five patients

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responded to treatment and recovered while only three patients passed due to other complication of disease associated with febrile illness.

The median age of patients was 51 years old (range 18-85) with most patients (44%) were aged between 41 and 60 years old.

Forty patients (63%) were females, and 29 patients (37%) were males. Forty-six patients (59%) were found to be cancer patients with solid tumors, and 32 patients (41%) were found to have hematological malignancies. Sixty-five patients were put on filgrastim after admission (83%).

The median duration of G-CSF use varied among patients with a median of 3 days (range 1-25). Piperacillin-tazobactam was the most commonly used broad spectrum antibiotic for empirical management of FN. It was administered in 72 patients (92%), fit was combined by amikacin in 18 cases. In addition, vancomycin and meropenem were used in special circumstances. The median duration of hospital admission was found to be 7 days with the longest admission time was 60 days; which was related to severe thrombocytopenia and other complications of chemotherapy.

**Conclusion:** Management of the FN was successful in the vast majority of patients at Tawam hospital. Clinicians followed the IDSA and NCCN guidelines recommendations. In addition, they were found to follow the local guideline, which was based on the local hospital's antibiogram.

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**Session-Board #** - 1-027

**Poster Title:** Measuring probability of opioid use at 3 postoperative time points in veterans with preoperative chronic opioid use, substance use disorder or mental health diagnoses

**Poster Type:** Descriptive Report

**Submission Category:** Pain Management/Palliative Care

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**Purpose:** Clinicians face a challenging task in achieving safe and therapeutic postoperative analgesia. This is met with a competing demand to avoid incident cases of chronic opioid therapy. Due to the risk of prolonged courses of therapy, guidelines caution against use of opioids in the presence of mental health diagnoses and substance use disorders. This guidance is especially relevant in a Veteran population, where presence of such risk factors is prevalent. In this analysis, we measured probability of opioid use at 3 critical postoperative time points based on presence of risk factors for prolonged opioid use.

**Methods:** This cohort analysis is comprised of Veterans undergoing orthopedic surgery at VA Salt Lake Healthcare System and agreeing to participate in the Transitional Pain Service (TPS) – a perioperative care coordination and pain management program. This analysis includes Veterans discharged from surgery between 1/1/2018 and 3/2/2019. The primary outcome is probability of opioid use at post-discharge day (PDD) 30, 60 and 90. In this analysis, we assigned Veterans with no evidence of risk factors for prolonged postoperative opioid use, i.e. mental health diagnoses, history of substance use disorder and preoperative chronic opioid use, as the “unexposed” group. In contrast, we identified comparator “exposure” groups based on presence of more than one of (1) mental health diagnoses, (2) history of substance use disorder or (3) preoperative chronic opioid use. Relative risk ratio (RR) was calculated to determine risk factor “exposure” effects on opioid use at each postoperative time point.

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**Results:** Inclusion criteria was met in 154 Veterans; 46 with no risk factors for prolonged opioid therapy, and 108 with at least 1 risk factor present. At PDD-30, we observed the following probabilities for opioid use: (1) unexposed:  $6/46=0.13$  (2) preoperative chronic opioid use:  $25/35=0.71$ , crude RR: 5.48, 95% confidence interval (CI): 2.52-11.89,  $p < 0.0001$  (3) substance use disorder:  $19/52=0.37$ , crude RR: 2.80, 95% CI: 1.22-6.41,  $p=0.0147$  and (4) mental health diagnoses:  $25/83=0.30$ , crude RR: 2.31, 95% CI: 1.02-5.22,  $p=0.04$ . At PDD-60, we observed the following probabilities for opioid use: (1) unexposed:  $2/46=0.04$  (2) preoperative chronic opioid use:  $21/35=0.60$ , crude RR: 13.80 95% CI: 3.46-54.97,  $p=0.0002$  (3) substance use disorder:  $13/52=0.25$ , crude RR: 5.75, 95% CI: 1.37-24.15,  $p=0.017$  and (4) mental health diagnoses:  $19/83=0.23$ , crude RR: 5.27, 95% CI: 1.28-21.6,  $p=0.02$ . At PDD-90, we observed the following probabilities for opioid use: (1) unexposed:  $1/46=0.02$  (2) preoperative chronic opioid use:  $20/35=0.57$ , crude RR: 26.29, 95% CI: 3.70-186.55,  $p=0.001$  (3) substance use disorder:  $12/52=0.23$ , crude RR: 10.62, 95% CI: 1.44-78.52,  $p=0.02$  and (4) mental health diagnoses:  $19/83=0.23$ , crude RR: 10.53, 95% CI: 1.46-76.14,  $p=0.02$ . Adjusted analyses also demonstrated sizable risk effect based on presence of risk factors.

**Conclusion:** Our analysis corroborates findings from previous studies with respect to increased probability to remain on opioids postoperatively based on presence of certain preoperative risk factors. Large effect sizes observed at PDD-60 and PDD-90 highlight the complexity to safely and effectively discontinue postoperative opioids in these populations. Results from our analysis support a call to action to prospectively identify Veterans at risk for prolonged opioid use and develop a multidisciplinary care plan for postoperative pain management.

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**Session-Board #** - 1-028

**Poster Title:** Improving pharmacy knowledge and skills of pharmacy students through meta-analysis research: a project integrating research and teaching

**Poster Type:** Descriptive Report

**Submission Category:** Precepting/Preceptor Skills/Education and Training

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**Purpose:** Ideally, research and teaching complement each other during pharmacy education. Pharmacy students can significantly improve their research skills and pharmacy knowledge by conducting research projects. However, there is a lack of opportunities for students to collaborate with their professors for research projects during pharmacy training. The objective of this study is to explore a sustainable method for faculty to conduct meta-analysis research with pharmacy students through a year-long project.

**Methods:** Pharmacy students from second to fourth professional years (P2 to P4) were invited to conduct a meta-analysis to evaluate the risk factors of bleeding and clinical non-effectiveness with long-term use of clopidogrel. Students were trained in the pilot phase by a research pharmacist for two months. In this training phase, students learned to conduct abstract screening, full paper screening, data extraction, and bias assessment. Students then performed each phase of the meta-analysis for the next six months. Online weekly meetings among all members in the team were held to build a cohesive vision, discuss work process and output, and ensure progress. To assess goals, expectations, and skills learned, an evaluation form was sent to pharmacy students, followed by a one-hour focus session after ten months.

**Results:** Seven students participated in this study (one P2, four P3, and two P4). One student dropped out after six months. Six students completed all 4 phases of the project: pilot training, abstract screening (6,955 articles), full paper screening (1,422 articles), and data extraction (98 articles). Students are expected to submit a poster abstract to the ASHP Midyear and be co-authors for the project's manuscript. From the evaluation, all students exhibited high interest in

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this research project and believed it meaningfully improved their ability to read and evaluate journal articles. However, they also suggest that the project needed to define clear expectations for students before starting. Students also were interested in teaching and leading new studies with similar methods

**Conclusion:** Our project showed that it is feasible and beneficial for pharmacy students to conduct systematic review and meta-analysis with faculty in a year-long project. This project provided not only research experience to students but also improved their ability to understand the periodical literature.

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**Session-Board # - 1-029**

**Poster Title:** Assessment of the center of excellence in primary care education pharmacy trainees' readiness and opportunity when entering the veterans affairs workforce

**Poster Type:** Descriptive Report

**Submission Category:** Precepting/Preceptor Skills/Education and Training

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**Purpose:** The Center of Excellence in Primary Care Education (CoEPCE) is a pilot project sponsored by the Veteran Health Administration, Office of Academic Affiliation with the goal of bringing interprofessional education to the primary care practice setting. Among other objectives, the CoEPCE project intended to create educational environments that allow trainees from the different clinical backgrounds to work and learn together. This project aims to examine the perception of the pharmacy trainees (PGY1, PGY2) on the effectiveness of the Center of Excellence in Primary Care Education (CoEPCE) in preparing them to join the VA healthcare workforce.

**Methods:** The CoEPCE comprised of seven VA sites and its selected Pharmacy Residents were involved with the project. A 12 questions survey was created by the project leader and peer reviewed by other preceptors within the CoEPCE. The questionnaire was separated into four sections: a brief demographic portion of past training and current employment, a Likert scale matrix regarding the perceived quality of training, a personal outlook section, and finally a free response portion about the positive and negative experiences. Score was set to be from 1 to 5 with 5 was assigned the highest score. The questionnaires were transcribed into Research Electronic Data Capture (REDCap), the VA's data collection tool that can only be accessed via internal network.



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List of potential survey participant was drawn from a roster of former pharmacy residents from the CoEPCE programs between academic year [July to June] 2011 to 2017. Those with evidence that they stayed within the VA healthcare system after their training were identified. The screened participant list was uploaded onto REDCap for survey distribution. Responses were voluntarily. The survey was opened for responses between October 1st to December 31st, 2018. The total of two Email Reminders were sent to all participates in the survey during the listed above period.

Descriptive analysis was completed with Excel. Data presented as median with interquartile range (IQR) and proportions by percentages.

**Results:** Of 62 subjects identified, 21 subjects (33.8%) responded. Nine (42.9%) did a PGY1, four (19.0%) did a PGY2 and eight (38.1%) did both a PGY1 and PGY2. About 67% (n =14) currently work where they trained; the remainder relocated to a different VA. Overall, subjects felt that the competition for a job in the VA was fierce with most had the VA as their first choice after completing their residency, median = 5, Interquartile range (IQR) = 4 - 5. A low number of subjects were actively looking for other jobs [median = 2, IQR = 1 -2]. Most subjects believed that the experience within the CoEPCE- an interprofessional practice setting, was unique compared to other VA Pharmacy residencies, hence made them a stronger candidate for VA employment [median score =4, IQR = 4 -5]. Most subjects felt that the CoEPCE prepared them for an interdisciplinary work environment [median = 4, IQR = 4 -5]. When asked about what they hoped they would be doing in 3 to 5 years, 57% desired a more diverse experience, 23.8 would be fine with current role and 19.1 would preferred a more well-defined, structured and standardized scope of practice with direct patient care.

**Conclusion:** Overall most of trainees surveyed were satisfied in their current positions within the VA and felt that the CoEPCE programs had made them more competitive and more prepared for their current job. The majority of the trainees were with the progressive mindsets and with the desire for a more diverse experience in the future while some of them desire more well-defined, structured and standardized practice.

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**Session-Board #** - 1-030

**Poster Title:** Outcomes comparison between risperidone and paliperidone in veterans

**Poster Type:** Evaluative Study

**Submission Category:** Psychiatry/Neurology

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**Purpose:** Long-acting injectable antipsychotics (LAI-APs) have been integral in the management of schizophrenia and other psychiatric illnesses, such as schizoaffective disorder and bipolar disorder, in veterans. However, there are no substantial studies comparing LAI-APs with each other, including Risperdal Consta (risperidone, RC) and Invega Sustenna (paliperidone, IS). RC requires a 3-week oral overlap and is administered every 2 weeks, while IS does not require an oral overlap and is administered every 4 weeks. Both LAIs deliver related molecules. This study sought to assess differences in psychiatric hospitalizations, medication nonadherence, and medication discontinuation between RC and IS.

**Methods:** This IRB-approved retrospective chart review included veterans  $\geq 18$  years old who have received at least 2 injections of either LAI-AP (RC or IS) and have received the LAI-AP injections during outpatient and/or inpatient care between 01/01/2016 and 12/31/2018 at VA Loma Linda Healthcare System. De-identified data collected included demographics, diagnoses, comorbid alcohol, nicotine, opioid, and substance use, duration on LAI-AP, medication nonadherence, medication discontinuation, pre and post psychiatric hospitalizations, and direct costs of psychiatric hospitalizations. Nonadherence was defined as missing an injection for a specified duration ( $>3$  days for RC and  $>7$  days for IS). Pre and post LAI-AP hospitalizations were assessed using a pre-post design with equivalent time periods. Descriptive statistics were used. Chi-Square, Fisher's Exact, and Mann-Whitney U tests were used for statistical analysis and p-value was set at  $< 0.05$  for statistical significance.

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**Results:** Ninety-seven subjects were included in this study (44 on RC and 53 on IS). Subjects had a mean age of  $46 \pm 13.8$  years, 92% were male, and 94% were diagnosed with schizophrenia or schizoaffective disorder. Subjects on RC were less likely to be rehospitalized (22.7% vs 47.2,  $p=0.013$ ), had less post-treatment hospitalizations ( $0.4 \pm 1.0$  vs  $0.9 \pm 1.5$ ,  $p=0.015$ ), a larger difference between pre and post LAI-AP hospitalizations ( $2.8 \pm 2.9$  vs  $1.3 \pm 1.7$ ,  $d=0.66$ ,  $p=0.001$ ), a larger difference in incidence per 10 person-years (7.4 vs 3.4,  $p=0.012$ ), and a higher amount of savings in direct costs of hospitalizations for RC users than for IS users ( $\$5,591 \pm \$5,715$  vs  $\$2,490 \pm \$3,395$ ,  $p=0.001$ ) compared to IS. However, subjects on RC had a shorter treatment duration ( $41.6 \pm 40.2$  vs  $58.2 \pm 45.7$  weeks,  $p=0.043$ ) compared to IS. No statistically significant differences were found in nonadherence rates (25% vs 28.3%,  $p=0.715$ ) and discontinuation rates (68.2% vs 62.3%,  $p=0.543$ ) between RC and IS.

**Conclusion:** Veterans on RC were less likely to be rehospitalized, had less post-treatment psychiatric hospitalizations, a larger difference between pre and post LAI-AP hospitalizations, a larger difference in incidence per 10 person-years, and a higher amount of savings in direct costs of hospitalizations compared to IS. However, subjects on RC had a shorter treatment duration. Medication nonadherence and discontinuation rates were comparable between RC and IS. Future studies that include all VA institutions as well as cost-minimization analyses are warranted.

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**Session-Board #** - 1-031

**Poster Title:** Knowledge, attitude and practice among adult Lebanese patients with epilepsy and the impact on seizure control

**Poster Type:** Descriptive Report

**Submission Category:** Psychiatry/Neurology

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**Purpose:** Epilepsy is the fourth most prevalent neurological disorder accounting for more than 50 million cases worldwide. Religious and sociocultural beliefs influence the nature of treatment and care received by epileptic patients. According to the World Health Organization (WHO), almost 94% of epileptic patients in developing nations are not taking the appropriate therapy to control their seizure leading to a higher incidence of lifelong active epilepsies in these regions. With no related data in Lebanon, this study sought to assess the knowledge, the attitude and the practice towards epilepsy among adult Lebanese epileptic patients and the associated factors.

**Methods:** This was a cross-sectional descriptive study approved by the ethical committee at the Lebanese international university. The sample was drawn randomly from community pharmacies based on stratified cluster sampling and the strata were the six districts of Lebanon. Sixty community pharmacies constituted the primary sampling units and ten pharmacies were randomly selected from the districts using the Research Randomizer computer program. Patients aged eighteen years and above with at least two years of diagnosis with epilepsy, who came for normal medications or for para-pharmaceuticals were enrolled in the study. Those not meeting the inclusion criteria or have mental illnesses were excluded. The enrolled participants were directly interviewed by the clinical pharmacists after providing their written informed consent. The data collection sheet retrieved information regarding participants' demography,

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knowledge, attitude, and practice toward their disease. It was established based on validated and standardized questionnaires including The Epilepsy Patient Knowledge Profile (EPQK) and The Kilifi Epilepsy Beliefs and Attitudes tool (KEBAS). Scores were generated using these questionnaires to classify knowledge (poor, moderate or good), attitude (positive or negative), and practice (poor or good). Data were analyzed using the Statistical Package of the Social Sciences software (SPSS, version 21).

**Results:** A Total of 134 epileptic patients (53% females, 47% males) with a mean age of  $36.53 \pm 13.15$  years were included in this study. Almost half of the participants were married (56%), employed (43.3 %) and had moderate incomes (49.3%). The majority of respondents had attained a minimum of secondary school education (91.3%). The most reported seizure type was generalized seizure (26%). Half of the respondents were on polytherapy (50.7%), while the rest (49.3%) were on monotherapy, with Valproic acid being the most prescribed medication (39.7%) followed by carbamazepine (34.9%). Approximately 64% of the studied patients had good seizure control. The majority of the patients had good knowledge (82%) and a positive attitude (98%) toward their disease with almost two-thirds having a good practice (63%) as well. There were no statistically significant associations between the level of knowledge, attitude or practice with seizure control ( $p= 0.14$ ,  $p=1$  and  $p=0.25$ , respectively). However, a statistically significant association was identified between the practice level and the number of seizure episodes among patients on treatment ( $p=0.034$ ).

**Conclusion:** The Lebanese patients suffering from epilepsy had basic good knowledge, attitude and practice towards their disease with good seizure control. Meanwhile, the seizure control was not associated with the knowledge, attitude, and practice of the patient toward their disease.

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**Session-Board #** - 1-032

**Poster Title:** Evaluating utilization of a metabolic monitoring tool versus actual laboratory monitoring in patients receiving second-generation antipsychotics

**Poster Type:** Descriptive Report

**Submission Category:** Psychiatry/Neurology

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**Purpose:** Metabolic adverse effects are major concerns with second-generation antipsychotics (SGAs), however adequate monitoring for these symptoms is rarely achieved. An electronic monitoring tool, referred to as a clinical reminder, was previously implemented at this facility. This tool flags the electronic health record of patients prescribed a SGA and missing recommended monitoring parameters. Clicking the flag opens a dialogue box which prompts ordering of labs. The purpose of this quality improvement project is to evaluate utilization of the tool, determine if monitoring was performed, and address discrepancies. The primary outcome was percentage of patients with incomplete reminders who received recommended monitoring.

**Methods:** This quality improvement project was approved by the Pharmacy and Therapeutics Committee prior to implementation and IRB approval was not required. Patients without a completed SGA reminder were identified using the psychotropic drug safety initiative (PDSI) dashboard, a nation-wide informatics tool within the Veterans Affairs system. After the initial list was obtained, chart reviews were conducted to obtain basic demographic information and metabolic monitoring parameters. Patients without a completed reminder who required additional monitoring were identified and a consult was entered to assign them to a mental health clinical pharmacy specialist (CPS). The CPS conducted initial and follow-up visits with patients. During these visits the purpose of metabolic monitoring was explained and patients were requested to complete missing monitoring parameters. If patients were agreeable to completing monitoring, the CPS entered the appropriate laboratory orders. Finally, follow-up

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chart reviews were performed. For patients to be included in this project they had to be actively assigned to this facility for care, have an incomplete SGA reminder, and require additional metabolic monitoring. Exclusion criteria included patients not assigned to this facility, patients receiving hospice or palliative care, and patients maintained by non-VA psychiatrists.

**Results:** Sixty-six patients were identified through the PDSI dashboard, 35 were excluded. Consults were entered for the remaining 31 patients. Twenty-two patients accepted the initial appointment and nine did not. Most patients who accepted the initial consult were white (77.3%) with an average age of 55 years old and average BMI of  $31.6 \pm 7.4 \text{ kg/m}^2$ . Average fasting plasma glucose ( $110.4 \pm 46.9 \text{ mg/dL}$ ) and hemoglobin A1c ( $5.9 \pm 1.2\%$ ) were indicative of prediabetes. Lipid profiles reflected slight elevations in triglyceride ( $183 \pm 93 \text{ mg/dL}$ ) and LDL ( $105 \pm 39.5 \text{ mg/dL}$ ), with HDL levels on the lower end of normal ( $48 \pm 15 \text{ mg/dL}$ ), and cholesterol within normal limits ( $189 \pm 49 \text{ mg/dL}$ ). At baseline, 77.3% had no fasting lipid panel within the previous 6 months, 68.2% had no fasting plasma glucose or hemoglobin A1c in the previous 6 months, and 54.5% did not have a recorded weight within the previous 3 months. Of the 22 patients seen in clinic 2 were found to be no longer actively taking an SGA. The remaining 20 patients were agreeable to updating necessary laboratory work, however only 9 of these patients actually went on to obtain appropriate monitoring. A total of 53 laboratory orders were entered by the mental health CPS. No clinical interventions were made by the mental health CPS.

**Conclusion:** The adherence rate to metabolic monitoring observed, although low, was consistent with findings in other studies. This quality improvement project highlighted the difficulty associated with maintaining appropriate follow up with patients, specifically within a mental health population. Barriers to adequate monitoring are multifaceted and even with concentrated effort are difficult to overcome. This was the first evaluation of the SGA monitoring tool at this facility and potentially laid the groundwork for future optimization of the tool.

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**Session-Board #** - 1-033

**Poster Title:** An audit of night sedation prescribing in the Mater Misericordiae University Hospital (MMUH); what has changed in 10 years?

**Poster Type:** Evaluative Study

**Submission Category:** Safety/Quality

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**Purpose:** When used appropriately, benzodiazepines and z-drugs (BZRA) can be effective for the short-term management of acute severe anxiety or insomnia<sup>1</sup>.

The MMUH formulary night sedation choice was agreed for use in consultation with Department of Adult Psychiatry and Department of Medicines for The Elderly<sup>2</sup>.

An audit of night sedation use was carried out in 2008 to assess the compliance with the MMUH formulary. A repeat audit was carried in May 2018.

To assess compliance of night sedation prescribing with the Hospital formulary and to compare results with 2008 audit.

**Methods:** The Clinical Pharmacy Service conducted a one day “snap shot” audit.

- All in patient drug charts were reviewed
- Data collected included the drug name, dose and frequency, whether the patient was admitted on a non-formulary night sedative and if a stop date was indicated.
- 2018 results were analysed and compared with 2008 results

**Results:** 599 patient’s drug charts were reviewed by the Clinical Pharmacy Service.

97 (16%) patients were prescribed night sedation. 39 (40%) of the prescriptions were prescribed in the regular section. No prescription for night sedation had a stop date. 46 (47%) of the patients were prescribed a MMUH formulary agent, temazepam or zolpidem; 44 (96%) of these were prescribed zolpidem. 44 (45%) of patients were prescribed zopiclone, of which, 11 (25%) of these were prescribed after admission to the MMUH.



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**Conclusion:** In 2018, 16% of patients were prescribed night sedation versus 40% of patients in 2008. This is a positive finding. However, in 2018, 47% of patients were prescribed a formulary choice versus 84% in 2008. These results highlight the need for regular review of the hospital formulary agents in conjunction with the relevant consultants.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 1-034

**Poster Title:** Effect of a quality improvement activity to reduce the dispensing errors

**Poster Type:** Descriptive Report

**Submission Category:** Safety/Quality

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**Purpose:** Medication errors can occur at any stage of drug management and use, which can be a threat to the safety of patients, as well as cause additional medical costs, resulting in socio-economic cost losses. Dispensing error is defined as a discrepancy between a prescription and the medicine that the pharmacy delivers to the patient. The aim of this quality improvement activity was to reduce the rate of dispensing error by 30% to contribute to patient safety by analyzing the types of errors that may occur during the preparation and administration phase.

**Methods:** From May to September 2016, we analyzed dispensing errors by type, work schedule and pharmacists' working experience by reviewing the dispensing error report. The major causes of errors were identified through data collection and quality improvement activity was initiated to reduce dispensing errors. These activities included conducting preventive education on dispensing errors, updating educational material, improving the environment of dispensing room, preventing filling errors, supplementing IT system, standardizing of inspection methods and conducting double inspection for accurate preparation of medicines. Then from May to September 2017, the number of dispensing errors after the improvement activity was investigated and the rate of dispensing errors was compared before and after quality improvement activity.

**Results:** The total number of prescriptions was 944,455 before and 977,273 after the quality improvement activity, while the number of dispensing errors was 50 and 33 before and after the quality improvement activity, respectively. The rate of error decreased significantly from

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0.0053% to 0.0034% after the quality improvement activity ( $p=0.011$ ). The most common dispensing errors by category were dispensing wrong quantity, wrong drug, wrong strength and wrong dosage form. By type of error, there were significant decreases after quality improvement activity in quantity errors ( $p=0.016$ ) and dosage form errors ( $p=0.019$ ). By type of work schedule, the rate of errors was higher in the order of holidays, weekdays and nights, and there was a significant decrease in weekdays ( $p=0.042$ ) compared to holidays and nights.

**Conclusion:** As a result of the improvement activity, the error rate was reduced by 32.6% which met the goal of reducing errors by 30%, and it was confirmed that the quality improvement activity was effective in preventing the dispensing error. It is expected that the quality of patient safety and medical care will be improved by reducing dispensing errors through continuing interest, education and process improvement even after the quality improvement activity.

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**Session-Board #** - 1-035

**Poster Title:** Increasing access to mental health and pain management for rural veterans by leveraging clinical pharmacy specialist providers

**Poster Type:** Descriptive Report

**Submission Category:** Small and/or Rural Practice

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**Purpose:** Increasing access to care for rural veterans through integration of mental health and pain clinical pharmacy specialist (CPS) providers affords greater access to comprehensive medication management and quality of care to rural Veterans. The CPS is an advanced practice provider with prescriptive authority to provide comprehensive medication management across the spectrum of chronic diseases encountered in mental health and pain.

**Methods:** Between October 2016 to October 2017, there were a total of 40 Mental Health and 31 Pain CPS Providers hired through a \$136 million 5-year grant to improve access to rural veterans. CPS were evaluated on encounters monthly, number of Veterans served, and the type of interventions provided. Encounters and Veterans served were collected via a national database. CPS interventions were tracked utilizing a standardized template within VA's electronic health record called the Pharmacists Achieve Results with Medications Documentation (PhARMD) tool. This allowed the CPS to efficiently document select interventions made during patient care encounters. A robust infrastructure to ensure success and provider real time support to facilities included standardization of foundational components, workload/productivity metric goals, deployment of a consultative visit process to promote practice sharing, comprehensive CPS mentorship program, and leadership and clinical bootcamps.

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**Results:** From October 1, 2016 to May 30, 2019, the Mental Health CPS Providers served a total of 29,607 Veterans, 54.5% of which were rural, through 89,519 encounters and documented a total of 213,157 interventions. The Pain CPS Providers served a total of 26,409 Veterans, 55.7% of which were rural, through 66,615 encounters and documented a total of 167,723 interventions. Patient care encounters were accomplished through multiple modalities including face-to-face, telephone, clinical video-telehealth, and video to the Veteran's home. The top disease states managed by the Mental Health CPS Providers included depression, anxiety, post-traumatic stress disorder (PTSD), insomnia and pain management. For the Pain CPS Providers, the top disease states included pain management, PTSD, diabetes mellitus type II, depression and anxiety. The Mental Health and Pain CPS Providers collectively had interventions in substance use disorders (731), opioid use disorder (792), alcohol use disorder (2,178) and alcohol withdrawal (18).

**Conclusion:** With the shortage of providers for mental health and pain accompanied by the need for access within rural settings, the CPS Provider in mental health and pain demonstrated increased access in underserved rural Veterans by providing comprehensive medication management through multiple modalities. Strong centralized program support allows for standardization of practice across the system to ensure Mental Health and Pain CPS Provider function in a consistent, optimized role.

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**Session-Board #** - 1-036

**Poster Title:** Prevalence and determinants of anti-platelet and anti-thrombotic medication use in Lebanese pregnant females: a cross sectional study

**Poster Type:** Descriptive Report

**Submission Category:** Women's Health

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**Purpose:** Gestation is associated with a hypercoagulable state due to the increase in the production of clotting factors. Pregnant females are at risk of thrombotic complications, which increases the risk of morbidity and mortality for both the fetus and the mother. The use of anti-thrombotic and anti-platelet agents during pregnancy is increasing. The objective of this study was to examine the prevalence and determinants of anti-platelet and anti-thrombotic medications use during gestation among Lebanese pregnant women.

**Methods:** A prospective, cross-sectional, multi-center study was conducted between December 2018 and May 2019 in pregnant females from the three districts of Lebanon: Beirut (the capital of Lebanon), South, and Mount Lebanon. The study was conducted in different gynecology clinics after receiving the gynecologist approval. The clinics were selected using cluster sampling. The participants enrolled in the study received an informed consent and were interviewed by a registered pharmacist. The pregnant females were asked to complete a questionnaire regarding their demographics, pregnancy state, and the use of anti-thrombotic and anti-platelet medications. The name of the medication was documented with the dose and frequency of administration, in addition to the indication of anti-thrombotic agent use. The main outcome was assess the frequency of anti-thrombotic and anti-platelet use drug pregnancy. Statistics were analyzed using statistical Package for Social Sciences version 25. Statistical tests used were frequency chi-square and logistic regression. P-value less than 0.05 was considered significant.

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**Results:** Of 368 Lebanese pregnant females interviewed, 102 (27%) females used either anti-thrombotic or anti-platelet medications. Of these, 6.8% were from Beirut region and 20% were from South. Of those receiving anti-platelet and anti-thrombotic drugs, the most common drug prescribed was Acetylsalicylic acid at a dose of 81 mg (88.2%) followed by Tinzaparin (10%) at a dose of 3500 IU and 1.9% at a dose of 4500 IU then Enoxaparin (1%) (P-value < 0.05). The major indication for the use of anti-thrombotic and anti-platelet medication was previous abortion (44%), followed by thrombosis (22%), then infertility (11%) and (5%) was due to other causes.

**Conclusion:** Gestation is a period of increased risk for thrombotic events. A large proportion of pregnant women in the Lebanese population received anti-thrombotic medications. The latter suggests a trend in prescribing practices with potentially important implications for mothers, and their neonate. Monitoring of prescribing practices and balance between risks and benefits to mother and fetus should be assessed before the prescription of anticoagulants and anti-platelet agents in pregnancy.

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**Session-Board #** - 4-001

**Poster Title:** Stress and burnout amongst pharmacy caregivers at a quaternary hospital in the Middle East

**Poster Type:** Descriptive Report

**Submission Category:** Administrative Practice/Management/Financial Management/Human Resources

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**Purpose:** This study evaluated the prevalence of stress and burnout syndrome among pharmacy caregivers at a quaternary hospital in the Middle East. We also evaluated the individual contributing factors for stress and burnout syndrome amongst these caregivers.

**Methods:** The anonymous, web- based survey was conducted over one month amongst pharmacy caregivers of a quaternary care hospital in the Middle East. The first section of the cross- sectional survey included demographic information, work related and work experience information. These data elucidated the contributing factors associated with stress and burnout. The remaining part of the survey was conducted using well- accepted and validated psychometric tools. The Warr, Cook and Wall job satisfaction scale has 10 questions with a seven- point likert score for each question which addresses various aspects of the work type, responsibilities and the working conditions. Cohen perceived stress scale has 10 questions with a five- point likert score for each question which measures the perception of stress. Maslach burnout inventory-human service survey contains 22 questions that address three domains of burnout: emotional exhaustion, depersonalization and personal accomplishment. Multivariate analyses were done to show the ordered variables and contributing risk factors which best predicts the overall stress and job satisfaction scale. Correlative analyses were done using Pearson's correlation for each variable against the overall stress and job satisfaction scale.



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These analyses were done using each contributing risk factor against each of the main outcome measures.

**Results:** Survey was sent to 100 pharmacy caregivers and 61 survey responses were received. Completed responses were 53 which included 24 pharmacists and 29 pharmacy technicians. Overall, 73% of the caregivers were satisfied with their job, remaining 19% were neutral and 8% dissatisfied. The prevalence of high burnout in our study was 38%. The prevalence of high burnout in each domain of the Maslach burnout inventory showed 28% emotional exhaustion, 58% depersonalization and 23% personal accomplishment. Our study showed strongly positive correlation between job satisfaction and factors related to good work environment, respect for colleagues, opportunity and recognition at work. Pharmacy regulatory boards and institutional committees should draft policies and set benchmarks to reduce stress and burnout.

**Conclusion:** The level of stress and burnout was comparable to the studies done amongst physicians and nurses. There should be a strong recommendation to limit the causes of stress and to increase the job satisfaction among the caregivers to prevent burnout. After the survey concluded, we included regular team building activities and games; family and social gathering outside work place to reduce stress and burnout amongst our caregivers. This created a family environment in the pharmacy department, there was mutual respect and everyone cared for each other.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-002

**Poster Title:** Effect of targeted interventions on cost savings and inventory control in automated dispensing cabinets at a community hospital's emergency department

**Poster Type:** Descriptive Report

**Submission Category:** Administrative Practice/Management/Financial Management/Human Resources

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**Purpose:** The Emergency Department (ED) is the front line for providing medical services to diverse patient populations. Timely access to medications is critical to efficient and effective patient care. The use of automated dispensing cabinets (ADCs) is increasingly common. However, inventory management continues to be a major challenge. In an era where financial solvency is vital to the survival of hospitals, pharmacies are tasked with the important goal of achieving cost savings while ensuring operation efficiency. The purpose of this study was to evaluate the impact of interventions aimed to optimize inventory control of ADCs in the ED.

**Methods:** This is an 8-month retrospective descriptive study of all medication dispenses made from five ADCs in the ED from October 2018 to May 2019. The interventions used by the pharmacy team include: a) monthly adjustment of inventory for drugs stocked in the ADC based on data from computerized physician order entry (CPOE) system and the ADC console, b) biweekly review and resolution of inventory discrepancies generated by end-users, c) monthly review of inventory stock out rates via reports from the ADC console, d) turning on an ADC feature which required end-users to count all medications upon dispense. The primary outcome of the study is cost of inventory stocked in the ADC. The secondary outcomes of the study include stock out rate, discrepancy rate, and the percentage of medications dispensed from the ADCs. Descriptive statistics was used to determine the outcomes in the study.

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**Results:** A total of 147,112 medication dispenses were included for evaluation. The median for the number of medications dispensed per month was 23,531 (22,557-24941). Over an 8 month period, the median (IQR) reduction in cost of inventory stocked in the five machines was \$10,981 (10495.28-12362.30). The median stock out rate was 1.03 (0.84-1.42), while the rate of user-generated discrepancy of inventory was 4.15 (3.79-4.57). The median vend:fill ratio was 6.4 (5.4-7.1).

**Conclusion:** Targeted interventions resulted in cost savings, operational efficiency, and optimized inventory control for ADCs stationed in the ED.

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**Session-Board #** - 4-003

**Poster Title:** How to create a comprehensive competency plan for a three-hospital system

**Poster Type:** Descriptive Report

**Submission Category:** Administrative Practice/Management/Financial Management/Human Resources

**Primary Author:** Kathy Chang, Cardinal Health; **Email:** kathy.chang@cardinalhealth.com

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**Purpose:** Many organizations struggle with creating and sustaining an organized staff competency plan that meets (or exceeds) federal, state, regulatory and accreditation requirements. At Palomar Health, the competency maintenance plan was convoluted and complex which led to non-compliance with CMS requirements. The goal of the project team was to develop a robust, relevant, automated, low-maintenance system to track competencies in order to assure staff is appropriately prepared for duties assigned as well as meeting/exceeding federal, state, regulatory and accreditation requirements.

**Methods:** This study was completed at Palomar Health, a three-hospital system with a 288-bed hospital (retail pharmacy on site), a 107-bed hospital and a 50-bed hospital with an infusion center. The culture and lack of leadership led to a disjointed competency system that delivered education via multiple methods and was ineffective at accurately or consistently tracking completed assignments. A gap analysis was performed on the existing competency system to identify variations from accreditation standards. Evaluation included a review of the online competency and training documentation system (iXpand), stand alone competencies (e.g., Pyxis, Medkeeper, sterile preparation), the process for competency assignment and tracking, leadership support and pharmacy culture. Gaps identified were used to create an action plan (30-day completion plan as promised to the California Department of Public Health) that helped to evolve and simplify the existing process, including combining and streamlining education delivery methods and documentation into a centralized, automated, electronic, organization-wide process. Duplicate competencies were eliminated and remaining competencies were updated as needed. Healthstream learning management system access was added to provide

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better accessibility and tracking. A new competency plan was created for the pharmacy that will be reviewed annually. Any new assignments will require System Director approval and be tracked for completion .

**Results:** Over 9000 electronic and paper competency records for 119 employees were reviewed as part of the gap analysis. Prior to project implementation, technicians and pharmacists were assigned 177 and 373 competencies, respectively. At the completion of the project, competency assignments for new hire technicians and pharmacists were reduced to only 31 and 46, respectively. All competencies are now initiated and tracked via iXpand and Healthstream. The compliance rate with assigned competencies increased from 43% prior to implementation up to 98.7% after completion. iXpand now automatically assigns competencies based on job code/title and accreditation/regulatory requirements (e.g., new hire, annual).

**Conclusion:** The use of a multi-step assessment tool and action plan led to streamlined competency requirements for pharmacy staff which resulted in a substantial increase in competency completion and documentation compliance per accreditation and regulatory requirements.

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**Session-Board #** - 4-004

**Poster Title:** Bedside prescription delivery program impacts hospital readmission rates

**Poster Type:** Descriptive Report

**Submission Category:** Administrative Practice/Management/Financial Management/Human Resources

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**Purpose:** Reduction of hospital readmission rates are a focus for hospitals to improve quality of care and optimize reimbursement. Hospital based outpatient pharmacies can provide assistance through eliminating barriers to accessing medications and provide drug counseling. Patients with co-payments of \$50 were four times more likely to abandon a prescription than patients paying \$10. Up to 50 percent of prescriptions never reach a pharmacy. The primary goal of this project was to provide access to medications to positively improve outcomes and reduce readmission rates. A secondary goal was to ensure patients understand the importance of their medications and possible side effects.

**Methods:** A transitions of care team housed within a community hospital outpatient pharmacy was developed. The project team developed a platform within their electronic medical record to identify patients who are at high risk for readmission, focused on high cost medications which often require prior authorizations and patients who are uninsured or under-insured. The team then worked with case management and nursing to assist with enrollment into the bedside delivery program. Case management involvement was essential with assisting with patients who face economic hardship when trying to maintain a medication regimen. The transitions of care team review medication profiles to identify drug-drug interactions, duplicate therapies, and high cost medications before the patients are discharged. The transitions of care team proactively reach out to the clinical team when an issue is identified allowing corrections

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to be made prior to discharge. Prescriptions are filled and delivered to the patients' bedside before discharge. Prescription counseling by a pharmacist is provided to all patients who participate in the bedside program to ensure comprehension of how to properly use their medications and understand possible side effects. The transitions of care team identify and resolve payment barriers to purchasing prescriptions. An analysis of readmission rates were performed and comparisons were made between patients who received medications at discharge to patients who chose not to participate in the bedside delivery program.

**Results:** This project has resulted in an increase from a 5 percent discharge prescription capture rate, to 61 percent (12.2 fold increase) of all discharge prescriptions being filled by the hospital-based outpatient pharmacy. The increase prescriptions contributed to \$736,562 gross revenue since the initiation of the project in October 2017 (23.6% growth). The total readmission rate calculated from the Premier data set was 9.6 percent (1761/18250), the non-bedside program participant readmission rate was 16.1 percent (1521/9421) and the bedside program participant readmission rate was 5.5 percent (240/4328).

**Conclusion:** Embedding a transitions of care team within a hospital based outpatient pharmacy led to scientifically identifying patients who were at higher risk of hospital readmission. Proactively reviewing medications before patients discharge promoted identification of barriers to medication access. Additional education was provided to ensure patient understanding of the importance of their medications and potential side effects. This process change has had impact on decreased readmission rates, improving patient outcomes and decreasing additional expenditures to the health system.

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**Session-Board #** - 4-005

**Poster Title:** Fosaprepitant conversion results in significant cost-savings

**Poster Type:** Evaluative Study

**Submission Category:** Administrative Practice/Management/Financial Management/Human Resources

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**Purpose:** Neurokinin (NK)-1 receptor antagonists play a key role in the prevention of acute and delayed nausea associated with moderate and highly emetogenic chemotherapy. Until late 2017, fosaprepitant was the only one intravenous (IV) NK-1 receptor antagonist available. Fosaprepitant is a prodrug of aprepitant. The approval of IV aprepitant provides an alternative to fosaprepitant with similar pharmacokinetic profiles and indications. The purpose of this study is to document the cost savings after a therapeutic interchange from fosaprepitant to IV aprepitant at Kalispell Regional Medical Center.

**Methods:** This is a retrospective review of the cost savings from a therapeutic interchange from fosaprepitant to IV aprepitant. This interchange was reviewed and approved by the Pharmacy and Therapeutics Committee. Aprepitant 130mg IV was substituted for fosaprepitant 150mg beginning in October 2018 for adult patients. Patients already approved for fosaprepitant were continued on this therapy for the remainder of their regimen. Actual savings were calculated using actual acquisition costs and review of purchase data. Projected annualized savings were based on volume from the past 12 months and current pricing.

**Results:** Actual drug spend in the 6 months after the interchange decreased by over 20% while volume stayed relatively stable. 22% of the drug spend for these agents is on a GPO account while 78% is on a 340b account. Projected annualized savings are approximately \$60,000.



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**Conclusion:** The availability of a second IV NK-1 receptor antagonist warrants a review to determine the most cost-effective product for the prevention of acute and delayed nausea and vomiting associated with moderate and highly emetogenic chemotherapy. These two agents have similar pharmacokinetic profiles and indications, making a therapeutic interchange a straightforward choice to achieve cost savings. In hospitals with a similar profile, significant costs savings of over 20% can be expected.

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**Session-Board #** - 4-006

**Poster Title:** Analysis of current status on the outpatients' prescription and the proposal of improving payment system for pharmacy dispensing fee

**Poster Type:** Evaluative Study

**Submission Category:** Administrative Practice/Management/Financial Management/Human Resources

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**Purpose:** In terms of the in-hospital dispensing for outpatients, the proportion of patients with a severe disease is larger than outside hospital. Also in-hospital dispensing has more prescribed medicines per patient and a considerable percentage of powdered medicine or divided tablet. However, in-hospital dispensing fee of Republic of Korea, differing from outside of hospital pharmacy, is only consisted of "dispensing and medication counseling fee," and so produces relatively lower dispensing fee in total.

Therefore this research was conducted to compare the current status of both in and outside hospital prescriptions and discuss the improvement of in-hospital dispensing fee.

**Methods:** The research used the term that is "in hospital" and "outside hospital". In hospital dispensing is made by in-hospital pharmacy for outpatients and outside hospital dispensing is prepared by community pharmacy for outpatients. Also the term of concurrent prescription means that one patient's prescription is divided by in-hospital and outside hospital dispensing. From June 1 in 2018 to June 30 in 2018, the research compared the current status of both in and outside hospital prescription records according to clinical department and form of dispensing (ATDPS(Automatic Tablet Dispensing and Packaging System), blister & pill counting, powder, syrup, topical, and injection medicine) in Samsung Medical Center.

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Additionally, the research analyzed the percentage of concurrent prescription for both in and outside hospital among total hospital prescription. For comparing, this research used item number which means that multiply prescription days by the number of medications.

**Results:** During the research period, number of patients is totally 80,686 and prescriptions number is 89,548. Among these, in-hospital prescription was 10,561 (12%) and outside hospital was 78,987 (88%). Prescribed medicines per patient were 3.2 of in-hospital and 2.9 of outside hospital.

In terms of the “item number,” the high rank five departments of in-hospital prescription were surgery (32.9%), nephrology (20.5%), neurology (12.5%), psychiatry (11.8%), and pediatric (5.3%).

The average number of medicines prescribed per patient was the highest in the department of neurology for both in and outside hospital, recording 6.0 of in-hospital and 3.8 of outside hospital.

Within total prescriptions, the percentage of powdered prescription was 2.2% of in-hospital and 0.7% of outside hospital dispensing. The percentage of pediatric patients under age 4 who need powder remedy was 5.0% of in-hospital and 0.9% of outside hospital dispensing.

Clinical departments with the high percentage of powdered prescription were the pediatric (26.9%), rehabilitation (5.2%), and neurology (4.8%).

Additionally, 3,176 prescriptions to the amount of 30.1% among in-hospital prescription, were a concurrent prescription for both in and outside hospital. The causes of concurrent prescription were “required medication for treatment during doctor consultation (28.7%),” “injection (27.3%),” and “compounding medication in hospital pharmacy (15.5%).”

**Conclusion:** The research showed that the pediatrics department with the highest percentage of powdered prescription and the neurology department with many medicines prescribed per patient, comprise a larger proportion of the in-hospital prescription than outside hospital. Additionally, the number of concurrent prescriptions comprised 30.1% of total in-hospital prescriptions. However the dispensing fee for in hospital prescriptions in this case is not arranged by the national health insurance.

Therefore, it appears that improvement in dispensing fee for the in-hospital prescription of outpatients is required by considering the difficulty of dispensing and concurrent prescriptions.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-007

**Poster Title:** Pharmacy-faculty work-life balance and career satisfaction: comparison of national survey results from 2012 and 2018

**Poster Type:** Evaluative Study

**Submission Category:** Administrative Practice/Management/Financial Management/Human Resources

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**Purpose:** To survey United States (U.S.) pharmacy faculty and compare current attitudes regarding work-life balance and career satisfaction with results from a similar survey conducted in 2012. The previous study found pharmacy faculty members to have relatively high levels of job satisfaction but relatively low levels of work-life balance. The 2012 survey also found work-life balance to be significantly related to intention to remain in academia.

**Methods:** A Web-based survey was administered via Qualtrics to members of the American Association of Colleges of Pharmacy (AACP). Survey items included demographics (i.e., gender, age, marital status and ethnicity), type of college (public vs. private), department, academic rank and years in academia. In addition, the validated perceived stress score (PSS) was used to assess stress. Questions related to faculty work-life balance, career satisfaction, lifestyle and stress-coping mechanisms were also queried. An initial invitation to participate in the survey was sent in June 2018, followed by three email reminders to non-responders until the survey closed in November 2018. The 46-item questionnaire took approximately 15 minutes to complete and participants who completed the survey were offered a chance to enter a random drawing for one of three \$50 gift-cards. Pharmacy faculty within the U.S. who were members of AACP and had a valid email address and internet access were eligible to participate in the study. The previous study conducted in 2012 utilized a similar methodology and format.

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Statistical comparisons between study years 2012 and 2018 were made using Student t-tests, Chi-square or Fischer's exact tests, as appropriate, using SAS V9.2. The study received Touro University California IRB approval.

**Results:** Of the 5,773 AACP members invited to participate, 1,205 initiated or started the survey with 1,090 completing the survey in its entirety for an overall response rate of 18.9%. The 2012 survey had a similar sample size and response rate (sample size=811, response rate=16.9%). Among the 1,090 respondents in the 2018 survey, 63.7% were female, 63.0% were aged 30-49 years and 79.2% were white. Institutional type (public vs. private) and length of time in academia (< 9 years or > 10 years) were nearly evenly split, with 48.7% reporting being employed by a private school and 52.1% reported being in academia for 9 years or less. In comparison to the 2012 sample, there were significantly more females (63.7% vs. 57.1%,  $p<0.01$ ), fewer assistant professors (40.7% vs. 46.0%,  $p<0.01$ ), more associate professors (34.2% vs. 27.5%,  $p<0.01$ ), and a greater percentage of pharmacy practice professors (71.4% vs 66.2%,  $p<0.01$ ) in the 2018 sample. The mean PSS was also significantly higher in 2018 ( $16.0 \pm 6.6$  vs.  $13.5 \pm 6.7$ ,  $p<0.01$ ) relative to 2012. Other measured demographic (e.g., marital status, number of children), and institutional variables (e.g., full professor, department or committee chair) were relatively similar between 2012 and 2018.

**Conclusion:** The makeup of educators has evolved to comprise more female and associate professors working within a pharmacy practice department. Noteworthy is the significant increase in self-reported stress. The implications of this are unknown but suggest that while academia is maturing and changing to reflect the current pharmacy workforce there has been a marked increase in stress. Limitations of the study include broader limitations of survey research (recall bias and response rates). Findings may aid administrators with plans to recruit and retain faculty. Stress may be a burgeoning concern, especially as roles continue to change rapidly within the academic workplace.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-008

**Poster Title:** Impact of a technician led inventory stewardship program at a community hospital

**Poster Type:** Descriptive Report

**Submission Category:** Administrative Practice/Management/Financial Management/Human Resources

**Primary Author:** Helen McKnight, Princeton Baptist Medical Center; **Email:** helen.mcknight@bhsala.com

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**Purpose:** Skyrocketing inpatient hospital drug costs have forced pharmacy leaders to be creative in pharmaceutical spend control. The purpose of this project was to assess the impact of a strategic inventory stewardship program led by an inventory management specialist and senior pharmacy technicians on annual pharmaceutical drug spend, on hand inventory value, and inventory turnover rate over a three year period. The primary endpoint was reduction in annual pharmaceutical drug spend. Secondary endpoints were changes in on hand inventory value and inventory turnover rate over a three year period. The projected reduction was ten percent from 2015 to 2018.

**Methods:** The pharmacy department has thirty-seven full time equivalents, including thirteen pharmacy technicians. The technician staff were tasked with saving ten percent of the pharmacy annual drug spend (\$900,000) from 2015 to 2018. The inventory management specialist and senior technicians established internal initiatives (for example, perpetual inventory software implementation; pharmacy formulary streamlining; therapeutic interchanges; drug cost monitoring; unit-dose strip packing outsourcing; quarterly review of automated dispensing machine usage levels and expiration dating; Central Pharmacy/IV room par level enhancement; and a NDC substitution program) to ensure adequate stock of formulary medications, optimize patient care through inventory control, and budget stewardship. Drug costs were calculated using wholesaler and inventory vendor biannual reports. Daily drug expenditures were entered on an Excel spreadsheet and characterized by

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primary and secondary vendors. The information was forwarded to the Pharmacy Director on a monthly basis for analysis. Changes in the primary and secondary endpoints were described with descriptive statistics.

**Results:** The annual pharmaceutical spend decreased by \$1.4 million, resulting in a 17 percent cost savings during the three year period. The initiatives associated with the largest reductions in pharmaceutical drug spend were perpetual inventory software implementation (\$545,000), pharmacy formulary streamlining (\$300,000), and automated dispensing machine usage level adjustment (\$284,000). For the same time period, the on-hand inventory value was reduced by \$593,000, a 42% reduction. The inventory turnover rate increased from 5.5 to 10.5 turns from 2015 to 2018.

**Conclusion:** Pharmacy technician led inventory stewardship efforts can assist in the reduction of pharmaceutical drug spend via perpetual inventory software implementation; changes in on-hand inventory value via pharmacy formulary streamlining; and inventory turnover rate via automated dispensing machine usage level adjustment. Technicians can be instrumental in prioritizing strategies, highlighting inefficient processes, and improving inventory management.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-009

**Poster Title:** Ambulatory clinical pharmacy specialist's contribution to the complex care practice: an innovative multidisciplinary service to reduce readmissions and emergency room visits from high utilizers

**Poster Type:** Descriptive Report

**Submission Category:** Ambulatory Care

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**Purpose:** Patients with multiple comorbidities and high hospital/ED utilization rates result in increased healthcare costs. Literature shows that team-based ambulatory care for these patients can decrease hospital readmissions and emergency room visits (HR/EV) and reduce healthcare expenditures, and that clinical pharmacy plays an important role on these teams. The newly formed Complex Care Practice (CCP) at Greater Baltimore Medical Center is a patient-centered approach that actively utilizes an ambulatory-residency trained clinical pharmacy specialist. The team influences patient behaviors and outcomes by addressing clinical issues, including medical and pharmacologic, and social determinants of health (SDH) in the ambulatory setting, thus reducing HR/EV.

**Methods:** The practice consists of 2 internists, an ambulatory-residency trained clinical pharmacy specialist, nurse, social worker, practice manager and medical assistant. CCP was designed throughout 2018 and welcomed its first patient in March 2019. Patients are identified through the hospital's EHR, Maryland's HIE system, and physician referrals. Patients with more than 5 HR/EV within the past year are considered for inclusion. If both the patient and their PCP agree, care is temporarily transferred to CCP. The team—with active involvement from the ambulatory clinical pharmacy specialist—meets with the patient, either in the office or the patient's home, and assesses clinical indicators and SDH that are root causes of high utilization. A comprehensive care plan is developed with the patient, and involves multidisciplinary coordination, self-management, and often includes home visits. The clinical pharmacist is



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present during clinic hours to review patient cases with the interprofessional team and to address medications and barriers to access/adherence. The clinical pharmacist proactively identifies medication issues that could lead to a HR/EV, performs regular face-to-face and telephonic communications with patients, recommends interventions and evidence-based cost-effective regimens, educates patients, and contributes to the development of new team-based care plans. Weekly group rounds ensure outreach and follow-up care are adequate and consistent. Once the patient graduates from the practice, a warm handoff occurs with their PCP or a patient-centered medical home near their home/workplace.

**Results:** Hospital leadership identified a cohort of patients who were responsible for a disproportionately high number of HR/EVs and related costs. Sixteen patients were enrolled during the first two months of the CCP model. Initial data show that HR/EVs for this cohort decreased from a monthly average of 7.3 in the 12 months pre-enrollment to a monthly average of 2.5 post-enrollment. In one case, a hemodialysis patient had a low hemoglobin and was instructed to go to the ED by his dialysis nurse. Because the patient was engaged in the CCP, he first called the CCP hotline and the team arranged for an immediate blood transfusion in the hospital's ambulatory infusion center. This eliminated the need for an ED visit, led to a satisfied patient who was home a few hours later, and saved thousands of dollars in health care costs. In two recent cases involving opioids, the ambulatory clinical pharmacist prevented ED visits by making medication recommendations, securing pre-authorizations, educating the patients, and obtaining medication use contracts. Enrollment in the program is continuing, and while initial data are limited, the team anticipates an ongoing decrease in HR/EV that is statistically significant.

**Conclusion:** The transfer of high-risk patients from traditional primary care to the CCP holds great promise. Review of CCP data shows an initial reduction in HR/EV and suggests this improvement is sustainable, due to the multidisciplinary team's approach in reducing costs by assessing clinical indicators and SDH. Every team member has a workflow focused on the program's success, and the ambulatory clinical pharmacist specialist is an essential member who enables an immediate response to medication-related issues, including adherence and access. The complementary knowledge and skills of the team lead to improved patient care, medication use and reduced healthcare costs.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-010

**Poster Title:** Impact of a pharmacist in the outpatient clinic of a community hospital

**Poster Type:** Descriptive Report

**Submission Category:** Ambulatory Care

**Primary Author:** Lissette Bauza, South Miami Hospital; **Email:** lissetteba@baptisthealth.net

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**Purpose:** Growth of pharmacists' services in ambulatory care settings is strongly supported by an array of pharmacy and non-pharmacy organizations. Pharmacist integration into outpatient care clinics can provide improvements in prescribing practices, adverse event rates, clinical outcomes, and hospitalization rates. Impact is measured directly through report of hospitalization and/or disease exacerbation rates or indirectly through reports of other measures such as patient adherence/compliance rates, interventions, efficiency scores, and patient satisfaction. At our institution outpatient services are provided to patients. The purpose of this study was to measure the impact of the pharmacists' presence at the outpatient setting.

**Methods:** This was a prospective, observational study conducted from February 25th, 2019 to March 22nd, 2019. A pharmacy resident was integrated with the healthcare team at the ambulatory care clinic. The study objectives were to assess and quantify interventions provided by the pharmacist, to assess the impact of the interventions on cost avoidance, and to assess patient satisfaction. All interventions provided by the pharmacist were documented in the patients' electronic health record. A literature review was conducted in order to correlate interventions with the estimated cost avoidance. Patients who had direct interaction with the pharmacist were asked to take an anonymous patient satisfaction survey.

**Results:** There was a total of one-hundred and three patient encounters. One-hundred sixty-three interventions were conducted and documented. The majority of the interventions were medication reconciliations and patient education sessions. A total of 140 (85.9 %) of the interventions made were accepted and majority of the encounters took around 6-15 minutes of the pharmacist's time. The estimated total cost avoidance during the study period was

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\$13,312.64. Results of the patient satisfaction surveys revealed a positive perception of their interaction with the pharmacist.

**Conclusion:** The pharmacist's presence in the ambulatory care clinic is beneficial for patient care while at the same time can result in significant cost avoidance to the hospital. Staffing a pharmacist in the ambulatory care clinic year round may result in a cost avoidance of approximately \$ 159,751.68. Patient satisfaction survey data suggest that patients were satisfied with the presence of a pharmacist in the ambulatory care clinic.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-011**

**Poster Title:** Implementation of an integrated, hospital-owned specialty pharmacy and care model at a large academic institution

**Poster Type:** Descriptive Report

**Submission Category:** Ambulatory Care

**Primary Author:** Bridget Cahill, Shields Health Solutions; **Email:** bcahill@shieldsrx.com

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**Purpose:** The specialty pharmacy industry includes some of the nation's most complex patient populations. The pharmacy is located within the hospital, and has partnered with a specialty pharmacy integrator to build its clinical program. An integrated care team plays a significant role in identifying and minimizing barriers to adherence, providing education, support, and encouragement to improve patient outcomes. We sought to assess our care model and its impact on successfully treating patients with hepatitis C.

**Methods:** The integrated model is inclusive of pharmacists and technicians who collaborate within the health system. Technicians are utilized both within the pharmacy and as patient liaisons located within each clinic. Liaisons assist providers with prior authorizations and obtain financial assistance. They are an accessible point of contact for patients, and perform personalized outreach calls before a medication refill is due. The model also encompasses clinical pharmacists, who are trained and experienced in specialty conditions, and provide proactive care to patients via telephonic outreach. All are, or in the process of becoming, Certified Specialty Pharmacists. Initial patient consultations include a full medication review prior to therapy, while follow up consultations occur regularly thereafter. Continuous education and support is provided to patients throughout the duration of their treatment. The clinical pharmacist team has full accessibility to view patient's electronic medical records and may discuss changes to a patient status with providers in real time. We conducted a retrospective, observational analysis to assess the impact of the care model in patients with hepatitis C in relation to adherence and SVR12. To minimize confounders associated with treatment length,

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pill burden, and tolerability we included only patients on ledipasvir/sofosbuvir. Patients were excluded if they were not seen at the institution, initiated therapy outside of 2017, or did not have at least one telephonic clinical assessment prior to or during therapy.

**Results:** We identified 200 patients of which 142 were included. The majority of patients were male (63.4%) and the median age was 52. The majority of patients were treatment naïve (83.8%) without cirrhosis (77.5%), and a fibrosis score of 0 (33.58%). The most common genotype treated was 1a (78.2%). There were 56 (39.4%) patients who did not return for bloodwork within the allotted timeframe of 12-36 weeks post treatment completion. There were 86 patients who had labs available for collection during the study period, 82 (95.3%) patients achieved SVR-12, and 4 (4.7%) patients failed treatment. We reviewed adherence for all patients as proportion of days covered (PDC); the mean PDC for all patients was 98.1% (79.2-100%). There was a small difference in PDC between those who achieved SVR12 and those who failed treatment (98% vs 94% respectively).

**Conclusion:** In conclusion, we found our care model to achieve a high rate of SVR12 and PDC in patients taking ledipasvir/sofosbuvir. It is imperative to establish a specialty pharmacy program that provides a high level of patient care and support, while striving to continuously improve patient outcomes. We identified the number of patients (39.4%) who did not return for bloodwork as an area for improvement. Since this finding, we have modified our best practices, including additional outreach to patients extending past completion of drug therapy to ensure outcome of therapy is obtained.

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**Session-Board # - 4-012**

**Poster Title:** New steps to reduce 30-day readmission through discharge counseling and follow-up phone calls in a meds-to- beds program

**Poster Type:** Evaluative Study

**Submission Category:** Ambulatory Care

**Primary Author:** Larry Calemine, WVU Medicine; **Email:** caleminel@wvumedicine.org

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**Purpose:** The meds to beds program at WVU Medicine in Morgantown, West Virginia is designed to reduce 30-day readmission, improve outcomes, and help transition patients back to the outpatient setting with as little disruption as possible. Part of this service not only offers bedside delivery of the patient's medications, but includes medication counseling and patient follow-up upon discharge. During the follow-up process patients were assessed on compliance to their treatment regimen, inquired about post-discharge issues as well as the patient's satisfaction of the discharge service. The main focus was to determine the adherence to the medication regimen post discharge.

**Methods:** During a 3-month period, patients were asked if a follow-up phone call was permitted to assess the following: If the medication regimen was changed post-discharge, adherence to the current regimen, which healthcare personnel offered the service, timeliness of delivery, opportunity for patients to address any concerns and the quality of the meds to beds program on a scale of 1- 5 (with a 5 being the highest score). The staff made three attempts within a 3 to 30-day time frame to reach the patient or caregiver. If the patient was not reached after the third attempt the patient was removed from the study. An excel spreadsheet was used to collect data and compared to the pharmacy's adjudication software to identify whether medications were dispensed and if meds to beds services were offered. EPIC software was used to develop folders to track patients accepting discharge services and to perform follow-up phone calls.

**Results:** Among the patients contacted during our outreach time frame, 62% of the patients utilized our discharge service while 38% left without their medications being dispensed.

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Analysis showed the most common reasons for not filling their prescriptions at the discharge pharmacy were a reassignment of their discharge disposition to a Skilled Nursing Facility, no new medications prescribed at discharge, or the patient's desire to use their home pharmacy. The results showed approximately 94% received their medication in a timely manner which coincided to their discharge. Approximately 75% of all patients received medication counseling at the time of discharge from either pharmacy or nursing staff. Of the patients receiving the follow-up 82% reported no changes in their medication regimen and the meds to beds service satisfaction scored an average of 4.69 on a 5-point scale.

**Conclusion:** Although the discharge service satisfaction scores remain high and compliance was promising, room for improvement is required. Inter-professional and patient communication still requires improvement and is our goal moving forward. Multidisciplinary in-service meetings have and will be instituted to provide a seamless discharge and identify problems in the discharge process. Collaboration with inpatient pharmacy has been instituted. Meetings for problem solving and improvement happen bi-weekly. Med history technicians and Pharmacy Interns are utilized to reach out and offer more patients the discharge service, identify issues, and act as a discharge liaison between the pharmacy and hospital floors.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-013**

**Poster Title:** Liver safety of ulipristal acetate for the treatment of uterine fibroids: a real world experience in a Korea hospital

**Poster Type:** Evaluative Study

**Submission Category:** Ambulatory Care

**Primary Author:** Ji Young Choi, Asan Medical Center; **Email:** readyjy@gmail.com

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**Purpose:** Ulipristal acetate (UPA), is a selective progesterone-receptor modulator, it decreases fibroid size and reduces menstrual bleeding. On 31 May 2018, the European Medicines Agency (EMA) recommended that several measures be put in place to minimise the risk of rare but serious liver injury with Esmya (UPA). This study was designed to evaluate the long term safety of UPA in real-world practice, with focus on liver safety.

**Methods:** This retrospective study consisted up to 8 consecutive 3-month courses of daily UPA 5mg. The electronic records of patients treated with UPA from January 2014 to December 2018 were reviewed. The main outcome measures were included the liver function test values (alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), total bilirubin) and symptoms of liver injury.

**Results:** All data was reported in a descriptive manner with no formal statistical comparisons. The 189 pre-menopausal women, with moderate to severe symptomatic uterine fibroids, were included. The median age was 45 years (range, 19-58 years) and the median number of intermittent treatment courses was 3 intermittent courses (range, 1-8 courses). All patients received 5mg/day UPA. No patients reported ALT/AST > 5×Upper Limit Normal (ULN) or ALP > 2×ULN or the combination of ALT/AST >3×ULN and total bilirubin >2×ULN during long-term intermittent treatment courses with 5mg UPA. Five patients (2.6%) reported ALT/AST > 3×ULN, but no signs of liver injury are identified.



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**Conclusion:** In this retrospective study, repeated UPA treatment did not present the signal of hepatic toxicity. The results of this study support the liver safety profile of extended use with UPA 5 mg/day. Based on the recent EMA review, the benefit/risk ratio of UPA remains positive, considering that periodic liver monitoring before, during, and after treatment with UPA for the prevention of rare risk of liver toxicity.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-014**

**Poster Title:** Pharmacist managed chronic disease state management under the patient centered medical home (PCMH) model: a cost-analysis

**Poster Type:** Evaluative Study

**Submission Category:** Ambulatory Care

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**Purpose:** The Patient Centered Medical Home model has risen in popularity to utilize multidisciplinary teams and continuous healthcare in the primary care setting. Many questions still exist on the effectiveness of the PCMH model on outcomes and costs. One component of interest is pharmacist inclusion in the PCMH model. Pharmacists under the PCMH model provide services such as medication therapy management and chronic disease state monitoring. The objective of this study was to compare associated healthcare costs for patients seen by a pharmacist under the PCMH model with those not seen by a pharmacist.

**Methods:** This retrospective case-control study was approved by the University of Nebraska Medical Center Institutional Review Board. This study was conducted at a large academic medical system in Omaha, Nebraska. A chart review was done to find PCMH patients participating in a pharmacist chronic disease state management service during calendar year 2018. Chronic disease states included diabetes, hypertension, and anticoagulation monitoring. Patients and the service they participated in were extracted from electronic health records. Using medical and pharmacy claims obtained through the partner accountable care organization, participating patients were matched to up to two controls with similar diagnoses, insurance provider, age, and risk-scores. The outcomes of interest were all cause hospitalizations and total costs obtained through claims data. Costs were also broken out by inpatient, ambulatory, prescription, and professional costs. All disease states were compared together and individually. Rates of hospitalizations were compared statistically using Chi-Square

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analysis while costs of services in different locations was compared using the Wilcoxon Ranked Sum test.

**Results:** A total of 244 pharmacist managed patients were matched to 415 control patients. That included 195 patients receiving anticoagulation services, 18 for hypertension, and 31 for diabetes. Hospitalization rates were low for both groups (4.1% for PCMH and 6.5% for controls) and the difference was not statistically significant for the disease states combined or individually. The mean net amount paid was higher in the PCMH participating group though not statistically significant (\$12,756 versus \$11,730,  $p=0.1527$ ). The ambulatory and prescription costs were both significantly different,  $p < 0.0001$  for both. Ambulatory costs were higher for the PCMH group (\$6,177 versus \$4,794) while prescription costs were lower than the control group (\$727 versus \$1,187). Professional and hospital costs were not statistically different ( $p=0.1611$  and  $p=0.3496$ ) between the groups.

**Conclusion:** This analysis serves as a measure of financial impact of pharmacists under the PCMH program on costs associated with hospitalizations. Due to a small sample size from to limited complete claims data for all PCMH participating patients, only ambulatory and prescriptions costs were found to be significant. Having pharmacist management on the PCMH model showed a decrease in prescription costs and an increase in ambulatory care costs in this setting. Future research with a larger population and longer duration of follow-up are needed to adequately assess the financial impact of pharmacist involvement in the care of PCMH patients.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-015

**Poster Title:** The role of the pharmacist in pharmacogenomics testing in a family medicine residency practice

**Poster Type:** Descriptive Report

**Submission Category:** Ambulatory Care

**Primary Author:** Staci Dotson, Mercy Health St. Rita's; **Email:** srdotson@mercy.com

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**Purpose:** Pharmacogenomic testing for medications is an emerging science providing new ways of optimizing personalized medicine and provide better pharmaceutical care. There are a wide variety of medications that have specific genotype and phenotypes that can give medical providers assistance in medication selection. Medications that are metabolized by the cytochrome P450 system are often the target of genetic reporting. Oftentimes, this includes mental health and opioid medications. Commercial testing is available for these classes of medications. Testing for these classes can help prevent adverse events and save patients money by choosing optimum therapy at the start of treatment.

**Methods:** Patients receiving pharmacogenomic testing have failed on previous medications or have other intolerances or allergies to medications. Patients may also be on multiple medications that are at high risk of experiencing medication interactions. Patients electing to receive genetic testing undergo a buccal swab in the family medicine office. This testing is then submitted to the genetic company and once completed, results are available via patient portal. Results typically take between 1 to 2 weeks. After that time, the patient is seen in clinic with provider and pharmacist to review results and to determine the best choice of therapy based on these results. Medical providers in the clinic include D.O, M.D., CNP and first year medical residents.

**Results:** No additional revenue is brought into the clinic with genetic testing. Having the pharmacist available to review results with the patients allows for the provider to have more time to see other higher complexity patients that result in higher billing codes (99213-99215). The ambulatory pharmacist serves as the interpreter and recommends therapy to the provider. This improves patient's quality of life and results in decreased side effects from medications.

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Using pharmacogenetic testing allows for the patient to receive better therapy personalized for them and results in better use of their copay allotment.

**Conclusion:** The use of pharmacogenomic testing presents as a novel way for pharmacist to assist in medication selection. Not only does the use of this testing help to make better medication decisions but also to help direct counseling on medication therapy. Pharmacogenomic testing resulted in better control of symptoms and better outcomes reported by patients. The role of a pharmacist in this capacity allows for better use of billable provider time.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-016

**Poster Title:** Correlating weekly warfarin dosing with patient shoe size: does size matter

**Poster Type:** Evaluative Study

**Submission Category:** Ambulatory Care

**Primary Author:** Rebecca Erb, AtlantiCare Regional Medical Center; **Email:**  
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**Purpose:** The dose of warfarin required to keep patients within the desired therapeutic range is dependent on many patient-specific factors. Liver volume, determined by ultrasound, appears to have a positive correlation with warfarin dosing requirements. Patient height also has a positive correlation with liver size. Moreover, patient height is correlated with foot length. Therefore, the size of a patient's foot may be a representation for liver size, which may have a positive correlation with warfarin dose requirements. The purpose of this study is to examine the relationship between weekly warfarin dose and patients' shoe size.

**Methods:** This retrospective evaluation occurred between June 2017 and January 2018. Patients were identified from a generated report using e-Clinical Works and were included if they were a patient of the anticoagulation clinic at AtlantiCare Regional Medical Center (ARMC) and were prescribed warfarin. Patients were excluded if they were over the age of 65, had a history of coagulopathy, significant drug interactions, documented dietary issues, and comorbidities affecting warfarin. Those included had a therapeutic International Normalized Ratio (INR) of 2-3. Medical records were reviewed and data collection included gender, age, weekly warfarin dose, height, weight, and shoe size per patient interview and observation. Body Mass Index (BMI), ethnicity, comorbidities, coagulopathies, and potential drug interactions were also recorded. The Pearson correlation coefficient was used to determine a relationship between patients' total weekly dose of warfarin and shoe size.

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**Results:** Forty-seven patients were included in our analysis with an average age of 55 years (range 29 to 65 years) with 34 males (72.4 percent). The average weekly warfarin dose, height, weight and shoe size were 51.6 milligrams (mg), 174 centimeters (cm), 97.8 kilograms (kg) and 10, respectively. Statistical analysis was utilized to compare weekly warfarin dose with age, gender, weight, BMI, height, and shoe size. There was a negative correlation between weekly dose and age ( $r = -0.4663$ ;  $P = 0.0013$ ). There was a positive, direct correlation between weekly dose and BMI ( $r = 0.3481$ ;  $P = 0.019$ ), shoe size and height ( $r = 0.7665$ ;  $P = < 0.0001$ ), and weekly dose and shoe size ( $r = 0.3377$ ;  $P = 0.0202$ ).

**Conclusion:** The results of this study provide evidence of a relationship between weekly warfarin dose and patient's shoe size in adults 65 years of age or younger. The clinical application of our findings is limited since multiple variables may impact warfarin dosing requirement. Further studies are warranted with a larger sample size to confirm if shoe size is a predictor of warfarin dosing.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-017**

**Poster Title:** Implementation of system pharmacy and therapeutics committee approved therapeutic interchanges for biosimilars at a community hospital within a large integrated health system

**Poster Type:** Descriptive Report

**Submission Category:** Ambulatory Care

**Primary Author:** Lisa Farah, University Hospitals Geauga Medical Center; **Email:** Lisa.Farah@uhhospitals.org

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Indrani Kar

**Purpose:** To provide insight into the various challenges and advantages associated with the implementation of system pharmacy and therapeutics committee (P&T) approved therapeutic interchanges for select biosimilars infliximab-dyyb, pegfilgrastim-cbqv, and filgrastim-sndz in a community hospital within a health system that utilizes an electronic medical record (EMR).

**Methods:** At a community hospital within a 15 hospital health system, a site-specific strategy to increase biosimilar utilization was initiated after the system P&T approved therapeutic interchanges to the biosimilars infliximab-dyyb, pegfilgrastim-cbqv, and filgrastim-sndz, from their respective reference products. The strategy has incorporated a preferred product in the EMR for filgrastim thus far. Dispensing records from January 2018 to January 2019 were reviewed to identify the providers at the site, who prescribed these reference products. Upon analysis, an initial 50 percent conversion from the reference products to the biosimilars was targeted at the community hospital outpatient infusion center. "Dear doctor letters" were emailed to providers prior to implementing auto-substitutions to encourage prescribing of biosimilars and to streamline insurance approvals. If provider resistance was encountered, follow-up letters were sent to clarify ongoing system strategies and to provide additional supporting evidence for biosimilar usage, safety, and efficacy. Reminders were sent to providers every three months to continue open lines of communication, encourage biosimilar prescribing, and provide system updates. Once providers acknowledged receipt of the information, the financial clearance team secured prior authorization for biosimilars prior to the



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patients' next scheduled doses. Pharmacists confirmed insurance approval status via an HTML based, financial clearance prior authorization transactional hub to ensure reimbursement. Conversion to biosimilars and cost savings were subsequently tracked and reported to hospital leadership on a monthly basis.

**Results:** Team members involved in the initiative included infusion nurses, oncology pharmacists, and financial clearance staff. All parties were in direct communication throughout the implementation timeframe of January 2019 to May 2019. Total patients targeted for conversion were as follows: 26 patients for infliximab, 17 patients for pegfilgrastim and 20 patients for filgrastim. The number of patients successfully converted to biosimilars were as follows: 10 (38.5%) of infliximab, 4 (23.5%) of pegfilgrastim, and 9 (45%) of filgrastim. Relative percent cost savings of those converted were as follows: 51.9% for infliximab, 15.7% for pegfilgrastim, and 13.3% for filgrastim. Regarding the providers involved, only one was resistant, and discussions about biosimilars continue with this provider. Two doses of reference pegfilgrastim were dispensed in place of pegfilgrastim-cbqv, and team members continue to strategize to improve financial clearance communication as a result.

**Conclusion:** Despite the influx of biosimilars into the mainstream market and the significant financial incentive to prescribe them, the initial transition to these products is often met with logistical challenges and provider resistance. This resistance typically stems from the perceived paucity of comparative product analyses, limited Food and Drug Administration guidance on biosimilar conversions, and insurance mandated approval of select reference products based on variable payor formularies. Overall, the community hospital implementation has yielded significant cost savings to the site and has shown successful movement toward the health system strategy.

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**Session-Board #** - 4-018

**Poster Title:** Assessment of the quality of life among asthmatic patients

**Poster Type:** Descriptive Report

**Submission Category:** Ambulatory Care

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**Purpose:** Asthma is one of the most common non-communicable diseases worldwide with physical and emotional impact. It is largely unrecognized that the effects of asthma are different in patients with severe disease compared to patients with mild to moderate disease. Severe asthma is associated with significant health-related quality of life. The purpose of this study was to evaluate the quality of life among asthma patients and assess the functional problems (physical, emotional, social and occupational) that are most troublesome to the patients.

**Methods:** : This is a prospective multi center study conducted on patients from schools, community pharmacies, and physician clinics across different Lebanese geographic areas from February till May 2019. Patients diagnosed with asthma and are self-dependent to effectively use the inhaler devices by themselves are enrolled in the study. Patients with psychiatric or mental disorders are excluded from the study. Eligible patients are interviewed by trained pharmacists through face-face interview to assess asthma quality of life through mini asthma quality of life questionnaire. The study is approved by the institutional review board and written informed consent obtained from each enrolled participant. Data analysis is performed using statistical package for social sciences (SPSS) version 21.0.

**Results:** A total number of 172 asthmatic patients are enrolled in the study with a mean age of  $31.79 \pm 20.92$  years and 55.8% are females. The results show that around 25.6% and 29.7%

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avoid both dust and cigarette smoking in the environment all the times respectively. As for symptoms assessment, almost 3.5% of the patients reported cough all the time. In addition, 22.7% report shortness of breath most of the time and 34.3% never felt frustrated from asthma state. As for activity limitation, majority of the patients document that both social (65.1%) and work (54.7%) performance isn't limited at all.

**Conclusion:** This study highlights that asthmatic patients have good quality of life that is being assessed through the social, physical, emotional, and occupational. Improved disease symptoms assessed through asthma manifestations is a result of enhanced patient knowledge and adherence. Enhanced follow-up and patient counseling may be effective in the future to halt disease progression and achieve optimum therapeutic outcomes.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-019**

**Poster Title:** Evaluation of student attitudes of interprofessional education (IPE) opportunities in ambulatory care advanced pharmacy practice experiences (APPEs) in a school of pharmacy and health sciences

**Poster Type:** Descriptive Report

**Submission Category:** Ambulatory Care

**Primary Author:** Alyssa Gallipani, Fairleigh Dickinson University; RWJBarnabas Health; **Email:** alyssa.gallipani@rwjbh.org

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**Purpose:** The accreditation council for pharmacy education (ACPE) outlines required elements for accreditation of professional degree programs in pharmacy to assure advanced quality in pharmacy education. In the 2016 guidance document, standard 11 requires all students to serve as a contributing member of an interprofessional team, including exposure to interprofessional team dynamics, education, and practice. The purpose of this study is to evaluate student self-reported attitudes and perceptions of interprofessional education exposure while on ambulatory care APPEs in one school of pharmacy.

**Methods:** This cross-sectional survey was conducted in all students in one school of pharmacy and health sciences during their fourth professional year. The interprofessional collaborative competency attainment survey (ICCAS) is a validated pre-post survey that measures change in students' perception of their ability to perform interprofessional activities. The ICCAS was distributed electronically to students in their required and/or elective ambulatory care APPE rotation by one of six faculty members. The survey contained six categories of questions related to communication, collaboration, roles and responsibilities, collaborative patient/family-centered approach, conflict management/resolution, and team functioning. The final survey consisted of twenty items developed into an online survey software questionnaire, in English, using Qualtrics Research XM. Students were asked to rate their ability for each of the categories before and after completion of this APPE. Completion of this survey was required of all students during this APPE, but had no effect on their grade. The survey was delivered and completed

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during the students' last day of the APPE rotation. Data were de-identified, recorded, and sent to the researchers for analysis.

**Results:** Between May 2018 and April 2019, a total of 93 students responded to the survey for a response rate of 100 percent. Sixteen surveys were not filled in correctly or completely and were not considered (either only the pre-items or the post-items were completed), leaving 75 surveys for the final analysis. Overall, there was improvement in all twenty domains. Prior to this APPE, 80 percent of responses revealed an agreement to any extent in IPE exposure in any competency. After this APPE, 88 percent of responses revealed agreement in IPE exposure. The percent of students who reported ability to work effectively with interprofessional team members increased from 73 percent to 83 percent after this ambulatory care experience. The percent of students who strongly agreed that they knew the contributions of interprofessional team members increased from 24 percent to 59 percent. The strongest effect sizes were for promotion of effective communication and learning from other team members to enhance patient care.

**Conclusion:** Student perception of improvement in all competencies reveals an increased exposure to interprofessional collaboration after ambulatory care course evaluation with the ICCAS.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-020

**Poster Title:** Impact of interprofessional hypertension chronic care clinic for uninsured patients

**Poster Type:** Evaluative Study

**Submission Category:** Ambulatory Care

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**Purpose:** Nearly two-thirds of Americans have hypertension or pre-hypertension yet only 54% are controlled. Uncontrolled hypertension is a risk factor for coronary artery disease, stroke, and kidney disease.

In 2018, an interprofessional hypertension clinic for uninsured individuals commenced at Clinic with a Heart in Lincoln, Nebraska. The clinic runs monthly and is staffed by advanced practice clinicians, pharmacist, dietician, nurse, interpreters, and ancillary staff. Goals are to treat blood pressure (BP) to meet national guidelines and to educate patients on self-care including diet, exercise, stress reduction and smoking cessation. This retrospective review was conducted in patients to measure BP control.

**Methods:** Twenty-four patients were seen from January–December 2018. Data collected included: age, gender, race, frequency of visits, concomitant illnesses, concomitant medications, smoking status, and baseline and follow-up BP. Prescribed medications and monitoring labs and associated costs were also captured. Student's paired t test was used to measure the change in BP comparing pre and post intervention.

**Results:** Most patients were White (46%) or Black (25%), 58% female and had mean age of 47.3+10.1 years. Mean SBP was reduced from 153.7+22.7 mmHg to 123.1+10.9 mmHg ( $p=0.001$ ) at first control. BP control defined as 6 months. BP control defined as 6 months. The total clinic costs in 2018 were \$1,973.41 and the mean annual cost per patient (medications and labs) was \$82.22.

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**Conclusion:** An interprofessional hypertension chronic care clinic for uninsured patients is effective in significantly lowering blood pressure and achieving control.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-021**

**Poster Title:** Comprehensive medication management review (CMR) effectiveness on A1c reduction in patients with uncontrolled diabetes

**Poster Type:** Evaluative Study

**Submission Category:** Ambulatory Care

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**Purpose:** The purpose was to conduct pharmacotherapeutic management of patients in the outpatient setting in order to improve diabetes management. A CMR program was implemented at select ambulatory care sites within our healthcare system. This review identified and addressed medication-related concerns to optimize diabetes management and attain positive patient outcomes.

**Methods:** This prospective review included patients 18 years of age and older with uncontrolled diabetes characterized by A1c greater than or equal to 9 percent. Patients were excluded if their diabetes care was managed by endocrinology, they had been lost to follow up (less than two billable visits in the past year), or if they were on hospice. The study was approved by the investigation review board. Evaluation assessed for therapeutic duplications, potential interactions, side effects, opportunity for therapy optimization, pharmacoeconomic issues and adherence concerns. All data was collected through the outpatient electronic health record. The primary outcome was the number of recommendations identified through CMR. Secondary outcomes included type of interventions made, percent of recommendations accepted, and reasons for rejection.

**Results:** A total of 76 patients were identified at 2 outpatient clinics. Of these, 51 patients were unable to be contacted and a total of 58 recommendations were made on the remaining 25.



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Out of the 58 interventions, 84 percent were accepted by providers and 2 percent were rejected with the remaining 14 percent still pending. Recommendations fell into 3 major categories: therapy optimization, cost/generic options, and adherence concerns. One recommendation was rejected because the provider felt the patient would not benefit from additional education during one of their follow-up visits.

**Conclusion:** CMR was shown to be highly effective in identifying appropriate medication interventions in order to optimize patient care. This study provided the framework to move pharmacists into other outpatient sites in the healthcare setting to assist in targeting inappropriate prescribing in the elderly.

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**Session-Board #** - 4-022

**Poster Title:** Pharmacist's role in discharge medication reconciliation in a meds to beds program

**Poster Type:** Descriptive Report

**Submission Category:** Ambulatory Care

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WVU Medicine Discharge Pharmacists

**Purpose:** Evaluate the role of the pharmacist in medication reconciliation at discharge.

**Methods:** This prospective study of WVU Medicine's Meds to Beds program during a patients discharge process show the clinical and financial benefit to the patient. Medication reconciliation strategies during the discharge process shows the time a pharmacist spends reviewing the patients medication improves patient outcomes. Unintentional prescribing of medications for home without the knowledge of the patient's insurance or home medication prove to cause more confusion to the patient and lead to readmission. The primary goal is to determine the time spent on discharge medication reconciliation would improve patients' outcome. A large part of improved outcome is making sure medication therapy is appropriate and medication accessible to the patient. This includes making changes to the patient's prescriptions to match the patient's insurance. When medications are prescribed, little is known by the prescriber whether the patient can afford the medication or whether this is the preferred medication for the insurance formulary. Discharge reconciliation taken while still inpatient and patient's current home medication decreases the likelihood of adverse effects and duplicate therapies from prescribed medication after discharge. The discharge pharmacist plays a significant role to reduce excessive dispensing of incorrect medication and can make medication affordable to patients.

**Results:** Chart studies were utilized to determine which medications were prescribed as well as test claims were done on prescription to see if insurance coverage was affordable to the patient. Review of what was prescribed was analyzed for possible adverse effects and counseling was done on patients prior to discharge or at delivery.

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**Conclusion:** Patients discharged and use the med-to beds program received clinical benefit in their overall care. Discharge Pharmacists performed medication reconciliation on 130 patients. Pharmacists areas of intervention were duplicate therapy; drug-drug interaction; Sub-therapeutic dosing; teaching opportunities and changes to prescriptions due to preferred insurance medication equivalents. It was found over 35 percent of patients had an issue with what was prescribed. And 20 percent had their medication changed due to payer formulary or preferred med list. The discharge pharmacists' role in the patient discharge process including medication education; reconciliation; payer formulary review improves the outcome of patients care after discharge.

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**Session-Board # - 4-023**

**Poster Title:** Assessing pharmacy student driven refill capture and adherence improvement in a health systems pharmacy setting

**Poster Type:** Descriptive Report

**Submission Category:** Ambulatory Care

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**Purpose:** In order to improve medication adherence, combat DIR fees and improve refill capture in a pharmacy health system with limited financial resources we implemented a program using students to manage refill requests. UIHealth pharmacies use Enterprise software which is equipped with a Contact Manager for organizing refills requests and replies, but due to the temporary staffing nature of our resident prescribers many refill requests are either not generated automatically within Enterprise or are simply ignored. By offering elective credit to students our goal was to allow an opportunity for professional development while providing better and timelier patient care.

**Methods:** Our Contact Manger refill pilot program consisted of three phases. Phase 1 began during the summer of 2018 and involved the centralized facilitation on an informal basis of refill management with no record keeping or data analysis. Phase 2 involved the expansion of the program to include three pharmacy students from the University of Illinois College of Pharmacy. The students were trained on our pharmacy and hospital software and then given access to their respective pharmacies. Weekly logs were maintained to quantify progress in the program. Phase 3 involved the further expansion of the program to four students, this time without the training requirement since student externs were recruited, and the same records were kept for further evaluation of the program.

**Results:** Pharmacy students worked in weekly two hour increments and an overall measurement was taken of events worked on in the contact manager. Data was recorded using

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a spreadsheet; attempts were identified as either an initial attempt, the deletion of a duplicate entry or an event that was already completed, and a received reply (either refill approval, denial or dose modification). A weekly evaluation was made to determine students were improving on a regular basis. Upon conclusion of the pilot students were performing over 100 contact manager events every week which is outreach that was taking days, sometimes weeks to occur using our existing staffing model. Although adherence data is still being analyzed feedback from pharmacy staff as well as the students who participated was positive, and raw data clearly shows an improvement in refill capture as well as the elimination of contact manager events which have already been responded to and prohibit the efficient sorting of the queue.

**Conclusion:** Health systems pharmacies with limited staffing resources and time that have access to an associated college of pharmacy can greatly benefit by incorporating students into the workflow. This also offers an opportunity for the students to get valuable work experience. In our health systems setting by offering elective credit we were able to successfully engage students in helping us to manage our refill capture and improve patient adherence.

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**Session-Board #** - 4-024

**Poster Title:** Nine gene pharmacogenomics project: Mayo Clinic experience

**Poster Type:** Evaluative Study

**Submission Category:** Ambulatory Care

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**Purpose:** Pharmacogenomics, or the use of genetic information to predict and optimize response to drug therapies, is a clinical tool to advance personalized medicine. Mayo Clinic utilized a collaborative approach to the implementation of pharmacogenomics testing from the lab to the bedside with involvement of pharmacists, Center for Individualized Medicine leadership, Department of Laboratory Medicine and Pathology, general internal medicine providers [who care for Executive Health patients] and OneOme®. We sought to demonstrate the potential impact of preemptive pharmacogenomics testing in optimizing current and future medication therapies.

**Methods:** 85 Mayo Clinic Executive Health patients consented from 2015-2017 were genotyped for 9 genes encoding cytochrome P450 enzymes (CYP1A2, CYP2C9, CYP2C19, CYP2D6, CYP3A4, CYP3A5), solute carrier organic anion transporter (SLCO1B1), major histocompatibility complex variant (HLA-B\*58:01), and vitamin K epoxide reductase enzyme (VKORC1). Recruitment was conducted in the Executive Health Clinic using an informational video and appointment request forms. This study was reviewed and approved by Mayo Clinic IRB. A pharmacy consult was ordered by the clinician for interested patients. All participants received an initial visit with the pharmacogenomics pharmacist and a follow-up phone call or face-to-face visit once results were available. During the initial visit, the pharmacist provided a comprehensive overview of the value of pharmacogenomics, obtained a comprehensive medication list with emphasis on current and past medication efficacy and intolerances. Due to the high cost of the test,

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pharmacists ordered the 9 gene panel test for patients who elected to proceed with testing. After testing was ordered, a cascade of the events occurred:

- A buccal swab was collected
- genotyping was conducted internally.
- patient data were de-identified and sent to OneOme for a patient-friendly final report.

At the follow-up visit, pharmacists provided recommendations for current medications or considerations for future therapy based on the patient's pharmacogenomics results. These recommendations were documented in the electronic medical record and sent to the ordering provider.

**Results:** Overall, the phenotype findings from this study were reflective of the general population. CYP1A2 rapid metabolizer the most common phenotype seen in the general Caucasian population; 93% of the 85 patients were rapid metabolizers. CYP3A4 normal metabolizers consisted of 91% of patients and 88% were CYP3A5 poor metabolizers. CYP3A4 is the predominant cytochrome P450 enzyme expressed in the adult human liver, specifically in Caucasian populations, whereas CYP3A5 is the predominant enzyme in African American populations. There was wide variability in phenotype frequencies for CYP2C19 and CYP2D6, which is consistent with the highly polymorphic nature of these genes. With regards to SLCO1B1, 72% of the study participants had normal function. HLA-B\*58:01 is associated with risk of severe cutaneous adverse reactions with allopurinol; 3% of the participants carried the risk HLA variant. Lastly, VKORC1 and CYP2C9 data were compounded to predict warfarin sensitivity and 36% of study participants carried variants that increased their sensitivity to usual warfarin dosing. For 54% of the patients, the pharmacist identified gene-drug associations and provided recommendations based on the patient's pharmacogenomics results with regards to past medication experiences as well as considerations for current medication therapy. The average number of pharmacogenomics-related recommendations sent was two.

**Conclusion:** Implementation of the 9 gene panel project was successful as evidenced by the number of patients tested. Collaboration with various groups was helpful in implementation at a large institution such as Mayo Clinic. Pharmacogenomics testing results reflected the general population frequencies. Pharmacists were a value added to the care team by providing gene-drug recommendations for current medications and further guided future individualized medication selection.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-025**

**Poster Title:** Integration of pharmacists in a primary care setting reduces A1c in adults with diabetes mellitus

**Poster Type:** Descriptive Report

**Submission Category:** Ambulatory Care

**Primary Author:** Ashley Moore, University of Wyoming School of Pharmacy; **Email:** ashmo1014@gmail.com

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**Purpose:** Implementation of a pharmacist in a primary care setting compliments the healthcare team in providing the best care for patients. A1c reduction was identified as a needed patient outcome to prevent or worsen co-morbidities and decrease healthcare costs. Having a pharmacist as an extension of the provider helps to better serve patients. Medication reconciliations, weekly insulin titrations, and co-visits with the providers helps to augment patients therapy. This project was designed to uncover the need for a pharmacist in a primary care setting to help reduce A1c in patients diabetes mellitus and improve patient outcomes and medication adherence.

**Methods:** Pharmacist were chosen for a unique opportunity to work in along side multiple providers. They designed and implemented a diabetes protocol to better assist the patients they were assigned to help reduce their A1c to bring them to goal. The protocol included weekly blood sugar readings, lipid screenings bi-annually, and A1c labs every 3 months (if continuously not at goal and uncontrolled). Pharmacists utilizing the protocol identified patients that would benefit from telephone encounters and face-to-face personalized insulin titration schedules. All pharmacists were required to de-identify and document patient's A1c progress.

**Results:** Two pharmacists were chosen to extrapolate data from separate clinics to track their patients A1c reduction progress. There were sixty six patients that were followed over a course



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of six months. Seventeen patients dropped out and forty nine patients remained on the titration schedule. The average patient had an average A1c reduction of 2.0% to 3.0%. The pharmacist were also able to identify and recommend statin therapy in over 72% of patients the providers saw. The providers indicated that the pharmacists role in the primary care setting is an asset. Their role has assisted providers in managing patients diabetes and keeping their A1c within goal reducing preventable morbidity and mortality rates.

**Conclusion:** The role of a pharmacist in a primary care setting has been helpful in identifying patient needs and improving patient outcomes by reducing their A1c. Having pharmacists on the forefront allows for better management of patient's insulin titrations, eating and exercise habits, and overall healthcare and prescription management needs.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-026

**Poster Title:** Validation of point-of-care INR correction equation

**Poster Type:** Evaluative Study

**Submission Category:** Ambulatory Care

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**Purpose:** Point-of-care (POC) devices, such as CoaguChek XS® allow for more convenient monitoring of international normalization ratio (INR) in patients taking warfarin. The objective of this study was to evaluate and compare the POC INR results obtained by CoaguChek XS®, a venipuncture INR (using STAGO®-Neoplastine® CI Plus 10 reagent), and a corrected INR developed by a previous study. We also wanted to determine a best-fit correction equation based on our outpatient anticoagulation clinic patient population.

**Methods:** Patients were sent to the local laboratory for a venipuncture INR if the patient had a POC INR result of 4.0 or greater on CoaguChek XS®. A corrected INR result was calculated during the office visit and that value was used to make a clinical decision. The patient was sent to the laboratory for a venipuncture INR following the office visit. Antiphospholipid antibody syndrome and lupus anticoagulant patients were excluded from the study. INR results were plotted, and a line of best fit was determined.

**Results:** A total of 50 sets of INR results were collected between February 8, 2016 and May 30, 2019. 36 POC INR results were between an INR of 4.0 and 5.9. 14 POC INR results were between 6.0 and 7.9. The equation that was the best fit for all POC INR results was  $0.449 \times \text{POC} + 1.556 = \text{estimated venipuncture INR}$ . The overall root mean square error was 0.6.

**Conclusion:** When POC INR is between 4.0 and 5.9 on CoaguChek XS®, correction equations are reliable tools to estimate venipuncture INR, decrease time to clinical decisions, and improve

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patient satisfaction. Other institutions using the same laboratory reagent could use the INR correction equation determined in this study in lieu of sending patients for venipuncture INR results.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-027**

**Poster Title:** Evaluation of pharmacist-led comprehensive medication management (CMM) service provided to patients with diabetes in rural primary care clinics

**Poster Type:** Evaluative Study

**Submission Category:** Ambulatory Care

**Primary Author:** Imi Mvere, ARcare; **Email:** Imvere@harding.edu

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**Purpose:** This study was designed to analyze the effectiveness of a comprehensive medication management service on improving health outcomes in a primary care setting. Federally qualified health care centers (FQHCs) are essential in providing care to patients living in underserved areas. Pharmacists integrated into these facilities increase access to healthcare. This study sought to measure the benefit of integrating pharmacists in the primary care team in caring for patients living with diabetes. The primary objective of this study was to decrease hemoglobin A1c (A1C) by 2% or more in patients 18 years or older with diabetes over 12 months.

**Methods:** Subjects were enrolled in the study if they met the inclusion criteria (diagnosed with type 1 or type 2 diabetes) and had an A1C greater than or equal to 9.0% at baseline. Subjects were subsequently seen by the clinical pharmacy team in collaboration with the medical provider to develop and implement an individualized pharmaceutical care plan. Hemoglobin A1c levels were measured at 3-month intervals during the study. This unique plan included an assessment and plan for medication therapy, gaps in care, and preventive measures. At follow up visits, pharmacists identified and resolved medication issues and associated barriers. The statistical difference between baseline and post-intervention A1C levels was calculated using a paired samples t-test. The  $\alpha$  level was set at 0.05. Descriptive statistics were used to summarize findings related to the type and frequency of medication therapy problems identified by the pharmacists. Medication therapy problems (MTPs) were categorized based on the Pharmacy

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Quality Alliance performance measures grouped into the domains of adherence, efficacy, safety, and indication.

**Results:** The study enrolled a total of 50 patients. 54% of the patients were female. The age of the participants ranged from 20 years to 77 years old with an average age of 57 years old. The overall average decrease in A1C among study participants post-intervention was 1.33%. ( $p < .00001$ ). Over 40% of the MTPs identified were in the efficacy domain (e.g., dose too low). The percent of MTPs in the indication, safety, and adherence categories were similar at 17%, 15% and 19% each while 6% were a combination of 2 or more categories.

**Conclusion:** This study adds to the body of evidence describing the impact of pharmacist interventions on chronic disease state management in FQHCs. Pharmacist-led CMM proved beneficial in managing patients living with diabetes. The significant decrease in A1C demonstrates the value of this service. The sustainability of this service needs to be studied and validated. Limitations of this study include the relatively small sample size and lack of a control group. Further investigation on a larger scale with separate control and test groups is warranted.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-028

**Poster Title:** Factors that influence patient's late medication pick-up behavior in an outpatient pharmacy

**Poster Type:** Descriptive Report

**Submission Category:** Ambulatory Care

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**Purpose:** Late or failure to pick-up monthly medications can negatively impact adherence and treatment outcomes. There is limited literature addressing the factors that influence the medication pick up behavior of patients in the ambulatory setting. Therefore, there is a need to understand the factors that influence patients' medication pick up behavior in order to provide the appropriate interventions. This study was designed to evaluate patients' reasons for late pick up behavior in an outpatient pharmacy setting.

**Methods:** A broad literature search to identify and assess factors that influence inappropriate/late medication pick up behavior was performed. An investigative review article was found and common factors related to late or failure to pick up medication were identified. A telephonic survey was designed and conducted to identify factors that influence patient's pick-up behavior in an outpatient pharmacy. A cohort of 46 patients that had late pick up behavior ( $\geq 11$  days past ready status) over a period of time were identified. Other related data such demographics, ethnicity and number of doctor's visit were gathered. Proportion of days covered (PDC6) over 6 months of CMS measured classes—diabetes, cholesterol, and hypertension – were used as indicators of adherence.

**Results:** Out of 46 patients, 24 patients responded to the survey. A majority of the patients were female and African-American. Fourteen patients (58%) identified transportation, thirteen patients (54%) identified syncing with doctor visit, eleven patients (46%) identified

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convenience, and eight patients (33%) identified forgetfulness as a reason for late medication pick up. Also, six patients (25%) noted that parking had a negative impact on their pick up behavior. Three out of ten and six out of 20 patients were below benchmark of 80% of Proportion of Days Covered (PDC6) for oral diabetic and statin medications, respectively. Within the cohort, the average number of doctor visits was 13 per year.

**Conclusion:** The top 5 factors influencing primary non-adherence/late medication pick up behavior among this cohort of patients were identified as transportation, syncing with doctor visits, convenience, forgetfulness, and parking. Transportation and parking may be unique issues to this setting because the pharmacy may not be easily accessible and patients have to pay for parking to pick up medications. Majority of the patients did not reach benchmark PDC6 values for CMS measured classes (diabetes, cholesterol, and hypertension). The average doctor visits of 13 per year is higher than the national average of 4 identified by the commonwealth fund in 2008.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-029**

**Poster Title:** Pharmacist's intervention in addressing social determinants of health: a pilot project to assess food insecurities in the veteran's population

**Poster Type:** Descriptive Report

**Submission Category:** Ambulatory Care

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**Purpose:** The role of pharmacists in the outpatient setting have expanded beyond dispensing medications and medication therapy management. Pharmacists are now involved in many aspects of patient care, including assessing for social and economic barriers. A growing area the pharmacist can make an impact is incorporating pharmacy-based public health services in the clinical settings. Objectives from this project included: 1) Pilot pharmacist-initiated screening program on food insecurities in the outpatient setting; 2) Compare the patterns of health outcomes/behaviors among Veterans who are food secure vs. insecure; 3) Compare patterns of health services utilization among Veterans who are food secure vs. insecure.

**Methods:** This pilot project was conducted from January 2018 thru March 2018 at the Veterans Affairs Medical Center's outpatient clinics. Ideas for this project came from a previously completed project on screening for food insecurity in the Veterans Administration clinics for the homeless. Using one validated screening question, we surveyed Veteran's patients in three pharmacists-managed outpatient clinics (congestive heart failure, diabetes, and anticoagulation) for food insecurity. The pharmacist used a paper tracking tool to record the patient encounter. Data collected includes whether the patient was food-secured or food-insecured, blood pressure and glycemic control, and emergency room visits. Patient demographics information (age, sex, and ethnicity), body mass index, co-morbidities, and a social worker referral was also documented.



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**Results:** The pharmacist surveyed a total of 81 patients from January 2018 thru March 2018 at the Veterans Affairs Medical Center's outpatient clinics. The mean age of the patient was 66 years old, with 95% being males. Of the 81 patients, 80% was diagnosed with hypertension, followed by type II diabetes mellitus (58%), and congestive heart failure (38%). Overall, 27 (33%) flagged positive for food insecurity within the last 12 months. Of those 27 flagged positive, 17 patients wanted a referral to the social worker for additional help such as identification of alternative food sources (soup kitchens or food pantries). Additionally, of those flagged positive for food insecurity, 47% had uncontrolled hypertension, 30% had hemoglobin A1c above 9, and 15% had an emergency room visit due to hypertensive crisis or hypoglycemia adverse drug reactions.

**Conclusion:** No previous project involved the pharmacist's assessment for food insecurity was conducted at the Veterans Affairs Medical Center's outpatient clinics. Incorporating food insecurity screening was well-received by both providers and patients. Results of this pilot project support that pharmacists may have a unique role in addressing food insecurities and contributing to closing the gap in health outcomes faced by the Veteran's population.

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**Session-Board #** - 4-030

**Poster Title:** Linagliptin-induced debilitating arthralgia

**Poster Type:** Case Report

**Submission Category:** Ambulatory Care

**Primary Author:** Stefanie Nigro, MCPHS University; **Email:** stefaniepharmd@yahoo.com

**Additional Authors:**

Jennifer Goldman

**Purpose:** From 2001 to 2013, 33 cases of severe joint pain were reported to the Food and Drug Administration (FDA) with the use of dipeptidyl peptidase-4 (DPP-4) inhibitors. In 2015, the FDA updated the product labeling of all DPP-4 inhibitors to warn patients and health care professionals about this risk. This case report describes a patient who developed debilitating arthralgias after the initiation of linagliptin. A 71 year-old Caucasian male with a past medical of type 2 diabetes, chronic kidney disease (eGFR 37 ml/min/m<sup>2</sup>), hypertension, coronary artery disease, and osteoarthritis presented to his primary care provider (PCP) for a routine diabetes follow-up. At the time of his visit, his antidiabetic regimen included metformin ER 500 mg twice daily and glyburide 10 mg daily. Other chronic and stable medications included acetaminophen 1,000 mg as needed, aspirin 81 mg daily, cholecalciferol 1,000 IU daily, citalopram 40 mg daily, fenofibrate 145 mg daily, gabapentin 400 mg four times daily, lisinopril 2.5 mg daily, rosuvastatin 5 mg daily, sildenafil 50 mg as needed, and trazodone 100 mg as needed at bedtime. The patient started a walking routine and reduced his overall intake of dietary carbohydrates since his last office visit. These changes resulted in a 10-pound weight loss. Despite these changes, his A1c remained elevated at 8.7 percent (8.8 percent at the previous office visit). It was determined that additional drug therapy for glycemic management was needed. The patient refused to use injectable therapies. His PCP decided to add linagliptin 5 mg daily to his current regimen. Nine days after the initiation of linagliptin the patient presented to the office complaining of new-onset, full body arthralgias and back pain. He reported pain and difficulty getting out of bed as well as walking. He took linagliptin for eight days and self-discontinued it one day prior to this appointment. He stated that these symptoms began within one day of linagliptin initiation and continued to worsen in intensity limiting his mobility. No other medications were initiated or discontinued, other than linagliptin. He has no history of drug-induced arthralgias in the past, including any from rosuvastatin or fenofibrate. None of

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his other medications have documented reports of arthralgias. At this visit, one day after discontinuation, he reported that his symptoms started to improve, but were not completely resolved. The patient reported full resolution of his symptoms seven days after discontinuation of the drug. Rechallenge with linagliptin or a different DPP-4 inhibitor was not considered appropriate. It was felt this reaction was due to the linagliptin and not from any of his chronic medications. The patient declined additional drug therapy interventions, preferring to work on additional lifestyle changes. Utilizing the Naranjo algorithm, linagliptin-induced arthralgia was probable. DPP-4 inhibitors are commonly prescribed oral medications for the management of type 2 diabetes. It is critical for pharmacists and other health care providers to be aware of this potential adverse effect to provide optimal care to patients and discontinue the offending agent in a timely manner.

**Methods:**

**Results:**

**Conclusion:**

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-031

**Poster Title:** Adherence improvement in ambulatory patients with chronic diseases

**Poster Type:**

**Submission Category:** Ambulatory Care

**Primary Author:** Alejandra Núñez-Sánchez, Hospital General de Rosarito; **Email:** alenusa@hotmail.com

**Additional Authors:**

**Purpose:** Adherence to treatment is a route to success on multidisciplinary medical attention.

Adherence

to treatment has been analyzed retrospectively, revising dates in which patients should have gone to the

pharmacy in order to fill their prescription during 2017. We detected that most patients are willing to

receive pharmaceutical counsel; also that patients had some problem understanding medical indications.

This is a descriptive, experimental, retrospective and longitudinal study in order to acknowledge the

degree of adherence of patients to their medical therapy. Adult patients were included in the study,

with chronic diseases and attended at internal medicine. The Morisky-Green modified survey was used

in order to measure medication adherence by patients.

It is important to point out that pharmacist are not a popular part of the medical group in Mexico, which

is why we point out that all patients who were interviewed were willing to participate. We asked 58

patients in 30 days, 54 years old average, with a polypharmacy of 6.2 medications/patient and 2.5 diagnosis/patient. From the Morisky-Green modified survey we know that 38% of them forget to take

their medicines at the correct time, and almost none of the patients suspend their medication even

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though they feel well (only 8%).

**Methods:**

**Results:**

**Conclusion:**

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-032

**Poster Title:** Evaluation of patient factors associated with achieving goal hemoglobin A1c in collaborative drug therapy management ambulatory care clinics by clinical pharmacists: a retrospective chart review

**Poster Type:** Evaluative Study

**Submission Category:** Ambulatory Care

**Primary Author:** Stefanos Torkos, MCPHS University/Atrius Health; **Email:** SDTorkos@gmail.com

**Additional Authors:**

Jacqueline Burke

Kathy Zaiken

**Purpose:** Multiple studies have demonstrated the positive impact of pharmacists on patient outcome measures for diabetes. However, current evidence to correlate patient-specific clinical and demographic factors with these outcome measures remains limited. The primary objective of this study is to identify if there are unique patient factors that may contribute to successfully lowering hemoglobin A1c (HgbA1c) to a target of less than 7 percent at discharge for patients managed by clinical pharmacists practicing under collaborative agreements. Study findings may support clinical pharmacy services by identifying patients who are more likely to succeed in diabetes management and help identify barriers to success.

**Methods:** A retrospective chart review was completed of 419 patients referred to clinical pharmacy collaborative drug therapy management clinics for type 2 diabetes. Patients included in this study were at least 18 years old, had a diagnosis of type 2 diabetes, had a documented HgbA1c goal of less than 7 percent at the first clinic visit and had a HgbA1c greater than 7 percent within 6 months of the first clinic visit. All patients were enrolled and discharged from follow-up with the clinical pharmacist between January 1, 2017 and January 1, 2019. For all patients, data were extracted from the electronic medical record at the initial clinic visit and discharge. Data elements included demographics, HgbA1c, duration of diabetes, diabetes medications, preferred pharmacy, medical insurance, use of other specialist providers, concomitant documented diagnoses, smoking status, number of pharmacy face-to-face clinic visits attended, missed, or cancelled, and number of non-face-to-face follow-ups via telephone

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or electronic messaging system. This study was approved by the MCPHS University Institutional Review Board.

**Results:** A total of 228 patients met the inclusion criteria. Eighty-one patients achieved clinical success (HgbA1c less than 7% within 180 days before or after discharge) and 144 were clinical failures (HgbA1c greater than 7% within 180 days before or after discharge). During the study period, several independent factors were predictive of patient success. These factors included Asian ethnicity (odds ratio (OR): 19.32), initial HgbA1c of 7 to 7.9% (OR: 2.34), duration of time enrolled in a pharmacist run clinic being 5 to 6 months (OR: 2.06) and discharged on a glucagon-like peptide-1 receptor agonist (GLP1-RA) (OR: 1.83). Factors that were predictive of failure were black or African American ethnicity (OR: 0.42) and discharged on a sodium-glucose cotransporter-2 (SGLT-2) inhibitor (OR: 0.27).

**Conclusion:** Overall this study found clinical and demographic factors that are associated with achieving a HgbA1c of less than 7 percent at discharge in a clinic managed by clinical pharmacists practicing under collaborative agreements. Factors associated with clinical success include Asian ethnicity, initial HgbA1c of 7 to 7.9%, enrolled in clinic for 5 to 6 months, and discharged on a GLP1-RA. Independent factors associated with clinical failure include black or African American ethnicity, and discharged on a SGLT-2 inhibitor. These results will further assist pharmacist in determining factors that may impact glycemic control in patients within a pharmacist run diabetes clinic.

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**Session-Board #** - 4-033

**Poster Title:** Improving accuracy of medication reconciliation for discharged patients at tertiary care hospital, Saudi Arabia

**Poster Type:** Evaluative Study

**Submission Category:** Cardiology/Anticoagulation

**Primary Author:** Ahmed Alanazi, King Fahad Medical City; **Email:** Asdfay54@gmail.com

**Additional Authors:**

Sameh Awwad

**Purpose:** Medication reconciliation is a vital step in ensuring patient safety across the continuum of care is completed in a timely fashion. Our objectives are to evaluate the incidence and characteristics of discharge medication discrepancies that are identified by pharmacists during discharge medication reconciliation for cardiac center patients at King Fahad Medical City(KFMC) in Saudi Arabia, in addition, will attempt to identify risk factors that may affect medication discrepancy occurrence during medication reconciliation.

**Methods:** A prospective observational study conducted at a tertiary care hospital in Riyadh for a period of 4 months. We collected data from discharge prescriptions which came to the pharmacy and compared it with medication administration record (MAR), medication history in the cortex system© and patient home medication list obtained from medication reconciliation form from ER during admission. We included all adult patients discharged from the cardiac center at KFMC.

**Results:** A total of 776 patients were enrolled in the study. 64.7% were male 35.3 were female. 180 patients (23.1%) out of 776 patients experienced 237 discrepancies. 73.4% of the discrepancies were intentional and 26.6% were un-intentionally discrepancies. Medication discrepancies were not associated with an increased number of prescribed medication (P-value = 0.081) and with increased age (P- value = 0.366). However, the Severity of medication discrepancy was having an association with medication discrepancy (P-value < 0.001). Minor discrepancies were increased with intentional medication discrepancy, whereas major discrepancies were increased with Un-intentional medication discrepancy (P-value < 0.001).



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**Conclusion:** At our hospital, one in four discharged cardiac patients had medication discrepancies. There were no association of age, increased number of medications with the number of medication discrepancy; However, un-intended medication discrepancy can be associated with increased adverse events leading to increase the number of ER/ hospital admission and associated costs. More studies with larger sample size are warranted to confirm this result.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-034

**Poster Title:** Does body mass index influence warfarin dosing requirements and anticoagulation control?

**Poster Type:** Evaluative Study

**Submission Category:** Cardiology/Anticoagulation

**Primary Author:** Eman Alhmoud, Hamad Medical Corporation; **Email:** ealhamoud@hamad.qa

**Additional Authors:**

Mohammed Abdulgelil

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**Purpose:** Qatar has some of the highest rates of metabolic disorders (including obesity) within the region. A recent report indicated that more than 70 percent of Qatar's population is either overweight or obese. Evidence supporting the effect of body mass index (BMI) on warfarin maintenance doses and anticoagulation control is contradicting.

The purpose of this study was to investigate whether a correlation exists between BMI and weekly warfarin dose required to maintain a stable therapeutic INR and whether an individual's BMI could affect anticoagulation control reflected by mean time in therapeutic range (TTR) and the incidence of thromboembolic and/or bleeding events.

**Methods:** A retrospective cross sectional study of adult patients (>18 years old) receiving stable doses of warfarin, defined as having a therapeutic INR without a change in warfarin dose for at least 6 weeks, and attending ambulatory anticoagulation clinic in Hamad General Hospital, a tertiary teaching hospital in Qatar, over one year period (July 1st 2016 - June 30th 2017).

Patients with missing data (demographics, target INR), those known to have poor compliance to warfarin and/or clinic visits or those who lost follow up with the clinic were excluded.

Relevant data were collected through electronic chart review. These include, patients' demographics, indication and duration of warfarin therapy, target INR, comorbidities (e.g., diabetes, hypertension, renal and hepatic dysfunction), tobacco use, the presence of drugs known to significantly interact with warfarin as well as any reported incidents of bleeding (along with type/severity of the bleeding) and thrombosis were collected.

TTR was calculated using Rosendaal method.

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BMI, the independent variable, was analyzed as a continuous and categorical variable (six BMI categories: underweight, normal weight, overweight, obese, morbidly, and severely obese) and was then correlated with warfarin dose (weekly and mg/kg) accordingly.

**Results:** A total of 159 patients were included (57.9% males). The BMI ranged between 14.3 – 61.8 kg/m<sup>2</sup> (median 30.56 kg/m<sup>2</sup>) and the mean TTR ( $\pm$  standard deviation) was 78 ( $\pm$  18.2). Overall, there was a weak positive correlation between BMI and weekly warfarin maintenance dose (Pearson's  $r$  0.186,  $P=0.019$ ).

When comparing mean TTR across different BMI categories, no differences were observed ( $P$ -value =0.61).

There was, however, a weak negative correlation between BMI and weekly mg/kg warfarin dose (Pearson's  $r$  -0.22). When compared to normal BMI, morbid and severely obese patients had lower weekly mg/kg warfarin doses requirements ( $P$ -value of 0.037 and 0.028 respectively). Among 159 patients, no thrombotic events were detected. Thirteen incidents of minor bleeding were reported with insignificant differences detected across different BMI categories ( $P=0.62$ ).

**Conclusion:** A weak positive correlation exists between BMI and total weekly warfarin dose. No correlation was observed between BMI and anticoagulation control.

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**Session-Board #** - 4-035

**Poster Title:** Evaluation of the validity of SAME-TT<sub>2</sub>R<sub>2</sub> score in a cohort of venous thromboembolism patients treated with warfarin in Qatar

**Poster Type:** Evaluative Study

**Submission Category:** Cardiology/Anticoagulation

**Primary Author:** Eman Alhmoud, Hamad Medical Corporation; **Email:** ealhamoud@hamad.qa

**Additional Authors:**

Hazem Elewa

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**Purpose:** Available evidence indicates that SAME-TT<sub>2</sub>R<sub>2</sub> score (sex female, age < 60 years, medical history [more than two comorbidities], treatment [interacting drugs, e.g., amiodarone for rhythm control], tobacco use [doubled], race [doubled]) may predict optimum anticoagulation control among atrial fibrillation patients (reflected by time in therapeutic range (TTR) above 65-70% with SAME-TT<sub>2</sub>R<sub>2</sub> score of 0-1). However, association between the score and anticoagulation control in Venous Thromboembolism (VTE) patients is controversial. The purpose of this study is to find out whether SAME-TT<sub>2</sub>R<sub>2</sub> score can be used to evaluate quality of anticoagulation control, measured by TTR, in patients treated with warfarin for VTE.

**Methods:** A retrospective cohort study. Adult patients treated with warfarin for Venous thromboembolism for at least 6 months in ambulatory anticoagulation clinics of two hospitals in Qatar were included. Patients with missing data (e.g., demographics, target INR), those known to have poor compliance to warfarin and/or clinic visits and those who lost follow up with the clinic were excluded.

Relevant data were collected through electronic chart review over one year. These include, patients' demographics, indication and duration of warfarin therapy, target INR, comorbidities (e.g., diabetes, hypertension, pulmonary disease, previous stroke, renal and hepatic dysfunction), tobacco and alcohol use. For interacting medicines, drugs with warfarin interaction category (D and X) in lexi-comp were considered.

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SAMe-TT2R2 score and TTR were calculated. TTR was calculated using linear interpolation method of Rosendaal et al.

Patients were categorized into low and high SAMe-TT2R2 score (0-1, 2 or more respectively); and good and poor INR control groups (TTR cutoff of 70%).

Categorical variables were compared using Chi-square test while continuous variables compared using T-test using SPSS. The study was conducted in full accordance with rules and regulations of research at Hamad Medical Corporation.

**Results:** A total of 295 patients were included (55.9% males), with majority being younger than 60 years old (77.3%). Target INR of 2-3 was the most common among all indications (88%).

Deep Vein Thrombosis was the leading indication for warfarin (30.5%) followed by Pulmonary Embolism (20.6%).

The mean TTR was  $76.6 \pm 18.6\%$ .

Patients with low SAMe-TT2R2 score (zero or 1) had statistically significant higher TTR than those with high SAMe-TT2R2 score (2 or more) ( $95 \pm 3.2\%$  vs  $76 \pm 18.6\%$ ,  $p=0.022$ )

Compared to patients with good INR control (TTR >70%), those with poor control (TTR  $\leq 70\%$ ) were more likely to have SAMe-TT2R2 score of 2 or more (OR: 1.495, 95%CI:1.38-1.62).

**Conclusion:** There is a significant association between lower SAMe-TT2R2 score and good anticoagulation control in a cohort of VTE patients treated with warfarin in Qatar. Contribution of other clinical factors and whether a different scoring may yield better prediction of anticoagulation control remains to be tested

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**Session-Board #** - 4-036

**Poster Title:** Reliability of point-of-care INR measurements in various patient populations

**Poster Type:** Evaluative Study

**Submission Category:** Cardiology/Anticoagulation

**Primary Author:** Kimberly Arline, Parkview Medical Center; **Email:** kimarline@comcast.net

**Additional Authors:**

Krista Sanchez

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**Purpose:** Determine if the Coagsense point-of-care (POC) instrument, using mechanical clot detection, provides more reliable INR measurements than the Coagucheck XS POC instrument, using electrochemical pulse for clot detection, in comparison to a venous blood sample on the Stago benchtop instrument. Seven groups of patients were studied to evaluate if certain medical conditions may be responsible for POC INR measurement variability.

**Methods:** The institutional review board approved this prospective observational study at a single-center outpatient anticoagulation clinic during a single patient visit. Male (n=39) and female (n=38) patients at least 18 years old were invited to participate in the study if they had a history of Antiphospholipid Syndrome-APS (n=11), Hypercoagulable disorder (n=13), Autoimmune condition (n=10), Peripheral Vascular Disease-PVD (n=10), Mechanical Heart Valve-MHV (n=12), Atrial Fibrillation (n=11) or DVT/PE/CVA history (n=10). Consent was obtained from each patient. If their standard of care INR was 2.0 to 5.0, a total of two capillary fingerstick blood samples were drawn for the Coagsense and Coagucheck XS POC meters, and a venous citrated blood sample was drawn for the Stago laboratory instrument. The primary objective was to measure the difference in INR values between each POC instrument and the reference laboratory instrument. A secondary objective was to determine if any of the seven disease states led to higher INR differences between POC and lab analyzer, to determine if there is a subset of patients that should not be monitored by POC devices.

**Results:** Of the 77 patients enrolled, Coagsense correlated well (92% of INRs within 20% of Stago INR, 64% of INRs within 0.2 of Stago INR, overall INR bias of 0.1 or 4% bias). Six patients had INR readings outside the 20% allowed bias in the following groups: APS (n=2),

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Autoimmune (n=2), PVD (n=1) and Hypercoagulable Disorder (n=1) and could have led to incorrect warfarin dosing in 4 patients.

In comparison, Coagucheck XS INRs correlated poorly (49% within 20% of Stago INR, 10% of INRs were within 0.2 of Stago INR, overall INR bias of 0.66 or 25.7% bias). Forty-one patients had INR readings outside the 20% allowed bias in the following groups: APS (n=6), Autoimmune (n=6), PVD (n=6), Hypercoagulable Disorder (n=11), MHV (n=6), Atrial fibrillation (n=3), DVT/PE/Stroke (n=3) and could have led to incorrect warfarin dosing in 28 patients.

Coagucheck XS is known to have higher INR bias for INRs over 3.0. The Coagsense INR bias remained stable (within 0.1-0.25 INR) across all Stago INR ranges from 1.8-5.0. Coagucheck XS INR bias increased with each 0.5 increase in Stago INR. The Coagucheck XS INR to Stago INR bias (0.46-1.3 INR) was statistically significant across all INR ranges above 2.0.

**Conclusion:** Coagsense correlated well while Coagucheck XS INR measurements were considerably higher than Stago INR with over half of all Coagucheck XS INRs outside the 20% acceptable limit. Four disease states (Antiphospholipid Syndrome, Autoimmune, Peripheral Vascular Disease and Hypercoagulable Disorder) had higher INR variability in both POC meters; suggesting POC INR results should be correlated with venous lab INR in patients with those disease states before trusting a POC meter for warfarin dosing. Three patients correlated well on Coagucheck XS but poorly on Coagsense showing patient correlations from one POC device cannot be extrapolated to another POC device.

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**Session-Board # - 4-037**

**Poster Title:** Assessing the inappropriate use of low-dose apixaban at an academic medical center

**Poster Type:** Evaluative Study

**Submission Category:** Cardiology/Anticoagulation

**Primary Author:** Michael Boller, University of Iowa College of Pharmacy; **Email:** michael-boller@uiowa.edu

**Additional Authors:**

Jamie Smelser

**Purpose:** Apixaban is a direct oral anticoagulant (DOAC) used for both venous thromboembolism (VTE) prophylaxis and treatment as well as for stroke prevention in non-valvular atrial fibrillation. Dosing of apixaban varies based on indication, concomitant medications, and patient factors such as age, weight and serum creatinine. Inappropriate low doses of apixaban may put patients at increased risk of events such as stroke, deep vein thrombosis or pulmonary embolism. This medication use evaluation was designed to assess for the rate of inappropriate low-dose apixaban and associated patient factors.

**Methods:** All patients that received at least one dose of 2.5 mg apixaban from the period of 5/1/18 to 4/30/19 were included in the study. Each use was assessed for indication, grouped into treatment of atrial fibrillation or VTE treatment/prophylaxis. Appropriateness of dosing was based on product labeling. Patient demographic data including sex, age and weight were included for data analysis. Linear regression analysis compared the rate of inappropriateness based on indication with further subgroup ANOVA analysis to assess for patient factors associated with inappropriate low dosing.

**Results:** Out of 299 patients, 66 (22%) met criteria for inappropriate low dose. Patients receiving apixaban with an indication for atrial fibrillation (n=118) were dosed inappropriately 46.6% (95% CI 37.6% to 55.6%) compared to patients receiving apixaban for VTE prophylaxis or treatment (n=179) who were dosed inappropriately 5.8% (95% CI 2.4% to 9.0%) of the time (p<0.001). Subgroup ANOVA analysis found significantly higher rates of inappropriate dosing for VTE prophylaxis/treatment patients based female sex (p=0.001) and higher weight (p=0.045)



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but not for age ( $p=0.536$ ). Similar analysis performed for atrial fibrillation patients found significantly higher rates of inappropriate dosing for atrial fibrillation patients based on older age ( $p=0.012$ ), lower weight ( $p<0.001$ ) but not for sex ( $p=0.920$ ).

**Conclusion:** The use of inappropriate low doses of apixaban at an academic medical center occurs at high rate, particularly in patients receiving anticoagulation for atrial fibrillation. Furthermore, patient factors such as age, weight and sex may predispose patients to receive inappropriate low doses of apixaban. Better education of providers and expansion of warning prompts during ordering may help mitigate this issue. Further expansion of the collected data to include event rates for thrombotic and bleeding events will provide a better understanding of the safety issues arising from inappropriate low dose apixaban.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-038

**Poster Title:** Analysis of antithrombin III utilization for heparin resistance in cardiopulmonary bypass after criteria approval

**Poster Type:** Evaluative Study

**Submission Category:** Cardiology/Anticoagulation

**Primary Author:** Kimberly Bolton, University of Iowa Hospitals and Clinics; **Email:** kboltonj@gmail.com

**Additional Authors:**

Ryan Hobbs

**Purpose:** Anticoagulation is a critical component of cardiopulmonary bypass (CPB) with heparin being the preferred anticoagulant. Sustained exposure to non-endothelial surfaces increases thromboembolic risk and increases heparin dosing requirements. Blood conservation guidelines recommend antithrombin III (ATIII) administration when there is difficulty in achieving goal anticoagulation with high-dose heparin. Heparin resistance occurs in approximately 20 percent of patients undergoing CPB. This difficulty in obtaining goal anticoagulation can frequently be alleviated by administration of fresh frozen plasma, if available, or ATIII.

**Methods:** The Pharmacy and Therapeutics Committee approved criteria for use of ATIII in heparin resistance in patients undergoing CPB. The criteria require the heparin dose to be greater than 600 units/kg and activated clotting time (ACT) to be less than 450 seconds. This study was a retrospective analysis of University of Iowa Hospitals and Clinics electronic medical records for patients with intraoperative orders for antithrombin III undergoing CPB. Objectives of the analysis were to assess whether ATIII utilization met P&T approved criteria with CPB (heparin dose greater than 600 units/kg and ACT less than 450 seconds), heparin dose at the time ATIII was ordered, and evaluate waste of ATIII doses that were ordered and not administered. IRB approval was obtained.

**Results:** The criteria were implemented in March 2017. There was a 65% increase in the monthly utilization of ATIII for CPB after criteria approval. Heparin dosing prior to ATIII administration was a mean of 442 units/kg with a median of 482 units/kg. Twelve percent of ATIII orders were compliant with the criteria.

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**Conclusion:** Due to these undesired outcomes, new perfusion policies have been developed and are being implemented that requires heparin dosing to exceed 600 units/kg prior to ordering ATIII. In the future, post procedure implementation data will be compared with current data to assess for improvement in ATIII utilization.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-039

**Poster Title:** Don't overlook anticoagulation safety: importance of DOAC monitoring programs

**Poster Type:** Descriptive Report

**Submission Category:** Cardiology/Anticoagulation

**Primary Author:** Antonia DeQuevedo, MelroseWakefield Healthcare; **Email:**  
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**Purpose:** Direct Oral Anticoagulants (DOACs) have been marketed as medications that don't require routine monitoring. However, as more patients are being prescribed DOACs, the need for medication management services to ensure safe and effective therapy is growing. In June 2018, the anticoagulation management service (AMS) expanded to include patients on DOACs (apixaban ,rivaroxaban, dabigatran). The objective of this report is to identify the most common types of interventions required and time needed to manage DOAC patients as well as to evaluate if a DOAC management program could help to reduce rates of admissions due to clotting/bleeding.

**Methods:** The pharmacist-run service provides patients with education, cost reduction resources, refills, perioperative management, and initial and follow up screening for appropriate dosing, medication interactions/adherence, and treatment duration. An anticoagulation management software system was utilized by AMS to schedule follow-up and to document clinical visits for patients on DOACS. In addition, a pharmaco-surveillance system was utilized to categorize the types and time needed to complete each clinical intervention. Clinical interventions were classified into the following types: medication compliance, dosing changes, adverse effects, duration of therapy, insurance interventions, medication interactions, perioperative interventions, renal evaluation, transitioning between different anticoagulants, new patient education, and scheduled DOAC follow-up. A retrospective review of patient charts from June 1, 2018 to February 1, 2019 was conducted in order to identify the frequency and type of clinical interventions made for DOAC patients enrolled in the service. In addition, a retrospective review of the hospital information system during this same time period was utilized to identify any patients admitted to the hospital due a bleeding or clotting event while

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on a DOAC medication utilizing ICD-10 diagnosis codes. Patients were excluded from this analysis if they were less than 18 years of age or for DVT prophylaxis following orthopedic surgery.

**Results:** The AMS enrolled 117 patients (apixaban 79%, rivaroxaban 21%, and dabigatran 1%) into its DOAC program from June 1, 2018 to February 1, 2019 and charted 725 clinical visits during the study period. The most common intervention types included new patient education (65%), dosing changes due to hepatic/renal function (12%), transitioning between anticoagulants (11%), insurance interventions (11%), and perioperative management (8%). 2 of the 117 enrolled AMS patients (1.7%) experienced a bleeding/clotting complication requiring admission. A total of 193 hours were spent managing DOAC patients which is an average of 5 visits/patient or 0.6 visits/patient/month (approximately 12 minutes/patient/month). Concurrent inpatient data was also reviewed and identified 62 patients admitted with a clotting/bleeding event on a DOAC. GI bleeding (48%) followed by CVA/TIA (15%) were the most common adverse events observed. Of the 62 total admissions, 2 were AMS patients (3%). This analysis also identified that 18 of the 62 patients admitted (29%) were on an incorrect dose, had inappropriate DOAC usage, or inappropriate frequency of administration.

**Conclusion:** This data suggests that DOAC management through a centralized service prevents adverse events leading to hospitalization and offers potential cost-saving opportunities by reducing hospital admissions.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-040

**Poster Title:** Direct oral anticoagulant (DOAC) utilization assessment to prepare for Joint Commission national patient safety goal (NPSG) for anticoagulation therapy

**Poster Type:** Evaluative Study

**Submission Category:** Cardiology/Anticoagulation

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**Purpose:** New elements of performance (EP) for the Joint Commission National Patient Safety Goal (NPSG) for anticoagulation therapy are to be initiated on July 1, 2019 with specific focus on direct oral anticoagulants (DOACs). Based on this new goal, it is important to determine if DOAC utilization meets EP for this NPSG at our facility. This study assessed medication reconciliation, ordering, dispensing, and administration activities of apixaban, dabigatran, and rivaroxaban for venous thromboembolism (VTE) treatment and stroke risk reduction in patients with nonvalvular atrial fibrillation (AF).

**Methods:** The study was a retrospective, process improvement analysis of patients for whom apixaban, dabigatran or rivaroxaban was prescribed by a hospitalist at a large community hospital from June 2018 to November 2018. The protocol was approved by the institutional review board. Inclusion criteria were patients 18 years and older that were prescribed apixaban, dabigatran or rivaroxaban by a hospitalist and had a diagnosis of deep vein thrombosis (DVT), pulmonary embolus (PE) or AF. Patients were excluded if prescribed a DOAC for prophylactic anticoagulation indications. Measures assessed included appropriate DOAC dosing during the transition from outpatient to inpatient, appropriate management during transition from parenteral anticoagulant to DOAC, DOAC scheduling/administration compliance, inpatient DOAC dosing and significant drug interactions. Patients were assessed for proper dosing for AF and VTE with apixaban, rivaroxaban, and dabigatran based on renal function, weight, and age. Data collection included the following: date of admission, length of

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hospital stay, weight (kg), date of birth, allergies, physician in charge, dosing of DOAC and parenteral anticoagulant used, indication for anticoagulation, past medical history, home medications, inpatient medications, dates and times of DOAC administration, dates and times of parenteral anticoagulation administration, aPTT, INR, serum creatinine, hemoglobin, hematocrit, platelets, albumin, and bilirubin. Creatinine clearance was assessed using the Cockcroft Gault equation. Actual body weight was used in this calculation.

**Results:** The study included 98 patients, 52 females and 46 males. The mean age was 64.4 years old (range 20 to 100 years). DOAC indications included DVT (16), PE (26), and AF (56). Sixty-one patients were ordered a DOAC prior to admission. Upon admission, 2 apixaban patients (1 patient had dose adjusted) and 1 rivaroxaban patient (dose adjusted) were not receiving the correct medication dose based on labeling. In total, 85 patients received apixaban, 8 patients received rivaroxaban, and 5 patients received dabigatran. Three apixaban patients, 1 rivaroxaban and 1 dabigatran patients had dosages that varied from recommendations provided in labeling for the respective indications. Thirteen patients were started on a parenteral anticoagulant (unfractionated heparin (UFH)-8 patients; enoxaparin-5 patients) prior to DOAC initiation. There was delay in initiation of the DOAC in all 8 patients administered UFH and 4 of the 5 patients administered enoxaparin. Two dabigatran patients did not have appropriate overlap with a parenteral agent. Overall, there were 713 administrations of a DOAC. The percentage of patients who missed, received late, or refused a DOAC was 14.9%. Twenty three percent of patients were not administered their rivaroxaban dose with a meal. Two medications were contraindicated with DOAC use.

**Conclusion:** Data retrieved concerning medication reconciliation, ordering, dispensing and administration of DOACs at a large community hospital admitted to the hospitalist's service provided information for improvements. The study results highlight gaps in compliance with the new NPSG for anticoagulation therapy. The most significant findings concern transitioning patients from parenteral anticoagulants to a DOAC and dosing rivaroxaban close to meals to enhance efficacy. Opportunity for policy and protocol enhancement with pharmacist involvement in facilitating improvements will be completed. Educational efforts for hospitalists, pharmacists, and nurses will be initiated to improve their understanding of DOAC clinical characteristics when ordering and administering these medications.

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**Session-Board # - 4-041**

**Poster Title:** Cangrelor use in patients undergoing percutaneous coronary intervention or neurovascular intervention with stent placement in a community hospital

**Poster Type:** Descriptive Report

**Submission Category:** Cardiology/Anticoagulation

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**Purpose:** Cangrelor is an intravenous P2Y12 antagonist approved by the FDA as an adjunct to percutaneous coronary intervention (PCI) for reducing the risk of periprocedural myocardial infarction, repeat coronary revascularization, and stent thrombosis in patients not treated with an oral P2Y12 inhibitor or glycoprotein IIb/IIIa inhibitor. The novel advantages of cangrelor include its rapid onset and offset. Due to these pharmacokinetic properties, its use has further expanded to bridge therapy for cardiac surgery and in patients requiring neurovascular intervention with anticipated intracranial stent, carotid stent or flow-diverter placement. The purpose of this review is to evaluate the appropriateness of cangrelor use.

**Methods:** This was a single-center, retrospective observational chart review to examine prescribing trends of patients who received cangrelor at Baptist Hospital of Miami (BHM) from January 2018 to January 2019. Data collection included patient demographics, indication for use, type of procedure performed, ordering physician and specialty, bolus dose, infusion dose and duration, transition to an oral P2Y12 agent, timing of oral P2Y12 administration in relation to the cangrelor administration, hemodynamic status prior to procedure, any co-morbidity precluding the use of an oral P2Y12 agent, incidence of thrombotic or bleeding event, discharge disposition, and 30-day readmission. The primary outcome of the review included compliance with the FDA label for indication and dose as well as appropriate transition to an oral agent. Secondary outcome included compliance with the BHM criteria for non-formulary drug usage



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including the evident or documented justification for not using a formulary equivalent prior to the procedure, adverse drug reactions, 30-day readmission and mortality.

**Results:** A total of 28 patients received cangrelor during the specified study period. Of these, 18 patients received it prior to cardiac catheterization (FDA approved use) and 10 patients received it prior to a neurovascular intervention (off-label use). All 18 cardiac patients underwent PCI; 4/18 (22%) patients received ticagrelor loading dose prior to cangrelor administration, thus not meeting the FDA labeled criteria for use. Furthermore, 5/18 (28%) patients were hemodynamically stable and were potential candidates for oral P2Y<sub>12</sub> administration prior to PCI. Seventeen out of eighteen patients were transitioned to ticagrelor prior to completion of cangrelor infusion. Of the 10 patients who were given cangrelor for neurointervention, five were admitted with ischemic stroke and the other 5 with aneurysm. Nine patients underwent cerebral angiography with stenting while 1 patient had cerebral angiography with mechanical thrombectomy and angioplasty. Ninety percent (9/10) patients received ticagrelor loading dose prior to cangrelor infusion. Due to incomplete documentation of dose and duration, the researchers were not able to assess accurate bolus, infusion and duration in all patients. In those where documentation was complete, the FDA approved bolus dose of 30 mcg/kg and the infusion dose of 4 mcg/kg/min was utilized for both cardiovascular and neurovascular cases.

**Conclusion:** Of the total cangrelor use during the study period, (18/28) 64% of the patients received it for a cardiac indication and (10/28) 36% received it for a non-cardiac indication. Ticagrelor loading dose preceded cangrelor administration in 22% of the PCI and 90% of the neurointervention cases. If indicated, patients were appropriately transitioned from an intravenous to oral P2Y<sub>12</sub> inhibitor. An opportunity to improve patient selection and dose documentation was identified through this review. Recommendations to revisit the formulary status and to establish the prescribing criteria for cardiovascular as well as neurovascular use is under consideration by the system-wide formulary committees.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-042**

**Poster Title:** Retrospective evaluation of the appropriateness of use of Vernakalant at a tertiary-care teaching hospital in Lebanon

**Poster Type:** Evaluative Study

**Submission Category:** Cardiology/Anticoagulation

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**Purpose:** Atrial fibrillation is an increasingly common arrhythmia. It remains one of the strongest cause of stroke and systemic embolism. One of the goals of therapy is to control the symptoms and to improve the quality of life. Patients with recent onset commonly undergo immediate restoration of sinus rhythm by pharmacologic or electrical cardioversion. Vernakalant hydrochloride is a novel, predominantly atrial selective antiarrhythmic drug that effectively and rapidly converts a new onset of atrial fibrillation. We aimed to retrospectively evaluate the usage of vernakalant at the American University of Beirut Medical Center (AUBMC) since its integration in the formulary.

**Methods:** This study is a retrospective chart review for all the adult patients who were prescribed vernakalant at the medical center from March 2017 through July 2018. Analysis of the use of this medication included patients demographics (age, gender, weight, height, allergies, admission date, reason for admission, hospital length of stay, past medical and surgical history), indication criteria, presence of any treatment exclusion or a relative exclusion criteria, dose of infusion, monitoring parameters, prescribing physician, place in therapy, adverse drug effects and drug-drug interaction.

Descriptive statistics such as mean values, percentages, and standard deviations, when applicable, were used to summarize to data. Statistical data were generated using SPSS, version 24. Following the AUBMC policy, the MUE did not require approval by any research committee. Informed consent was also waived due to the study design, which aims at quality improvement.

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**Results:** A total of 18 patients were prescribed vernakalant since March 2017 until July 2018. One patient was excluded from the data collection, due to the inability to access the medical record. All patients met the inclusion criteria to prescribe the medication. 82% of the patients required a second dose of 2 mg/kg after a dose of 3 mg/kg. In 29.4% of the cases, a cardiology fellow prescribed the dose and the order set was not used. All monitoring parameters were taken at baseline, but only in 5.8% of the patients they were repeated after 30, 60, 90 and 120 minutes of the start of the infusion. In addition, an electrocardiogram was not done in 100% of the cases. The sodium and potassium levels were monitored for 70.5% of the patients. On the other hand, no adverse effects were observed. A category X interaction was found in 29.4% of the patients, and others of type D was noted in 11.76%.

**Conclusion:** Despite the low number of patients, this study showed the need to educate the physicians about the necessity to restrict the prescribers to electrocardiologists. Moreover, they should be alerted about the need to monitor blood pressure and heart rate after 30, 60, 90 and 120 minutes after the start of the infusion, to compare potassium and sodium levels before the start of the administration and at the end. Furthermore, they should be educated about the need to do an electrocardiogram after the end of the infusion of vernakalant. Finally, physicians should be informed about the possible interactions with other medications.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-043**

**Poster Title:** Incidence, severity and duration of thrombocytopenia after cardiopulmonary bypass

**Poster Type:** Evaluative Study

**Submission Category:** Cardiology/Anticoagulation

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**Purpose:** Thrombocytopenia, defined as a platelet count of less than 150,000/mm<sup>3</sup>, after cardiopulmonary bypass (CPB) occurs commonly. Heparin is the preferred anticoagulant for CPB. Thrombocytopenia development after heparin exposure frequently raises concern for heparin-induced thrombocytopenia (HIT). Probability assessment of HIT may vary depending on factors used for other potential causes of thrombocytopenia. When other known causes of thrombocytopenia are not considered, overestimation of HIT probability can occur. Moderate to high HIT probability warrants the use of non-heparin anticoagulation.

**Methods:** A two-month retrospective consecutive-patient analysis was completed to determine the incidence, severity and duration of thrombocytopenia after CPB in adult patients. Platelet counts were assessed prior to CPB and daily through postoperative day 5. HIT testing via heparin dependent antibody (HDA) laboratory specimens in this population was also assessed.

**Results:** There were 68 consecutive patients included in the analysis. Sixty-one patients (90%) developed platelet counts less than 150,000/mm<sup>3</sup>. Thirty-eight (56%) patients developed platelet counts less than 100,000/mm<sup>3</sup>. Two (3%) patients developed platelet counts less than 50,000/mm<sup>3</sup>. Platelet nadir occurred between day 2 and 3. Six patients had HDA tests ordered, which all resulted as negative.

**Conclusion:** Thrombocytopenia associated with CPB occurs at a high incidence. It appears to be self-limiting with initial recovery in platelet count occurring after postoperative day 3. CBP

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should be considered as a likely cause of thrombocytopenia when assessing HIT probability within postoperative day 5 of CPB.

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**Session-Board # - 4-044**

**Poster Title:** Impact of obesity on real-world clinical outcomes in patients with atrial fibrillation on direct oral anticoagulant therapy: a retrospective cohort study

**Poster Type:** Evaluative Study

**Submission Category:** Cardiology/Anticoagulation

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**Purpose:** Direct oral anticoagulants (DOACs) are widely used in atrial fibrillation (AF) to significantly reduce the risk of stroke and systemic embolic events. For patients who are overweight or obese, there are no DOAC dose adjustment recommendations due to limited data available on how body weight influences cardiovascular and bleeding outcomes in patients on DOACs. The purpose of this study was to evaluate the impact of overweight or obesity on any stroke or systemic embolic events and major bleed events in AF patients who are users of dabigatran, rivaroxaban, apixaban, or edoxaban.

**Methods:** An observational retrospective cohort study of adult (18 years or older) AF or atrial flutter patients initiating a DOAC from January 1, 2015 to December 31, 2017 was conducted using pharmacy and medical claims data from health plan members in Texas. Patients were stratified into five cohorts based on body mass index (BMI): normal (BMI 18.5-24.9 kg/m<sup>2</sup>), overweight (BMI 25.0-29.9 kg/m<sup>2</sup>), obese I (BMI 30.0-34.9 kg/m<sup>2</sup>), obese II (BMI 35.0-39.9 kg/m<sup>2</sup>), and obese III (BMI ≥40.0 kg/m<sup>2</sup>). The primary effectiveness outcome was stroke, including ischemic stroke and hemorrhagic stroke, or systemic embolism (SE). The primary safety outcome was major bleeding, including gastrointestinal bleeding, intracranial bleeding, and major bleeding from other sites. From the date of first pharmacy fill of a DOAC (index date), patients were followed until the earliest occurrence of either: (i) 12 months post-index date, (ii) occurrence of study outcome of interest, or (iii) 30 days post-discontinuation date, defined as no evidence of DOAC filled for 30 days from the last days' supply of the last filled prescription

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date. Baseline demographics and characteristics and outcome rates were reported descriptively, and bivariate analyses were performed. Cox proportional hazards regression was conducted to compare time-to-event in each of the cohorts. The Baylor Scott & White Health Institutional Review Board approved this study.

**Results:** The primary analysis consisted of 1,035 patients. Collectively, obese patients accounted for the largest cohort (438 in all obese classes: 220 in obese I, 132 in obese II, and 86 in obese III), followed by overweight (352) and normal weight (245) patients. The mean age at index date was 75.9 years. A majority of the patients were of White race (96.2%), non-Hispanic ethnicity (97.7%), and had Medicare insurance (70.6%). Decreasing trends were observed from normal to obese III cohorts in mean age (81.5, 77.0, 74.7, 71.2, and 66.0 years, respectively), CHA2DS2-VASc score (4.8, 4.2, 4.2, 4.0, and 3.8, respectively), and HAS-BLED score (2.6, 2.5, 2.4, 2.3, and 2.1, respectively). A total of 11 (1.1%) patients experienced a stroke/SE event and similar rates were observed among the cohorts (3 [1.2%] normal; 3 [0.9%] overweight; 3 [1.4%] obese I; 1 [0.8%] obese II; 1 [1.2%] obese III). A total of 29 (2.8%) patients experienced a major bleed event. The frequency of bleed decreased as BMI cohorts increased (9 [3.7%] normal; 11 [3.1%] overweight; 5 [2.3%] obese I; 3 [2.3%] obese II; 1 [1.2%] obese III). A cox proportional hazards regression could not be performed due to the low number of event rates.

**Conclusion:** This study suggests that a small subset of patients who are users of DOACs experience a stroke/SE or major bleed event, and patients who are overweight or obese are not significantly associated with higher thrombotic or bleed rates compared to normal weight patients. However, this study is limited to a single health plan population with low event rates. As such, statistical testing could not be conducted to assess outcomes. Further studies with larger patient populations are warranted.

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**Session-Board #** - 4-045

**Poster Title:** Impact of ivabradine on hemodynamics and heart rate variability in acute heart failure

**Poster Type:** Evaluative Study

**Submission Category:** Cardiology/Anticoagulation

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**Purpose:** In acute heart failure, elevated heart rate is a common phenomenon but a strong predicting factor for poor prognosis. However, the role of beta-blockers is limited in this setting due to its negative inotropic effect. Ivabradine has comparable chronotropic effect with that of beta-blockers but without affecting contractility. However, its clinical evidence on hemodynamic stability and heart rate variability in acute heart failure patients is limited. The aim of this study was to evaluate the impact of ivabradine on hemodynamic stability and heart rate variability in patients with acute heart failure.

**Methods:** Between April 2016 and February 2017, eleven consecutive patients with acute heart failure, sinus rhythm with heart rate of 70 bpm or more and left ventricular ejection fraction (LVEF) less than 40%, were began with ivabradine at the dose of 2.5-5 mg twice daily during hospitalization. In order to evaluate hemodynamic impact of ivabradine objectively, the study utilized a non-invasive hemodynamic system using bio-impedance measurements to detect cardiac contractility, stroke volume, blood pressure and vascular resistance. Heart rate variability parameters were collected using holter monitor. Data was obtained before initiation of ivabradine, one week and one month after initiation of ivabradine.

**Results:** The mean age of study subjects was 57. The leading cause of heart failure was ischemic heart disease (46%), followed by uremic cardiomyopathy (18%). Ivabradine was initiated in 63% of the patients within the first 72 hours after admission. No patients were requiring inotropic therapy at the time of initiation of ivabradine. The mean heart rate was significantly decreased



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after initiation of ivabradine:  $92.2 \pm 12.59$  bpm at baseline;  $78.7 \pm 11.21$  bpm at one week ( $p=0.004$ );  $76.64 \pm 12.94$  bpm at one month ( $p=0.031$ ). Cardiac contractility index was similar in one week but significantly increased at one month compared to that at baseline:  $28.11 \pm 12.89$  at baseline;  $32.78 \pm 12.92$  at one week ( $p=0.334$ );  $36.8 \pm 10.92$  at one month ( $p=0.019$ ). Stroke volume index, cardiac index, mean arterial pressure, systemic vascular resistance, and heart rate variability were similar before and after initiation of ivabradine. LVEF was significantly improved from 26.4% to 45.6% within three months after discharge ( $p=0.003$ ). New York Heart Association functional class was significantly improved at one week and one month ( $p=0.004$ ). NT-proBNP was reduced within two weeks after ivabradine initiation though the difference was not statistically significant ( $p=0.145$ ). One patient (9%) experienced bradycardia while on ivabradine. In-hospital mortality rate and three-month readmission rate were 0%.

**Conclusion:** Ivabradine was effective in reducing heart rate without significantly affecting cardiac index, blood pressure, and heart rate variability in patients with acute heart failure in sinus rhythm. Since Ivabradine was well-tolerated, it might be considered as a treatment option in patients with acute heart failure in sinus rhythm with elevated heart rate. Further study with larger sample size is warranted to confirm the findings of this study.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-046

**Poster Title:** Knowledge, attitudes and prescribing practices of Lebanese physicians about aspirin for primary and secondary prevention of cardiovascular diseases in eligible patients

**Poster Type:** Descriptive Report

**Submission Category:** Cardiology/Anticoagulation

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**Purpose:** Cardiovascular diseases (CVD) are considered the leading cause of morbidity and mortality worldwide. Long term aspirin use has shown significant reductions in major occlusive events including coronary heart diseases. In secondary prevention, the benefits outweigh bleeding risks. However, its use in primary prevention is still controversial among physicians due to different risk assessment methods. Due to insufficient data on aspirin use for primary and secondary prevention of CVD in Lebanon, we conducted this study to evaluate the knowledge, attitudes, and current practices of Lebanese physicians in relation to the use of aspirin.

**Methods:** A cross-sectional observational study was conducted in Lebanon from January to April 2019. The institutional review board of participating hospitals and of the school of pharmacy at the Lebanese International University approved the study. Recruited participants were attending physicians and residents practicing in any unit of seven hospitals and external clinics. After receiving an oral informed consent, participants filled a pre-established questionnaire. Demographic information was gathered. Knowledge was assessed based on the latest recommendations for the use of aspirin for primary and secondary prevention of CVD. Attitudes were evaluated with regards to the prescribed dose and dosage form of aspirin, while prescribing practices were determined using questions collecting information about patient education when prescribing aspirin and medications co-prescribing habits. In addition, we computed a continuous score to evaluate the level of physician's knowledge. Statistical analysis

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was performed using SPSS version 21.0. Descriptive analyses were reported as mean standard deviation (SD) for quantitative variables or frequency and percentage for categorical variables. Bivariate and multi-variable analysis to determine factors associated with knowledge score were assessed using student t-test, one-way ANOVA and Kruskal-Wallis, as well as linear regression models. A  $p$ -value $\leq 0.05$  was deemed statistically significant.

**Results:** A total of 230 Lebanese physicians and residents were included. The mean age  $\pm$  SD was  $43.41 \pm 13.77$  years and 165 (71.7%) were males. Physicians reported prescribing aspirin for secondary prevention in the following indications: myocardial infarction (99.1%), coronary artery bypass graft (97.4%), percutaneous coronary intervention (PCI) with stent placement (98.3%), stroke (93.9%), transient ischemic attack (83.4%), stroke prophylaxis in atrial fibrillation (42.2%), and PCI without stent (36.1%). On the other hand, in patients having additional diagnosis, physicians reported prescribing aspirin as such: cardiac failure (28.3%), hiatus hernia (25.7%), asthma (11.8%), or potential bleeding disorder (6.5%). For primary prevention, the prophylactic use of aspirin was reported in patients with risk factors of CVD: age $>65$  years (85.7%), diabetes (76.5%), or family history of CV events (79.2-86.6%). For other risk factors, the majority of the physicians were confused whether to prescribe aspirin or not (23-56.5%). Most Lebanese physicians shared a common attitude towards aspirin formulation and dose: enteric coated (98.2%) and 81mg (97.9%) as well as concordant practice and medications co-prescription. Bivariate analysis showed significant differences in physicians' knowledge, most knowledgeable being older ( $p < 0.001$ ), attending physicians compared to residents ( $p < 0.001$ ) and with more years of experience ( $p < 0.001$ ).

**Conclusion:** This study showed that aspirin was appropriately prescribed by Lebanese physicians for secondary prevention of CVD. However, the majority of physicians either tend to prescribe aspirin despite its questionable benefits or were confused about aspirin use for primary prevention in patients with CV risk factors. Moreover, prophylactic use of aspirin was reported higher in Lebanon compared to US and Europe. Therefore, further educational interventions and appropriate dissemination of updated guidelines is required to reduce uncertainty and improve the quality of CVD preventive care in Lebanon.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-047

**Poster Title:** Enoxaparin treatment dosing in an obese patient on hemodialysis

**Poster Type:** Case Report

**Submission Category:** Cardiology/Anticoagulation

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**Purpose:** The purpose of this patient case is to describe the management of an obese patient on hemodialysis who is being bridged with enoxaparin and warfarin for treatment of a superior vena cava thrombus. The patient's information was collected from the electronic medical record. The patient is a 45-year-old female admitted to the hospital for a skin graft placement after elective left upper extremity arteriovenous graft infection. The patient has a past medical history of a gastrointestinal bleed, morbid obesity, superior vena cava thrombus (diagnosed two months prior to admission), and end-stage renal disease on hemodialysis. The patient's actual body weight is 148.8 kg, whereas her ideal body weight is 66.2 kg. During the admission, the patient was on a high dose heparin drip as a bridge therapy with warfarin due to a sub-therapeutic INR. However, the patient lost intravenous access, resulting in discontinuation of the heparin drip and a transition to enoxaparin. Pharmacy was consulted to dose enoxaparin. Literature provides limited treatment options for subcutaneous or oral agents in a setting of a superior vena cava thrombus treatment in hemodialysis patients. Additionally, there is limited guidance on enoxaparin dosing in obese patients on hemodialysis. The pharmacist initiated the patient on enoxaparin 1mg/kg every 24 hours using an adjusted weight (99.2 kg) with Low Molecular Weight Heparin (LMWH) anti-Xa level monitoring. Per CHEST Guidelines, the therapeutic range for anticoagulation is 0.6-1 units/mL. Literature suggests that LMWH anti-Xa levels should be checked at their peak at four hours after dosing. Enoxaparin is predominately renally cleared. In a setting of renal failure, this may cause enoxaparin's half-life to be prolonged and lead to an increased risk of bleeding. At the institution, the LMWH anti-Xa level is not done in-house. Because of the prolonged turnaround time of the lab and high risk of bleeding, the LMWH anti-Xa level was drawn four hours after the second dose. The pharmacist monitored for signs of bleeding and thrombosis regularly due to a high risk of both.

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The pharmacist also managed the patient's warfarin by adjusting the dose based on the INR daily. The medical team planned to bridge the patient for five days and until the INR was within goal of 2-3. The LMWH anti-Xa level resulted within goal at 0.6 units/mL and the same dose was continued for a total of four days. While on enoxaparin and warfarin, the pharmacist also counseled the patient on appropriate use of her anticoagulation medications as well as possible side effects. Once intravenous access was re-established, the pharmacist intervened by transitioning the patient back to a high dose heparin drip as soon as possible. The patient was successfully bridged for five days and achieved a therapeutic INR without any complications. Thus, it is the role of a pharmacist to recommend appropriate dosing and monitoring of anticoagulation agents, provide education to the patient, as well as transition the patient to a safer alternative when possible to prevent complications.

**Methods:**

**Results:**

**Conclusion:**

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**Session-Board # - 4-048**

**Poster Title:** Evaluation of four-factor prothrombin complex concentrate in the management of factor Xa inhibitor-associated bleeding

**Poster Type:** Evaluative Study

**Submission Category:** Cardiology/Anticoagulation

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**Purpose:** The use of direct oral anticoagulants (DOACs) has increased due to guideline recommendations and expanded indications. Bleeding related to DOAC use is a serious adverse effect. Despite approval of coagulation factor Xa (recombinant), inactivated-zhzo, a specific reversal agent for apixaban and rivaroxaban, the debate regarding the optimal treatment strategy for bleeding associated with factor Xa inhibitors is unsettled. Four-factor prothrombin complex concentrate (4F-PCC) is commonly used off-label for treatment of serious bleeding in patients receiving DOACs. The purpose of this medication use evaluation is to evaluate the efficacy and safety of using 4F-PCC in the management factor Xa inhibitor-associated bleeding.

**Methods:** A retrospective chart review was completed using the hospital's electronic medical record. All patients who received 4F-PCC to manage apixaban or rivaroxaban-associated bleeding from June 2018 to April 2019 were included. Data collected included patient demographics, pre-admission DOAC, concomitant medications, source of bleeding, 4F-PCC dose, and adjunctive hemostatic therapy (e.g., desmopressin, tranexamic acid, blood products). The primary efficacy outcome was achievement of adequate hemostasis following 4F-PCC administration. Effective hemostasis was defined as not requiring any additional hemostatic agents, coagulation factors, or blood products more than 48 hours after receiving 4F-PCC for any type of bleeding. In addition, bleeding-site specific requirements for effective hemostasis as defined by the International Society on Thrombosis and Hemostasis were incorporated into the assessment. Non-visible bleeding (e.g., gastrointestinal) was considered to have effective hemostasis if the patient's hemoglobin was stable (no more than 10% reduction) at 48 hours

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and visible bleeding required cessation within four hours. Musculoskeletal bleeding required improvements in pain and swelling at 24 hours. Effective hemostasis of intracranial hemorrhage was evaluated using physician documentation based on computed tomography. Length of stay, as well as rates of thrombosis and mortality were also evaluated. Descriptive statistics were used to analyze the data.

**Results:** Seventeen patients received 4F-PCC for apixaban (n=16) or rivaroxaban (n=1) associated bleeding. The cohort was 66% male with an average age of 77 years. Atrial fibrillation was the anticoagulation indication for 87% of patients. Concurrent home antiplatelet therapy included aspirin (n=7) and dual therapy with aspirin and ticagrelor (n=1). Patients received either 50 units/kg (87%) or 25 units/kg (13%) of 4F-PCC. Hemostatic efficacy was unable to be evaluated in two patients as they were transferred to a tertiary hospital soon after admission. Of the fifteen patients evaluable for hemostatic efficacy, the site of the bleed was intracranial (n=7), gastrointestinal (n=6), paravertebral (n=1), and pericardial (n=1). Hemostatic efficacy was achieved in 14/15 (93%) patients. The single patient with inadequate hemostasis had a gastrointestinal bleed complicated by disseminated intravascular coagulopathy requiring additional hemostatic interventions. Two patients (13%) died and no patient experienced a thrombotic event during hospital admission.

**Conclusion:** In this retrospective study, 4F-PCC appears to provide adequate hemostasis for apixaban-associated bleeding without increasing the risk for thrombosis. No conclusions can be drawn regarding rivaroxaban-associated bleeding since just one patient receiving rivaroxaban was evaluated. This study is limited by the small sample size and reliance on adequate medical record documentation of hemostasis.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-049

**Poster Title:** Improper transition of care leading to stent occlusion and myocardial infarction

**Poster Type:** Case Report

**Submission Category:** Cardiology/Anticoagulation

**Primary Author:** Michael Rickson, MCPHS University; **Email:** michael\_rickson@my.uri.edu

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**Purpose:** This case illustrates poor transitions of care leading to negative consequences. A 47-year-old male presented to primary care with complaints of a five-day history of loss of energy, loss of appetite, and general weak sensation. Upon further questioning at presentation, he reports to have vomited the morning when symptoms first presented, and his appetite has been poor for the past few days. In his primary care physician's office an electrocardiogram (EKG) revealed new ST elevation anterior leads compared to an EKG from 2017. Acute ischemia could not be ruled out. He was given three 81mg aspirin tablets on top of one that was already taken a few hours prior and was sent to the emergency department (ED). An EKG was performed in the emergency department and the patient was found to have ST elevations in V3, V4, and V5. Troponin was also elevated at 22.97ng/mL indicating cardiac injury. The interventional cardiologist gave the patient ticagrelor 180mg as well as heparin and sent him to a nearby catheterization lab. Coronary angiography revealed severe mid-left anterior descending artery (LAD) stenosis, severe proximal right coronary artery (RCA) stenosis, moderate distal circumflex artery stenosis, and patent mid-RCA stents. At this time, two overlapping drug-eluting stents were placed in the LAD and recommended percutaneous coronary intervention of proximal RCA prior to discharge. Two days after the first two drug-eluting stents were placed in LAD and one day after the drug-eluting stent in RCA was placed the patient was cleared for discharge. He and his wife were given discharge education regarding medications, activities, and follow-up appointments, which, per the patient chart, the wife verbalized understanding. Aspirin 81mg daily and metoprolol tartrate 50mg daily were continued at previous doses, ticagrelor 90mg twice daily was initiated, atorvastatin was increased to 80mg daily, and lisinopril was increased to 10mg daily. Three days after discharge the patient presented to a different ED with presyncope and chest pressure. He was found to be in mild cardiogenic shock with hypotension and complete heart block. Upon further



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questioning, the patient described that he had not taken the ticagrelor since he left the hospital. His wife stated the pharmacist was telling her the order was still in a pending state and he ultimately did not receive the medication. She asked the pharmacist if the medication was important since her husband just had a heart attack with stents placed and was told multiple times it was pending. Both the RCA and LAD stents were fully occluded. His troponin was elevated at 1200 indicating another cardiac injury. Adequate flow was restored after thrombectomy, and he remained electrically and hemodynamically stable with minimal peripheral norepinephrine support. He was re-stented in both the LAD and RCA, had an immediate improvement in function, and came off vasopressors with no further cardiac symptoms. Before the second discharge, his primary care pharmacist was notified by the patient's wife and got a prior authorization for ticagrelor 90mg bid and it was filled before his discharge. The patient and his wife deny being educated on the critical importance of ticagrelor. His pharmacy did not contact his primary care pharmacist or physician to initiate a prior authorization or request a change in therapy. This case reveals a need to re-evaluate the roles of physicians and pharmacists in transitions of care, focusing on utilizing resources to ensure the medications prescribed are either preferred on a patient's insurance or proper steps are taken to initiate necessary authorization or obtain covered medications prior to discharge.

**Methods:**

**Results:**

**Conclusion:**

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-050

**Poster Title:** Assessment of unfractionated heparin use in a tertiary care hospital in Lebanon

**Poster Type:** Evaluative Study

**Submission Category:** Cardiology/Anticoagulation

**Primary Author:** Marwan Sheikh-Taha, Lebanese American University; **Email:** marwantaha@yahoo.com

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**Purpose:** The anticoagulant unfractionated Heparin (UH) is a high-risk drug used in the prevention and treatment of a variety of venous and thromboembolic disorders. It has a narrow therapeutic window with high inter- and intra-patient variability necessitating careful laboratory monitoring and dose adjustment to ensure proper antithrombotic protection while minimizing the bleeding risk. The objective of our study was to assess the appropriate use of UH in a tertiary care hospital in Beirut, Lebanon.

**Methods:** The medical charts of all patients admitted to the hospital and received UH between September 26 and November 30, 2018 were reviewed. We assessed the indication for UH, dosage, monitoring parameters, and possible side effects.

**Results:** During the study period, 24 patients received UH. Acute coronary syndrome (ACS), 9 patients (38%), was the most common indication, followed by atrial fibrillation, 6 patients (25%), deep venous thrombosis (DVT) prophylaxis, 5 patients (21%), and pulmonary embolism, 1 patient (4%). Three patients (13%) received therapeutic doses of UH without documented indications in patients' charts.

All patients received appropriate dosing for DVT prophylaxis. On the other hand, among the 19 patients receiving the drug for indications other than DVT prophylaxis, 15 patients (79%) did not receive a bolus dose, and 5 patients (26%) received inappropriate maintenance doses. Activated partial thromboplastin time (aPTT) was appropriately monitored in only 2 of the 19

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patients (10.5%) and only 2 patients (10.5%) had a therapeutic aPTT after 24 hours of initiating UH.

Patient's weight was not documented in 7 patients (29%). Four patients developed thrombocytopenia (platelet count < 100,000 /mm<sup>3</sup>) and one patient bled while receiving the drug. All patients had appropriate hemoglobin, hematocrit and platelet monitoring.

**Conclusion:** The use of UH was inappropriate in the majority of patients. This raises the need for appropriate application of the available protocols and emphasizes the role of pharmacists in drug monitoring.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-051**

**Poster Title:** Assessment of the calcium channel blocker, lower extremity edema, loop diuretic prescribing cascade: a prescription sequence symmetry analysis

**Poster Type:** Evaluative Study

**Submission Category:** Cardiology/Anticoagulation

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**Purpose:** Dihydropyridine calcium channel blockers (DH-CCBs), a first-line option for treatment of hypertension, can cause lower extremity edema (LEE). Anecdotal reports suggest this may result in a prescribing cascade (PC), where DH-CCB-associated LEE is treated with a loop diuretic (LD). We aimed to assess the magnitude and characteristics of the DH-CCB associated LEE, LD PC (the PC).

**Methods:** A prescription sequence symmetry analysis (PSSA) was used to assess initiation of LDs before or after initiating DH-CCBs among patients  $\geq 20$  years old, without a heart failure (HF) diagnosis using a private insurance claims database from 2005 to 2017. Secular trend-adjusted sequence ratios (aSR) with 95% confidence intervals (CI) were calculated within a 360-day window of the initial DH-CCB claim. The percentage of patients impacted by this PC was estimated by the difference in initial LDs before and after initial DH-CCBs divided by DH-CCB initiators. Patient characteristics and relative rates of the PC were calculated using relative risks (RR) among sub-populations with potentially differential PC risk. The study was exempted from review by the University of Florida Institutional Review Board due to use of deidentified data.

**Results:** Among the 1,206,093 DH-CCB initiators, 55,818 patients had a new LD prescription within 360 days of initiating DH-CCB, resulting in aSR 1.87 (95% CI 1.84-1.90). An estimated 1.44% of DH-CCB initiators experienced the PC. Older adults (RR 2.01, 95% CI 1.96-2.07) and those initiated on a high dose DH-CCB (RR 2.59, 95% CI 2.46-2.74) were more likely to

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experience the PC. There was no change in the incidence of PC over the duration of the study period.

**Conclusion:** The temporality of initial DH-CCB and LD claims further supports the presence of the PC. Although a low percentage of DH-CCB initiators experienced the PC, the number of patients impacted is likely substantial given DH-CCBs' use in hypertension. Older adults and patients initiated on high dose DH-CCB may be at increased risk for the PC. There were no improvements towards avoiding the PCs over time.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-052

**Poster Title:** Assessing baseline rates of stroke risk score documentation and anticoagulation in patients with atrial fibrillation (AF) at an integrated delivery network

**Poster Type:** Descriptive Report

**Submission Category:** Cardiology/Anticoagulation

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**Purpose:** Patients with AF are five times more likely to experience a stroke. Current guidelines recommend the use of stroke risk scores such as the CHA2DS2-VASc to identify high-risk patients for primary stroke prevention through prophylactic anticoagulation. Recent studies found that approximately 39% of high-risk non-valvular AF patients remain untreated. This study was designed to assess baseline rates of risk score documentation and anticoagulation to determine local guideline compliance and areas of opportunity for electronic clinical decision support tools.

**Methods:** This baseline assessment was conducted through retrospective analysis of electronic health record (EHR) data. An EHR report was built to query for patients diagnosed with AF during a face-to-face, emergency department, or admission encounter from January 1, 2018 to December 31, 2018. The report was designed to first identify the total number of unique AF patients, and then determine the rates of risk score documentation and anticoagulation in this population. Documentation rates for the currently recommended CHA2DS2-VASc as well as the older CHADS2 score were collected. Due to limitations with the data source, scores were only captured if they were entered in structured fields (i.e. flowsheets). Data were also collected regarding encounter types associated with score documentation, with a random sample of encounters manually reviewed. With recent guidelines recommending the use of direct oral anticoagulants (DOAC) over warfarin in eligible patients, the report was built to capture

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separate utilization rates for warfarin, apixaban, betrixaban, dabigatran, edoxaban, and rivaroxaban.

**Results:** The EHR report identified 16,230 unique AF patients. The report found that the CHADS2 score was not utilized during the specified timeframe but had historically (prior to 2018) been documented for 17% (n= 2,753) of patients. During 2018 a CHA2DS2-VASc score was documented for 12% (n= 1,887) of patients. The majority of documented scores were attributable to an anticoagulation clinic encounter (84%) or telephone encounter (15%). A supplemental EHR query searching for CHA2DS2-VASc scores documented in unstructured fields (i.e. freeform provider notes) yielded a variety of formats and documentation methods that made utilization of these scores for any standardized systemic intervention unfeasible. Of the unique AF patients 60% (n= 9,771) had an oral anticoagulant ordered during the study period. Apixaban was ordered most frequently (31%), followed by warfarin (20%) and rivaroxaban (13%), with negligible use of dabigatran, edoxaban, and betrixaban.

**Conclusion:** This baseline assessment revealed that only 12% of AF patients in our system had stroke risk scores documented in structured data fields. Risk scores documented in unstructured fields could not be reliably abstracted. To be able to employ electronic clinical decision support tools to promote guideline compliance, standardized risk score documentation must be improved upon first.

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**Session-Board #** - 4-053

**Poster Title:** Assessment of physician prescribing habits among patients with plaque psoriasis and psoriatic arthritis treated with ustekinumab

**Poster Type:** Evaluative Study

**Submission Category:** Chronic/Managed Care

**Primary Author:** Trista Tam, Kaiser Permanente; **Email:** tristata@usc.edu

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**Purpose:** The incredibly high cost and inevitable side effects of specialty drugs in the treatment of plaque psoriasis and psoriatic arthritis continue to present challenges for managed care organizations. Currently, ustekinumab (Stelara) is the last line agent. Medication utilization evaluation can help determine the appropriate use of ustekinumab for plaque psoriasis or psoriatic arthritis as substantial variance may occur between dermatologists and rheumatologists in terms of treatment plans. The objective of this study is to compare the prescribing trend of ustekinumab between dermatologists and rheumatologists and to evaluate physician adherence to Kaiser Permanente's drug guidelines for plaque psoriasis and psoriatic arthritis.

**Methods:** The study was a retrospective chart review of 24 adult patients who have received a prescription for ustekinumab from January 2015 to August 2018 for the treatment of plaque psoriasis or psoriatic arthritis at Kaiser Permanente Downey Medical Center. Patient charts were reviewed using the Health Connect electronic medical record system. Age, gender, types of prescriber, and prescription drugs for plaque psoriasis or psoriatic arthritis were extracted from patient charts. Exclusion criteria include patients who are deceased, were pregnant at any point after diagnosis of plaque psoriasis or psoriatic arthritis, or are no longer active at Kaiser Permanente. Medication use evaluation and structural chart reviews were used to determine the adherence of physician prescribing patterns of ustekinumab with the current stepwise therapy for the treatment of plaque psoriasis or psoriatic arthritis under Kaiser Permanente drug guideline.



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**Results:** Out of the 28 patients reviewed, 24 subjects were included. There was a greater number of patients diagnosed with plaque psoriasis (n=20, 83.3%) compared to psoriatic arthritis (n=10, 41.7%) with 6 patients diagnosed with both plaque psoriasis and psoriatic arthritis. There were a total of 12 patients that did not meet the minimum criteria in order to be initiated ustekinumab. Out of the 12 patients, 10 patients (83.3%) using ustekinumab that were not adherent to Kaiser Permanente's drug guideline were prescribed by dermatologists (p=0.81). Dermatologists appeared to be prescribing ustekinumab more to the older population (>45 years of age) while rheumatologists were prescribing more to the younger population (< 45 years of age). It also observed that many of the biologics were only utilized for a short period of time (approximately 1 to 2 years) before switching to another agent. However, there is no significant difference between dermatologists and rheumatologists in terms of prescribing adherence to the Kaiser Permanente drug guideline.

**Conclusion:** This study was limited by not being able to reach power for statistical significance due to small subject size. However, it is observed that there is no significant difference between dermatologists and rheumatologists in terms of prescribing habit and adherence to the Kaiser Permanente's drug guideline. Next step is to discuss with the chief of service the results and to initiate physician education if appropriate.

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**Session-Board #** - 4-054

**Poster Title:** Comparative clinical effectiveness of biological medications in the management of rheumatoid arthritis at a tertiary care hospital in Jazan, Saudi Arabia

**Poster Type:** Evaluative Study

**Submission Category:** Clinical Topics/Therapeutics

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**Purpose:** The objective of the study was to compare the clinical effectiveness of biological agents compared to other non-biological-based regimes in the management of RA. The most important measurements used to estimate the efficacy of the treatment were the following: DAS 28 score, ESR, CRP, anti-CCP, and RF. These markers were assessed for last twelve months of data observation and follow up after pharmaceutical intervention.

**Methods:** This cross-sectional study was conducted at a tertiary central hospital in Jazan, a southwestern region of Saudi Arabia. Real-world data of adults patients diagnosed with rheumatoid arthritis were retrospectively collected and analyzed the data of patients for patient's following up in the outpatients clinics between September 2015 and September 2018. Ethical approval was obtained from the hospital's Institutional Review Board. Statistical analysis was performed using the Statistical Package for Social Sciences version 24.0 for Windows (SPSS Inc., Chicago, IL, USA). Participants were categorized into three Groups: Group 1 received one biological agent; Group 2 received one or two disease-modifying anti-rheumatic drugs DMARDs; and Group 3 received the drugs of Group 1 plus 2. The biological agents include adalimumab, tocilizumab, etanercept, abatacept, infliximab, rituximab, and tofacitinib. The DMARDs involve methotrexate, sulfasalazine, hydroxychloroquine, and leflunomide. In addition, the Tukey HSD test was used for intergroup comparisons to evaluate any statistically significant differences between the groups being compared (overall  $\alpha = .05$ )

**Results:** Demographic characteristics of the 316 patients who were identified from the hospital database meeting the inclusion criteria were as follow: 95% Saudi nationality, 89.2% female,

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and 52.5% in the age of 40-60 years. Baseline clinical markers were as follow: mean±SD of ESR was 46.14±31.14mm/h, CPR 1.32±1.98mg/L, and DAS was 2.74±0.80. After 12 months of treatment with individual drug of biological therapies. there were significant improvement in DAS for patinets used biological agent or a combination of DMRDS and biological medication, as illustrated in the following table:

Variables      One way ANOVA

Medication used	One way ANOVA			F	P- Value	
	Group 1	Group 2	Group 3			
ESR	32.37 ± 30.18	48.29 ± 30.90	46.53 ± 31.16	2.09	0.126	
CRP	0.64 ± 0.79	1.59 ± 2.45	1.26 ± 1.82	2.03	0.133	
DAS-ESR	2.22 ± 0.45	2.78 ± 0.77	2.76 ± 0.82	4.19	0.016*	

**Conclusion:** This study showed that significant different between patients used biological medications only and patients who used DMARDs with biological medication.

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**Session-Board #** - 4-055

**Poster Title:** The impact of pharmacist interventions in conversion of intravenous medications to oral: a prospective study at Tawam hospital, UAE

**Poster Type:** Evaluative Study

**Submission Category:** Clinical Topics/Therapeutics

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**Purpose:** The main aim of this study was to explore the pharmacist role in improving the utilization of -intravenous medications and respective conversion to oral within 24-48 hours of initiated order. The main objective was to evaluate the rate of conversion from IV to PO enhanced by pharmacist interventions in adult patients who have been on intravenous medications in the selected clinical units at Tawam hospital. The selected medications were chosen to be converted from IV to PO because of availability in injection and oral form, have comparable bioavailability, have different cost price between injection and oral form and highly prescribed.

**Methods:** Adults patients who were receiving intravenous medications during hospitalization and have met the inclusion criteria for conversion from intravenous to oral therapy. The pharmacist generated a daily report from health information system (Malaffi) of patients who were on selected intravenous medications (Esomeprazole, Ranitidine, Metronidazole and fluconazole) which have been started for more than 24-48 hours. The pharmacist screened patients for opportunity of intravenous conversion to oral and has contacted prescriber/attending physician to obtain verbal approval for conversion. The conversion was documented as an accepted clinical intervention in the patient's electronic medical record. The pharmacist continued monitoring patients receiving oral medications by getting clinical feedback from attending physician progress notes. Patients eligibility for conversion were screened based on patient's age, gender, comorbidities, IV medication, medication converted to PO, reason for IV, reason for conversion, patient's

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clinically improvement. Inclusive criteria were all adult patients on intravenous therapy within 24-48 hours of drug initiation.

Criteria to be considered in the conversion from IV to PO therapy, patients should satisfy the following characteristics that documented oral intake, oral diet, tube feeding with  $\leq 100$  mL residuals over 24 hour. Also patient with no documented nausea/vomiting, no use of “as needed” anti-emetics in the previous 24 hour.

Paediatric patients and adult ICU, patients with chemotherapy-related neutropenia and/or bone marrow transplant patients and patients admitted to emergency department were excluded.

**Results:** The pharmacist has conducted 120 interventions for conversion of intravenous medications to oral therapy as per the policy of conversion. However, 120 interventions (59%) has been accepted by the treating physician and consequently the orders has been replaced with oral in accordance with the protocol.

The main finding was a number of patient’s medications converted from intravenous to oral in which patients were eligible for switch within 24/48 hr and total cost saving 28,720AED.

Usually medications are prescribed with automatic stop order (ASO) Esomeprazole and Ranitidine 30days, Metronidazole 7 days, Fluconazole 14 days all converted to PO after 24-48 hr\*

**Conclusion:** The rate of acceptance to convert IV medication to orally was increased by pharmacist role played in communication with physicians for possibility of intervening the switch of IV to PO. The impact on the cost minimization enhanced by pharmacist efforts is evidence based [9]. The important role of the pharmacist in conversion of intravenous to oral therapy and the substantial reduction in excessive use of intravenous medications will change the unnecessary prolonged use of intravenous medication. This approach can be used to reduce excess use of intravenous medications, with potential benefits in patient comfort, safety and cost saving.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-056

**Poster Title:** Efficacy and safety of nintedanib in elderly patients with idiopathic pulmonary fibrosis

**Poster Type:** Evaluative Study

**Submission Category:** Clinical Topics/Therapeutics

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**Purpose:** Idiopathic pulmonary fibrosis (IPF) is a chronic and progressive lung disease that predominantly affects individuals over the age of 60 years. Elderly patients with IPF are more likely to be frail, to have comorbidities, and to experience side-effects from medications. Older age may be a barrier to initiating antifibrotic therapy. We investigated the efficacy and safety of nintedanib, an approved treatment for IPF, in patients aged  $\geq 75$  years using pooled data from clinical trials.

**Methods:** Data were pooled from five clinical trials of nintedanib: the Phase II, 52-week, placebo-controlled TOMORROW trial (NCT00514683), the two replicate 52-week, placebo-controlled INPULSIS trials (NCT01335464, NCT01335477), the 12-week, placebo-controlled period of the INMARK trial (NCT0278847) and the  $\geq 6$ -month placebo-controlled period of a Phase IIIb trial (NCT01979952). Subgroup analyses were conducted in patients aged  $< 75$  versus  $\geq 75$  years at baseline.

**Results:** 1364 patients (nintedanib 717; placebo 647) were aged  $< 75$  years and 326 patients (nintedanib 178; placebo 148) were aged  $\geq 75$  years. Mean FVC at baseline in patients aged  $< 75$  and  $\geq 75$  years, respectively, was 82.2% and 87.7% predicted. Nintedanib reduced the annual rate of decline in FVC versus placebo in patients aged  $< 75$  and  $\geq 75$  years, with no significant difference in the treatment effect between subgroups (treatment-by-time-by-subgroup interaction  $p=0.60$ ). In patients aged  $< 75$  years, the annual rate of decline in FVC was  $-104.3$

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mL/year with nintedanib and  $-229.5$  mL/year with placebo (difference  $125.2$  mL/year [95% CI:  $90.1, 160.4$ ]); in patients aged  $\geq 75$  years, it was  $-96.0$  mL/year with nintedanib and  $-201.3$  mL/year with placebo (difference  $105.3$  mL/year [95% CI:  $39.3, 171.2$ ]). The adverse event profile of nintedanib was similar between the subgroups, but a greater proportion of patients aged  $\geq 75$  years discontinued treatment due to adverse events (26.4% with nintedanib, 12.2% with placebo) than patients aged  $< 75$  years (16.0% with nintedanib, 10.8% with placebo). Diarrhea was the most frequent adverse event in patients treated with nintedanib, reported in 59.4% and 60.7% of nintedanib-treated patients aged  $< 75$  and  $\geq 75$  years, versus 20.4% and 14.9% of placebo-treated patients in these subgroups, respectively.

**Conclusion:** Nintedanib has the same benefit on reducing the progression of IPF in patients aged  $\geq 75$  years as in younger patients. Proactive management of adverse events is important to help maintain patients on antifibrotic therapy.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-057

**Poster Title:** Basaglar treatment failure: a case report

**Poster Type:** Case Report

**Submission Category:** Clinical Topics/Therapeutics

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**Additional Authors:**

**Purpose:** Basaglar (insulin glargine) is a long-acting insulin, a biosimilar of Lantus (insulin glargine). It was approved and launched in the United States in December 2016. Since then, it has become a preferred version of insulin glargine on many drug formularies, leading to its frequent use.

A 58 y/o female was referred to the Clinical Pharmacy service for diabetes education and medication therapy management by her Primary Care Physician. The decision was made to start a basal insulin due to the patient's elevated Hemoglobin A1C. Basaglar was the insulin chose due to its preferred status on the patient's formulary. The patient was started on 10 units daily. Despite titrating the dose up to 60 units twice daily, the patient continued to have blood glucose readings in the 400 mg/dL range. In an attempt to correct for administration error, the patient switched insulin pens at the advice of the pharmacist. It was also confirmed that she had been utilizing the correct injection technique although the patient was concerned that insulin continued to leak out despite holding the pen in place for 10 seconds or more after the injection.

Upon presenting to a visit with her PCP, the patient was switched to Levemir insulin. After the switch of insulins, the patient's blood sugar was able to be controlled on 40 units of Levemir daily. The patient's Hemoglobin A1C was 13.9% immediately prior to the switch and decreased to 7.9% in a period of three months after the switch to Levemir. The patient continued to utilize the same injection technique and discussed that the insulin was no longer leaking after the completion of the injection.

A PubMed search utilizing the keywords "basaglar", "treatment failure", "case report" did not result in any information. As such, this may be the first case report discussing treatment failure with Basaglar insulin. Clinicians should be aware of this and consider switching the patient's basal insulin if treatment failure is a concern.



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**Methods:**

**Results:**

**Conclusion:**

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**Session-Board #** - 4-058

**Poster Title:** Clinical pharmacist evaluation of medication inappropriateness in a geriatric hospital

**Poster Type:** Evaluative Study

**Submission Category:** Clinical Topics/Therapeutics

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**Purpose:** Inappropriate prescribing (IP) in older patients is highly prevalent and is associated with increased risk of adverse drug events, morbidity, and mortality. Consequently, several criteria have been used to measure the appropriateness of medication prescription in such a vulnerable population. Explicit criteria are usually drug or disease orientated and frequently focus on selected drugs to avoid. On the other hand, implicit measures depend on clinical judgment. Using these criteria, The current study aimed to estimate the most common disorders encountered in a Lebanese elderly care center and the prevalence of IP.

**Methods:** A retrospective observational study was conducted at elderly daycare in Beirut during spring 2018. Patients' files were screened to gather demographic data, social and past medical history along with current medications taken. The clinical picture for each patient was evaluated using a tool that includes the Medication Appropriateness Index. Data collected was strictly confidential. Statistical analysis was performed using SPSS (version 20). The results were considered significant at  $P < 0.05$ .

**Results:** The results showed a high prevalence of liver disorders and osteoporosis in this population followed by diabetes, hypertension, and others. This necessitates close monitoring of elderly patients to adjust dose accordingly. As for the IP, drug indication and cost of the drugs were the most encountered problems followed by effectiveness, drug-drug interactions and duration problems. As the number of drugs increased the IP increased ( $p < 0.05$ ).

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**Conclusion:** As a conclusion, a clinical pharmacist is indispensable in elderly daycare to minimize IP.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-059

**Poster Title:** Assessment of knowledge and attitude of Lebanese patients towards antibiotics use

**Poster Type:** Evaluative Study

**Submission Category:** Clinical Topics/Therapeutics

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**Purpose:** Throughout history, infections were considered as critical health problems until the discovery of antimicrobial drugs and antibiotics evolution. Human misuse of antibiotics caused unnatural pressure on bacteria and thus serious threat “resistance”. By 2014 and 2015, awareness campaigns were conducted in Lebanon for orientation about the importance of antibiotics and the risk of resistance emergence when misused. The study aims to evaluate the knowledge of Lebanese participants on antibiotics as well as the people’s attitude toward proper use and consequences of misuse.

**Methods:** An observational, cross-sectional, community-based survey was conducted, in different regions of Lebanon, during June 2017. Lebanese adult patients above 18 years old who were familiar with the word “antibiotics”, were eligible to fill the questionnaire. The questionnaire was tested for content validity by two experts and further adjustments were done after a pilot testing. Data were analyzed using the Statistical Package for Social Sciences program (SPSS) version 20.

**Results:** Sixty percent of the participants showed a moderate level, while 15% had a poor level. The highest percentage (30.4%) of participants having a poor level of knowledge accounted for those having an elementary level of education, whereas those with a good level of knowledge (29%) accounted for university. Only 37% of participants in this study knew about these advertisements and activities, while 56 % benefited from them.

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It was apparent that some patients were misusing antibiotics regardless of the huge awareness effort done by the government. For example, 32.5% stopped the course of antibiotic when symptoms improved. Moreover, patients had a misconception about the need of antibiotics for a non-bacterial infection. The results also revealed that the participants confused some drugs with antibiotics such as “Profinal®” (59.4%) and paracetamol (42.5%).

**Conclusion:** As a consequence, further, attempt to improve patients’ knowledge and practice towards antibiotics should be targeted by organizing more informative campaigns and providing more counseling for patients. Additionally, more restrictions on antibiotics prescription should be applied and supervised.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-060

**Poster Title:** Knowledge and attitude toward common cold in Beirut, Lebanon

**Poster Type:** Evaluative Study

**Submission Category:** Clinical Topics/Therapeutics

**Primary Author:** Souraya Domiati, Beirut Arab University; **Email:** t.domyati@bau.edu.lb

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**Purpose:** The common cold is a self- limiting condition targeting the upper respiratory tract. Even though the condition resolves on its own and may require only over the counter (OTC) drugs yet it accounts for 40% of absentees from work and a large number of visits to the family physician clinic. Treatment of this minor ailment can be either by supplements and herbal products or traditional drugs. The aim of the current study is to assess the knowledge and attitude of a sample of Lebanese population on the common cold.

**Methods:** A cross-sectional descriptive questionnaire-based study was performed. The sample size enrolled was 385 Lebanese participants living in Beirut area. The questionnaire was divided into three parts that included demographic information, as well as knowledge and attitude questions. Results were considered significant when P-value was  $\leq 0.05$  with a confidence interval of 95%.

**Results:** Results showed that the youngest group were more knowledgeable about common cold than the elderly (age>65 years). Moreover, Ph.D. holders were the most knowledgeable about this condition as they scored 6.71/10. Most of the tested sample believed that the Ministry of Public Health should be involved to educate the people on this condition despite their attitude for the choice of medication and non-pharmacological measures which was adequate.

**Conclusion:** The role of all health care providers and ministry of public health is to ensure proper education on the common cold by conducting awareness campaigns on the etiology, treatment, and prevention of this condition.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-061

**Poster Title:** Standardizing aminoglycoside induced ototoxicity monitoring in individuals with cystic fibrosis

**Poster Type:** Evaluative Study

**Submission Category:** Clinical Topics/Therapeutics

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**Purpose:** Aminoglycoside antibiotics are essential for the treatment of non-tuberculous mycobacteria and *Pseudomonas aeruginosa* lung infections in cystic fibrosis (CF). Potential nephrotoxicity and ototoxicity make appropriate monitoring critical. The 2017 Cystic Fibrosis Foundation Patient Registry (CFFPR) reports a prevalence of hearing loss of 1.3% among pediatric patients and 2.2% overall. The National Institute on Deafness and Other Communication Disorders reports an incidence of 13% among Americans aged > 12 years. A standardized aminoglycoside induced ototoxicity monitoring algorithm (AIOA) was implemented in 2017 at Children's Mercy Kansas City (CMKC) to assess CF patients treated with intravenous and/or inhaled aminoglycosides.

**Methods:** The CMKC AIOA implementation process included a review of published literature, survey of CF providers, retrospective chart review, and observational cohort analysis. The algorithm 1) serves as a reference for clinicians, 2) provides specific monitoring instructions, and 3) identifies high risk patients. A team including a nurse practitioner (Cystic Fibrosis Center Coordinator) and pharmacist are responsible for monitoring adherence to the algorithm including 1) identification of new monitoring patients during pre-clinic huddles and hospitalizations, 2) review of monthly aminoglycoside prescriptions, and 3) inpatient intravenous aminoglycoside order review.

**Results:** Prior to implementation of the AIOA, 12 of 50 patients (24%) treated with intravenous aminoglycosides had an audiogram. In the 24 months after implementation, 43 of 44 patients

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(98%) treated with intravenous aminoglycosides had an audiogram; of these, 27 (63%) were abnormal. The identified hearing abnormalities included 12 patients with distortion product otoacoustic emissions (DPOAE) abnormalities and 15 patients with varying degrees of high frequency hearing loss. Prior to development of a standard process, 18 of 70 patients (26%) that received at least two courses of inhaled aminoglycosides had an audiogram. Post implementation, 19 of 33 patients (58%) receiving inhaled aminoglycosides had an audiogram per the AIOA. Among these, 10 (53%) were abnormal. In the 24 months following implementation, 30 patients had two or more audiograms. Among these 13 had unchanged audiograms; eight remained normal, three continued to have DPOAE abnormalities, and two had the same degree of high frequency hearing loss. Fourteen patients had clinically significant changes, including four that developed DPOAE abnormalities and 10 with significant ototoxic changes as defined by American Speech Language Hearing Association criteria. Interventions based on audiogram data included referral to otolaryngology and modifications to pulmonary exacerbation treatment regimens.

**Conclusion:** Implementation of an AIOA increased the frequency of audiogram screening among CF patients treated with intravenous and inhaled aminoglycosides. The prevalence of hearing abnormalities among people with CF identified at CMKC is higher than that reported by the CFFPR and that of the general US population. This discrepancy may be secondary to aminoglycoside usage specific to our center or lack of audiogram testing nationally. The frequent use of aminoglycosides among CF patients and the high probability of aminoglycoside induced hearing loss suggest an urgent need to establish an AIOA nationally.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-062

**Poster Title:** Plecanatide for treating chronic idiopathic constipation: a pooled analysis of efficacy and safety

**Poster Type:** Evaluative Study

**Submission Category:** Clinical Topics/Therapeutics

**Primary Author:** Howard Franklin, Salix Pharmaceuticals; **Email:** Howard.Franklin@salix.com

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**Purpose:** Patients with chronic idiopathic constipation (CIC) suffer from infrequent or difficult stool passage and often report accompanying abdominal symptoms, such as bloating and discomfort. Plecanatide is structurally similar to human uroguanylin, an intestinal peptide that induces fluid and ion secretion, but contains a single amino acid substitution. Plecanatide is approved in the United States for the treatment of CIC in adult patients. The objective of this analysis is to evaluate the efficacy and safety of plecanatide in patients with CIC in two identically designed phase 3 trials, including the impact on patient-reported secondary outcomes.

**Methods:** Data were pooled from two 12-week, randomized, double-blind, phase 3 clinical trials of plecanatide in adults with CIC (NCT01982240; NCT02122471). Patients (aged 18–85 years) meeting modified Rome III criteria for CIC were eligible to participate and were randomized (1:1:1) to plecanatide 3mg, plecanatide 6mg, or placebo for 12 weeks. The primary efficacy endpoint was the percentage of durable overall complete spontaneous bowel movement (CSBM) responders. Secondary efficacy endpoints included the mean change from baseline ( $\Delta$ ) in the frequency of CSBMs and spontaneous bowel movements (SBMs), as well as the assessment of patient-reported symptoms of straining, abdominal bloating, and abdominal discomfort. Efficacy and safety data from these two 12-week trials were pooled.

**Results:** The combined efficacy population included 2683 patients (3mg, N=896; 6mg, N=890; placebo, N=897). Significantly more patients treated with plecanatide were durable overall CSBM responders over 12 weeks of treatment (3mg, 20.5%; 6mg, 19.8%; placebo, 11.5%;  $P < 0.001$  vs placebo both doses). A significantly greater change in CSBM frequency was

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demonstrated for plecanatide (3mg,  $\Delta=1.07$ ; 6mg, 0.89;  $P < 0.001$  vs placebo both doses), as well as in SBM frequency (3mg,  $\Delta=1.51$ ; 6mg, 1.58;  $P < 0.001$  vs placebo both doses). Significant reductions in patient-reported outcomes were observed favoring plecanatide vs placebo, including for straining (3mg,  $\Delta=-0.31$ ; 6mg,  $\Delta=-0.27$ ;  $P < 0.001$  vs placebo both doses), and the perceptive symptoms of abdominal bloating (3mg,  $\Delta=-0.12$ ;  $P < 0.001$  vs placebo; 6mg,  $\Delta=-0.08$ ;  $P=0.009$  vs placebo), and discomfort (3mg,  $\Delta=-0.11$ ;  $P < 0.001$  vs placebo; 6mg,  $\Delta=-0.07$ ;  $P=0.027$  vs placebo). Both plecanatide doses were safe and well tolerated. The most common adverse event (AE) was diarrhea (3mg, 4.6%; 6mg, 5.1%; placebo, 1.3%). Discontinuation rates due to AEs were 4.1% (3mg), 4.5% (6mg), and 2.2% (placebo), with low discontinuation due to diarrhea (3mg, 1.9%; 6mg, 1.8%; placebo, 0.4%).

**Conclusion:** Results for this pooled analysis indicate that plecanatide is efficacious, safe, and well-tolerated in patients with CIC. Compared with placebo, plecanatide 3mg and 6mg demonstrated durable improvements in key clinical outcomes for patients with CIC, including improvements in stool frequency, straining, and perceptive abdominal symptoms.

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**Session-Board #** - 4-063

**Poster Title:** Efficacy and safety of plecanatide in patients with irritable bowel syndrome with constipation: pooled analysis of 2 randomized clinical trials

**Poster Type:** Evaluative Study

**Submission Category:** Clinical Topics/Therapeutics

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**Purpose:** Irritable bowel syndrome with constipation (IBS-C) is a chronic condition that significantly impacts quality of life. Plecanatide is structurally similar to human uroguanylin, an intestinal peptide that induces fluid and ion secretion, but contains a single amino acid substitution. Plecanatide is approved in the United States for the treatment of IBS-C in adult patients. The objective of this analysis is to evaluate the efficacy and safety of plecanatide in patients with IBS-C in two identically designed phase 3 trials, including the impact on patient-reported secondary outcomes.

**Methods:** Data were pooled from two 12-week, randomized, double-blind, phase 3 clinical trials of plecanatide in adults with CIC (NCT02387359; NCT02493452). Patients (aged 18–85 yrs) meeting Rome III criteria for IBS-C were eligible to participate and were randomized to once-daily placebo, plecanatide 3 mg, or plecanatide 6 mg. The primary efficacy endpoint in both trials was the percentage of Overall Responders, defined as a patient who was both an Abdominal Pain Responder ( $\geq 30\%$  decrease in worst abdominal pain vs baseline) and Stool Frequency Responder (increase  $\geq 1$  complete spontaneous bowel movement vs baseline) in the same week for  $\geq 6$  of 12 treatment weeks. Safety and tolerability were assessed by the incidence, nature, and severity of adverse events (AEs). Efficacy and safety data from these two 12-week trials were pooled.

**Results:** A total of 1456 patients were included in the combined intention-to-treat population (placebo, N=733; 3 mg, N=728; 6 mg, N=728). Demographics were similar between treatment groups and across the studies. Plecanatide treatment resulted in a significantly greater percentage of Overall Responders than did placebo (placebo, 16.0%; 3 mg, 25.7%; 6 mg, 26.6%;

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P < 0.001 both doses). A significantly greater percentage of plecanatide-treated patients were weekly Abdominal Pain Responders (placebo, 27.3%; 3 mg, 36.8%; 6 mg, 39.1%; P < 0.001 both doses) and weekly Stool Frequency Responders (placebo, 31.4%; 3 mg, 40.9%; 6 mg, 41.9%; P < 0.001 both doses) for  $\geq 6$  weeks of the 12-week studies. Plecanatide significantly improved patient-reported symptoms including stool consistency and straining severity. AE rates were similar in all 3 groups, with the only AE occurring in  $\geq 2\%$  of patients and with an incidence greater than placebo being diarrhea (placebo, 1.0%; 3 mg, 4.3%; 6 mg, 4.0%). There were low rates of discontinuation due to diarrhea (placebo, 0%; 3 mg, 1.2%; 6 mg, 1.4%).

**Conclusion:** Results for this pooled analysis indicate that plecanatide is efficacious and safe in patients with IBS-C. The hallmark symptoms of IBS-C, abdominal pain and reduced stool frequency, as well as secondary symptoms, were significantly improved with 12 weeks of once-daily plecanatide treatment compared with placebo. In plecanatide-treated patients, there were low AE and discontinuation rates, including diarrhea.

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**Session-Board #** - 4-064

**Poster Title:** Implementation of a diagnostic algorithm for heparin induced thrombocytopenia

**Poster Type:** Evaluative Study

**Submission Category:** Clinical Topics/Therapeutics

**Primary Author:** Jessica Justiz, Baptist Hospital of Miami; **Email:** jessica.justiz@gmail.com

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**Purpose:** Heparin induced thrombocytopenia (HIT) is a clinical diagnosis which can be validated by a pre-test probability scoring system like the 4T's score and laboratory testing. A historical review demonstrated high rates of platelet factor 4 (PF4) testing with limited serotonin release assay (SRA) testing. The study determined that 4T scores of 4 or greater and a new thrombotic event, regardless of 4T score, were independent risk factors for HIT. The purpose of this study is to assess the impact of the development of a diagnostic algorithm for HIT on PF4 testing and subsequent treatment in these patients.

**Methods:** This was a single-center, IRB-exempt, prospective chart review of hospitalized patients between January 1, 2019 and April 30, 2019 with a positive PF4 enzyme linked immunosorbent assay (ELISA) immunoassay test result. Historical study data from a previous retrospective study reviewing patients with a positive PF4 ELISA immunoassay test and subsequent treatment with argatroban was utilized as a comparator for outcome measures. Rates of PF4 ELISA immunoassay and SRA functional assay confirmation testing were reviewed and treatment with argatroban in these patients was evaluated. Median optical density value, SRA result, number of days on argatroban therapy and associated adverse drug were also recorded. The data was assessed to determine the impact of a diagnostic algorithm for HIT. Descriptive and comparative statistics were utilized in the data analysis.

**Results:** Evaluation of historical data from a previous retrospective chart review led to the implementation of a diagnostic algorithm for HIT. Overall, the implementation of the diagnostic algorithm led to a significant decrease in the ordering of PF4 ELISA immunoassays and an

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increase in SRA confirmatory testing. Post implementation of the HIT diagnostic algorithm, PF4 testing decreased by 43% with monthly PF4 orders decreasing from 71 to 40 during the 4-month study period. Meanwhile, SRA testing increased by 71%. A total of 24 SRA functional assays were ordered, with 68% of the positive PF4 results being reflexed to SRA functional assay orders. Also, argatroban use decreased from 12 to 9 patients per month; on the other hand, the length of therapy and argatroban utilization ratio per positive PF4 increased. This can likely be attributed to the optimal patient selection for HIT diagnosis and management in the post diagnostic algorithm implementation group.

**Conclusion:** Implementation of a diagnostic algorithm for HIT that includes 4T score calculation, PF4 ELISA immunoassay testing, and SRA functional assay confirmation testing had a significant impact on the rate of diagnostic testing for HIT at our institution. Implementation of the diagnostic algorithm has led to a decrease in the over testing and subsequent over diagnosis of HIT.

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**Session-Board #** - 4-065

**Poster Title:** Clinically significant interaction between meropenem and valproic acid: a case series

**Poster Type:** Case Report

**Submission Category:** Clinical Topics/Therapeutics

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**Purpose:** A decrease in seizure threshold is a well-known side effect of the carbapenem B-lactams. In addition, a clinically significant reduction in valproic acid plasma levels has been reported when combined with a carbapenem. Postulated mechanisms for this interaction include: increased metabolism of valproic acid to the glucuronide conjugate, increased renal elimination of the glucuronide conjugate, decreased intestinal absorption of valproic acid secondary to inhibition of intestinal transporters, increased distribution of valproic acid into erythrocytes, and decreased enterohepatic recirculation of valproic acid.

Pertinent literature review shows that the interaction is a class effect of the carbapenems and can occur starting 24 hours after the initiation of the carbapenem. The magnitude of this interaction ranges from about a 50% to an 80% reduction in valproic acid plasma concentrations. The half-life of valproic acid is reduced from 15 to 4 hours with concurrent carbapenem administration. Increasing the dose of valproic acid during the combined use period of both agents does not result in increasing valproic acid level back to its therapeutic range. Following the discontinuation of the carbapenem, the effect on valproic acid has been noted to continue for 7 to 14 days.

We present three patient cases receiving valproic acid for epilepsy who were started on meropenem which resulted in sub-therapeutic valproic acid plasma levels. The indication for meropenem on the three patients was hospital acquired pneumonia and the antibiotic doses were appropriate based on renal function. An anti-pseudomonal carbapenem is the preferred empirical option for hospital acquired pneumonia at our institution because of the high incidence of extended spectrum beta-lactamase producing organisms (around 30% of our *Escherichia coli* and *Klebsiella pneumoniae* strains). The three patients were stable on valproic

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acid and had the following therapeutic plasma levels upon admission: 72, 71, and 62 mcg/ml (target level: 50-100 mcg/ml). After the initiation of meropenem, valproic acid concentrations measured 3, 5, and 10 days later on the three patients were: 20, 17, and 12 mcg/ml respectively (75-80% reduction from admission plasma concentrations). Two of the patients developed seizures after the initiation of meropenem. The duration of therapy of meropenem for the three patients ranged between 7-10 days as the culture results were negative and the patients were clinically improving. Valproic acid dose was increased and another anticonvulsant (phenytoin or levetiracetam) was added and continued after stopping antimicrobial therapy. The management of the patients eventually led to the resolution of seizures and stabilization of the patients' conditions.

The combination of valproic acid and carbapenems should be avoided when possible. Close monitoring of valproic acid plasma levels and patient's clinical status is required when there is no alternative antimicrobial. In most cases, adding another antiepileptic drug is warranted if a carbapenem is to be combined with valproic acid.

**Methods:**

**Results:**

**Conclusion:**



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**Session-Board #** - 4-066

**Poster Title:** Antimicrobial activity of camel lactoferrin peptide

**Poster Type:** Evaluative Study

**Submission Category:** Complementary Alternative Medicine (herbals, etc.)

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**Purpose:** This study examines the effects of lactoferrin and black seed oil on microorganisms, as well as the extent to which they inhibit the growth of bacteria. Resistance to antibiotics has been outlined in previous research; therefore, a new strategy is required for sourcing natural biological materials for the extraction of antimicrobial peptides. The current research study addresses camel lactoferrin by evaluating its mechanisms of antimicrobial activity. This activity was observed in the contexts of *Staphylococcus aureus*, *Streptococcus agalactiae*, *Streptococcus pneumoniae*, *Streptococcus pyogenes* and *Candida albicans*.

**Methods:** Throughout study, we hypothesize that lactoferrin and NG exhibit a hydrolase- like antimicrobial action that functions principally as an isolate free from iron. Thus, it is necessary to remove some crucial substrates that are necessary for the evolution of bacteria within the bacterial membrane, as well as for binding to the lipopolysaccharide of bacterial walls. Consequently, the membrane will lose its rigidity, leading to the death of bacterial cells.  
Disk diffusion method

A variety of systems can be used to target the antimicrobial frailty of a microorganism pathogen. The circle dissemination strategy represents a change to the Kirby-Bauer method.. If performed unequivocally, this system yields information that can anticipate in vivo adequacy of the referenced medication. However, despite circle dispersion's ability to provide data allowing most antimicrobial specialists to translate a strain as defenseless, halfway or safe, this approach does not give exact data on negligible inhibitory fixation.

GOR IV prediction method

Specific secondary structures of mutant and native peptides were predicted through application of the GOR IV algorithm. The quality of the data supplied by the databases was verified.

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Furthermore, the capacity of amino acids to generate given structures was also evaluated by the GOR IV calculated based on whether adjacent amino acids had previously formed the particular structures.

**Results:** This study has determined various results concerning the peptides and their effects on microorganisms in the context of positive bacteria and gram-negative bacteria, as well as for nigella sativa oil (BSO). The study has also found results for the mixture of the peptide and the Nigella sativa oil in the context of the microorganisms.

It has been found that lactoferrin is effective in bacterial applications. Gram-positive bacteria has also been found to be more efficient when the synergistic action of camel lactoferrin (SAoCL) mutant peptide is used with NS oil.

**Conclusion:** This study developed and maintained hypotheses related to the complexity of lactoferrin. It also showed that native and mutant aspects have direct effects on bacteria. This study has achieved promising outcomes related to the analysis of the mutant peptide. Using the disc diffusion method, crucial areas of inhibition against tested oral streptococci were identified in black seed oil. The present research has uncovered the effects of various pharmaceutical iterations of alkaloids on the antibacterial properties of Nigella sativa oil in relation to gram-positive bacteria. It was shown that these bacteria had greater sensitivity than gram-negative bacteria, with well-defined inhibition zones.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-067

**Poster Title:** Evaluation of anti-cancer effects of bitter melon

**Poster Type:** Evaluative Study

**Submission Category:** Complementary Alternative Medicine (herbals, etc.)

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**Purpose:** Fresh bitter melon was previously studied for its anti-diabetic and anti-cancer properties and has shown to improve survival in diabetic patients with pancreatic cancer. Although the efficacy of bitter melon fruit has been studied for its anti-diabetic effects and anti-cancer properties, research comparing the cytotoxic effects of bitter melon fruit with the over-the-counter (OTC) bitter melon tablets is lacking. The purpose of this study was to evaluate and compare the cytotoxicity of fresh bitter melon juice with over-the-counter bitter melon tablets in ascites meta human pancreatic cancer (AsPC-1) cell lines in a concentration- and time-dependent manner.

**Methods:** AsPC-1 cells were cultured in T75 flasks with filtered Roswell Park Memorial Institute (RPMI) 1640 growth media, 10% fetal bovine serum, and 1% penicillin/streptomycin. They were incubated in a carbon dioxide incubator and monitored every 24 to 48 hours until the flask surface was at least 80% confluent. The AsPC-1 cells were then sub-cultured in 96-well plates and treated with either fresh bitter melon juice or OTC bitter melon tablets in a concentration-dependent (1%-5% volume/volume and 1%-5% weight/volume, respectively) and time-dependent manner (for 24, 48, and 72 hours). The untreated cells served as the negative control, and the cells treated with phosphate buffered saline served as the positive control. MTT [3-(4,5-Dimethylthiazole-2-yl)-2,5-diphenyl tetrazolium bromide] assay was performed to determine and compare the cytotoxicity or cell viability of the AsPC-1 cells treated with bitter melon juice and bitter melon tablet at each time interval.

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**Results:** Fewer AsPC-1 cells were viable after the 24-hour treatment of bitter melon juice and bitter melon tablet treatment ( $P = 0.019$ ). At 48 hours, the cytotoxic effects of bitter melon tablets on AsPC-1 cells were more pronounced and significant compared to the cytotoxic effects of bitter melon juice in a concentration-dependent treatment ( $P = 0.008$ ). At 72 hours, however, the cells treated with bitter melon juice showed more variable cytotoxic activity at higher concentrations. This was observed differently in the AsPC-1 cells treated with OTC bitter melon tablets, where there was more cytotoxicity at higher concentrations.

**Conclusion:** The cytotoxicity of bitter melon juice on AsPC-1 cells was variable at higher concentrations when treated for 72 hours. This may have resulted from the AsPC-1 cells developing resistance to bitter melon juice over time. In contrast, the cytotoxicity of bitter melon tablet was consistently observed at higher concentrations and over time even at 72 hours. This may have resulted from the OTC tablet possessing higher concentrations of the active protein responsible for anti-cancer activity.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-068

**Poster Title:** Use and opinions of medical use of cannabis among patients

**Poster Type:** Evaluative Study

**Submission Category:** Complementary Alternative Medicine (herbals, etc.)

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**Purpose:** To determine patients' willingness to accept advice for use of medical cannabis if recommended by a health care practitioner.

**Methods:** A written survey was created and solicited to patients admitted to a community hospital in suburban Massachusetts. Questions gathered information on patients' history of cannabis use and knowledge, and opinion on cannabis for managing a medical condition on their own or if recommended by an alternative or licensed health care practitioner. Likert scaling of strongly agree/agree/neutral/disagree/strongly disagree was used for opinion-based questions. Written, IRB approved, informed consent was obtained for all patients.

**Results:** Twenty patients completed the surveys with an average age of 64.7 years (range 19-90); 55% women; and 90% white, 5% black, 5% middle eastern. Half of the patients had used cannabis in the past, of which 50% used it daily, 10% used it more than 1 day per week, 10% used it more than 1 day per month, and 30% used it more than 1 month per year. Personal recreation was the most commonly stated reason for use (50%), with other reasons including arthritis, pain management, anxiety, nausea, depression, and bipolar disorder. One patient stated that current use was recommended by an alternative practitioner and three patients were recently recommended to use cannabis by a licensed practitioner. Knowledge of potential side effects was limited; 65% of all patients didn't know of any including 40% of those patients who had used cannabis. A majority (95%) of patients agreed that cannabis should be available for medical use under the guidance of a medical practitioner, while 75% would use it if recommended for them, and only 55% would self-treat a medical condition with cannabis.

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**Conclusion:** Patients want physicians to recommend cannabis as a treatment option and are less inclined to self-medicate. Additional data would be useful to adequately power further statistical analysis.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-069

**Poster Title:** Phosphodiesterase-5 inhibitors in complementary alternative medicine causing blind duplicate therapy and further health complications

**Poster Type:** Evaluative Study

**Submission Category:** Complementary Alternative Medicine (herbals, etc.)

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**Purpose:** Complementary alternative medicine (CAM) therapy is seen as a natural alternative to active pharmaceutical ingredients. However, the market for CAM products is sparsely regulated, allowing manufacturers to produce and sell adulterated supplements, while promoting them as natural and pure. A prevalent use of CAM products is for erectile dysfunction, often used in substitute for phosphodiesterase-5 inhibitors (PDE5-I). Sexual enhancement products account for 14.1% of emergency department visits due to CAM therapy, possibly due to adulteration of these products<sup>1</sup>. This study investigates some male enhancement CAM products sold online label claim authenticity, possible adulteration with PDE5-I, quality and safety.

**Methods:** Six male enhancement CAM products were surveyed and purchased through a retail store in three different batches. High-performance liquid chromatography was used to detect possible adulteration with PDE5-I. Reversed phase C18 column was used (column length of 25 cm) along with acetonitrile:10 mM aqueous ammonium formate in ratio 50:50 as the mobile phase. The flow rate in the run was 1 ml/min (DAD detection at  $\lambda_{max}$  of 230 nm). Near Infrared Spectroscopy (NIR) and SeDeM analyses were used to measure the inter and intra variability amongst these products and their pharmaceutical quality and reproducibility. Furthermore, content uniformity, weight variation, and friability tests were used to investigate the physical properties and quality.

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**Results:** All of the 6 products tested contained Sildenafil at varying levels between 0.64 mg-49.6 mg. Amounts varied widely within brands, with one product ranging in levels between 10mg and 40mg between each capsule tested. NIR spectroscopy and weight variation revealed that the products showed low levels of uniformity across and within brands. SeDeM analysis revealed the products were close to equivalence to each other.

**Conclusion:** Patients using adulterated CAMs could cause more harm to their health due to dangerous drug interactions. If patients are unaware of the true components in CAM products, then a patient may be taking a duplication therapy, unbeknownst to them and their healthcare providers. Using a PDE-5 inhibitor with another vasodilator or antihypertensive API could result in orthostatic hypotension, dizziness, weakness, and other severe symptoms. If symptoms continue, this could lead to hospitalization, permanent damage, strokes, or death. Health systems should be wary of CAM products for male enhancement and advocate for the use of safe prescription alternatives under medical supervision.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-070**

**Poster Title:** Retrospective study assessing drug utilization for agitation and delirium in the intensive care unit among Lebanese hospitalized patients

**Poster Type:** Descriptive Report

**Submission Category:** Critical Care

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**Purpose:** A significant number of critically ill patients have agitation during their intensive care unit (ICU) stay, and may develop delirium as a result of inadequate detection or treatment. In such cases, sedatives are frequently used to alleviate anxiety, reduce the stress of being mechanically ventilated, and avoid agitation-related complications. However, guidelines implementation rates in diagnosing and treating agitation and delirium among intensive care patients are sub-optimal. The aim of this study was to evaluate the pattern of drug utilization in intensive care departments in Lebanese hospitals to control agitation and delirium.

**Methods:** This study was a five months retrospective observational hospital-based study on drug utilization. Researchers obtained institutional review board approval from three Lebanese hospitals in Beirut. Hospital records were scanned from January 2018 till May 2019 to include patients, eighteen years and older, that have received treatment for agitation or delirium during their intensive care unit (ICU) stay. Patients presenting with a psychiatric illness, ongoing therapy with anti psychotics prior to hospitalization, migraine, agitation prior to intensive care unit (ICU) admission, as well as comatose patients were excluded. A comprehensive data collection sheet was used to assess the most commonly prescribed sedative, its administration, reason for admission, and the need for adjunctive drugs; it was composed of four fields including patient demographics, admission data, medication prescribing patterns, and other administered drugs, and filled by the researchers on site. Data was analyzed using statistical

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package for social science (SPSS) version 22. Means, standard deviations, and percentages were used.

**Results:** Among three hundred scanned files, sixty patients with mean age  $69.1 \pm 19.19$  years were eligible for the study. Regarding psychiatric illness history, 70.2 percent reported no previous episode, and 98.2 percent had no drug abuse. The mean length of stay of patients in the intensive care unit (ICU) was  $14.28 \pm 12.69$  days. Sepsis and respiratory distress were the main reasons for intensive care unit (ICU) admission with equal percentages (15.7 percent), followed by post-surgical care (9.8 percent), and stroke (3.9 percent). Thirty percent of the patients received midazolam as primary care for agitation or delirium; haloperidol was used in 21.7 percent of the sample, and valproic acid in 11.7 percent. Alternative drugs such as propofol, quetiapine, fentanyl or other benzodiazepines or anticonvulsants were used to a lesser extent. Among the sample, 43.3 percent received monotherapy, whereas 56.7 percent received one adjunct to the main sedative, or a combination of adjunctive medications to treat agitation or delirium. The majority of the sample (81.7 percent) received the listed drugs through intravenous route.

**Conclusion:** The findings of this study revealed that midazolam is the most commonly prescribed drug for agitated and delirious patients in the intensive care unit (ICU) in Lebanese hospitals. Hence, adherence to international agitation and delirium guidelines in Lebanese hospitals must be highlighted. Educational efforts directed at the proper prevention, prompt recognition and adequate management of agitation and delirium in critically ill patients is fundamental.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-071**

**Poster Title:** Assessment of factors affecting CHA 2 DS 2 VASc score in acute stroke settings and its

relation with MRS

**Poster Type:** Evaluative Study

**Submission Category:** Critical Care

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**Purpose:** Atrial fibrillation (a-fib), a common cause of cardioembolic stroke, is associated with worse outcomes. The risk assessment of stroke is performed through evaluating CHA2DS2VASc score that takes into consideration one or two points for each identified risk factor. However, stroke prognosis in the hospitals is assessed through Modified Rankin Scale (MRS) which predicts the degree of mortality and disability. The aim of this study was to assess the factors affecting CHA2DS2VASc score in acute stroke settings and analyze if there is any correlation between MRS upon hospital admission and CHA2DS2VASc score.

**Methods:** A retrospective, multicenter, observational study was conducted on Lebanese hospitals between February and May 2019. Inclusion criteria were patients with ischemic stroke of a-fib origin. The questionnaire covered the following sections: demographic characteristics, past medical history, CHA2DS2VASc score, acute ischemic stroke management, and MRS. MRS was categorized into two categories 0-2 associated with “good prognosis” and >2 “bad prognosis”. Institutional Review Board of the three hospitals approved the study. Statistical analysis was performed using IBM SPSS (Statistical Package for Social Sciences) version 21.0.

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**Results:** From a total number of 146 patients screened for possible enrollment, 82 had a-fib and were included in the study. The mean ( $\pm$  Standard deviation SD) age of the participants was 80.67 ( $\pm$  6.97) years and 65.6% were females. The majority of the study subjects were hypertensive 84.1% and the most common cardiovascular disease was angina pectoris (36.6%) followed by congestive heart failure (32.9%). Most of the patients were on acetylsalicylic acid (44%) and around 31.7% were on oral anticoagulants before hospital admission. Females had a higher mean CHA<sub>2</sub>DS<sub>2</sub>VASc score than males (5.35 and 4.17 respectively) with p-value of 0.02. Patients with dyslipidemia and hypertensive had significantly higher CHA<sub>2</sub>DS<sub>2</sub>VASc score of 5.53 and 5.24 respectively with a p-value  $< 0.01$ . The mean  $\pm$  SD for CHA<sub>2</sub>DS<sub>2</sub>VASc score and MRS recorded upon hospital admission was  $4.93 \pm 1.53$  and  $4.3 \pm 1.00$  respectively. Patients with MRS  $> 2$  vs  $0-2$  upon hospital admission had a significantly higher mean CHA<sub>2</sub>DS<sub>2</sub>VASc score of  $5.11 \pm 1.42$  vs  $3.75 \pm 2.12$  with a p-value of 0.019.

**Conclusion:** This study suggests the strong correlation between CHA<sub>2</sub>DS<sub>2</sub>VASc score and MRS among acute ischemic stroke patients. The findings highlight the important preventive and modifiable lifestyle factors that must be implemented to protect against stroke development. However, pharmacists can play an integral role in lowering disease progression by effective patient counseling about the underlying risk factors that increase stroke development.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-072**

**Poster Title:** Assessment of pharmacist competency during cardiopulmonary arrest code participation in a community hospital

**Poster Type:** Descriptive Report

**Submission Category:** Critical Care

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Ada Jalice

**Purpose:** Research demonstrates that pharmacist participation during adult advanced cardiovascular life support (ACLS) results in decreased mortality. Pharmacists at our institution play an essential role in adult cardiopulmonary arrest codes, also known as code blue response. As a result, pharmacists are provided in-house training and given the opportunity to become ACLS certified. This project was designed to assess our pharmacists' knowledge and comfort levels with code blue response and to examine if establishing an annual competency program would be a beneficial process to bridge knowledge gaps and boost code blue participation comfort levels.

**Methods:** All pharmacists who volunteered to participate in the study were included. Pharmacists who did not volunteer to participate and the authors directly involved in the study were excluded. Participants were provided a baseline comfort survey and competency assessment. The baseline comfort survey assessed years of experience attending code blues and addressed comfort levels with code blue participation. The competency assessment consisted of twenty multiple choice questions derived from the 2015 ACLS guidelines, our institution's crash cart policy, and intravenous drips—standard concentrations list. After completion of the pre-assessment and survey, participants sat for a one hour educational session on code blue participation, our institution's crash cart policy, and ACLS guidelines/recommendations. Participants were asked to complete a post-comfort survey and competency assessment one week post-the educational session.

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**Results:** After the educational training session, there was an overall five point increase in the total number of correctly answered questions for the competency assessment. There was a four and seven point increase in the total number of correctly answered questions that pertained to ACLS recommendations and the location of medications within the crash cart, respectively. Prior to the training 43 percent of pharmacists felt that they had good understanding of the indications for certain medications, 57 percent expressed that they felt comfortable locating medications in the crash cart, and 50 percent expressed feeling comfortable responding to code blue alerts. Post-training, those results improved to 100 percent, 100 percent, and 82 percent, respectively.

**Conclusion:** Providing a yearly code blue educational training session followed by a competency assessment as a yearly refresher may be a beneficial process in bridging potential knowledge gaps and boost confidence regarding code blue response.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-073**

**Poster Title:** Impact of vitamin C, hydrocortisone, and thiamine on mortality in critically ill patients with severe sepsis and septic shock

**Poster Type:** Evaluative Study

**Submission Category:** Critical Care

**Primary Author:** Daniela Fernandez, Morton Plant Hospital; **Email:** danielafernandez7@outlook.com

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**Purpose:** Sepsis remains a common cause of mortality among critically ill patients. In 2017 Marik et al. provided a unique rationale and compelling evidence for the use of vitamin C, hydrocortisone, and thiamine in severe sepsis and septic shock. As a result of this study, intensivists at our community teaching hospital have implemented this adjunctive therapy in the intensive care units. The purpose of this study was to evaluate outcomes in critically ill patients with severe sepsis or septic shock that have received vitamin C, hydrocortisone, and thiamine in comparison to a matched control group that did not receive this therapy.

**Methods:** This was an institutional review board approved, retrospective, pre-post matched cohort study conducted at 687 bed community teaching hospital. Patients were divided into a treatment group that received vitamin C, hydrocortisone, and thiamine and a control group that did not receive vitamin C or thiamine. These groups were matched by APACHE IV score. Inclusion criteria included patients  $\geq 18$  years of age with a diagnosis of severe sepsis or septic shock (defined as meeting  $\geq 2$  SIRS [systemic inflammatory response syndrome] criteria), procalcitonin (PCT)  $\geq 2$  ng/mL, in addition to patients in the treatment group having received four days of vitamin C treatment. Data was collected from July 2016 to June 2017 for the control group and July 2017 to March 2019 for the treatment group using Baycare eICU software and the hospital electronic medical record. The primary endpoint was in-hospital mortality. Secondary endpoints included intensive care unit (ICU) and hospital lengths of stay (LOS), ventilator and vasopressor duration, change in PCT over 72 hours, and hyperglycemia during ICU stay.

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**Results:** A total of 100 patients were enrolled. There was no statistically significant difference between groups for baseline and demographic data with the exception of ventilator status and vasopressor use. There was a statistically significant higher number of patients in the vitamin C group compared to the control group on mechanical ventilation (35 versus 22;  $P = 0.009$ ) and vasopressors (50 versus 37;  $P < 0.005$ ) at baseline upon ICU admission. Otherwise, the patients in both groups were well-matched with mortality scores. For the primary endpoint of in-hospital mortality, there were 19 (38%) deaths in the vitamin C group versus 15 (30%) in the control group ( $P = 0.398$ ). For the secondary endpoints, the vitamin C group had a significantly longer ICU and hospital LOS, vasopressor duration and hyperglycemia.

**Conclusion:** The results of this study show that vitamin C, hydrocortisone, and thiamine did not have a significant impact on in-hospital mortality in patients with severe sepsis or septic shock. Randomized controlled trials are needed in order to further define the role of vitamin C, hydrocortisone, and thiamine in the management of sepsis.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-074

**Poster Title:** Retrospective analysis of baseline potassium with succinylcholine administration at an academic medical center

**Poster Type:** Descriptive Report

**Submission Category:** Critical Care

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**Purpose:** Succinylcholine is a depolarizing neuromuscular blocker and widely used for urgent intubation. Succinylcholine can increase serum potassium due to efflux of potassium from muscle cells. The purpose of this chart review was to evaluate baseline serum potassium in patients receiving succinylcholine.

**Methods:** The Institutional Review Board approved this retrospective medical record review of patients receiving succinylcholine for urgent intubation. Inclusion criteria included patients 19 years or older who received succinylcholine in the intensive care or emergency department. Patients were evaluated from May 2017 to December 2017. Patients receiving succinylcholine for a surgical procedure were excluded. The primary endpoint of this study was to determine if baseline potassium was assessed prior to the administration of succinylcholine. The secondary endpoint of this study was to examine if the patient developed hyperkalemia (potassium > 5 mEq/L) and describe the treatment of hyperkalemia. Descriptive statistics were utilized to summarize all outcomes of interest.

**Results:** 1112 patient charts were identified; 86 patient charts met the criteria of receiving succinylcholine in the intensive care or emergency department. The biggest reason patients were excluded from this study was because the patient was given the succinylcholine in the surgical suite or had an order for succinylcholine but no documented administration. The 86 subjects had a mean age of 53 years (19-96) and were 64% male. The baseline potassium was

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assessed in 73 patients and averaged 4.2 mEq/L. Patients in the emergency department with urgent intubation were less likely to have a baseline potassium drawn before administration of succinylcholine. 6 patients (8%) developed hyperkalemia within 12 hours of receiving succinylcholine with no negative sequelae. Two patients received additional crystalloid fluids. The average succinylcholine dose given was 1.25 mg/kg.

**Conclusion:** Periodic quality reviews of high-risk medications are necessary to improve quality of care by identifying problems, implementing and monitoring corrective action if needed. It is important clinicians are aware of hyperkalemia caused by succinylcholine and the associated risk factors for toxicity. This data demonstrated 85% of patients receiving succinylcholine for urgent intubation had a baseline potassium assessment. Patients who did not have a documented baseline potassium, presented to the emergency department where a clinical decision for rapid intubation was made.

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**Session-Board #** - 4-075

**Poster Title:** Assessment and evaluation of hypertension treatment in acute ischemic stroke

**Poster Type:** Evaluative Study

**Submission Category:** Critical Care

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**Purpose:** Hypertension (HTN) is a common early finding in patients presenting with acute ischemic stroke. Treating HTN in the acute setting is controversial, since both high and low blood pressures are associated with poor outcomes. Current American Stroke Association (ASA) guidelines recommend treating systolic blood pressure (SBP)  $\geq 220$  mmHg and/or diastolic blood pressure (DBP)  $\geq 120$  mmHg in patients ineligible for thrombolytics; however, make no recommendations regarding a blood pressure target. Thus, prescribing patterns of antihypertensive medications will vary. The aim of this study is to describe and evaluate the utilization of antihypertensive drugs in the emergency department (ED).

**Methods:** A retrospective, multicenter, observational study was conducted between February and May 2019. Patients diagnosed with acute ischemic stroke were included, while patients with transient ischemic attacks and hemorrhagic strokes were excluded. A standard questionnaire was used and collected the following data: demographic characteristics, past medical history, SBP and DBP at admission, pharmacotherapy administered in the ED (thrombolytics and antihypertensive medications) and modified Rankin scale (mRs) at admission  $>2$  defined as "bad prognosis". The primary outcome of this study was to describe the utilization of antihypertensive drugs in the ED. The secondary outcome was to assess whether patients were over-treated with antihypertensive drugs; in patients who did not receive thrombolytics, overtreatment was defined as SBP  $< 220$  and/or DBP  $< 120$  and prescribed an antihypertensive, while in those who received thrombolytics, overtreatment was defined as SBP of  $< 185$  and/or DBP of  $< 105$  and prescribed an antihypertensive. The

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Institutional Review Board of the hospitals approved the study design. Statistical analysis was done using the Statistical Package for the Social Sciences version 22.0 (SPSS).

**Results:** A total of 146 patients were included with a mean age ( $\pm$  standard deviation) of 76.55 years ( $\pm$  11.86) and 56.8% were females. More than half of the patients were on antihypertensive medications 53.7% and 76.7% had a previous history of hypertension. The mean SBP and DBP at baseline were  $160.61 \pm 31.27$ mmHg and  $85.45 \pm 14.87$ mmHg, respectively. Only 5.5% of the patients had SBP of more than or equal to 220 and 2.1% were given thrombolytics. Regarding blood pressure management in the ED: overtreatment was observed in 60% of the patients and, amlodipine was the most prescribed antihypertensive (31.9%), followed by nitroglycerin patch (23.6%), angiotensin converting enzyme inhibitors (18.1%), labetalol (13.9%), and nicardipine (1.6%). Over-treatment was more evident in patients with a previous history of hypertension, were at least on one antihypertensive drug before admission to the hospital, had mRs  $> 2$  upon admission to the hospital, and those 65 years and older (p-value of  $< 0.05$ ). However, gender and level of consciousness at admission were not associated with overtreatment (p $>0.05$ ).

**Conclusion:** This study highlights the non-adherence to the guidelines of blood pressure management in acute ischemic stroke. The underlying reasons for overtreatment in this study are mainly due to either previous hypertension diagnosis or higher mRs upon hospital admission. The findings also support the fact that thrombolytics are inadequately prescribed in acute ischemic stroke which raises the need for optimizing patients' education about the early presentation to the hospital after onset of the symptoms.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-076**

**Poster Title:** Assessment of compliance with safety monitoring parameters of propofol in mechanically ventilated critically ill patients at a tertiary-care teaching hospital

**Poster Type:** Descriptive Report

**Submission Category:** Critical Care

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**Purpose:** Propofol is a relatively safe agent recommended for sedation of mechanically ventilated critically ill patients. Some concerns have recently been risen, such as PRIS (propofol-related infusion syndrome), hypertriglyceridemia and zinc deficiency. Monitoring includes daily CPK and lactate for PRIS, triglyceride levels at baseline and every 3-7 days thereafter for hypertriglyceridemia, and zinc levels in major sepsis and/or burns, diarrhea, or propofol use beyond 5 days. A protocol for propofol administration exists, but only advocates CPK monitoring. The aim of this study is to assess the percentage of compliance with proper safety monitoring practices of CPK, lactate, TG and zinc levels.

**Methods:** This is a single-center retrospective study based in the American University of Beirut Medical Center, whereby mechanically ventilated and critically ill patients receiving propofol for sedation were included through a chart-review process from January 2016 to May 2019. Exclusion criteria included uncontrolled and untreated hypertriglyceridemia, documented history of pancreatitis within the past 6 months, history of familial mitochondrial disease, zinc deficiency, hypersensitivity to propofol or any component of the formulation, eggs, egg products, soybeans, or soy products, documented pre-existing rhabdomyolysis, and propofol use for indications other than sedation. PRIS was defined as metabolic acidosis plus cardiac dysfunction and one of the following: rhabdomyolysis, hypertriglyceridemia or renal failure occurring after the start of propofol therapy. Risk factors collected included serious neurological injury, sepsis, concurrent use of vasoconstrictors, steroids and/or inotropes, as

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well as administration of propofol at a dose greater than 4-5 mg/kg/h or 67-83 mcg/kg/min for more than 48 hours. On the other hand, hypertriglyceridemia was defined as TG  $\geq$  500 mg and pancreatitis which was also monitored, was defined as amylase  $\geq$  125 IU/L and lipase  $\geq$  60 IU/L with an abdominal computed tomography scan or clinical examination consistent with pancreatitis. As for zinc deficiency, patients predisposed to deficiency including those on prolonged propofol therapy (>5 days), and patients with severe sepsis, diarrhea or burns were monitored for levels < 84 mcg/dL.

**Results:** From January 2016 till May 2019, a total of 382 patients received propofol, of which only 52 could be assessed. 69% of patients were male, and 56% were above 65 years of age. Findings showed that 54% of patients received propofol at a starting infusion rate of 5 mcg/kg/min, and 86% had propofol titrated at a maximum of 5-10 mcg/kg/min. The maximum infusion rate was 48 hours in 47%. As for the institutional order set, it was utilized in 58% of cases. CPK was taken prior to/at baseline in 12% of patients, and daily in 10%, while lactate was taken in 58% prior to/at baseline and daily in 38%. PRIS occurred in 1 patient, but was not detected at the time. Moreover, baseline TG was taken in 21% of patients, and periodically in 25%, with one patient found to develop hypertriglyceridemia. Lastly, zinc levels were not drawn for any patient even though 46% of patients had a risk factor, and 10% received propofol > 5 days.

**Conclusion:** Propofol monitoring was found to be sub-optimal, and steps should be taken in order to ensure safe and optimal administration of this agent. Although the aforementioned adverse events may be infrequent, preventing or reducing their occurrence is crucial, since PRIS is associated with a high risk of mortality, hypertriglyceridemia increases the risk of pancreatitis, and zinc deficiency increases the risk of innate immune suppression and secondary infection. Future plans for improvement may include updating and enforcing the use of order sets at the institution, as well as providing proper education on adequate monitoring to health-care practitioners involved.

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**Session-Board # - 4-077**

**Poster Title:** Hypnotics utilization in the management of primary insomnia in a tertiary care hospital in Jazan, Saudi Arabia

**Poster Type:** Evaluative Study

**Submission Category:** Drug Information/Drug Use Evaluation

**Primary Author:** Mohammed Abutaleb, Ministry of Health, Saudi Arabia; **Email:** abutaleb33@yahoo.com

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**Purpose:** Literature indicated that insomnia affects nearly one third of the Saudi population. National guidance for insomnia management recommends sleep hygiene advice, access to non-pharmacological treatments such as cognitive behavioural therapy for insomnia (CBT-I) and, in cases of severe insomnia that interferes with daily life, short-term use of hypnotic drugs. The current study aimed to assess the current practice in treating insomnia with hypnotics in Saudi Arabia, and to evaluate its agreement with the US guidelines.

**Methods:** The study was conducted using data collected about patients who were either prescribed benzodiazepines (BZDs) or Z-drugs or diagnosed with insomnia between April 2012 and March 2017 at tertiary care hospital in Jazan, an area in the southwest of Saudi Arabia. Data included documented diagnosis, use of cognitive behavioral therapy for insomnia (CBT-I), use of BZDs and/or Z-drugs in the treatment regimen, and whether physicians prescribed anti-histamines for insomnia. The data were analyzed using Stata 14.

**Results:** Of the 504 records reviewed, 379 patients (75%) were prescribed BZDs or Z-drugs; only 182 (48%) of them had clearly documented indications for their use. Three hundred and seven patients (60%) were diagnosed with insomnia; none of them received CBT-I as initial treatment. No patients on long-term use of hypnotics were reviewed by their physicians after they began using the medication. More than 43% of patients were prescribed anti-histamines for insomnia. No records met all (or even six) of the seven criteria. Most physicians did not follow US guidelines.

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**Conclusion:** There is a need to improve physicians documentation about diagnosis and treatment guidelines. The study recommends that physicians should be trained in prescribing hypnotics and national guidelines need to be developed.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-078**

**Poster Title:** Adverse drug reaction (ADR's) detection through trigger drugs": an approach for medication safety in Al-Khor Hospital

(part of Hamad Medical Corporation –Qatar)

**Poster Type:** Evaluative Study

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** The use of “triggers,” or “clues,” to identify adverse drug events (ADEs) is an effective method for measuring the overall level of harm from medications in a health care setting (IHI-2019). Inadequate risk perception about newly marketed drugs may lead to undermine certain ADRs or simply render us unable to detect them when they happen.

Aim of the study:

- To investigate if the use of trigger drugs tool could improve the identification of ADRs in Alkhor hospital
- To quantify the degree and severity of harm.

**Methods:** A Prospective study conducted in Al khor hospital between Feb 2018 to Dec 2018 where adult inpatient (>14 years) open files were monitored using “trigger drugs tool” method, in addition, “abrupt stop of medication” method was used in the outpatient area.

Before starting the project, an educational awareness lecture was conducted at AKH hospital (physicians, pharmacists and nurses)

The trigger tool was distributed to all departments of Alkhor hospital to spread awareness and ease access to the tool.

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All suspicious ADRs were confirmed by clinical experts using the HMC definition of ADRs, and then reported according to the process map.

**Results:** The data showed an increase in ADRs reporting between 2017-2018 from 40 reports to 137 reports, 58% of the ADRs detected by the trigger drugs tool, while 42% by the traditional method. The data also showed that clinical pharmacists are the higher reporter 59%, followed by the nurses 22%, pharmacists 18% and physicians 1%. Clinical pharmacists reporting increased from 18 ADRs in 2017 to 93 in 2018. Majority of ADR's reported in 2018 were caused by antibiotics (21%), followed by antihypertensive (10.6%). Analgesics, anticoagulants, anti-hyperglycemic and control medications caused nearly the same percentage of reported ADR's (6%). Reported ADR's were classified based on the harm level caused for the patient. 32% of patients were reported to have no harm from the reported ADR's while 34% caused no harm but the patient needed monitoring. On the other hand 24% of ADR's caused temporary patient harm that needed treatment with an antidote or other medication used in the intervention. However only 10% of the cases needed hospitalization.

**Conclusion:** ADRs are under reported in Al Khor Hospital.

"Trigger drugs tool" method increased ADRs reports to more than 100% via an easy review process. Clinical pharmacists play an important role in identification and management of ADRs in Al Khor Hospital.

Education of the importance of ADRs is crucial and important to further stimulate healthcare providers to document ADRs and not just manage them with no documentation.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-079**

**Poster Title:** Cancer incidence among insulin users with human insulin and insulin analogues, a cohort study using the national health insurance research database in Taiwan

**Poster Type:** Evaluative Study

**Submission Category:** Drug Information/Drug Use Evaluation

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Yuh-Lih Chang

**Purpose:** Insulin analogues were designed to have a more desirable pharmacokinetic/pharmacodynamic profile for insulin therapy, they have demonstrated with lower rates of hypoglycemia incidents in DM patients. In Taiwan, another reason why insulin analogues are widely used in diabetic patients is partly due to they are the only available pen-filled injections and are more patient-friendly compared to human insulin, which are only available in vial packaging. However, there has been a long debate on whether insulin analogues increase risk of cancer. This study aims to investigate the effect of insulin analogues on the risk of cancer development compared with human insulin.

**Methods:** This study is conducted using the Longitudinal Health Insurance Database 2010 (LHID2010), which contains one million individuals randomly sampled from the Registry for Beneficiaries of the National Health Institute (NHI) program in 2010 in Taiwan. The eligible study population for this retrospective cohort study is defined as patients with newly diagnosed diabetes (ICD-9-CM code 250.XX) between 2001-2011, and with a first-time prescription of any type of insulin. Patients aged under 20 and over 80 when diagnosed with diabetes, diagnosed with any type of cancer prior to insulin use, exposed with both human insulin and insulin analogues were excluded. The follow up period is defined as the date of first insulin prescription to the diagnosis of any cancer, death or the end of the database period (2011). Binary logistic regression analysis was conducted, and odds ratio (OR) and 95% confidence interval (CI) were estimated. Multiple variables were assessed, including sex, age at diagnosis of

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DM, type of DM, social economic status, comorbidity, baseline concomitant medication use, and number of hospitalizations during the follow up period.

**Results:** 2708 newly diagnosed DM patients with first-time insulin treatment were enrolled, 1252 used human insulin and 1456 used insulin analogues. The median follow up period were 6.15 and 6.76 years for human insulin and insulin analogue groups. 369 patients were diagnosed of cancer during the follow up period. The adjusted odds ratio for developing cancer in association with insulin analogues compared to human insulin was 0.575 ( $p < 0.001$ ). Subgroup analysis was conducted and demonstrated variables such as sex, type of diabetes, age at diagnosis of diabetes, diabetes disease duration, and baseline concomitant use of metformin and statins were effect modifying factors.

**Conclusion:** Insulin analogues demonstrated with reduced risk of cancer development compared to human insulin in DM patients, while the protective effect was lost in patients with disease duration longer then 9 years. This study showed decrease of cancer risk for insulin analogues, however, with only 369 cancer events observed, the clinical significance of this result should be determined in larger, long-term studies.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-080

**Poster Title:** Statin use and risk of prostate cancer: a nationwide propensity-matched cohort study in Taiwan

**Poster Type:** Evaluative Study

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** Prostate cancer is the most common cancer among men worldwide. Numerous epidemiologic studies have suggested an association between the risks of incident prostate cancer in men and the use of statins, the first-line and well tolerated lipid-lowering agents. However, the relevant conclusions are revealed controversial. In present study, we conducted a population-based propensity-matched cohort study using comprehensive information from Taiwan's National Health Insurance Research Database (NHIRD), and attempted to investigate the association between statin use and the subsequent development of incident prostate cancer.

**Methods:** Taiwan's NHIRD contains comprehensive information of clinical visits, including prescription details and diagnostic codes of all beneficiaries of the Taiwan National Health Insurance program, which covers nearly 99% of all Taiwanese residents. The eligible study population was categorized as statin user group and statin nonuser group. Statin users were defined as patients who had received at least one statin prescription during the study period (January 1, 2000 to December 31, 2011). Conversely, patients with at least one ambulatory care visit and no statin prescriptions during the study period were defined as statin nonusers. In addition, patients with a history of malignancy before the index date were excluded. We employed a 1:1 statin users–nonusers matching analysis based on age, propensity score, and index year. In accordance with Anatomic Therapeutic Chemical classification system code, we selected simvastatin, pravastatin, fluvastatin, atorvastatin, and rosuvastatin for analysis. Meanwhile, the characteristics of statins (potency, lipophilicity, and type) and the dose- and

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duration-response were also analyzed. The dissimilarities in the participant characteristics were assessed using the chi-square and t tests for categorical and continuous variables. Relationships between statin use and the risk of prostate cancer were evaluated using the Cox proportional hazards model.

**Results:** In the final 53,292 enrolled patients, statin-users revealed a trend of lower risk of incident prostate cancer as compared to non-statin users; incidence rates (IRs) are 8.29 and 9.76 cases per 1000 person-years in statin users and in non-statin users respectively (HR, 0.86; 95% CI, 0.72-1.03,  $p = 0.111$ ). In the further subgroup analysis, patients with cumulative use of statins demonstrated significant lower risks for incident prostate cancer in dose- (301-600 DDDs: aHR = 0.60, 95% CI = 0.40-0.89,  $p < 0.05$ ; 601-900 DDDs: aHR = 0.42, 95% CI = 0.23-0.77,  $p < 0.01$ ;  $\geq 901$  DDDs: aHR = 0.21, 95% CI = 0.11-0.41,  $p < 0.001$ ), and duration-dependent manners (601-1200 days: aHR = 0.59, 95% CI = 0.40-0.88,  $p < 0.05$ ; 1201-1800 days: aHR = 0.41, 95% CI = 0.23-0.74,  $p < 0.01$ ;  $\geq 1801$  days: aHR = 0.22, 95% CI = 0.10-0.47,  $p < 0.001$ ). Furthermore, rosuvastatin (HR = 0.40, 95% CI = 0.22-0.72,  $p < 0.01$ ) and hydrophilic statin users (HR = 0.70, 95% CI = 0.49-0.99,  $p < 0.05$ ) also revealed lower risks for incident prostate cancer.

**Conclusion:** Our findings suggest that statin use was associated with the decrease risks of incident prostate cancer in manners of cumulative statin use and statin types.

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**Session-Board #** - 4-081

**Poster Title:** Real-world effectiveness of Guselkumab in Taiwan

**Poster Type:** Evaluative Study

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** Guselkumab, a selective interleukin 23 (IL-23) inhibitor, is indicated for the treatment of moderate-to-severe psoriasis in Taiwan. Guselkumab has established the improvement of Psoriasis Area Severity Index (PASI) Score in many clinical trials. However, effectiveness of guselkumab in Asia population in the real-world clinical practice remains unclear. To fill this gap, the purpose of our study is to analyze prescription pattern and effectiveness of guselkumab.

**Methods:** This was a retrospective chart review study by using single medical center hospital Electronic Medical Record (EMR) in Taiwan. We included newly used guselkumab psoriasis patients between November 2018 and April 2019, the patients without baseline PASI were excluded. We followed these patients from the initiations of guselkumab to loss of follow-up or May 2019. We performed medical chart reviews to calculate PASI score after 1-month therapy. We also described the patients' baseline characteristic included sex, age, combination of conventional Disease-modifying anti-rheumatic drugs (DMARDs), previous treatment (biological agents and oral DMARDs), having health insurance or not. Descriptive statistics were used to characterize the information collected.

**Results:** We included 20 guselkumab users with the mean age of 49 years (SD 12) and 80% of men in our study. Only one patient lost of follow up during study period. The average of PASI score before using guselkumab was 15.32 (SD 7.84), and the average PASI score after using guselkumab for one to three month was 8.40 (SD 7.18). After calculated, the mean delta PASI

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was 48.8% (SD 26.67). There were 4 (20%) patients reached  $\Delta$ PASI 75 ( $\geq$  75% improvement from baseline PASI). Prior to initiation of guselkumab, 12 (60%) patients had received other kinds of biological agents (etanercept: 2; ustekinumab: 9; secukinumab: 4; Ixekizumab: 1; Golimumab: 1) and 18 (90%) patients had used DMARDs before. On other hand, there are 6 of them use of conventional DMARDs concomitantly with guselkumab (MTX: 3; acitretin: 2; cyclosporin: 1).

**Conclusion:** For the use of guselkumab in the management of plaque psoriasis, most of the patients exhibited high level of clinical response. Our findings could serve as a clinical reference for guselkumab to improve plaque psoriasis. On account of our patients using the drug in the short term, there is no relevant information about long-term safety issues. The more real-world evidence must be determined in larger, long-term studies.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-082

**Poster Title:** Uptake rates, knowledge, and barriers to seasonal influenza vaccination among Lebanese healthcare workers: a cross-sectional study

**Poster Type:** Descriptive Report

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** Seasonal influenza is a major public health problem associated with increased morbidity and mortality in healthcare settings. This communicable disease can be spread to and from healthcare workers. Accordingly, the immunization of healthcare workers against influenza is an essential preventive measure to protect them and ensure patient safety. In Lebanon, there is a clear deficiency in immunization awareness and practices. This study aims to examine the vaccination coverage rates, and to understand the knowledge and attitudes regarding seasonal influenza vaccination among healthcare workers in Lebanon.

**Methods:** The institutional review boards approved this cross-sectional study conducted between February and March 2019 among a sample of Lebanese healthcare workers. Following an informative introduction by PharmD students, participants signed the informed consent and filled a self-administered questionnaire that assesses vaccination status, knowledge, and attitude towards influenza vaccine. Information was collected from community pharmacists in Beirut, Saida, Tyr, Nabatieh, and neighboring towns, as well as from nurses, interns, residents, and physicians working at Al-Zahraa University Hospital in Beirut, Lebanon. Participants were asked about seasonal influenza, its symptoms and complications, its high-risk groups, and its vaccine. They were also asked about their willingness to be vaccinated and offer the vaccine, and their barriers to immunization. A pilot study was carried out to ensure the clarity of the survey. Descriptive analysis was used for both categorical and continuous variables. A Pearson

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Chi-square and Fisher's exact tests were used to assess significant values. Logistic regression was also used to assess factors associated with the knowledge of influenza vaccine as well as the acceptance of taking the vaccine.

**Results:** A total of 316 subjects participated in the study. Of those, 52.5 percent were females. The majority were between 25-29 years of age (33.9 percent) and between 18-24 years of age (17.7 percent). Of the total sample, 181 (57.3 percent) reported having received the vaccine previously, and only 81 (25.6 percent) were vaccinated this season. However, 261 (83.7 percent) were willing to recommend the vaccine to their patients. The most common barriers of immunization included being in good health, questioning the effectiveness and safety of the vaccine, and fear of injections. Physicians attained the highest score of general knowledge regarding influenza (68.4 percent), followed by residents (60.0 percent), and then pharmacists (58.8 percent). Those who worked in obstetrics, pediatrics, and adult intensive care unit departments had a better knowledge of the vaccine recommendations. Doctorate holders were 8.44 times more likely to have better knowledge about influenza compared to other degrees (P equals 0.004). Residents were 5.01 times more likely to take the vaccine than nurses, interns, physicians, and pharmacists. Additionally, the odds of accepting the vaccine is almost 5.30 times greater for those who do not pay for the vaccine compared to those who pay for it (P equals 0.045).

**Conclusion:** This study reveals that the vaccination rate during the 2018-2019 season was relatively low among healthcare workers. Lack of knowledge on influenza vaccine is a barrier to immunization. Therefore, efforts and initiatives to fill the gaps and minimize the barriers faced by healthcare workers must be carried out. Education campaigns and seminars will help emphasize compliance with the recommendations and subsequently improve rates of vaccination among healthcare workers and enhance the vaccine uptake by their patients.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-083

**Poster Title:** Experience of use and safety of dimethyl fumarate in a tertiary level hospital

**Poster Type:** Evaluative Study

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** Multiple sclerosis is a demyelinating, degenerative and autoimmune disorder of the central nervous system. Dimethyl fumarate has emerged as an alternative for adult patients with relapsing-remitting multiple sclerosis (RRMS). Preclinical studies indicate that dimethyl fumarate pharmacodynamic responses appear to be primarily mediated through activation of the Nuclear factor (erythroid-derived 2)-like 2 (Nrf2) transcriptional pathway. Dimethyl fumarate has been shown to up regulate Nrf2-dependent antioxidant genes in patients. The main objectives of our study is to describe the use and safety of dimethyl fumarate in a tertiary hospital.

**Methods:** Observational study of patients treated with dimethyl fumarate was carried out from October 2015 to June 2017 at a reference hospital in the Northwest of Spain. Data sources: electronic medical records (IANUS®) and prescription program (Silicon®). A statistical analysis was performed using the STATA® 15 software. Variables collected: sex, age, Expanded Disability Status Scale (EDSS) score, previous treatment, posology, duration of treatment, adverse events (AE) and discontinuation causes.

**Results:** 51 patients (78% women). Age (mean): 43.4±9.9 years old. EDSS Score (mean): 1.75±1.30. Among the included patients, 22 (39.3%) were treatment naïve, 16 (31.2%) had only received previous therapy and 13 (25.5%) received dimethyl fumarate as the third or fourth line. Regarding previous therapy, most patients had been treated with immunomodulatory

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drugs (6 interferon- $\beta$  1b, 13 interferon- $\beta$  1a, 6 glatiramer acetate), two patients with fingolimod and one patient with natalizumab. The change from previous therapy to dimethyl fumarate was motivated by AE (16 patients) and due to lack of efficacy (8 patients). Posology: 5/56 patients required a slower dose increase, after this period, all patient received the maintenance dose of 240mg twice a day. During the study period, 17 patients (35.7%) permanently discontinued treatment with dimethyl fumarate. In 11 cases (30.4%) the suspension was motivated by AEs (7/11 gastrointestinal disorders, 2/11 persistent lymphopenia, 1/11 headache, 1/11 recurrent urinary tract infections). 4 patients (20%) stopped treatment due to disease progression and the presence of relapses and 2 patients (20%) due to pregnancy planning.

**Conclusion:** Dimethyl fumarate is proposed as a safe therapy for the treatment of RRMS. Nevertheless, future studies are necessary to detect less frequent AEs, or those occurring with long-term dimethyl fumarate treatment.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-084**

**Poster Title:** Opioid Stewardship: hydromorphone drug use evaluation across 22 free standing emergency care centers

**Poster Type:** Evaluative Study

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** In 2017, the US Department of Health and Human Services officially declared the opioid crisis affecting the United States a public health emergency. Opioid Stewardship programs are being instituted at acute care facilities across the nation to reduce inappropriate opioid use and increase the utilization of non-opioid alternatives to treat pain. As part of our facility's opioid stewardship program we examined the use of intravenous hydromorphone across twenty two standalone City Hospital Emergency Care Centers in the Dallas and Fort Worth areas in Texas.

**Methods:** A retrospective chart review was completed for patients who received intravenous hydromorphone at any of the 22 City Hospital Emergency Care Centers across Dallas- Fort Worth area. Data collected include amount of hydromorphone given, prescribing physician, indication for use, date, and location. A complete medication background was also performed for each patient through the Texas prescription monitoring program, to identify any discrepancy or suspicion of multi-prescribers, and multi-pharmacy use for control medications. The time frame for the retrospective review was from March 1, 2019 to March 31, 2019.

**Results:** In March 2019, a total of 152 hydromorphone doses were given to 132 patients across 22 City Hospital Emergency Care Centers. Twenty percent of the hydromorphone doses were administered at the Fort Worth-Bass location; followed by 12 percent of the total doses given at Garland location and Mesquite-Beltline road location. The main reason documented for the administration of hydromorphone was abdominal pain (44%), followed by 21% due to injury. Other reasons for hydromorphone administration were due to genitourinary pain, chest pain,

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chronic pain, acute pain due to illness, headache, migraine, and acute exacerbation of chronic pain.

A complete medication background was also performed for each patient through the Texas prescription monitoring program (PMP). Out of 132 patients, 16 patients were given 2 or more doses of hydromorphone at the same visit or in the same day. Eight patients were found with a history of obtaining controlled medications from multiple prescribers and multiple pharmacies. Six patients were identified with higher than normal 30 days average morphine milligram equivalents (MME)/day level, which is < 50 MME/day. Nine patients were prescribed CII pain medications following their visit.

**Conclusion:** Based on the results of this review, we now know how much hydromorphone was used at each location in one month. To reduce the utilization of hydromorphone we are proposing a specific protocol for hydromorphone use in our Emergency Care Centers, which should include a pain severity scale. In addition, we also recommend education for healthcare providers on alternative analgesic medications and procedures as well as a patient screening via Texas PMP prior to administering pain medication or prior to writing discharge prescriptions for controlled substances.

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**Session-Board #** - 4-085

**Poster Title:** Identification of trends in opioid prescribing in an ambulatory 330 center

**Poster Type:** Descriptive Report

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** The frequent prescription of opioids for pain management has provoked an “opioid epidemic” as declared by the Centers for Disease Control and Prevention (CDC) in 2011. According to the National Prescription Audit (2012) and the National Survey on Drug Use and Health (2014), the use and abuse of opioids in the United States is significant. Nevertheless, Puerto Rico’s opioid prescription data have not been considered. Therefore, this study was intended to raise data regarding opioid analgesics prescribing and potential abuse in an ambulatory 330 center.

**Methods:** This descriptive study was performed at an ambulatory 330 center and intended to evaluate opioid prescribing trends during a three-year study period (2015-2017). Data was collected by means of a Medication Utilization Evaluation (MUE) and a retrospective analysis of descriptive statistics was conducted. The variables were selected according to the CDC Guidelines for Prescribing Opioids for Chronic Pain (2016) in order to identify the prescribing trends compliance with guidelines. To control the precision of the estimates, a sample size for prescriptions to be studied was calculated. A sample of 1,067 prescriptions was considered and proportionally distributed for each year of the period under study. Data from 1,067 opioid prescriptions was extracted through electronic medical records review.

**Results:** Prescription trends revealed a predominance in the age group of 50-64 (43%), female gender (56%), and non-malignant pain indication (51%). Other variables such as: chronic use,

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dosage form, concurrent benzodiazepine use, and prescription duration were also studied to determine compliance with the CDC guidelines. The total amount of prescriptions that were noncompliant with the CDC guidelines accounted for 775 out of 1,067 (72.53%). The variable with the greatest impact on these results was prescription duration. Only 31 (2.91%) of the prescriptions did not comply with the guidelines as determined by the analysis, if therapy duration was not considered.

**Conclusion:** The study did not demonstrate a significant influence of the CDC guidelines recommendations (2016) in the prescribing trends, but confirmed that these have not deviated from the guidelines. This conclusion is based on data collection which included prescriptions from 2015, one year before the CDC recommendations became available to healthcare workers (2016). Data were compared before and after the CDC guidelines recommendations. Study results contributed to develop set of recommendations to help improve prescribing trends at the institution, particularly opioids' duration of therapy in compliance to CDC guidelines.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-086

**Poster Title:** Assessment of ceftaroline use at a tertiary-care teaching hospital

**Poster Type:** Evaluative Study

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** The alarming rate of antibiotic resistance is one of the major threats to healthcare today. More specifically, resistant strains and reports of clinical failure with vancomycin, linezolid and daptomycin are increasing, indicating the need for an effective and safe alternative agent active against methicillin resistant *Staphylococcus aureus* (MRSA). Ceftaroline is fifth-generation cephalosporin, approved in 2010 for the treatment of skin & soft tissue infections (SSTIs) and community-acquired pneumonia (CAP). The objective of this study is to retrospectively evaluate elements of prescription and administration of ceftaroline use at a tertiary-care teaching hospital.

**Methods:** This is a retrospective observational study based in the American University of Beirut Medical Center, whereby a chart-review process was conducted from July 2017 through October 2018. Appropriateness of therapy was measured by appropriateness of indication, dosing, frequency, route of administration, duration, and the presence of ID approval (restricted prescription). Appropriateness of indication was defined according to medical policy, as use for severe infections (SSTI and CAP) where MRSA is suspected or confirmed, and for polymicrobial infections where the use of one drug is more convenient, safe, and cost-effective than a combination of antibiotics. It also included proper de-escalation after culture results, and atypical coverage in empiric treatment of CAP. As for dosing, doses were considered appropriate if properly adjusted to system creatinine clearance; failure to adjust dose at any time rendered dosing inappropriate. Moreover, appropriate dosing frequency was every 12 hours, and appropriate route of administration was the intravenous route. On the other hand,

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duration of therapy was considered appropriate if ceftaroline was given 5-7 days for CAP and 7-14 days for SSTI. Longer durations however, were also considered appropriate if extended therapy was clinically indicated. Lastly, restricted prescription was defined as the presence of an ID attending physician approval, with verbal approval for the initial dose.

**Results:** From July 2017 till October 2018, a total of 160 patients received ceftaroline, of which 151 were assessed. Ceftaroline was used for SSTIs in 42% of the cases, CAP in 42.5%, HAP in 9%, bone and joint infections in 2%, intra-abdominal infections (IAIs) in 2%, UTI in 2%, and primary bacteremia in 0.5%. Use was appropriate in 77% of the cases. 82% of the indications were community acquired, while 18% were hospital acquired. Also, a total of 90% of patients received ceftaroline empirically, while 10% received it as targeted therapy. On the other hand, dosing according to system CrCl was appropriate in 94% of patients, while that according to CrCl (Cockcroft & Gault) was 87% appropriate, meaning dosing according to system CrCl therefore overestimated values by around 7%. Moreover, duration of treatment was appropriate in 99.5% of patients. Also, dosing frequency and route were appropriate in all patients, since all patients received ceftaroline intravenously as every 12 hours. ID approval was also available in all patients with verbal approval upon initial dose, hence ceftaroline was given under ID restriction. Finally, no significant interactions were identified with ceftaroline, and adverse events were uncommon (3.3%).

**Conclusion:** Ceftaroline was given appropriately in the majority of cases, and was shown to be relatively safe, with no significant drug interactions. This agent may be recommended in relatively complicated SSTIs most likely caused by MRSA, non-MRSA CAP after first-line agents have failed (with atypical coverage in empiric used), and MRSA CAP. On that note, clinical pharmacists and antimicrobial stewardship committees may play an integral role in ensuring appropriate ceftaroline use through practioner education and real-time intervention.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-087

**Poster Title:** A survey of methods and sources healthcare providers use for medical information

**Poster Type:** Evaluative Study

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** Healthcare providers (HCP) routinely need to address questions and issues concerning the medications they are utilizing. There are numerous resources they can utilize for that information. The purpose of this survey was to gain knowledge of the preferred methods and sources HCPs use to obtain medical information with the ultimate objective of improving HCP access to quality medical information.

**Methods:** In March 2019, 511 healthcare professionals were surveyed through a third-party market research firm and were composed of 202 physicians, 105 clinical pharmacists, 100 advance practice nurses, 53 registered nurses, and 51 physician assistants practicing in the United States in a variety of practice settings and with a variety of specialties. Individuals working for a pharmaceutical company were excluded. The survey included demographics of respondents, frequency of searching medical information, types of questions searched, sources of medical information, and rationale for preferred and non-preferred sources of medical information. Utilization of medical information resources were rated on a 5-point ordinal scale. Descriptive statistics were utilized to describe the data.

**Results:** Of the 511 respondents, 452 (88%) search for medical information either daily or several times per week. The most common questions were dosing/administration, drug-drug interactions, adverse events and safety, clinical practice guidelines, and disease state information. Specific medication websites/applications were “frequently” searched, while

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general online search engines, medical literature search database, prescribing labels/information, professional literature and company resources were “sometimes” searched. Specific medication websites/applications (76%) and general online search engines (87%) were used 76% and 87% of the time, respectively, for ease of use; medical literature search database (67%), prescribing labels/information (57%), and professional literature (62%) were used 67%, 57%, and 62% of the time, respectively, for their accuracy. The main reason for infrequent use of specific medication websites/applications and medical literature search database, 33% and 45% respectively, was unfamiliarity; for general online search engines (63%), inaccuracy; and for prescribing labels/information and professional literature (53%; 62%), “takes too long”. The pharmaceutical company was used “sometimes” for medical information. When the medical information department was used, the medical information department call center and the website were considered thorough/complete (56% and 71%); however, the limitations included “takes too long” (58%) or unfamiliarity with the website (48%).

**Conclusion:** HCP frequently search for medical information. Specific medication websites and general online search engines are frequently/very frequently used primarily due to the ease of use. While many utilize prescribing label/information and professional literature, the main limitation is that it takes too long. Information provided by pharmaceutical companies is seen as thorough/complete; however, time to use and unfamiliarity are the main limitations. By understanding search preferences of HCPs, more efficient and useful resources can be developed. There is a need to provide a centralized location for medical information that brings together the benefits of each of the resource/platforms identified.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-088**

**Poster Title:** Comparative study of amlodipine besylate (Amlor®) with other generics in the Lebanese market: an analytical approach

**Poster Type:** Evaluative Study

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** Amlodipine besylate, the active ingredient of Amlor® capsule, is a dihydropyridine Calcium Channel Blocker. After the expiration of the patency in 2007, many generics have been released into the market. While generic drugs and the innovator contains the same labeled active materials, they may not be identical due to differences in excipients, source of raw materials, and manufacturing process. These differences may affect the efficacy and safety of drugs. Consequently, the aim of the current study is to compare five generic formulations of amlodipine besylate 5mg to the brand formulation Amlor® 5mg

**Methods:** In-vitro dissolution tests were done on the brand and generic formula using Erweka dissolution apparatus. Assay and uniformity of content were done on the drugs using UV Spectrophotometry. Absorbance was measured at  $\lambda_{max}$  363 nm and the % recovery of amlodipine besylate was calculated for the different brands and compared with that of the innovator.

**Results:** With respect to the assay data, the innovator content was 101.77 % of the claimed amount, while one generic hadn't passed the acceptance criteria ( $\pm 5\%$ ). Uniformity of content of the innovator had an average content of 102.44%, and all tested generics comply with the acceptance criteria. The results obtained for the disintegration test of different generics were compared to those of the innovator using one-way ANOVA Test, and all tested generic showed a significant difference ( $p < 0.05$ ), though they all comply with the acceptance criteria. As for the dissolution test, all tested capsules had more than 90% release within 30 minutes and thus complying with the specified criteria.

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**Conclusion:** In conclusion, the innovator together with four out of the five generics showed compliance with the specifications required while only one was not complying. Accordingly, those four could be used safely as an alternative to Amlor® with the advantage of lower costs.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-089

**Poster Title:** Attitude and satisfaction of Lebanese mothers towards the pharmacist's counseling on proper usage and administration of antibiotics suspensions for pediatric usage

**Poster Type:** Descriptive Report

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** In Lebanon, most of the pediatric oral antibiotics are manufactured in a powder form and reconstituted before use. For appropriate use of these antibiotic suspensions, parents should be aware of the correct reconstitution, concentration, dose administration, duration of treatment, and storage conditions.

The Lebanese mother's satisfaction toward pharmacist counseling programs for usage and administration of oral antibiotic suspension is unclear.

This study aims to investigate the attitude and satisfaction of Lebanese mothers towards the pharmacist's counseling on proper usage and administration of antibiotics suspensions for pediatric usage.

**Methods:** This study is a questionnaire based descriptive study conducted among the Lebanese population between October 2018 and June 2019, where a sample of 300 mothers were met and asked to answer a face to face questionnaire. The study group was interviewed at major community pharmacies following the presentation of prescriptions for pediatric oral antibiotics.

**Results:** Preliminary results mainly showed that most of the Lebanese mothers who were interviewed got their knowledge from their pharmacists more than other sources. A high percentage of mothers were satisfied by their pharmacist's counseling as they ranked their satisfaction by more than 3 over 5. On the contrary, they were unsatisfied by their pharmacist's short consultation time allocated for storage conditions and need to use specific measuring devices.

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**Conclusion:** Although a good percentage of Lebanese mothers claim that they were counseled by their pharmacists about proper usage and administration of pediatric oral antibiotics, still this group appear not to be satisfied with all pharmacist practices. Therefore, there is a real need to improve communication in order to avoid many of the undesired improper storage and dose measuring and to decrease the extent of misuse of these drugs.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-090

**Poster Title:** Assessment of online open-access resources for drug-drug interaction identification and management

**Poster Type:** Evaluative Study

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** Our objective is to assess drug-drug interaction identification and suggested clinical management of online, open-access resources in comparison to each other and to subscription-based databases. Clinicians and patients alike utilize drug interaction databases to manage drug therapy. Open-access resources offer a readily accessible method for checking drug interactions and provide details of a specific interaction's clinical consequences regardless of the user's ability to pay for or affiliation with a clinic, hospital, or healthcare system. While these resources provide timely information, it is unclear whether the information provide is comparative to subscription-based services or whether any provide inappropriate or outdated information.

**Methods:** Open-access drug-drug interaction resources were defined as websites with or without mobile applications that offered free interaction analysis of a medication list. Inclusion criteria included English language, incorporation of FDA-approved medications, and the ability to check 3 or more medications for interaction at one time. Exclusion criteria included any resource that required pay for service, subscription, or personal information (such as registration of name and email to provide results), the ability to compare no more than 2 medications at one time, clear promotion of a particular product or service, or redirection to a subscription-based database. Websites and subsequent tools with emphasis on natural products or a specific disease/condition (such as hiv-druginteractions.org) were also excluded. Each resources was assessed as follows: 1) Data source; 2) Last update and update policy if available; 3) Identification, clinical management suggestion, and references for three unique drug interactions of varying severity. The drug interactions were: amoxicillin and norgestimate and ethinyl estradiol; sertraline, venlafaxine, and trazodone; and simvastatin and fluconazole.

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**Results:** Six open-access, online drug-drug interaction checkers met the study criteria for inclusion (American Association of Retired Persons [AARP], Drugs.com, Medscape, RxIsk, RxList, and WebMD). Data source was identified in 3 of 6 of resources. Last update and references were available in 1 of 6 resources. As a whole, the six resources identified the 3 posed interactions 83% of the time (15 of 18). Drugs.com was the only interaction checker that identified its source, last update, and successfully identified all three interactions supported by relevant clinical management suggestions and references. Three tools were housed under WebMD Health Services (WebMD, Medscape, RxList). Despite having similar ownership, each of these interaction checkers gave varied results with one (RxList) being unable to identify any of the three interactions posed. The data source for each of these 3 interaction checkers were not clearly defined but did include a disclaimer pertaining to third parties. Several tools gave results intermixed with drug-food, drug-herb, and drug-lifestyle interactions which may decrease the likelihood that the drug-drug interaction is readily identified and subsequently addressed by the user.

**Conclusion:** Patients and off-site clinicians choosing to utilize open-access resources for drug interaction screens should be cognizant of the tool's source, update frequency, and ability to analyze multiple FDA-approved medications to meet their needs. Several tools described the same interaction as either mild, moderate, or severe (with one tool listing the same interaction as all three) which could lead to confusion over appropriate clinical management. As all tools were likely licensed by third-parties that also own or oversee a commercial drug database, it is likely that these open-access tools would suffer without a thriving subscription-based environment.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-091

**Poster Title:** Comparing clinical characteristics and outcomes of dipeptidyl peptidase-4 inhibitors and metformin in treatment of naïve type 2 diabetes in an academic teaching hospital in Japan

**Poster Type:** Evaluative Study

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** Although metformin is recommended as the first-line therapy in the guidance document from the American Diabetes Association, Japanese clinical guidelines do not guide the physician on the application of specific oral hypoglycemic agents to drug naïve patients. In Japan, dipeptidyl peptidase-4 (DPP-4) inhibitors are often prescribed for patients newly diagnosed with type 2 diabetes mellitus (T2DM) because of the low incidence of side effects. However, our previous study revealed that metformin was underused. This study examined the prescribing patterns of DPP-4 inhibitors and metformin in drug-naïve patients with T2DM and evaluated factors affecting initiation of DPP-4 inhibitors versus metformin.

**Methods:** The study was approved by the Institutional Review Board of the Kitasato University Hospital (KUH), Japan. A retrospective chart review of drug-naïve patients with T2DM was conducted at KUH between January 1, 2015 and July 31, 2017. Patients older than 20 years who newly started DPP-4 inhibitors or metformin monotherapy were included in the study. Data was collected from electronic medical records. The outcomes evaluated included the utilization patterns of DPP-4 inhibitors and metformin, and baseline patient factors that were associated with the selection of the agents. Multivariable logistic regression models were built to identify baseline patient factors associated with initiation of DPP-4 inhibitors versus metformin. Patient characteristics including sex, age, Body Mass Index (BMI), smoking, alcohol, and estimated glomerular filtration rate (eGFR), were used as the predictor variables in univariate analysis;

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multivariate analysis was performed using factors with p-value less than 0.2 and the odds ratio (OR) calculated. The univariate analysis was performed to identify predictive factors for attaining hemoglobin A1c levels less than 7.0 percent after three months of treatment initiation. In addition, we examined the selection of either DPP-4 inhibitors or metformin based on combinations of the following three factors: age equal to or greater than 65, BMI, and eGFR. The Kaplan-Meier method was used to compare treatment intensification or discontinuation period of the two treatment groups using the log-rank test.

**Results:** A total of 110 patients were enrolled (68.2 percent males, 31.8 percent females). Of these, 79 (71.2 percent) were prescribed DPP-4 inhibitors and 31 (28.2 percent) were prescribed metformin. The mean age was 69 and 50 years in the DPP-4 inhibitor and metformin groups, respectively (p-value less than 0.001). The mean BMI was higher in the metformin group than in the DPP-4 inhibitor group (28.2 vs. 23.1, p-value less than 0.001). Moreover, the mean eGFR was higher in the metformin group than in the DPP-4 inhibitor group (89.0 vs. 64.3, p-value less than 0.001). Patient factors associated with DPP-4 inhibitors selection over metformin were age equal to or greater than 65 years (p-value less than 0.001, OR equals 12.34) and BMI less than 25 kg/m<sup>2</sup> (p-value less than 0.001, OR equals 3.11). None of the factors were associated with attaining HbA1c less than 7.0 percent. Selection rate of DPP-4 inhibitors based on combinations of the three factors were: three (94.4 percent), two (100.0 percent), one (55.6 percent), and zero (36.4 percent). The Kaplan-Meier curves for the rate of treatment intensification or discontinuation period indicated initial selection of DPP-4 inhibitor or metformin was not associated with the period of treatment continuation.

**Conclusion:** DPP-4 inhibitors over metformin were initiated in more than double the patients. However, initial selection of either DPP-4 inhibitors or metformin was not associated with achieving the target goal of 7.0 percent HbA1c after three months and treatment continuation. Factors significantly associated with selection of DPP-4 inhibitors over metformin were age greater than 65 years and lower BMI. There was great variability in initiating DPP-4 inhibitors among patients with zero or one factor. Identifying those factors may help pharmacists promote rational selection of initial therapy.

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**Session-Board #** - 4-092

**Poster Title:** Trend of intravenous magnesium sulfate (IV MgSO<sub>4</sub>) consumption in a Lebanese hospital: a retrospective medical chart review

**Poster Type:** Descriptive Report

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** The indications, measurement of levels and treatment of hypomagnesemia with IV MgSO<sub>4</sub> are not well defined among hospitalized patients. In 2011, IV MgSO<sub>4</sub> has been reported as one of the medications being in short supply worldwide. In Lebanon, there is no available literature that examined the trend of IV MgSO<sub>4</sub> consumption in hospital wards till this date. Therefore, the purpose of this study is to examine the trend of IV MgSO<sub>4</sub> consumption in a Lebanese hospital over the last 5 years. In addition, this study will also explore the drug utilization review of IV MgSO<sub>4</sub> in different hospital wards.

**Methods:** The Institutional Review Board of the hospital and research committee of the Lebanese International University-School of Pharmacy approved this retrospective cross-sectional study that was conducted from February 2019 till May 2019. Medical charts for patients who received IV MgSO<sub>4</sub> were reviewed from 2014 till 2018 stratified by hospital wards were enrolled in this study. To assess the study primary outcome the daily consumption of IV MgSO<sub>4</sub> was quantified to estimate the total grams of IV MgSO<sub>4</sub> used in each year. As for the secondary outcomes, dichotomous data was presented as percentages and continuous data was presented as means. Pearson Chi square test and Fisher exact test was used to estimate the odds ratios and to estimate bivariate associations. T test was used to analyze continuous data. Binary logistic regression was use to estimate strength and precession of the associations taking into consideration age, gender, correct dose, monitoring and therapeutic

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appropriateness of IV MgSO<sub>4</sub>, corrected magnesium (Mg), calcium (Ca), serum creatinine (SrCr), and potassium (K) levels after IV MgSO<sub>4</sub> administration.

**Results:** Among the 331 hospitalized patients IV MgSO<sub>4</sub> use has increased by 1.05 fold from 2014 to 2018. From 2016 till 2018, the incorrect therapeutic appropriateness IV MgSO<sub>4</sub> was 48.8% (p=0.01). Bivariate analysis showed that there was no direct association between the corrected level of Mg after IV MgSO<sub>4</sub> and death. However, the percentage (%) of death among patients who had corrected Ca level (5.2 %) after IV MgSO<sub>4</sub> was lower compared to those with no corrected Ca level (16.0%) (P value=0.05). As for the for the % of death among patients who had corrected SrCr (5.5 %) after IV MgSO<sub>4</sub> was lower compared to those with no corrected SrCr level (22.5 %) (P value < 0.01). Binary logistic regression showed that with every increase in age by one year, risk of death increased by 1.055 (P value < 0.01). In addition, abnormal SrCr level after IV MgSO<sub>4</sub> increase the risk of death in patients by 1.02 (P value < 0.01) compared to those with normal SrCr level.

**Conclusion:** According to study findings, the IV MgSO<sub>4</sub> consumption in hospital had increased over the last 5 years which cannot be explained for by medical indications. It is worth mentioning that there was a significant difference in therapeutic appropriateness between years due to the absence of guided protocol of IV MgSO<sub>4</sub> use in hospital wards. The risks and benefits of IV MgSO<sub>4</sub> deserve further investigations as IV MgSO<sub>4</sub> administration significantly affect other electrolytes. Based on this study, special precautions should be undertaken in elderly patients when it comes in correcting Mg level, Ca and Scr.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-093

**Poster Title:** Pharmacist's role in management of home health patients admitted to the hospital

**Poster Type:** Evaluative Study

**Submission Category:** Geriatrics

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**Purpose:** Patients that have undergone complicated inpatient admissions may be at a higher risk of medication issues due to changes and additions in therapy. Maintaining an updated medication list for them can be challenging. These patients may qualify for home health care due to limitations in mobility and transportation and therefore, receive routine visits from healthcare professionals to assist with chronic illnesses. The purpose of this study was to determine if the reason for readmission was due to a medication-related issue and assess the value of a pharmacist in reviewing these patients.

**Methods:** This prospective cohort study included all patients enrolled in home health services admitted to an inpatient unit. Patients were excluded if they were admitted for congestive heart failure due to a concurrent study on this patient population. Those treated and released from the emergency department were also excluded. The pharmacist evaluated medical records, conducted patient interviews, and addressed discrepancies in the medication reconciliation. The primary outcome was the number of patients admitted due to a medication-related event. Secondary outcomes included the number and type of discrepancies identified and the number of patients readmitted within 30 days for a medication-related issue. Patients were assessed daily and counseled on newly initiated medications in the hospital. Patients also received a follow-up phone call post-discharge to address questions of therapy and reiterate adherence.

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**Results:** A total of 41 patients were evaluated. The average age of this patient population was 76 years with about half being male. Approximately 30 percent of home health patients were admitted to the hospital due to a medication-related issue. The classes of medications most frequently causing hospital admission were antibiotics due to failing outpatient therapy, as well as antidiabetic medications causing hypoglycemia. Other medication classes included antihypertensives and serotonin-norepinephrine reuptake inhibitors. The pharmacist identified an average of two medication discrepancies per patient. The most common reason for deviances included omission of a medication the patient was actively taking, followed by incorrect dosing, inappropriate addition of a medication, duplicate therapy, and lastly incorrect indication. Follow-up phone calls were conducted on 25 patients. The remaining patients either expired, were discharged to another facility, or unavailable. During post-discharge phone calls, adherence was assessed and reinforced, patient concerns were addressed and additional questions regarding medications were answered. A limitation of this research was that not all patients were able to be interviewed and counseled inpatient due to being discharged prior to speaking with the pharmacist. Other limitations included a small sample size and limited study duration of two months.

**Conclusion:** Home health patients can be at risk for readmissions due to complex medication regimens. The integration of pharmacy services is beneficial in bridging gaps between health care settings. Pharmacists are able to identify discrepancies in the medication reconciliation and rectify such a comprehensive list. Interviewing patients is very beneficial, however, during this study the pharmacist was not able to speak with all patients due to time constraints. The study has been continued for another month to increase sample size. Overall, inclusion of a pharmacist in the medication evaluation decreased inaccuracies in therapy and addressed barriers in understanding medications.



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**Session-Board #** - 4-094

**Poster Title:** Knowledge and awareness of Lebanese elderly on OTC NSAIDs adverse events

**Poster Type:** Descriptive Report

**Submission Category:** Geriatrics

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**Purpose:** Non-steroidal anti-inflammatory drugs (NSAIDs) are highly used by the geriatric population for many indications including pain, osteoarthritis, and rheumatoid arthritis. Although these drugs are effective, they carry many risks of adverse reactions to elderly patients. The aim of this study is to determine the knowledge and awareness of the elderly on the adverse events of OTC NSAIDs in Lebanon.

**Methods:** A cross-sectional questionnaire-based study was carried on a sample of elderly patients aged 60 years and above taking at least 1 OTC NSAID. Data were analyzed using SPSS version 23.

**Results:** Data obtained showed that 64.2% of the sample studied were unaware of the NSAIDs side effects except for the gastrointestinal irritation. Moreover, the participants agreed on the fact that they would think twice and take more caution if they have been aware of NSAIDs' side effects.

**Conclusion:** Lebanese elderly patients are unaware that NSAIDs may cause many side effects affecting negatively their health. Therefore, many serious steps should be taken such as organizing awareness campaign and emphasizing on the pharmacist counseling when dispensing OTC NSAIDs.

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**Session-Board #** - 4-095

**Poster Title:** Attitude and satisfaction of Lebanese elderly patients towards the pharmacist's counseling on OTC NSAIDs

**Poster Type:** Descriptive Report

**Submission Category:** Geriatrics

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**Purpose:** People aged 65 years and older currently represent 7.3 percent of Lebanon's population. Moreover, this percentage is expected to increase rapidly in the upcoming years. This age category is exposed to many diseases and painful situations where NSAIDs is highly needed and consumed. However, geriatric patients are more susceptible to the side effects of NSAIDs and therefore require special attention and counseling from the pharmacist. The current study aimed to assess the attitude and satisfaction of elderly patients towards the pharmacist's counseling on OTC NSAIDs as well as the outcomes of this counseling.

**Methods:** A multicenter cross-sectional questionnaire-based study was carried. Inclusion criteria included elderly patients aged 60 years and above who are on OTC NSAIDs. Data were analyzed using SPSS version 23.

**Results:** Results mainly showed that most of the elderly who were aware of the NSAIDs side effect got their knowledge from their pharmacists more than other sources. However, a high percentage of elderly were not satisfied by their pharmacists counseling as they ranked their satisfaction by less than 3 over 5. More specifically, they are not satisfied by their pharmacist's short consultation time as well as the follow-up.

**Conclusion:** Although a good percentage of elderly patients claim that they were counseled by their pharmacists about NSAIDs side effects, still this age group appear not to be satisfied by

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their pharmacist practices. This dissatisfaction reflects a weak relation between pharmacist and patients. Therefore, there is a real need to improve their communication in order for the elderly to avoid many of the undesired effects of NSAIDS and to decrease the extent of misuse of these drugs.

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**Session-Board #** - 4-096

**Poster Title:** Hip-fractures among elderly – lack of concordance between the patient’s medication list and the presence of drugs in the blood at the time of fracture

**Poster Type:** Descriptive Report

**Submission Category:** Geriatrics

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**Purpose:** Many drugs, other than those associated with orthostatic blood pressure, may increase the risk of falling in elderly. In a Swedish study, the use of antidepressants and opioids, respectively, was associated with a 60 % increased risk of falling, while hypnotics showed a 13 % increased risk. Knowledge of all medications used by the patient is an important basis for risk minimization. However, the information we have on a patient’s medications is not always correct. In this study, we compare the information from patient’s medication list with substances detected in the blood of the patient at the time of falling.

**Methods:** One hundred consecutive patients with a hip fracture were included. A single blood sample was drawn at arrival to the emergency department of a university hospital. The samples were screened for over 500 commonly prescribed drugs and their metabolites by liquid chromatography/time of flight mass spectrometric analysis, LC-TOF-MS. Analyses were performed on an Agilent 6540 TOF-MS, in combination with a 1290 UHPLC. Information on prescribed medications was retrieved from the electronic health record at the time of the admittance to the hospital. Information on drugs given in the ambulance was also collected. Informed consent was retrieved from all participants and the study was approved by the regional Research Ethics Board.

**Results:** 95 out of 106 recruited hip fracture patients were followed up with TOF-screening. Mean age was 84 years; women (67%) and men (23%). Around one fourth of the patients lived

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in a special care facility Eighty out of 95 patients fell indoors. According to the medical records, the median number of prescribed drugs in the group was 7 (0-16). Three patients had no medications. Drugs known to have been given in the ambulance (ketobemidone, diazepam, phytonadione, metoclopramide, morphine, ketamine and ondansetron) were excluded in the interpretation of drug screening analyses.

In 95 patients, one or more of the prescribed drugs, e.g. enalapril, tolterodine or prednisolone, could not be detected in the blood sample. On the other hand, in 47 patients, other drugs than those registered in the health record were present in blood samples. The detected non-prescribed drugs were acetaminophen (17 patients), antidepressants (3 patients), opioids (4 patients), omeprazole (2 patients), metoprolol (2 patients) and cetirizine, ephedrine, donepezil and meclizine in one patient each. Ropivacaine or xylocaine, probably given but not documented in the ambulance, were also detected in 18 patients.

**Conclusion:** In 15 out of 95 patients with a hip fracture, drugs that may be associated with an increased risk of falling and/or fracturing were detected in a blood sample at arrival to the hospital, but were not recognized or registered in the medication list. This may be due to the patient being non adherent, or to shortcomings in communication or documentation of drugs taken or prescribed. Our findings support the need for a thorough medication review in connection to a fall, to minimize the risk for further accidents.

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**Session-Board #** - 4-097

**Poster Title:** Evaluating outcomes of extended versus intermittent infusion of antipseudomonal beta-lactams for treatment of critically ill patients with respiratory infection: a systematic review and meta-analysis

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** Since beta-lactams are the most common antimicrobial drugs used in critically ill patients with respiratory tract infections, alternative dosing strategies have been recommended for dose optimization. The objective of this systematic review and meta-analysis was to focus on extended infusion and capture additional data to evaluate whether the extended infusion antipseudomonal beta-lactams have improved mortality and better clinical efficacy compared to intermittent infusion in critically ill patients with predominant respiratory infection.

**Methods:** Two authors independently performed a literature search of trials using PubMed, Cochrane Library, Scopus and ICHUSHI in English and Japanese language from inception to February 2019. We retrieved both published and unpublished trials comparing extended infusion (3 or more hours) to intermittent infusion (up to 60 minutes) in critically ill patients. Two independent reviewers extracted and investigated the data. A meta-analysis was conducted using Review Manager 5.3 and R statistical software. Risk deference (RD) and 95% confidential interval (CI) were calculated regarding all outcomes by using random effect model. Statistical heterogeneity among studies was assessed by using  $I^2$  statistic and Q statistic ( $\chi^2$  test). The quality of each study was assessed. Sensitivity analysis and publication bias were evaluated. This meta-analysis is reported according to Preferred Items of Systematic reviews

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and Meta-analyses (PRISMA) guidelines and registered with the PROSPERO database, number CRD42019119166.

**Results:** 3,244 articles were identified and screened. Ten studies (3 Randomized Controlled Trials and 7 non- Randomized Controlled Trials) involving 1,558 participants were included in the meta-analysis. Studies comparing extended to intermittent infusion of penicillins, cephalosporins and carbapenems in critically ill patients having predominant respiratory tract infection were included. We excluded articles if no clinical outcome was reported and studies comparing continuous (lasting for 24 hours) infusion to intermittent infusion. Additionally, studies comparing between 2 different beta-lactams or not comparing extended to intermittent infusion were excluded.

Compared to intermittent infusion regimen, severely ill patients receiving extended infusion were associated with lower all-cause mortality RD, -0.10 [95% CI, -0.15 to -0.04]. Heterogeneity was ( $p=0.04$ ,  $I^2=51\%$ ). However, no significant difference in clinical success RD 0.10, [95% CI, -0.06 to 0.26], ICU length of stay RD -2.37, [95% CI, -5.17 to 0.42], hospital length of stay RD -1.68, [95% CI, -3.85 to 0.48] and antibiotic duration RD 0.05, [95% CI, -1.80 to 1.90] was observed between the two groups. The sensitivity analysis showed the results were stable.

**Conclusion:** Extended infusion beta-lactams compared to intermittent infusion were associated with significantly reduced mortality rates in severely ill patient with predominant respiratory infection, but no statistical difference in clinical success rate. Well-designed randomized controlled trials are warranted to confirm these findings.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-098

**Poster Title:** Impact of targeted prescriber education and metrics on antibiotic utilization

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** To assess the effectiveness of prospective audit and prescriber-directed utilization metrics on antibiotic utilization.

Centers for Disease Control and Prevention (CDC) cites that 20-50% of all antibiotics prescribed in U.S. acute care hospitals are either unnecessary or inappropriate. Providing personalized communication about how prescribers can improve their antibiotic prescribing is one strategy suggested by the CDC. While acceptance of pharmacist interventions demonstrates success of an Antibiotic Stewardship Program (ASP), shaping prescriber habits was given equal weight in evaluating sustained ASP outcome measures.

**Methods:** This was a two-phase, single-center study evaluating the impact of pharmacist-led prospective audit and education to prescribers regarding their individual prescribing. Phase I (Jan-Dec 2016) consisted of antimicrobial stewardship program team (AST: infectious diseases physician and pharmacist) prospective audit and feedback targeting de-escalation, escalation, unnecessary duplicative coverage, and duration of therapy. Additionally, focused group presentations were provided to hospitalists as well as quarterly individualized report cards with comparison vs. peers were provided to prescribers. Phase II (Jan-Dec 2018) included targeted prescriber group education to all medical staff providers. The primary endpoint was antibiotic utilization (days of therapy (DOT)/1000 adjusted patient days [AdjPD]) before (Jul-Dec 2015) and after implementation of each phase. Secondary endpoint included assessment of the required number of AST interventions per prescriber within the same time period. A Student's T-test was utilized to assess the impact of the interventions.



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**Results:** No difference in DOT/1000 AdjPD (mean+SD) was experienced post-implementation of Phase I vs. baseline (571.5+28.9 vs. 576.7+20.0;  $p=0.53$ ). However, a significant reduction was observed following Phase II vs. baseline (503.6+36.6 vs. 576.7+20.0;  $p<0.0001$ ). Reduction in utilization from baseline was mainly driven by decreases in DOT/1000 AdjPD of the following antimicrobial classes: fluoroquinolones (55.8 vs. 81.2), metronidazole (24.6 vs. 45.8), and first generation cephalosporins (40.9 vs. 55.0), carbapenems (22.1 vs. 34.1), and penicillinase-resistant penicillins (15.7 vs. 29.8). Additionally, significantly fewer AST interventions per month (mean+SD) were necessitated post-implementation of Phase I (26.6+7.5 vs 38.0+6.5;  $< 0.0001$ ) and II (25.6+6.7 vs. 38.0+6.5;  $< 0.0001$ ).

**Conclusion:** This study highlights the importance of prescriber group focused education regarding antibiotics. AST-led prospective audit along with individualized hospitalist education and report cards did not significantly decrease antibiotic utilization but resulted in fewer AST interventions. Incorporating targeted antibiotic education to all prescriber groups led to a reduction in DOT/1000 AdjPD.

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**Session-Board #** - 4-099

**Poster Title:** Implementation of an interprofessional approach to minimize the usage of inappropriate broad-spectrum gram-positive antimicrobials in respiratory infections in patients covered by adult medicine rounding teams

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** In a prior study, appropriate usage of linezolid and vancomycin in adult inpatients on interprofessional rounding teams with documented respiratory tract infections (RTI) was evaluated. Inappropriate prescribing, as well as overuse of antimicrobials, contributes to antimicrobial resistance. Recommended empiric antibiotic therapy for inpatient community acquired pneumonia (CAP) is either a fluoroquinolone monotherapy or a beta-lactam and macrolide combination therapy. Vancomycin or linezolid should only be utilized when community-acquired methicillin-resistant *S. aureus* (MRSA) is suspected. The purpose of this study was to determine the results of interprofessional quality improvement measures implemented to reduce unnecessary empiric coverage with vancomycin and linezolid.

**Methods:** The study was a single-center, retrospective, cohort design. Inclusion criteria included adults (age > 18 years) assigned to an internal medicine teaching service who received > 24 hours of scheduled vancomycin or linezolid for documented upper or lower RTI upon admission. Exclusion criteria included diagnosis of infection other than respiratory in nature and pregnancy. Patients were identified using Theradoc and/or Siemens Pharmacy. The following patient parameters were analyzed: patient demographics, broad-spectrum antimicrobial used, days to therapy, diagnosis, culture results, days from culture results to de-escalation, and cost.

**Results:** Vancomycin or linezolid were used inappropriately in 48.75% of patients in the control group which lead to unnecessary antibiotic exposure and increased healthcare costs. Following the educational intervention from pharmacy and medical providers to prescribers, correct

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usage of antibiotic therapy increased from 51.25% to 63.5% ( $p = 0.14$ ). There was a significant decrease in number of days on inappropriate therapy (212 vs 108,  $p < 0.001$ ), which resulted in a difference in cost of \$3,433.00. To follow guideline-directed therapy, vancomycin and linezolid should be reserved for empiric therapy in patients with a MRSA risk. This medication use evaluation established a baseline for prescribing practices at the health system of interest in the specified subset of patients and practitioners. Limitations of the study include a small study population and cost, which was an estimate.

**Conclusion:** The intervention was successful in reducing the days of inappropriate antibiotic therapy in patients with RTIs. A decrease in inappropriate prescribing was demonstrated; however, not statistically significant. Vancomycin and linezolid were used empirically for patients who do not require MRSA coverage, identifying an area for improvement within the health system. This exposure to broad-spectrum gram-positive agents puts patients at risk for more resistant organisms in the future. While the total number of days of inappropriate antibiotic therapy decreased and percentage of correct use increased from pre- to post-intervention, these results indicate there is still room for improvement to be made.

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**Session-Board #** - 4-100

**Poster Title:** Evaluation of pharmacist interventions on antimicrobial use: a multicenter, tertiary, teaching hospital-based study

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** The misuse or overuse of antimicrobials is known to be associated with poor clinical outcomes. To ensure appropriate antimicrobial use, an antimicrobial stewardship program (AMS) has been implemented in various countries, and specialized pharmacists have been proposed as core members of the AMS; however, the participation of pharmacists in the AMS is limited to some institutions in Korea. Therefore, we aimed to evaluate the pharmacist interventions for antimicrobial use for hospitalized patients by conducting a multicenter, retrospective study. In addition, we investigated the effect of having a dedicated pharmacist of AMS on the rate of pharmacist interventions for antimicrobial use.

**Methods:** This study is a multicenter, retrospective analysis performed using documented pharmacist interventions for antimicrobials use between January 2017 and December 2017. Five tertiary teaching hospitals participated in this study. The type of drug-related problem (DRP) and clinical significance of the pharmacist interventions were evaluated according to the Pharmaceutical Care Network Europe classification V8.01 (PCNE) and National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) criteria, respectively. In addition, we evaluated the acceptance rate of pharmacist interventions and the intervention rate. The correlation between the participation of a dedicated pharmacist in AMS and the intervention rate for antimicrobial use was evaluated by using multivariate logistic regression analysis.

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**Results:** In total, 11,950 interventions were documented for 7,151 inpatients. The intervention rate based on the number of patients and the acceptance rate of pharmacist interventions was 6.3% (range 0.9%–10.4%) and 96.1% (range 82%–99%), respectively. The most prevalent DRP was “dose selection” (67.8%) followed by “drug selection” (19.8%). Approximately 77.5% of pharmacist interventions were classified beyond D of the NCC MERP index. The participation of a dedicated pharmacist in the AMS increased the likelihood of pharmacist intervention for antimicrobials (aOR, 3.58; 95% confidence interval, 2.55–5.06).

**Conclusion:** This study demonstrated that pharmacist interventions for antimicrobial use in hospitalized patients were widely accepted and were clinically significant. The participation of a dedicated pharmacist for AMS is expected to contribute to the safe and effective use of antimicrobials through interventions for antimicrobial prescriptions.

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**Session-Board # - 4-101**

**Poster Title:** Awareness of recommended vaccinations and vaccine preventable diseases among Lebanese adult population, 2019

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** The incidence of Lebanese adults suffering from serious health problems due to diseases for which vaccines are available is increasing every year. Vaccination is the most effective strategy for preventing such diseases and their complications. People of 18 years of age and older are recommended to receive certain vaccines based on their stage of life, medical status, lifestyle, and other contemplations. This study was designed to evaluate factors independently associated with Lebanese population awareness of CDC (center for disease control and prevention) recommended adult's vaccinations and vaccine-preventable diseases for the first time in Lebanon

**Methods:** This was a community based cross-sectional study conducted from December 2018 till June 2019. Out of 1000 screened participants, a representative sample of 600 subjects aged 18 years old and above, and residing in the six districts of Lebanon were examined to assess their awareness of selected vaccine-preventable diseases and adult vaccinations including influenza, pneumococcal, tetanus, diphtheria, pertussis (Tdp), human papillomavirus (HPV), herpes zoster, measles, mumps, rubella (MMR), hepatitis A and B, along with their self-reported vaccination status. Data collection form was filled up through one on one interview with the main investigators and each participant alone. IBM SPSS 20 (Statistical Package for Social Sciences) was used for data analysis. All analyses were weighted to reflect the Lebanese adult population. T-tests were used to identify the differences in vaccination status and awareness of adult vaccinations and vaccine-preventable diseases by the selected covariates. A multivariable

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logistic regression model with a predictive marginal approach was used to identify independently associated factors with awareness of selected vaccine-preventable diseases and vaccines status among adult populations. A two-sided significance level of 0.05 was adopted for all statistical tests.

**Results:** Among the surveyed population, 75.5% agreed that adults' vaccination is good for health. The percentage of adults who reported taking adults' vaccines as recommended by the CDC ranged between 9.9% to 28.8% (Tdp vaccine 14%, influenza vaccine 28.8%, MMR vaccine 15.2%, zoster vaccine 12.9%, HPV vaccine for males 9.9%, HPV vaccine for females 11.9%, pneumococcal vaccine 13.6%, hepatitis A vaccine 12.6%, hepatitis B vaccine 10.5%, meningococcal vaccine 11.9%, haemophilus influenza b vaccine 13.7%). Awareness of vaccine-preventable diseases ranged from 47.7% to 88.9% (88.9% reported awareness of influenza, 61.1% reported awareness of tetanus and pertussis, 61.3% reported awareness MMR, 53.8% reported awareness of varicella zoster, 47.7% reported awareness of HPV, 64.2% reported awareness of hepatitis A, and 62.5% reported awareness of hepatitis B, 58.8% reported awareness of meningitis). Awareness of the corresponding vaccines ranged from 38% to 69.5% (Tdp vaccine 38%, influenza vaccine 69.5%, MMR vaccine 40.2%, Zoster vaccine 46.4%, HPV vaccine for male 50.1%, HPV vaccine for female 55.8%, pneumococcal vaccine 46.2%, hepatitis A vaccine 49.4%, hepatitis B vaccine 47.2%, Meningococcal vaccine 43.2%, haemophilus influenza b vaccine 44.4%). In multivariable analysis, being female, married, college graduate and a health care provider were significantly associated with higher awareness levels.

**Conclusion:** Despite the relatively high level of awareness of most of vaccine preventable diseases, the awareness for available vaccines and recommended vaccination schedule was modest. Furthermore the self-reported vaccination coverage was found to be alarmingly low. The role of pharmacists is to increase the level of awareness of vaccination for vaccine-preventable diseases and to find ways to reduce the gap between awareness and vaccination.

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**Session-Board # - 4-102**

**Poster Title:** Clinical outcomes of empirical use of piperacillin/tazobactam versus meropenem in adult patients admitted to the intensive care unit with sepsis

**Poster Type:** Descriptive Report

**Submission Category:** Infectious Disease/HIV

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**Purpose:** Sepsis is a clinical condition commonly occurs in patients admitted to the Intensive Care Unit (ICU). Timely initiation of adequate empiric antibiotic therapy is associated with improved clinical outcomes. Piperacillin/tazobactam and meropenem are both acceptable as initial empirical antibiotic coverage in sepsis due to their broad-spectrum activity, mainly against Gram-negative bacteria. we aimed to determine whether there is difference in clinical outcomes in adult patients admitted to the ICU with sepsis and started empirically on piperacillin/tazobactam or meropenem.

**Methods:** Data of all adult patients admitted to the ICU with sepsis between January 2015 and December 2017 were retrospectively reviewed. Collected variables included demographic data, underlying comorbidities, possible source of infection, culture results and susceptibilities of identified Gram-negative bacteria to piperacillin/tazobactam and to meropenem. Primary outcomes of interest were ICU length of stay and 30-day mortality. Secondary outcomes included the delta Sequential Organ Function Assessment (SOFA) score, C-reactive protein (CRP) ratio, and difference between serum procalcitonin (PCT) concentrations and White Blood Cell (WBC) count on admission and 48-72 hours later. A propensity score matching (PSM) analysis and multivariate analysis were performed to control for all potential confounders.

**Results:** There were 122 patients enrolled and who received either piperacillin/tazobactam (n=82) or meropenem (n=40) for sepsis. After adjusting for confounders, there was no significant difference in ICU length of stay between piperacillin/tazobactam (median 12, Interquartile Range (IQR) [7, 20]), and meropenem (median 15.5, IQR [8.5, 27]) treated groups,



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P=0.2. Similarly, the 30-day mortality was not significantly different between the piperacillin/tazobactam and meropenem groups 73% vs. 76.3%, respectively, P=0.6. Additionally, other variables such as delta SOFA, CRP ratio, serum PCT and WBC count on admission and 48-72 hours later, also showed no significant difference as a response to initial empiric therapy between both groups. The propensity score matching analysis confirmed these findings, with no significant difference in the average treatment effect (ATE) nor the average treatment effect among treated (ATT) both for mortality and length of stay in the ICU.

**Conclusion:** The study showed no difference in ICU length of stay, 30-day mortality and other clinical outcomes in adult patients admitted to the ICU with sepsis and empirically treated with either piperacillin/tazobactam or meropenem. These findings support the use of carbapenem sparing agent, such as piperacillin/tazobactam, as an initial empiric antibiotic therapy to treat sepsis in ICU and avoid meropenem overuse. However, there is a definite need for a prospective, multicenter design study comparing the empirical use of piperacillin/tazobactam and meropenem in sepsis that could provide more definitive evidence.

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**Session-Board # - 4-103**

**Poster Title:** Medication use evaluation and pharmacist intervention impact on Polymyxin B dosing for multidrug resistant gram-negative bacteria in a secondary care hospital

**Poster Type:** Descriptive Report

**Submission Category:** Infectious Disease/HIV

**Primary Author:** Zaritza Cajigas, Comprehensive Pharmacy Services- University of Puerto Rico Hospital; **Email:** zaritza.cajigas@cpspharm.com

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**Purpose:** Polymyxins have been on the market for many years, but little is known about their pharmacokinetics and pharmacodynamics (PK/PD) and appropriate dosing for multidrug resistant (MDR) Gram-negative bacteria beyond the manufacturer recommendations (Kalil 2016; Kassamali 2015; Sandri 2013). The purpose of this medication use evaluation (MUE) was to assess the use of polymyxin B and to develop and implement recommendations in a secondary care hospital.

**Methods:** A retrospective MUE was conducted for all patients prescribed polymyxin B between January 2018 and July 2018. Data was collected from electronic medical records and analyzed with descriptive statistics. For each polymyxin B order, the following data were recorded: indication for use, isolated pathogens, polymyxin B total daily dose, duration of therapy, concomitant nephrotoxic medications, length of stay, and development of acute kidney injury. After completion of the MUE, the onsite clinical pharmacist performed interventions for polymyxin B orders received between August 2018 and April 2019. For the pharmacist intervention group post-MUE, the same data was collected from medical records and average daily dose was compared to the pre-intervention MUE average daily dose. Dosing of 25,000 units/kg/day divided every 12 hours was used for recommendations and as reference to assess dose appropriateness. (Sandri 2013)

**Results:** Twenty-four patients were included in the MUE (pre-intervention group). All patients received polymyxin B for the treatment of systemic MDR Gram-negative infections. All patients reported positive cultures for MDR Gram-negative bacteria including: *Acinetobacter baumannii*

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(45.7%), *Klebsiella pneumoniae* (42.9%) and *Pseudomonas aeruginosa* (11.4%). Patients received either 250,000 units (8.3%), 500,000 units (45.8%) or 1,000,000 units (45.8%) per day as a 24hour continuous infusion. All patients were sub-therapeutic based on units per kilogram of total body weight. Of the 24 evaluated patients, approximately one-half (13; 54.2%) were discharged home. After the MUE and during the period of August 2018 to April 2019, the pharmacist intervened in a total of eight polymyxin B orders for the treatment of systemic MDR Gram-negative infections. The isolated organisms were the following: *Pseudomonas aeruginosa* (50%), *Klebsiella pneumoniae* (25%), *Acinetobacter baumannii* (16%), and *Proteus mirabilis* (8.33%). Approximately 62% of the interventions were partially accepted in terms of dosage and frequency. The average daily dose was greater in the post-MUE pharmacist intervention group: 17,931 vs 10,333 units/kg/day. This represents a 73.5 % increase in dose in the post-MUE pharmacist intervention group. Approximately 75% of the patients were discharge home in the post-MUE pharmacist intervention group.

**Conclusion:** Overall, the use of polymyxin B was appropriate in terms of indication; however, there is an opportunity to improve medication dosing based on the patient's total body weight. Clinical outcomes and PK studies demonstrate that polymyxin B total body clearance is not dependent on renal clearance; therefore, there is no PK rationale for renal dose adjustments. Based on these results and with the support of the new consensus guidelines, institutional recommendations will be developed to improve polymyxin B with the goal of optimizing clinical outcomes.

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**Session-Board # - 4-104**

**Poster Title:** Knowledge of community pharmacists about antibiotics, and their perceptions and practices regarding antimicrobial stewardship: a cross-sectional study in Lebanon

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** Antimicrobial resistance is one of the most urgent concerns worldwide, including Lebanon, due to frequent use and misuse of antibiotics. The untoward outcome of this issue is the emergence of resistant strains of bacteria, which presents a significant threat to public health. The present study was designed to determine knowledge, attitude and practice of community pharmacists in Lebanon towards antibiotics use before incorporating them in antimicrobial stewardship (AMS) program.

**Methods:** This cross-sectional study was approved by the institutional review board; and involved community pharmacists practicing in Beirut and Mount-Lebanon. Pharmacists having Bachelor of Pharmacy (BPharm) and Doctor of Pharmacy (PharmD) were considered eligible to participate in the study and completed a previously validated questionnaire. The primary endpoint was to evaluate the community pharmacists' knowledge about antibiotics. The secondary endpoints were to assess the community pharmacists' perception and practices regarding AMS program; as well as, to assess the collaboration undertaken by pharmacists with other health care professionals over the use of antibiotics. Data were analyzed using descriptive statistics and bivariate analysis (Independent Sample T-test and One-Way Anova test).

**Results:** A total of 360 community pharmacists were included in the study over a 5-month period. The response rate was 100% as all participants completed the questionnaire. We have defined statistically a maximum score of 40 and 50 for knowledge and practice respectively.

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Most of the participants have a Bachelor of Pharmacy (77.2 percent) with about 1 to 4 years of practice (38.3 percent). The majority of pharmacists had good knowledge and appropriate practice with a mean score of  $35.48 \pm 4.33$  and  $42.23 \pm 6.14$  respectively. On the other hand, half of the participants were uncertain regarding the AMS program importance at the level of the community pharmacy setting (48.9 percent), and its impact on improving patient care (49.2 percent), and decreasing resistance (48.9 percent).

**Conclusion:** Community pharmacists in Lebanon expressed good overall knowledge about antibiotics, yet major gaps still exist regarding AMS program. Therefore, more continuing education is needed to improve perception and provide better infection control while considering the burden of resistance. This study could be implemented to further detect any inappropriate perception or practice towards antimicrobials utilization, and urge the enrollment of community pharmacists in the AMS program.

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**Session-Board #** - 4-105

**Poster Title:** Improving penicillin allergy documentation and its effect on antibiotic prescribing at a community hospital

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** Penicillin allergy is the most commonly reported beta-lactam allergy. True, IgE-mediated penicillin allergies are rare with the estimated frequency of anaphylaxis being less than 0.05% in the general population. The high prevalence of reported penicillin allergies may be attributed to inaccurate allergy documentation. Beta-lactam antibiotics, including cephalosporins, are commonly avoided in patients who report a penicillin allergy, despite recent evidence demonstrating minimal cross-reactivity. The purpose of this study was to evaluate the impact of a pharmacy-driven allergy assessment on decreasing the use of non-beta-lactam alternatives and improving allergy documentation in patients with a reported penicillin allergy.

**Methods:** This single-center, IRB-approved, prospective study evaluated patients admitted to Baptist Hospital of Miami with a reported penicillin allergy between February 6, 2019 and April 30, 2019. Patients admitted with a documented penicillin allergy who met inclusion criteria were interviewed to clarify allergy history (i.e. severity, reaction) in order to improve allergy documentation and optimize antibiotic selection. Medication records and outpatient fill history were evaluated for prior tolerance of beta-lactam antibiotics. For patients with mild-to-moderate penicillin allergies and/or patients with prior tolerance of beta-lactam antibiotics (regardless of severity), treatment with a beta-lactam antibiotic was recommended to the prescriber. The primary endpoint was the number of patients with a reported penicillin allergy for whom the assessment led to treatment with a beta-lactam antibiotic. Secondary outcomes

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included cost of therapy of antibiotic recommended by pharmacist compared to the agent(s) initially selected by the prescriber, prescribing trends before and after the allergy assessment and adverse events. Descriptive statistics and percentages were analyzed and reported using Microsoft Excel.

**Results:** A total of 63 patients met inclusion criteria. Of these, 43 patients (68%) were switched from a non-beta-lactam antibiotic to a beta-lactam antibiotic with a 100% prescriber acceptance rate. Aztreonam and levofloxacin were the most commonly prescribed non-beta-lactam antibiotics prior to the allergy assessment. Prior beta-lactam use was confirmed in 57% of patients and allergy documentation was updated in 83% of patients. A potential cost savings of \$21,468 was estimated over a 3-month period.

**Conclusion:** Conducting a pharmacy-driven allergy assessment led to improved allergy documentation, increased use of beta-lactam antibiotics and associated cost savings for patients with a reported penicillin allergy.

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**Session-Board #** - 4-106

**Poster Title:** Implementation of a pharmacist driven therapeutic interchange of levofloxacin: 2 years later

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** Fluoroquinolones are broad spectrum antibiotics commonly used for the treatment of a variety of infections. With increasing use of fluoroquinolones, there has been rising rates of resistance as well as increased incidences of disabling and potentially permanent side effects. The FDA has updated boxed warnings for the fluoroquinolone class of antibiotics. Dignity Health Mercy San Juan Medical Center has implemented a therapeutic interchange policy to reduce the use of levofloxacin. The purpose of this study is to examine the efficacy of a levofloxacin therapeutic interchange policy by analyzing levofloxacin days of therapy and hospital acquired *Clostridium difficile* rates.

**Methods:** We conducted a single center retrospective chart review study of the electronic medical record to identify Mercy San Juan Medical Center hospitalized patients who were prescribed levofloxacin between September 1, 2015 and May 31, 2019. In August of 2016, the Antimicrobial Stewardship Program distributed an advisory letter to medical staff to educate prescribers on the new boxed warning and encouraged them to use safer alternatives. In February 2017, we created a badge buddy with empiric antibiotic preferences based on types of infections and local resistance patterns, these were created to minimize the use of levofloxacin. In March 2017, the levofloxacin therapeutic interchange policy was implemented. This interchange allowed the Antimicrobial Stewardship Pharmacist to change levofloxacin to therapeutic equivalent antibiotics for the following indications: community acquired pneumonia, COPD exacerbation/pneumonia, urinary tract infection/pyelonephritis, sinusitis, bronchitis, and colitis/diverticulitis. Patients included were over the age of 18 and prescribed



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levofloxacin. Excluded patients were those in the intensive care units, received one time prophylactic dose for surgery, and patients not admitted to the hospital. The primary study endpoint was an analysis of antibiotic days of therapy before and after policy implementation. Secondary study endpoint will include Clostridium difficile rates.

**Results:** From the time medical staff was educated in August 2016 until May 2019, there has been a significant decline in levofloxacin days of therapy at Mercy San Juan Medical Center. Prior to any intervention, the mean levofloxacin days of therapy per 1000 patient days was 108 and decreased to 10 after the implementation of the interchange policy. Initially, the decrease was modest but continued to decline over the study period, and for the last 12 months had a maximum days of therapy of 4.87 and minimum of 1.74. For the last 12 months, the mean days of therapy was 3.27, a 97% reduction. As a secondary endpoint, we analyzed hospital acquired Clostridium difficile associated diarrhea rates. There was a mean of 8.6 CDAD infections per 10,000 patient days pre-implementation and 5.8 CDAD infections per 10,000 patient days post-implementation.

**Conclusion:** Levofloxacin therapeutic interchange policy significantly decreased the use of levofloxacin and reduced hospital acquired Clostridium difficile rates. One of the benefits of this policy is that it educated prescribers as shown by a decrease in inappropriate levofloxacin orders; it is commonly ordered when penicillin allergies are listed. Penicillin allergies has been the biggest limitation of this policy given that most allergies listed in the patient record are not true allergies or not concerning for cross reactivity with ceftriaxone usage. Overall, this therapeutic interchange policy has been successful in limiting the usage of levofloxacin.

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**Session-Board # - 4-107**

**Poster Title:** Nephrotoxicity associated with intravenous vancomycin and extended-infusion piperacillin/tazobactam

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** Intermittent piperacillin-tazobactam has been extensively used in conjunction with intravenous vancomycin to ensure adequate coverage of pathogens. However, this combination has been associated with acute kidney injury (AKI). Recently, Extended-infusion (EI) piperacillin/tazobactam has been adopted at many institutions to optimize its pharmacokinetic and pharmacodynamic properties. Nephrotoxicity associated with EI is not well documented and current literature has been predominately retrospective reviews. The purpose of this study was to evaluate the incidence of AKI with combination of intravenous vancomycin and EI piperacillin/tazobactam.

**Methods:** The institutional review board approved this single-center prospective chart review. Patients who received concomitant intravenous vancomycin and EI piperacillin/tazobactam during their hospitalization were identified through a monitoring queue in the electronic health record. They were screened and excluded if less than three doses of either antimicrobial were administered concomitantly, the patient had end-stage renal disease, or was receiving renal replacement therapy at time of initiation of therapy. The primary outcome was the incidence of AKI in patients treated with the study therapy. AKI was defined by the Kidney Disease Improving Global Outcomes definition of the Risk, Injury, Failure, Loss, End-Stage (RIFLE) and Acute Kidney Injury Network (AKIN) criteria. Secondary outcomes included the number of patients who needed dose adjustment due to decline in renal function, number of recommendations made

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by pharmacy for dose adjustment and percentage of recommendations accepted, onset of AKI following administration and incidence of AKI resolution after discontinuation of study therapy.

**Results:** A total of 17 patients were identified from February and March of 2019. In patients treated with concomitant intravenous vancomycin and EI piperacillin/tazobactam, AKI occurred in 1 of 17 patients (6%). Dose adjustments due to decline in renal function were required in 3 patients (17.6%) and 7 of 11 (63.6%) recommendations for renal dose adjustment were accepted. Onset of AKI following administration was 1 day and the AKI resolved after discontinuation of therapy.

**Conclusion:** Many previous retrospective studies showed similar rates of AKI in patients treated with concomitant intravenous vancomycin and EI piperacillin/tazobactam compared with intermittent piperacillin/tazobactam. In addition, this review demonstrated low incidence of AKI with the use of combination intravenous vancomycin and EI piperacillin/tazobactam. This review provides prospective analysis in evaluating AKI in patients treated with the EI dosing strategy.

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**Session-Board #** - 4-108

**Poster Title:** Developing and revising guidelines to improve antimicrobial prophylaxis in surgery

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

**Primary Author:** Ha Jin Chun, Ajou University Hospital; **Email:** hjchun0822@naver.com

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**Purpose:** Surgical-site infection is a major cause of nosocomial infections, and the appropriate selection of surgical prophylactic antibiotics can reduce surgical-site infection, drug adverse reaction, antimicrobial resistance development, and cost. Antimicrobial stewardship programs promote the appropriate use of antimicrobials.

Our antimicrobial stewardship program team developed “The guidelines for antimicrobial prophylaxis in surgery” in 2014 and revised it in 2018.

We aimed to evaluate changes in the rate of appropriate antibiotic use by implementing the guidelines as part of the antimicrobial stewardship program.

**Methods:** Our multidisciplinary team, consisting of an infectious disease specialist and pharmacists, that executes antimicrobial stewardship programs selected the surgeries to be included in the guidelines, explored evidence through literature review, developed the guidelines, and obtained feedbacks from the prescribing departments.

We evaluated the use of prophylactic antibiotics for surgery based on the new guidelines and recommended to change inappropriate antibiotic use. New clinical pathways were reviewed based on the guidelines. The guidelines were disseminated via databases and booklets.

The guidelines were revised by adding the following surgeries via the same process: hernia repair and clean-contaminated head and neck surgery.

The rate of appropriate use and change in prophylactic antibiotic use for surgery at 6 months before and after the development (in 2014) and revision (in 2018) of guidelines were evaluated.

**Results:** Fifteen surgeries (clean/clean-contaminated procedure) were initially included in the guidelines, and two surgeries were added later.

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The appropriate use rate of surgical prophylactic antibiotics was 1.6%–100% (mean  $\pm$  SD = 77.2  $\pm$  31.8%) before the development of guidelines and 79.7%–100% (93.8  $\pm$  7.0%) after the development, with a mean increase of 16.5%.

The mean appropriate antibiotic use rate after the revision was 92.6% (62.6%–100%, SD = 11.2%), a drop by 1.1% ( $p \geq 0.05$ ) from that before the revision.

The antibiotic use rate for the newly included surgeries, namely hernia repair and clean-contaminated head and neck surgery was 0.6% and 28.4%, but increased to 81.4% and 65.9% after the revision, respectively.

**Conclusion:** The strategy of developing institutional guidelines, collecting feedback from prescribers, reporting to the committee and recommending changes can promote the appropriate use of antimicrobial prophylactic antibiotics for surgery, which can reduce antimicrobial resistance and enhance safety.

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**Session-Board #** - 4-109

**Poster Title:** Impact of modifying prescriber Clostridioides difficile (C. difficile) test ordering practices on C. difficile infection rates

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** A community hospital identified a larger than anticipated increase in hospital-acquired Clostridioides difficile infections (CDI) after changing testing methods from glutamate dehydrogenase plus toxin A and B enzyme immunoassays to polymerase chain reaction (PCR). Infection Prevention and Antimicrobial Stewardship Committees determined that there was an opportunity to improve which patients were tested for Clostridioides difficile (C. difficile) to avoid unnecessary testing and ensure treatment of active infection instead of colonization. The purpose of this project was to determine if changing how prescribers ordered C. difficile tests impacted the number of hospital-acquired CDIs.

**Methods:** Three interventions were performed to improve prescriber ordering of C. difficile tests. Prescribers were no longer allowed to provide a verbal order for a C. difficile test. The C. difficile PCR test was required to be ordered by the prescriber in the electronic medical record (EMR). No repeat testing of C. difficile within seven days was permitted, and if ordering was attempted, an educational pop-up message alerted the prescriber with an explanation about unnecessary testing. EMR clinical decision support within the laboratory ordering module for C. difficile was built to guide the prescriber to appropriately assess the patient and need for CDI testing. To determine the impact of the interventions on CDIs, all hospital-acquired CDIs were retrospectively reviewed for each month one year prior to interventions (May 2017 through April 2018) and one year post interventions (May 2018 through April 2019). Hospital-acquired CDI was defined by the Centers for Disease Control and Prevention's National Healthcare Safety

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Network. No patients with hospital-acquired CDI were excluded from review. Statistical analysis for the change in the number of hospital-acquired CDIs was evaluated through a paired t test. Data are expressed as means with 95 percent confidence intervals.

**Results:** The total number of hospital-acquired CDIs in both intervention periods was 101 with 67 prior to intervention and 34 after intervention. The mean hospital-acquired CDIs for each month decreased from 5.58 pre-intervention to 2.83 post-intervention (95 percent CI, 1.47 to 4.03, P less than 0.001).

**Conclusion:** Implementation of prescriber ordering changes for C. difficile tests led to a decrease in hospital-acquired CDIs.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-110**

**Poster Title:** Fighting resistance needs your assistance: teaching pharmacists how to apply antimicrobial stewardship principles in primary care and community practice

**Poster Type:** Descriptive Report

**Submission Category:** Infectious Disease/HIV

**Primary Author:** Shelita Dattani, Canadian Pharmacists Association; **Email:** sdattani@pharmacists.ca

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**Purpose:** Antimicrobial resistance (AMR) is a global public health crisis. Inappropriate antibiotic use is the most common cause. Pharmacists have made strides as antimicrobial stewards in acute care. However, 90% of antibiotics are prescribed in primary care and up to 50% are inappropriate. Demystifying the role of pharmacists as antimicrobial stewards in primary care was identified as a need to increase awareness and impact of pharmacists as the “quarterbacks” of antimicrobial stewardship (AMS) in primary care. This national webinar was developed using case based learning to teach pharmacists how to apply AMS principles and identify opportunities in primary care.

**Methods:** The webinar was developed and delivered by pharmacist subject matter experts interested in bridging gaps in knowledge regarding the role of pharmacists as antimicrobial stewards in primary care. It consisted of a case-based overview focusing on four domains – education, health promotion and prevention, appropriate independent prescribing and collaboration with prescribers. Several practice tools were reviewed including the role of viral prescription pads, delayed prescribing strategies and use of evidence based shorter courses of therapy for uncomplicated community-acquired infectious diseases. Strategies to leverage pharmacist scope of practice to optimize antimicrobial drug regimens were also reviewed. The pharmacists were asked different knowledge questions at different time periods during the hour. At the end of the webinar, pharmacists were asked (on a scale of 1-5) whether the knowledge gained from the session would allow them to improve care for at least one patient in their practice environments. Pharmacists also rated the webinar on a satisfaction scale of 1-5 and were asked to provide detailed feedback on their learnings.



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**Results:** In total, 293 pharmacists registered for the webinar, 178 attended and 112 responded to the evaluation. The average score of whether pharmacists felt that they were able to improve the care of at least one patient was 4.48 out of a possible 5. The average overall satisfaction score was 4.49 out of a possible 5. Among the learnings that pharmacists reflected on the most were delayed prescribing, use of viral prescription pads, leveraging scopes of practice such as prescribing for minor ailments (e.g. uncomplicated urinary tract infection) or amending antimicrobial drug regimens to optimize duration of therapy. Pharmacists indicated that the webinar was extremely useful. They felt that it filled gaps by clearly identifying evidence-based stewardship strategies in primary care and how pharmacists could apply those using their knowledge, skills and expanded scopes of practice. The pharmacists felt that the webinar filled gaps in learning by creating an awareness of resources of which many were not aware and they were enthusiastic about the opportunity to access future additional tools to support care in this area.

**Conclusion:** AMS is a team sport. Pharmacists have the potential to be leaders in this space, particularly in primary care where the majority of antibiotics are prescribed. This national webinar was the first in a series of tools being developed as part of a pharmacist toolbox of resources for AMS in primary care. This first tool accomplished its objectives in creating awareness of specific tools and strategies to be used by pharmacists to make an impact in patient care. As additional tools are developed, we look forward to further evaluating their impact on the care that pharmacists provide.

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**Session-Board # - 4-111**

**Poster Title:** Impact of reflex fosfomycin E-testing on the utilization of carbapenems for definitive extended spectrum beta-lactamase Escherichia coli urinary tract infection treatment

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

**Primary Author:** Kevin Deemer, Baycare Health System - Mease Countryside Hospital; **Email:** Kdeemer@outlook.com

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**Purpose:** Urinary tract infections (UTI) caused by Enterobacteriaceae commonly possess Extended Spectrum Beta Lactamases (ESBL) which are typically treated with carbapenem agents (meropenem or ertapenem). Due to the mounting evidence and concern for resistance to these broad spectrum, last-line agents, a new Baycare protocol will automatically including fosfomycin E-testing when a urine isolate is positive for ESBL E. coli (this species accounts for about 70% of all cystitis and is highly susceptible to fosfomycin irrespective of ESBL production).

**Methods:** This retrospective, IRB-approved, cohort study assessed the impact of the stewardship policy in reducing carbapenem usage for ESBL E. coli UTI without pyelonephritis or bacteremia through several endpoints. Two groups were compared, 80 patients collected pre- and post-implementation of the fosfomycin reflex policy. The inclusion criteria were: age > 18, ESBL positive E coli cystitis treated with at least one dose of definitive therapy, and inpatient admission to one of the four study hospitals within a large Florida health system. Patients were excluded if he/she had pyelonephritis, perinephric abscess, bacteremia/sepsis, carbapenem use for non-UTI indication, allergy to carbapenem or fosfomycin, or if the isolate was not tested for fosfomycin in the post-implementation group. The primary outcome was proportion of patients who received any definitive carbapenem therapy. Key secondary outcomes included median total carbapenem days of therapy (DOT), discharge on IV UTI antibiotics, and median total antibiotic DOT.

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**Results:** Pre-protocol vs post-protocol carbapenem utilization was seen in 59/80 patients (73.8%) and 71/99 patients (71.7%), respectively (95% CI for difference -11.1% to 15.1%,  $p=0.76$ ). Rates of stepdown in those receiving carbapenems pre- and post-intervention were 15/59 (25.4%) and 35/71 (49.3%) ( $p=0.004$ ). Median carbapenem DOT in those receiving carbapenems decreased from 8 days to 4 days (95% CI [-5 to -1 days],  $p=0.001$ ). Median total DOT decreased from 10 days to 8 days (95% CI [-3 to -1 days], ( $p=0.002$ ). Patients discharged on IV UTI antibiotic therapy decreased from 32/80 (40%) to 23/99 (23.2%) ( $p=0.016$ ). Median wholesale cost of total UTI antibiotic therapy (US Dollars) was insignificantly decreased (291 pre-protocol vs. 244 post-protocol, 95% CI: -124 to 21).

**Conclusion:** Implementation of a laboratory policy to automatically E-test ESBL positive E coli for fosfomycin did not reduce the percentage of patients receiving at least one dose of carbapenem treatment. It did, however, result in a larger percentage of stepdown prior to discharge (mostly to fosfomycin); reduction in discharge on intravenous antibiotics for UTI; reduction in carbapenem DOT; and reduction in total antibiotic DOT. Further studies are needed to assess the impact of this protocol on clinical resolution of UTI series; rates of carbapenem-resistant Enterobacteriaceae and/or ESBL isolates; and total cost impact (drug cost plus administration and other downstream estimations).

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-112**

**Poster Title:** Impact of an ertapenem restriction program in a community hospital

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

**Primary Author:** Julie Downen, Memorial Medical Center; **Email:** downen.julie@mhsil.com

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**Purpose:** Ertapenem was used throughout the organization for indications such as surgical prophylaxis, urinary tract infections, pneumonia, and sepsis. The antimicrobial stewardship team chose to focus on ensuring appropriate use of ertapenem due to its broad spectrum of activity and potential for emergence of resistance. A baseline medication use evaluation (MUE) for ertapenem identified opportunity for alternative therapy in roughly 75% of patients.

**Methods:** This was a single center, retrospective study comparing antibiotic utilization before (Oct 17-Aug 18) and after (Oct 18-Mar 19) implementation of an ertapenem restriction program. A baseline medication use evaluation (MUE) and review of current published treatment guidelines were utilized to develop criteria for ertapenem use. The MUE results were reported to the hospital's stewardship team as well as the city-wide infectious disease group. The ertapenem restriction criteria was approved by the Pharmacy and Therapeutics Committee and included empiric therapy for patients with a history of infection or colonization with a multidrug-resistant organism, active infection with an extended-spectrum beta-lactamase producing organism, and a one-time dose prior to discharge for planned outpatient infusion therapy. Alternative therapies were provided for patients prescribed ertapenem for indications outside of the restriction criteria. Ertapenem culture and sensitivities were also removed from the antibiogram and suppressed on microbiology reports if the organism is susceptible to ceftriaxone. Prescriber education regarding the restriction criteria was conducted prior to the implementation. To determine the impact of the intervention, utilization was assessed before and after implementation for ertapenem, meropenem, and ceftriaxone. Utilization was assessed via days of therapy per 1000 patient days (DOT/1000 PD)

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and cost per patient day (cost/PD). Compliance with restriction criteria is monitored monthly with random audits.

**Results:** A decrease in mean DOT/1000 PD was experienced post-implementation of the ertapenem restriction criteria (8.8+2.4 vs. 20.2+3.7). Additionally, a reduction in mean cost/PD was observed (\$0.66/PD vs. \$1.87/PD) resulting in a \$95,000 cost savings in the first six months of implementation. No difference was experienced in DOT/1000 PD of ceftriaxone (82.8+10.6 vs. 79.9+7.6) and a slight reduction in meropenem was observed (17.8+5.3 vs. 21.4+6.6). To date, all audited ertapenem orders have been compliant with the restriction criteria.

**Conclusion:** Implementation of an ertapenem restriction program was effective in decreasing utilization and expenditure without resulting an increase in ceftriaxone or meropenem.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-113

**Poster Title:** Development and interim analysis of a cystic fibrosis-specific antibiogram

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** Antibiotic therapy is essential for the treatment of cystic fibrosis (CF) lung infections. However, CF-specific airway pathophysiology and frequent antimicrobial exposure increase the risk of developing resistant infections. Antibiotic selection is generally based on previous culture information, if available, or institution-specific antibiograms. Most institutional antibiograms, including Children's Mercy Kansas City (CMKC) exclude CF patient cultures. Hence, it can be a challenge to assess the appropriateness of empiric antibiotic selection and changes in susceptibility patterns. We report three-year data from a planned 10-year CF-specific antibiogram implemented at CMKC in 2016.

**Methods:** CF patient culture data collection started in 2016 and will continue until 2026. All CF patient cultures, sputum or throat swab, obtained at CMKC will be included in the CF antibiogram. Patients were identified via a microbiology report and the following data were collected for 2016-2018: demographics, microorganism isolates, and susceptibility information. Susceptibility information was reported for methicillin-susceptible *Staphylococcus aureus* (MSSA), methicillin-resistant *Staphylococcus aureus* (MRSA), *Pseudomonas aeruginosa* (PA), *Achromobacter*, *Stenotrophomonas maltophilia*, and *Burkholderia* species.

**Results:** Comparing the 2016-2018 CF antibiogram to the hospital antibiogram, gram-positive and gram-negative microorganisms tested were less susceptible. CF isolates from sputum cultures were less susceptible than those from throat swabs. Both MSSA and MRSA had significantly lower susceptibility for clindamycin compared to hospital-wide rates (MSSA 70% vs

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81%, MRSA 39% vs 84%,  $p < 0.0001$ ). MSSA and MRSA susceptibility rates for other antimicrobials tested in the CF antibiogram were similar to the hospital antibiogram. Over the three-year period, the hospital-wide prevalence of MRSA was higher than among the CF population (32-34% vs 27-28%). The most common gram-negative isolate for CF cultures was PA. For every antimicrobial tested, including aminoglycosides, PA isolates from CF patients were less susceptible than hospital-wide PA isolates. Over the three-year period, there did not appear to be any significant changes in susceptibility pattern for CF microorganisms tested.

**Conclusion:** The CF-specific antibiogram demonstrated significantly increased rates of clindamycin resistance for MRSA and MSSA isolates and more resistant PA isolates among CF patients. This has important clinical implications for empiric antimicrobial selection and will allow monitoring of resistance trends over time.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-114**

**Poster Title:** Enterobacteriaceae bloodstream infections and comparative efficacy of oral step-down antimicrobial therapy

**Poster Type:** Descriptive Report

**Submission Category:** Infectious Disease/HIV

**Primary Author:** Spencer Evans, CHI CUMC- Bergen Mercy; **Email:** spencer.evans@alegent.org

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**Purpose:** Step-down from intravenous to oral antimicrobial therapy in Enterobacteriaceae bloodstream infections can reduce costs, length of stay, and complications from intravenous therapy. This study was designed to assess the efficacy of various oral antibiotic step-down regimens in hospitalized patients with Enterobacteriaceae bloodstream infections from a confirmed urinary source. Secondly, this study also aimed to assess unwanted adverse effects from antimicrobial therapy such as Clostridioides difficile infections and development of antibiotic resistance.

**Methods:** This study was a retrospective electronic medical record review approved by the Institutional Review Board. Hospitalized patients 19 years and older from October 1, 2017 through September 30, 2018 were assessed for inclusion with a laboratory report of blood and urine cultures positive for the same Enterobacteriaceae species or a positive blood culture with an Enterobacteriaceae species plus confirmed diagnosis of pyelonephritis (fever/flank pain or radiographic imaging). In addition, transition from intravenous to oral antibiotics was required for inclusion. Patients were excluded if any of the following applied: polymicrobial infection(s), neutropenia, isolation of extended spectrum beta-lactamase producing organisms, or pregnancy. Data collection included patient demographics, comorbidities, culture and susceptibility data, antibiotic allergies, therapy administered, planned duration, hospital length of stay, and intensive care unit length of stay. This study evaluated outcomes in three patient groups based on oral antimicrobial regimen prescribed (fluoroquinolone, beta-lactam, or other). The primary outcome was identification of treatment failure, which was defined as



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repeated healthcare encounter(s) within 30 days of discharge with bacteremia of the same species. Secondary outcomes assessed were development of *Clostridioides difficile* infection and/or development of antimicrobial resistance.

**Results:** A total of 129 patients met inclusion criteria for our study. Fluoroquinolones were prescribed most frequently (n=76), followed by beta lactams (n=48) and other oral antibiotics which included doxycycline and sulfamethoxazole/trimethoprim (n=5). CT confirmed pyelonephritis was seen in 14 % of patients while 13.2% exhibited documented urinary obstruction. *Escherichia coli* was the primary pathogen isolated (76%) followed by *Klebsiella pneumoniae* (12%). Mean oral antibiotic length of therapy was  $10.5 \pm 4.3$  days while average IV therapy duration was  $3.8 \pm 2.3$  days. Total average length of antibiotic therapy was  $14.2 \pm 4.7$  days. There were no differences between the three groups in regards to duration of therapy. The primary outcome of treatment failure was identified in two patients (fluoroquinolone, n=1; beta lactam, n=1; other, n=0). Differences in treatment failure were not significant among the three oral antibiotic groups ( $p = 0.876$ ). Secondary outcomes assessed included one (20%) *Clostridioides difficile* infection in the other group versus none in the fluoroquinolone and beta lactam groups ( $p = 0.035$ ). In addition, development of a resistant pathogen was identified in 8 patients (fluoroquinolone, n=5; beta lactam, n=3; other, n=0), however this was not statistically significant ( $p = 0.719$ ).

**Conclusion:** This study supports similar efficacy of oral beta lactam and fluoroquinolone regimens for step-down therapy in Enterobacteriaceae bacteremias from a urinary source. While the development of resistant organisms and *Clostridioides difficile* infection were similar among these two groups, the patient population and outcome rates were small. Future large scale studies are required to confirm the appropriateness of fluoroquinolone sparing oral step-down regimens for Enterobacteriaceae bloodstream infections from a urinary source.

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**Session-Board #** - 4-115

**Poster Title:** Pharmacist roll in detection, control and prevention of arboviruses

**Poster Type:**

**Submission Category:** Infectious Disease/HIV

**Primary Author:** Christina Fernandez-Barrantes, San Juan de Dios Hospital; **Email:** cristifdez@gmail.com

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**Purpose:** Diseases produced by the arbovirus infections are a serious global public health problem, their surveillance and prevention not only imply the control of the viral disease but also the surveillance of the vectors. Latin America is facing an epidemic of dengue, zika, chikungunya, viral infections transmitted by Aedes mosquito, mainly Aedes aegypti. The geographical location of Latin America, the commercial exchange, tourism and migrations as well as the presence of mosquitoes highly adaptable as vectors, makes the emergence and reemergence of these diseases inevitable.

To mitigate the burden these diseases have on public health, daily actions must be taken in every community. This is why community pharmacist is encouraged to stay updated regarding this subject and to promote and develop the necessary strategies which will result in an improvement in the detection, management, prevention and control of dengue, zika, chikungunya and other arbovirus infections in the region.

Pharmacist have the following scope of action:

To orient the population about the prevention and control of these diseases.

To identify suspicious signs and symptoms and refer people to the health services for a diagnostic

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evaluation.

To indicate, when relevant, proper therapies for the relief of signs and symptoms (over the counter medication).

To monitor the patients under treatment and with a diagnosis to see if they archive therapeutic goals.

To archive these objectives, the governments of the region through their ministries of health or the

specific initiatives from the professional pharmacy organizations, have developed information campaigns with educational materials ready to be reproduced, which can be used in the community pharmacies.

Pharmacists contribute to improve public health by informing and educating the population about

necessary and current health issues such as those with arbovirus infections.

**Methods:**

**Results:**

**Conclusion:**

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**Session-Board # - 4-116**

**Poster Title:** Assessment of the pharmacodynamic profile of a novel  $\beta$ -lactam- $\beta$ -lactamase combination, cefepime-enmetazobactam (formerly AAI-101), in comparison with piperacillin-tazobactam against several Gram-negative pathogens

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

**Primary Author:** Amelia Furbish, Medical University of South Carolina; **Email:** furbish@musc.edu

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**Purpose:** Cefepime-enmetazobactam (FPE) is a novel  $\beta$ -lactam- $\beta$ -lactamase inhibitor combination in phase III trials for the treatment of complicated urinary tract infections caused by Gram-negative pathogens. Novel combination  $\beta$ -lactam- $\beta$ -lactamase inhibitors such as FPE are currently being developed to combat increasing resistance patterns observed in a variety of clinically challenging Gram-negative infections. The following Monte-Carlo analysis was conducted in order to simulate the efficacy of FPE against a selection of Enterobacteriaceae clinical isolates. FPE was compared to piperacillin-tazobactam (TZP), one of the most commonly prescribed empiric regimens for serious Gram-negative infections including bacteremia and sepsis.

**Methods:** MIC values were collected for three different subsets of Enterobacteriaceae including wild-type Enterobacteriaceae (WTE), carbapenem-resistant Enterobacteriaceae (CRE), and Enterobacteriaceae expressing non- $\beta$ -lactamase resistance mechanisms (ENBL). Pharmacokinetic (PK) variables included two different volumes of distribution, representing a population of healthy volunteers and septic patients, and four different weights (60, 70, 80, and 90 kg). Drug clearance (Cl) was calculated from a CrCl vs. Cl regression equation using CrCl distributions from our institution. Protein binding was estimated for each drug using the average of reported estimates in the literature. Pharmacodynamic (PD) targets, expressed as the percent of time the free plasma concentration of drug remains above the MIC (% ft > MIC), were chosen based on parameters required to achieve bacterial stasis (no net killing or growth) and near maximal bactericidal killing (2-logs killing). PD targets were specific for cephalosporins

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(40% fT > MIC and 70% fT > MIC) and for penicillin antibiotics (30% fT > MIC and 60% fT > MIC) in Gram negative organisms. Dosing regimens were chosen based on TZP dosing regimens used clinically for the treatment of sepsis and FPE phase III clinical trial dosing, which closely mirrors cefepime dosing regimens used clinically for the treatment of sepsis. Monte-Carlo analysis (n=10,000) was used to determine percent target attainment (%TA), representing the percent of simulated patients achieving selected PD parameters.

**Results:** FPE achieved 99% TA and 100% TA for the high PD target and the low PD target, respectively, across all PK parameters and body weights for WTE and ENBL. In comparison, TZP achieved 86% TA across all parameters for both the low PD and high PD targets against WTE. TZP attained lower %TA against ENBL achieving 65% TA for the low target and a range of 62-64% TA for the high target. The most significant difference in %TA was seen in regard to CRE, with FPE achieving 96-98% TA for the low PD target and 80-88% TA for the high PD target compared to TZP, which achieved only 4% TA across all parameters. Although slight differences in %TA were seen with variations in body weight and volume, these differences were not substantial (less than 8% change in %TA across all organisms). As a general trend, higher volumes and higher weights were correlated with slightly higher %TA. This is likely due to increased drug half-lives in patients with higher volumes of distribution, which can serve to prolong the time above the minimum inhibitory concentration.

**Conclusion:** FPE showed superior results to TZP against all organisms studied, a result that was particularly apparent in the subset of CRE and ENBL isolates. However, it is important to note that TZP maintained relatively high target attainment in the WTE subset. Given the increasing prevalence of resistant pathogens in clinical practice, it is reasonable to conclude that FPE would be a promising antimicrobial combination in the treatment of serious Enterobacteriaceae infections, especially in isolates demonstrating antimicrobial resistance and as empiric therapy in patients with life-threatening infections such as sepsis and septic shock.

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**Session-Board # - 4-117**

**Poster Title:** Appropriateness of empiric antibiotics for Pseudomonas aeruginosa bacteremia

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

**Primary Author:** Nathan Gartland, University of Pittsburgh Medical Center, Mercy; **Email:** gartlandn@duq.edu

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**Purpose:** Appropriate utilization of empiric antibiotic therapy is crucial to effective management of Pseudomonas aeruginosa bacteremia (PAB). Pseudomonas is one of the most common nosocomial gram-negative bacilli presumed when attempting to discern infectious etiology. Swift utilization of appropriate broad-spectrum antibiotics is associated with decreased mortality and decreased recurrence of infection. Our study aimed to review the appropriateness of empiric antibiotics for PAB in order to guide future antimicrobial stewardship guidelines at our institution.

**Methods:** Retrospective chart review of all patients >18 years of age who were admitted to a single academic community hospital from 2015 to 2018 who had PAB throughout their hospitalization. The primary endpoint was the appropriateness of empiric antibiotic therapy, defined as receiving active therapy prior to the return of antimicrobial sensitivities that were susceptible to the empiric agents used. Additionally, patient demographics, length of stay, vasopressor requirement, and mortality data was collected.

**Results:** We identified 69 patients with PAB. The most common sources of infection included primary bacteremia/line infection (33.3%), urinary (29%) and intra-abdominal (17.4%). Based on the susceptibility reports, the most active agents were aminoglycosides (92.8% for gentamicin ; 97.1% for tobramycin) and cefepime (92.8%). Fifty nine out of 69 (85.5%) of patients received empiric therapy that tested susceptible. Among the non-susceptible isolates, four (5.8% of the total) were intermediate, five (7.2%) were resistant, and 1.4% were not tested. Piperacillin/tazobactam was the most common inappropriate empiric choice (55.5%)

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followed by meropenem (33.3%) and cefepime (11.1%). Overall mortality in our study was 15/69 (21.7%) with 14/15 (93.3%) patients receiving appropriate empiric therapy.

**Conclusion:** The results of this study demonstrate that across our patient population, 85.5% of patients received appropriate empiric antibiotics for PAB. increased risk of mortality was not demonstrated in our study, although studies have shown that delays in appropriate therapy are associated with increased mortality. Interestingly, the majority of mortalities occurred in patients receiving an antibiotic the isolate was susceptible to. This may be explained by the possibility for inappropriate dosing, which we did not investigate. We also conclude that in our institution, piperacillin/tazobactam may not be the preferred agent for empiric use when there is concern for pseudomonas bacteremia.

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**Session-Board # - 4-118**

**Poster Title:** Implementation of penicillin allergy testing in a community hospital as an antimicrobial stewardship intervention

**Poster Type:** Descriptive Report

**Submission Category:** Infectious Disease/HIV

**Primary Author:** Heather Gibson, FirstHealth of the Carolinas Moore Regional Hospital; **Email:** hdgibson@firsthealth.org

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**Purpose:** Penicillin allergies are reported by 10-15% of patients, making it the most commonly reported drug allergy in the United States. Most allergies are self-reported and unconfirmed by a medical professional. True penicillin allergies are rare. Compared to penicillin non-allergic patients, those reporting a penicillin allergy have increased exposure to broad-spectrum antibiotics and higher rates of multidrug resistant infections. Selecting an alternative antibiotic may also provide less effective treatment for specific infections and increase antibiotic resistance. Penicillin allergy skin testing (PST) can be used to rule out true penicillin allergies and allow those deemed non-allergic to be treated with penicillin antibiotics.

**Methods:** Penicillin allergy skin testing (PST) was implemented at FirstHealth of the Carolinas Moore Regional Hospital in May 2017 as an antimicrobial stewardship initiative. Moore Regional Hospital is a 400-bed acute care, not-for-profit community hospital in Pinehurst, NC. A PST protocol and order set were created and incorporated into the hospital's electronic medical record system. Infection control nursing staff and clinical pharmacists received both online and live training prior to implementation. PST can be ordered by any prescribing practitioner at FirstHealth. After an order is placed and prior to testing, the antimicrobial stewardship (AMS) pharmacist must review the patient's profile and interview the patient to ensure eligibility. The patient must provide verbal consent. When eligibility is confirmed, a testing kit is prepared by the inpatient pharmacy. Testing is performed by a trained infection control nurse and the AMS pharmacist and is completed in a two-step process: a skin prick test followed by an intradermal test. If the patient tests negative, they are deemed to be penicillin non-allergic. Physicians



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have the ability to order an optional oral challenge or can transition to an intravenous (IV) penicillin product. The AMS pharmacist updates the patient's allergy information and provides the patient with a test result card.

**Results:** Between May 2017 and June 2019, 13 penicillin allergy tests were performed. Eleven tests were performed on patients currently receiving antibiotic therapy and two tests were performed during the training process. All 13 patients tested were deemed to be penicillin non-allergic. Of the 11 patients receiving current antibiotic therapy, 10 had changes made to their antibiotic regimens based on PST results. Four of 10 patients were changed to a first-line antibiotic regimen, four of 10 were changed to a more narrow antibiotic therapy, and the remaining two of 10 were transitioned to oral therapy from IV therapy.

**Conclusion:** Penicillin allergy skin testing is an effective tool for confirmation of penicillin allergies. All patients who received PST at FirstHealth were confirmed to be penicillin non-allergic. Ten of 11 PST patients currently on antibiotic therapy were transitioned to more targeted antibiotic regimens. Therefore, PST is an effective antimicrobial stewardship tool that can help reduce inappropriate antibiotic use, decrease antibiotic resistance, and provide the most efficacious treatment for specific disease states.

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**Session-Board # - 4-119**

**Poster Title:** Analysis of vancomycin loading doses before and after order set implementation in a community teaching hospital

**Poster Type:** Descriptive Report

**Submission Category:** Infectious Disease/HIV

**Primary Author:** Olga Ginsberg, Saint Peter's University Hospital; **Email:** oginsberg@saintpetersuh.com

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**Purpose:** Appropriate vancomycin dosing is critical to achieve successful antimicrobial treatment. The Infectious Disease Society of America recommends that vancomycin dosing be actual weight based, even in the obese population. Because of vancomycin's relatively long half-life, loading doses of 20 to 30 mg per kg (maximum 2000 mg) are recommended in order to achieve effective therapeutic concentrations quickly. To facilitate this approach our facility implemented an order set and counseled prescribers on the importance of weight based dosing. An analysis was conducted comparing vancomycin loading doses before and after implementation of the order set and physician education.

**Methods:** A vancomycin order set was implemented in June of 2018 to facilitate adult weight based dosing, including initial loading doses of 20 to 30 mg per kg. The emergency department pharmacists promoted the use of this order set, assisted with order entry, and advised prescribers on the importance of appropriate weight based dosing in achieving therapeutic vancomycin serum concentrations. Vancomycin utilization reports were produced from the pharmacy computer system for June, July, and August of 2017 and 2018. Initial orders with a frequency of 'once' were analyzed. The following data were collected: dose, patient weight, serum creatinine at baseline, 24 hours, 48 hours, and 72 hours. It was then determined if the dose ordered was 20 to 30 mg per kg, 15 to 20 mg per kg or less than 15 mg per kg. A sub-analysis was performed on patients who experienced acute kidney injury post loading dose. Acute kidney injury was defined as an increase of serum creatinine of 0.3 mg/dL or greater at either 24 or 48 hours post baseline, or equal to or greater than 1.5 times baseline at any of the

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data points collected. Data from 2017 and 2018 data were compared to see if there was a difference in prescriber behavior.

**Results:** A total of 273 initial one time doses of vancomycin were identified in 2017 and 304 in 2018. In 2017, 23 doses (8.4 %) were in the 20 to 30 mg per kg range, 76 doses (27.8%) were in the 15 to 20 mg per kg range, and 174 (63.7%) were below 15 mg per kg. In 2018, 110 doses (36 %) were in the 20 to 30 mg per kg range, 73 doses (24%) were in the 15 to 20 mg per kg range, and 121 (39.8%) were below 15 mg per kg. There were 43 (16%) and 41 (13%) cases of acute kidney injury in 2017 and 2018, respectively. Of the 43 cases from 2017 11.6% received doses of 20-30 mg per kg, 23.3% received doses of 15-20 mg per kg, and 65.1% received doses of less than 15 mg per kg. Of the 41 cases from 2018, 36.6% received doses of 20-30 mg per kg, 29.3% received doses of 15-20 mg per kg, and 34.1% received doses of less than 15 mg per kg.

**Conclusion:** Implementation of a vancomycin order set in combination with prescriber education increased the frequency of appropriate weight based loading doses of vancomycin, with no concomitant increase in acute kidney injury.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-120**

**Poster Title:** Exploring strategies to incentivize students to receive their annual influenza vaccination

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** Seasonal influenza vaccination rates among college students are consistently well below national goals. To raise awareness of influenza and increase vaccination rates among college students at a local university, a campaign using incentives and competitions, called #BearTheBand-Aid (#BtB), was started several years ago. Although #BtB has slightly increased vaccination rates, it has not been as successful as anticipated. The purpose of this study was to evaluate student awareness of #BtB and explore what motivates and incentivizes students to get their annual flu vaccination. In addition, this study sought to identify factors that prevented students from getting their annual flu shot.

**Methods:** An anonymous 20-item online survey was developed using RedCap survey software. The survey items included eight “yes” or “no”, nine 5-point Likert items, and three selection questions. The survey questions assessed whether respondents were aware of the #BtB campaign; it also identified reasons respondents did not get vaccinated, and how likely current incentives and those under consideration would motivate them to be vaccinated. Inclusion criteria were age 18 to 24 years old, current enrollment and physically attending classes on the local university campus. Students enrolled in health professions programs were excluded. The survey was reviewed by faculty with content expertise and distributed to nine random college students to check face validity. After local IRB approval, the online-survey was opened for 8 weeks. Self-selecting subject recruitment occurred by disseminating a QR code and URL to link to the survey by paper flyers, social media, and email. In addition, electronic versions of the

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flyer were posted as home screens on all university computers. Likert scales assessed how likely current #BtB incentives and those under consideration would increase student motivation to get their vaccination. In addition, Likert scales also assessed how likely certain influencers (i.e. parents, and friends) would motivate students to get vaccinated. Data were analyzed using descriptive and non-parametric inferential statistics using Microsoft Excel. Significance was established apriori as a p-value < 0.05.

**Results:** There were 448 respondents; 238 met inclusion criteria, of which 103 (43%) received a flu shot. The most common factors preventing unvaccinated students from getting their flu shot were lack of time and a dislike of getting shots. Adding more locations on campus for students to receive their flu shot, would motivate more than a third (54 (40%)) of unvaccinated students to be vaccinated. There were 171 (72%) students unaware of #BtB, of which 112 (65%) were unvaccinated. One or both current #BtB incentives would increase motivation in 73 (65%) of these students. Regardless of vaccination status, students who were unaware of #BtB would be more likely get vaccinated if they knew about current #BtB incentives. Similarly, if students were aware of #BtB and the incentives under consideration, regardless of vaccination status, they would likely be more motivated to get vaccinated. Of the two incentives under consideration, winning a gift card to a local restaurant would motivate the most unvaccinated students 80 (59%). In students who were aware of #BtB, influencers (i.e. parents, and friends) motivated vaccinated students significantly more than unvaccinated students (p=0.040) However, among students who were unaware of #BtB, they motivated vaccinated and unvaccinated students similarly.

**Conclusion:** The university's influenza vaccination rate is below national goals and awareness of #BtB is low. Reasons preventing students from getting their annual influenza vaccination were consistent with other studies. Increasing awareness of #BtB could improve influenza vaccination rates because students may be more motivated to get vaccinated knowing they could receive current #BtB incentives or those under consideration. Offering more locations for students to receive their flu shot may also increase the university's influenza vaccination rate. Strategies to increase awareness of the #BtB campaign among students' parents and friends, and offer more on-campus locations for vaccinations should be explored.

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**Session-Board #** - 4-121

**Poster Title:** Design and synthesis of novel oxadiazole-based antimycobacterial agents

**Poster Type:** Descriptive Report

**Submission Category:** Infectious Disease/HIV

**Primary Author:** Morgan Harris, Creighton University; **Email:** morganharris1@creighton.edu

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**Purpose:** Our lab has developed novel indole-2-carboxamides with potent antimycobacterial activity both in vitro and in vivo against *Mycobacterium tuberculosis* and *Mycobacterium abscessus*. However, the indole-2-carboxamides suffer from poor bioavailability stemming from poor aqueous solubility. To improve aqueous solubility, we employed nonclassical bioisostere replacement of the indole-2-carboxamides amide linkage to a 1,2,4-oxadiazole.

**Methods:** This synthesis was achieved through a four-step synthesis. The antimycobacterial assessment against *Mycobacterium tuberculosis* and *Mycobacterium abscessus* was performed using microbroth dilution method.

**Results:** The oxadiazole ring was detrimental for *Mycobacterium tuberculosis* activity, however it does allow for bactericidal activity against *Mycobacterium abscessus*. The addition of a hydroxyl group on the N3 position improved activity against *Mycobacterium abscessus* and is bacteriostatic in nature.

**Conclusion:** The oxadiazole-based agents were proven to be effective in vitro against *Mycobacterium abscessus* but not *Mycobacterium tuberculosis*

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-122**

**Poster Title:** Evaluation of health sources & resources administration (HSRA) visit criteria and its impact on viral load suppression in HIV-infected patients at a University-Based HIV Clinic

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** The Health Sources & Resources Administration (HSRA) is committed to improving the quality of patient care for people with HIV (PWH) through its Ryan White programs. HSRA provides a series of activities that focus on enhancing the treatment quality and encourages PWH to complete one medical visit in each 6-month period of the 24-month period in order to achieve and maintain virologic suppression. We hypothesize that meeting HSRA visit criteria will correlate with virologic suppression in PWH.

**Methods:** We conducted a single-center, retrospective cohort study of HIV infected adults ( $\geq 19$  years) receiving care at a Midwestern HIV clinic between January 1, 2017 and December 31, 2018, with at least 1 HIV RNA reading during the study period. Visit recordings for each 6-month period over the previous 24-month period were collected for each patient to determine the proportion of patients meeting HSRA recommendations. The last HIV RNA in 2018 was used as the virologic suppression endpoint (HIV RNA  $\leq 50$  copies/mL). Sociodemographic, ART regimen, ART adherence, comorbidities and other clinical characteristics were abstracted from the Nebraska HIV registry. Pearson Chi-squared tests and binary logistic regression were used to determine the impact of HSRA visits on viral suppression.

**Results:** A total of 1019 patients were evaluated in the study; 450 (44.2%) that met HSRA visit criteria and 569 (55.8%) who did not. A significant difference was observed for virologic

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suppression between the groups (94% vs 86%,  $p < 0.0001$ ). In comparison to PWH who did not meet the HRSA criteria, PWH who met HRSA visit criteria were 2.67 (95% CI: 1.68-4.23) times more likely to have a viral load  $\leq 50$  copies/mL and 2.16 (95% CI: 1.24-3.79) times after adjusting for sociodemographic, ART regimen and adherence, and other clinical characteristics. Factors found to be negatively associated with viral suppression were single marital status (aOR: 0.48; 95% CI: 0.24-0.94), current or historical opportunistic infection (aOR: 0.48; 95% CI: 0.24-0.94), and usage of a multiclass or dual ART regimen (aOR: 0.40; 95% CI: 0.16-0.98). On the contrary, positive factors included solely commercial insurance coverage (aOR: 2.40; 95% CI: 1.00-5.79) and commercial insurance along with AIDS Drug Assistance Program (ADAP) coverage (aOR: 2.17; 95% CI: 1.02-4.64).

**Conclusion:** Meeting HRSA visit criteria was significantly associated with virologic suppression in PWH.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-123**

**Poster Title:** Vancomycin stewardship pilot using methicillin-resistant *Staphylococcus aureus* (MRSA) nasal screening among patients with pneumonia

**Poster Type:** Descriptive Report

**Submission Category:** Infectious Disease/HIV

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Helen Lee

**Purpose:** Vancomycin is often included in the empiric regimen for pneumonia when there is a concern for methicillin-resistant *Staphylococcus aureus* (MRSA). Recent data indicate that MRSA nasal screenings have a high negative predictive value among all types of pneumonia, ruling out MRSA as a lower respiratory pathogen. As a result, MRSA nasal screenings emerged as an antimicrobial stewardship tool for pneumonia to encourage discontinuation of vancomycin if MRSA screening result is negative. The purpose of this study is to evaluate the impact of a vancomycin stewardship pilot with prescriber education utilizing MRSA nasal screenings on the usage of vancomycin for pneumonia.

**Methods:** The institutional review board exempted this retrospective, quasi-experimental, pre-post intervention study comparing 70 patients during two ten-week periods before (n equals 39) and after (n equals 31) the implementation of a vancomycin stewardship pilot protocol. The pilot consisted of continuing the institutional protocol to screen all admitted patients for MRSA colonization with chromogenic agar medium, creating a vancomycin stewardship protocol to guide the interpretation of nasal screening results and antibiotic selection in pneumonia, educating prescribers and pharmacists on the protocol, and incorporating a pharmacy-driven nasal screening surveillance process for all vancomycin per pharmacy orders indicated for pneumonia. Inclusion criteria are patients 18 years and older with community acquired pneumonia (CAP) with a history of multi-drug resistant organisms (MDRO), hospital-acquired pneumonia, and ventilator-associated pneumonia, and received vancomycin per pharmacy dosing for the indication of pneumonia. Exclusion criteria include septic shock, alternative indications for vancomycin, cavitary pulmonary lesions, febrile neutropenia, and CAP without a

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history of MDRO. The primary outcome was vancomycin duration of therapy. Secondary outcomes include length of stay, incidence of acute kidney injury (AKI), all-cause mortality during admission, and the predictive values of MRSA nasal screening for pneumonia. Subgroup analysis was performed on non-MRSA pneumonia cohorts. Statistical analysis was based on an alpha value of 0.05, requiring 70 patients to achieve 80 percent power to detect 50 percent reduction in vancomycin duration of therapy.

**Results:** The absolute difference of total vancomycin duration of therapy between the historical group and the pilot group was 51 days or 46.4%. The mean difference of vancomycin duration of therapy per patient was 0.9 days or 32.1% reduction ( $p=0.22$ ). There were similar length of stays (15 days versus 17.6 days,  $p$  equals 0.38), AKI (0 cases versus 3 cases,  $p$  equals 0.05), and all-cause mortality (9 cases versus 2 cases,  $p$  equals 0.06) between the historical and the pilot groups. The positive predictive value was 60 to 66 percent and the negative predictive value was 92 to 93 percent. In the subgroup analysis, vancomycin use for non-MRSA pneumonia occurred 80 percent of the time in both groups (31 cases vs 25 cases,  $p$  equals 0.90). Among this cohort, the pilot group had significantly more discontinuations of vancomycin before a negative nasal screening result (9.7 percent versus 32.0 percent,  $p$  equals 0.04). Among the pilot group with non-MRSA pneumonia, prescribers discontinued vancomycin without requiring pharmacy intervention 76 percent of the time. Of the 24 percent requiring pharmacy intervention, 100 percent of the interventions were accepted.

**Conclusion:** The implementation of a vancomycin stewardship pilot utilizing MRSA nasal screening in pneumonia was associated with a trend towards reduction in vancomycin duration of therapy while maintaining similar clinical outcomes, as reflected by similar length of stays and all-cause mortality rates. Prescriber education is crucial in ensuring judicious use of vancomycin as depicted by a greater number of vancomycin orders discontinued prior to nasal screening results.

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**Session-Board #** - 4-124

**Poster Title:** Successful treatment of mycobacterium tuberculosis and carbapenem-resistant klebsiella pneumoniae infection in a post kidney transplant patient

**Poster Type:** Case Report

**Submission Category:** Infectious Disease/HIV

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**Purpose:** This case describes a post kidney transplant patient had carbapenem-resistant Klebsiella pneumoniae (CRKP) perirenal infection and Mycobacterium tuberculosis infection, complicated by the diagnosis of TB with inconsistent laboratory test results and the strategy of antimicrobial treatment for CRKP in immunocompromised patients. Patient WZ is a 50-year-old male with renal graft failure, admitted for the second allograft kidney transplant. The donor was intubated in ICU for 5 days with negative blood culture at time of transplant. On postoperative day 13, WZ spiked fever (T 103.1°F) with elevated WBC, CRP and procalcitonin. Chest computed tomography (CT) scan showed increased density in the upper and lower lobes of the right lung and upper lobe of the left lung, and enlarged lymph nodes in the mediastinum and the right hilar area. Empiric antibiotic therapy of imipenem/cilastatin (1g q8h) and voriconazole (First day 400mg q12h, then 200mg q12h) was started. Seven days after the treatment, fever resolved. But nine days later, the patient developed recurrent fever. Blood, sputum and urine cultures were negative. On postoperative day 46, fiberoptic bronchoscopy showed the anterior segment of the right upper lobe and the medial segment of the right middle lobe were distorted and narrowed. Despite the negative result of interferon-gamma release assay (IGRA), WZ was diagnosed TB infection based on immunocompromised state, clinical signs and symptoms, acid-fast bacilli result, and CT result. Therefore, imipenem/cilastatin and voriconazole were discontinued, and isoniazid, rifampicin, ethambutol, and pyrazinamide were initiated. Fever was subsided next day. However, fever reoccurred three days after, and the ultrasound showed significant swelling in the transplanted kidney

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area. The abscess culture post incision and drainage grew CRKP, resistant to imipenem and meropenem ( $MIC > 8\mu\text{g/ml}$ ), and susceptible to tigecycline and chloramphenicol. Although there is a lack of consensus on the treatment of CRKP in renal transplant patients, numerous studies have shown the best outcomes from combination antimicrobial therapy. High dose of tigecycline (200mg loading dose followed by 100mg q12h) and imipenem/cilastatin (1g infused over 3 hours q8h) were used in combination therapy for CRKP. Five days after the treatment, fever resolved, but the patient developed nausea and diarrhea, so imipenem/cilastatin was discontinued and tigecycline dose was adjusted to 50 mg q12h. Three days later, labs were normal, wound drainage was removed, repeat chest CT showed improved, and tigecycline was discontinued. The patient was discharged on postoperative day 69 with the continuation of anti-tuberculosis treatment outpatient.

### **Methods:**

### **Results:**

### **Conclusion:**

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**Session-Board #** - 4-125

**Poster Title:** Nintedanib reduced the decline in forced vital capacity across subgroups of patients with systemic sclerosis-associated interstitial lung disease: data from the SENSICIS trial

**Poster Type:** Evaluative Study

**Submission Category:** Investigational Drugs

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**Purpose:** In the SENSICIS trial, nintedanib reduced the progression of interstitial lung disease associated with systemic sclerosis (SSc-ILD) compared with placebo, as demonstrated by a significantly lower rate of decline in forced vital capacity (FVC) over 52 weeks (primary endpoint). The purpose of this analysis was to assess the effect of nintedanib on the rate of decline in FVC in the SENSICIS trial across pre-specified subgroups defined by baseline characteristics.

**Methods:** Patients with SSc-ILD with onset of first non-Raynaud symptom < 7 years before screening and  $\geq 10\%$  fibrosis of the lungs on a high-resolution computed tomography scan were randomised to receive nintedanib 150 mg bid or placebo double-blind. The annual rate of decline in FVC (mL/year) assessed over 52 weeks (primary endpoint) was analysed in the overall population using a random coefficient regression model (with random slopes and intercepts) including anti-topoisomerase I antibody (ATA) status, age, height, gender and baseline FVC as covariates. Analyses in subgroups by baseline characteristics included additional terms for treatment-by-subgroup and treatment-by-subgroup-by-time interaction.

**Results:** A total of 576 patients were treated (288 in each group). Most (75.2%) of the patients were female, 51.9% had diffuse cutaneous SSc, and 48.4% were taking mycophenolate at baseline. Mean  $\pm$  standard deviation age was  $54.0 \pm 12.2$  years and 21.4% of patients were aged

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≥65 years. Nintedanib had a consistent effect on reducing the rate of FVC decline across pre-specified subgroups defined by baseline characteristics ( $p > 0.05$  for all treatment-by-time-by-subgroup interactions). For example, the adjusted difference (95% confidence interval) between nintedanib and placebo in rate of decline in FVC was 34.6 (-9.3, 78.4) mL/year in female patients and 58.6 (-18.0, 135.1) mL/year in male patients ( $p = 0.59$ ). The corresponding age-related data were: 44.4 (1.4, 87.4) mL/year in patients aged < 65 years and 28.1 (-54.2, 110.4) in those aged ≥65 years ( $p = 0.73$ ). In patients with diffuse cutaneous SSc, the difference between nintedanib and placebo was 56.6 (3.2, 110.0) mL/year, compared with 25.3 (-28.9, 79.6) mL/year in limited cutaneous SSc ( $p = 0.42$ ).

**Conclusion:** Nintedanib is effective at reducing ILD progression in a broad range of patients with SSc-ILD.

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**Session-Board #** - 4-126

**Poster Title:** Safety profile of nintedanib in patients with systemic sclerosis-associated interstitial lung disease and idiopathic pulmonary fibrosis

**Poster Type:** Evaluative Study

**Submission Category:** Investigational Drugs

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**Purpose:** Nintedanib has been investigated in patients with systemic sclerosis-associated interstitial lung disease (SSc-ILD) in the SENSCIS trial and idiopathic pulmonary fibrosis (IPF) in the two INPULSIS trials. These patient populations differ in age, sex, disease characteristics and comorbidities. The purpose of this analysis was to compare the safety and tolerability of nintedanib in patients with SSc-ILD and IPF.

**Methods:** Adverse events that occurred over 52 weeks of treatment in the SENSCIS and INPULSIS trials were assessed descriptively in patients who received  $\geq 1$  dose of trial drug.

**Results:** A total of 576 patients were treated in the SENSCIS trial (288 nintedanib; 288 placebo) and 1061 in the INPULSIS trials (638 nintedanib; 423 placebo). At baseline, mean (standard deviation) age was 54.0 (12.2) and 66.8 (8.0) years in SENSCIS and INPULSIS, respectively. The proportion of males was 24.8% and 79.3%, respectively. Over 52 weeks, 19.4% and 10.8% of patients treated with nintedanib and placebo discontinued treatment in SENSCIS, compared with 24.5% and 18.9% of patients treated with nintedanib and placebo in INPULSIS.

Gastrointestinal adverse events were the most frequently reported adverse events with nintedanib and, as expected based on the underlying disease, were more frequent in patients with SSc-ILD than IPF in both treatment groups. Diarrhea adverse events were reported in 75.7% and 31.6% of patients treated with nintedanib and placebo in SENSCIS, and 62.4% and

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18.4% of patients treated with nintedanib and placebo in INPULSIS, respectively. Percentages of patients in SENSICIS experiencing nausea were 31.6% (nintedanib) and 13.5% (placebo), while in INPULSIS these values were 24.5% and 6.6%. Vomiting occurred in 24.7% and 10.4% of patients receiving nintedanib and placebo in SENSICIS, compared with 11.6% and 2.6% in INPULSIS.

**Conclusion:** The safety and tolerability profile of nintedanib in patients with SSc-ILD is similar to that observed in patients with IPF.



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**Session-Board # - 4-127**

**Poster Title:** Investigation of the potential anti-inflammatory and analgesic activities of some chemical products

**Poster Type:** Evaluative Study

**Submission Category:** Investigational Drugs

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hanan Ragab

**Purpose:** Non-steroidal anti-inflammatory drugs (NSAIDs) are among the most frequently used drugs worldwide. Nevertheless, they carry several side effects such as gastrointestinal mucosal damage, renal toxicity, and cardiovascular side effects. Aiming to find a novel analgesic/anti-inflammatory drug with minimal side effects, the present study was designed to screen and evaluate some newly synthesized molecules.

**Methods:** Mice weighing 20 to 25 g were used to determine the efficacy of the newly synthesized compounds. Anti-inflammatory effect of the investigated compounds was assessed using carrageenan-induced paw edema. Tail flick and hot plate tests were used to evaluate the analgesic effects. Data were analyzed using SPSS version 20.

**Results:** Out of 17 compounds, 6 showed a statistical significant anti-inflammatory effect as compared to the control group. In the tail flick test, 5 compounds showed a significant increase in latency time as compared to the control. Results were even better than indomethacin and celecoxib groups. Hot plate test confirmed the results obtained in the tail flick test.

**Conclusion:** The compounds possessing anti-inflammatory and analgesic effects constitute a potential molecules for further studies

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**Session-Board # - 4-128**

**Poster Title:** Investigational drug service – challenges and opportunities to workflow processes following a change in location

**Poster Type:** Descriptive Report

**Submission Category:** Investigational Drugs

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**Purpose:** The Investigational Drug Service (IDS) is responsible for dispensing and performing drug accountability for about 550 clinical trials. Approximately 60% of our studies are in oncology and 30% for other internal medicine subspecialties. Our service fully moved into the central pharmacy at the Huntsman Cancer Hospital in April 2019. Before this move, IDS operated from its own location. This report describes the workflow process opportunities and challenges IDS faced following a change in location.

**Methods:** In the summer of 2018, the IDS staff started to prepare to move into the central pharmacy. The new location created the need to change some major IDS operational workflow processes - study documentation, inventory / drug returns, and study monitor and audit visits. The technicians and a pharmacist developed a process to convert our paper binders to all electronic binders. Key steps included the development of a checklist denoting which binders and sections of each binder were scanned, uploaded, and reviewed. There were at least 2 reviews per binder. Inventory technicians also contacted all study sponsors and clinical research associates (CRAs) for ongoing studies to inquire about saving drug returns and used investigational product vials. Pharmacists informed study sponsors and CRAs about the drug return and destruction processes during site initiation visits. Updated drug return information was entered in to the study file in the IDS electronic drug accountability database. The monitor technicians started to inform CRAs in fall 2018 regarding changes in drug accountability

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processes during study monitor and auditor visits. These technicians take time-date-stamped pictures of unused investigational product. These pictures are sent the evening prior to the individual coming to conduct the study visit. During the scheduled visit, the CRA may request to view investigational product through a video calling service.

**Results:** IDS now shares workspace, IV compounding, and storage of hazardous drugs with central pharmacy operations. Moving into the central pharmacy also helped us maintain compliance with proposed USP 800 regulations. Our service transitioned to all electronic documentation for activities associated with study drug accountability and dispensing. All documents formally housed within a binder are now viewable within our electronic drug accountability database. We no longer permit the retention of drug returns or used vials for newly started trials. We were able to reduce the number of returns or saved used vials for ongoing trials by about 50%. This change provides us more shelf space to meet the growing demand of clinical trials. Our study monitor and auditor process was optimized to allow onsite and remote monitoring appointments. Study monitors are not permitted in the new IDS location to perform drug accountability in the traditional way. For drug accountability purposes, a pharmacy technician takes pictures and uses a video calling service. This change has allowed the technicians to optimize their time while a study monitor is here and has helped decrease monitor visit times. All standard operating procedures were updated to reflect new workflow processes.

**Conclusion:** The optimization of these workflows allowed the IDS staff to meet the demands of our new and shared space with central pharmacy operations and enabled compliance with USP 800 and Utah pharmacy law.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-129**

**Poster Title:** Implementation of a clinical research pharmacy team at Pfizer to optimize the investigational product handling experience for healthcare providers and patients

**Poster Type:** Descriptive Report

**Submission Category:** Investigational Drugs

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**Purpose:** Pfizer Worldwide Research, Development and Medical's (WRDM) mission is to deliver breakthrough medicines that change patients' lives. As clinical trials for investigational products (IP) continue to grow in complexity and scope, it is critical that biopharmaceutical companies and clinical trial sites work collaboratively to strengthen the IP handling experience for both healthcare providers and patients. A need for clinical research pharmacy expertise was identified to enhance this partnership with external stakeholders.

**Methods:** Clinical Research Pharmacy (CRP) was established at Pfizer to partner with clinical sites to maintain data integrity, ensure regulatory compliance and protect patient safety. An initial gap analysis identified an opportunity to improve the IP handling experience at clinical trial sites. Subsequently, the CRP team conducted clinical site visits globally. These visits provided Pfizer colleagues an opportunity to engage in conversations regarding clinical site operations and local pharmacy practices related to IP handling. In addition, the CRP team has taken the initiative to invite clinical site personnel to Pfizer in order to gain an understanding of IP operations and processes.

**Results:** Two patient-focused initiatives, Site Awareness and Visit Exchange (SAVE) and Site Practices and Opinions Round Table (SPORT), were implemented. These two initiatives identified five areas of focus related to IP handling. They are 1) optimization of IP handling documentation; 2) access to "end-user (healthcare provider and patient) friendly" clinical trial supplies and supplemental tools (e.g. videos); 3) provision of IP handling training through

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investigator meetings and clinical site initiation visits; 4) consultation on clinical site IP handling related matters and 5) development of innovative mobile applications to enhance IP handling experience for clinical sites.

CRP has created an IP manual with detailed handling instructions for use by the clinical trial sites. Patient/caregiver dosing instruction cards and site administration instructions are provided to assist on the proper use of IP. CRP provides enhanced IP handling training at investigator meetings/clinical site initiation visits and serves as a key resource for clinical site IP queries. CRP was instrumental in the deployment of two mobile applications designed to minimize dispensing errors and notify clinical sites of pending IP shipments.

**Conclusion:** CRP at Pfizer is an innovative and novel organization that was created to enhance the IP handling experience and optimize the conduct of Pfizer-sponsored clinical trials.

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**Session-Board #** - 4-130

**Poster Title:** Analysis of pharmacist's work on investigational product management

**Poster Type:** Evaluative Study

**Submission Category:** Investigational Drugs

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**Purpose:** According to the National Institute of Health (NIH), South Korea has a cumulative total of 10,092 clinical trials from 2000 to 2019 March, which is 6th in the world. There is a regulation stating that investigational products (IPs) should be handled by clinical trial pharmacist with appropriate qualification, but there is no regulation with regards to the standard of human or institutional resources needed for clinical trials. The aim of this study is to examine the current status of clinical trial pharmacy (CTP) and analyze the role of a clinical trial pharmacist, to provide evidence for the establishment of standards.

**Methods:** We collected data on clinical trials conducted at Samsung Medical Center CTP from 2014 to 2018, and identified the number of initiated tasks, the number of tasks to be carried out, the number of drugs administered, the task management status, and the activities of the pharmacist. In addition, from January to May 2019, the pharmacist's work history was classified according to the ASHP standard, and the time and work ratio were analyzed.

**Results:** A total of 1,009 study protocols were managed from 2014 to 2018, and the average number of protocols was 684. The number of IPs increased 115% from 2,280 in 2014 to 2,615 in 2018, and refrigerated or frozen products increased 146% from 540 in 2014 to 788 in 2018. The average length of the protocol was 4 years.

According to the analysis of clinical trial pharmacist's work from January to May 2019, an average monthly initiation visits were 14 cases, pharmacy management fee calculation 21 cases, dispensing guide setting 14 cases, receipts 367 cases, preparation 2,192 cases, CRA monitoring 238 cases, IPs return and disposal 66 cases, audit and inspection were 4 cases.

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Based on the calculation of the time required, it was analyzed that each pharmacist could manage 59 studies.

**Conclusion:** Recently, research design has become more complicated and diverse, and the work of clinical trial pharmacist is increasing. The clinical trial pharmacists must be able to meet the needs of clinical trial tasks, ensure the safety of study subjects, and protect the integrity of clinical research data. For this reason, it is necessary to develop the standard indicators so that the necessary support can be provided according to the appropriate evaluation of the work specificity of the clinical trial pharmacist.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-131**

**Poster Title:** Burnout response among U.S. hospital pharmacy directors and departments

**Poster Type:** Evaluative Study

**Submission Category:** Leadership Development

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**Purpose:** This survey study sought to detect what measures United States (U.S). hospital pharmacy departments have undertaken to minimize or prevent burnout in their work place and identify the rate of hospitals that have initiated interventions to minimize burnout.

**Methods:** A customized, 19 question descriptive survey was open for two, one-month periods. The survey was developed by a collaborative group of clinical pharmacists from eight institutions and addressed questions towards U.S. hospital pharmacy department leaders regarding leadership demographics, perception of burnout as a problem and steps taken to address burnout. Participants were requested to limit one survey per institution. The possible interventions to combat burnout were categorized as communication improvements, workflow modifications and quality improvement initiatives. The first period in March 2019 was sent to directors of pharmacy in the Vizient purchasing network. The second survey period occurred in May 2019 when a link to the survey was posted on three American Society of Health-System Pharmacist's (ASHP) Connect Communities (Section of Practice Managers, Pharmacy Leadership Connect Group, and Section Advisory Group on Clinical Leadership). Participants were directed to complete the survey on the Research Electronic Data Capture (REDCap©) website and incentivized with a weekly drawing of two \$50 online gift cards. A reminder email was sent two weeks after survey opening in each study period. Descriptive statistics were used to report the results.



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**Results:** Two-hundred thirty-four surveys were completed. Half of participants were pharmacy directors (n=116, 49.6%), having worked less than 5 years at their position (n=118, 50.4%). Eighty-two percent believed their departments were negatively affected by burnout, however, only 53.4% formally assessed their employees for burnout. Thirty percent of participants reported interventions to combat burnout have already been instituted, while 44.8% had plans to initiate measures. The most frequent interventions implemented in each category were as: communication (regular department meetings [27.3%], informal surveys or department wish lists [17.1%], personal management style changes [16.2%]), workflow (changes to scheduling processes [23.1%], new or updated technologies [20.9%], and changes to the dispensing and verification process [20.9%]), and quality improvement (stress reduction presentations or seminars [13.2%] and new break/meal time protections [12.8%]). Funding for interventions was either obtained from the annual budget (10.6%) or absent (10.6%). Employee participation in reduction strategies was most frequently estimated that 25 – 50% of employees participated (23.3%). Twenty percent of participants that reassessed the intervention(s) effectiveness considered the changes as beneficial, Most do not plan to reassess (37.3%). More than half of participants consider staffing resources (64.5%), time commitment (56.4%), and scheduling requirements (53%) as barriers to addressing burnout.

**Conclusion:** The majority of pharmacy leadership of U.S. hospitals acknowledge burnout may negatively impact their departments. Communication, workflow, and quality improvement initiatives have been implemented however despite the acknowledgement of burnout as a problem, incorporation of strategies to combat burnout does not appear widespread at this time. The effectiveness of instituted improvements is not frequently reassessed. Perceived barriers to reducing burnout were identified such as not having enough time, staffing resources, and scheduling flexibility. As enthusiasm for combating burnout grows, further study is warranted to continue developing methods to combat burnout, enhance participation, and facilitate the continual assessment of implemented measures.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-132

**Poster Title:** Emotional intelligence of pharmacists in the United States and in Japan

**Poster Type:** Evaluative Study

**Submission Category:** Leadership Development

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**Purpose:** Emotional intelligence (EI) is similar to Intelligence Quotient (IQ), except that it measures one's ability to manage emotions and relationships. According to Sala (2002), EI includes four domains: self-awareness, self-management, social awareness, and relationship management. EI may be an important predictor of a successful pharmacy career (Romanelli et.al., 2006). Pharmacists with higher EI potentially have higher personal satisfaction leading to better patient-centered care (Birks & Watt, 2007). However, current literature on EI of pharmacists is limited. The current study aims to compare EI via TEI-que survey scores between practicing pharmacists in the United States and in Japan.

**Methods:** An online survey of practicing pharmacists in the fields of community, hospital, university, and pharmaceutical industry, either working in the U.S. or Japan, was conducted. We excluded pharmacists who were not currently practicing or practicing outside of the above settings. The TEI-que Short Form survey (30 questions) was selected because of its ease of administration, and according to Cooper & Petrides (2010), established validity, reliability, and applicability to healthcare respondents. TEI-que used a Likert scale (0-7), with comparable averages. The primary outcomes were the EI scores of pharmacists between the U.S. and Japan. Each question in the survey was categorized into one of the four competencies of EI: self-awareness, self-management, social awareness, and relationship management. Descriptive statistics and an unpaired t-test was used to compare the EI scores between the countries.

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**Results:** We received responses from 172 pharmacists (125 from the U.S. and 47 from Japan). Of the respondents from the U.S. and Japan, 40% and 21.3% were male, respectively, and 63.2% and 14.9% completed a postgraduate training program, respectively. U.S. vs. Japanese respondents had an average of 9.8 and 5.23 years of experience. The overall mean EI scores were 163 and 140 (difference 22.16 ;  $P < 0.0001$ ) for pharmacists in the U.S. and Japan, respectively. The EI scores of all four competency areas were significantly higher among pharmacists in the U.S. compared to Japan, especially in social awareness. Self-awareness, social awareness, relationship management, and self-management scores between U.S. and Japan were 5.4 vs 4.8 ( $P < 0.0001$ ), 5.8 vs 5.1 ( $P < 0.0001$ ), 5.2 vs 4.3 ( $P < 0.0001$ ), and 5.1 vs 4.6 ( $P < 0.0001$ ), respectively. Japanese pharmacists' highest average EI score was in the well-being (social awareness) category. When comparing the variation of EI scores across the pharmacy practice settings in the U.S. or Japan, there were no statistically significant differences.

**Conclusion:** This study shows pharmacists in the U.S. have statistically significant higher EI scores in all four domains than pharmacists practicing in Japan. The difference in EI scores may be attributed to differences in culture, pharmacy curriculum, and standard pharmacy practice. Future studies should focus on actual measures of patient satisfaction, pharmacist job satisfaction with correlation to EI scores and comparison of pharmacists in different practice settings and cultures. Potentially, efforts to improve EI in pharmacists, or at least, make them more aware of its importance in the workforce, may be beneficial to both pharmacists and patients.

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**Session-Board #** - 4-133

**Poster Title:** Treatment of B-cell acute lymphoblastic leukemia induced veno-occlusive disease with Intravenous and oral N-acetyl cysteine in a six year old girl

**Poster Type:** Case Report

**Submission Category:** Oncology /Hematology

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**Purpose:** Hematopoietic stem cells transplant (HSCT) and cytotoxic chemotherapy in children and adults hold many complications and one of the most frequently serious complications is hepatic sinusoidal injury, Venous-occlusive disease (VOD) or Sinusoidal Obstruction Syndrome (SOS), which often leads to multiorgan failure in a large percentage of patients. We describe the case of a six year old girl with newly diagnosed B-cell Acute Lymphoblastic Leukemia (ALL) involving bone marrow, liver and kidneys who developed veno-occlusive disease due to her leukemia. She presented to the ER with five days history of lethargy, associated with multiple episodes of blood tinged vomiting. There was no evidence of diarrhea, melena, bilious vomiting, or any history of toxic ingestions, abdominal surgery, weight loss, or night sweats. Patient's clinical symptoms included weight gain, hepatomegaly, ascites, and elevated direct and total bilirubin (3.0 mg/dL) levels. Her initial clinical course was complicated by bleeding from her polysite which necessitated the administration of blood, fresh frozen plasma (FFP) and platelet transfusions. This was further complicated by third spacing and fluid overload. Her physical exam showed palmar erythema and jaundice. She was initiated on prophylactic ursodeoxycholic acid 15 mg/kg/dose orally every 12 hours for protection against hepatic sinusoidal obstruction syndrome. The increased bilirubin did not allow the administration of chemotherapy as per the ALL induction protocol regimen. Instead, she received a modified regimen which included prednisone, half a dose of vincristine once, 4 days of cyclophosphamide, 10 days of cytarabine and 6-mercaptopurine (6-MP) based on the hospital's

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tumor board decision. Furthermore, spironolactone, furosemide, fluid restriction and adequate oxygenation were initiated to treat generalized edema that manifested as ascites, pleural effusions, pericardial effusion, pitting sacral and perineal edema. Pain was managed with acetaminophen and fentanyl citrate. The patients' bilirubin kept rising to reach 6.1 mg/dl. Although defibrotide has demonstrated significant reduction in VOD/SOS-related mortality and resolved VOD/SOS-related symptoms, with a manageable safety profile; multiple factors render defibrotide as an inappropriate therapy. In our case, financial burden and thrombocytopenia, thus other treatment possibilities were necessary. After not responding to any of the above treatments, a complete literature search revealed the benefit of using intravenous N-acetyl cysteine (NAC) in treating VOD. The patient was started on N-acetyl cysteine 150 mg/kg loading dose IV drip over 1 hour, followed by 20 doses of 70 mg/kg IV drip over 30 minutes every 6 hours. Elevated bilirubin serum levels dropped evidently within the first six days of treatment. Generalized edema, pain, vitals, platelet count, and liver function showed marked improvement. Despite the marked drop in bilirubin and improvement in her clinical condition, her bilirubin remained high not allowing for the safe administration of her ALL induction chemotherapy regimen. After not being able to secure IV NAC, the only option was to switch the patient to the oral form of NAC. She received a total of 37 doses alternating in frequency between every 6 or 8 hours depending on physician preference. Her bilirubin level continued to drop with oral NAC reaching normal values suggesting that oral NAC is a viable option when IV is not available. Once the patient's VOD improved she resumed her induction treatment regimen with adjusted dosing based on St. Jude Children's Research Hospital (SJCRH) and Children's Oncology Group (COG) Criteria.

**Methods:**

**Results:**

**Conclusion:**

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**Session-Board # - 4-134**

**Poster Title:** CheckMate 817: first-line nivolumab + ipilimumab in patients with ECOG performance status (PS) 2 and other special populations with advanced non-small cell lung cancer (NSCLC)

**Poster Type:** Evaluative Study

**Submission Category:** Oncology /Hematology

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**Purpose:** Data are limited for immunotherapy in patients with advanced NSCLC and poor performance status or other comorbidities. CheckMate 817 is a multi-cohort, open-label phase 3b/4 study investigating safety and efficacy of flat-dose nivolumab plus weight-based low-dose ipilimumab in advanced NSCLC. Here we evaluate this regimen as first-line treatment in special populations (cohort A1) and a reference population (cohort A; previously reported in Paz-Ares L, et al. WCLC 2018).

**Methods:** Patients with previously untreated advanced NSCLC in Cohort A1 (n=198) had ECOG PS 2 or ECOG PS 0–1 with 1 of: asymptomatic untreated brain metastases, hepatic or renal impairment, or HIV; Cohort A (n=391) had ECOG PS 0–1. Cohort A1 patients were grouped as ECOG PS 2 (PS2 [n=139]) and all other special populations (AOSP [n=59]); AOSP included patients with brain metastases (n=44), renal impairment (n=8), hepatic impairment (n=4), or HIV (n=4). Patients with known EGFR mutations or ALK translocations sensitive to available targeted therapy were excluded from both cohorts. Nivolumab 240 mg Q2W plus ipilimumab 1 mg/kg Q6W was administered for two years or until disease progression/unacceptable toxicity. Safety and efficacy endpoints were assessed; Cohort A1 analyses were exploratory.

**Results:** Median follow-up was 9.1 and 11.3 months in Cohorts A1 and A, respectively. Baseline characteristics were generally balanced between cohorts. In Cohort A1, rates of any grade/grade 3–4 treatment-related adverse events (TRAEs) were 67%/27%, respectively, 62%/24% in PS2 and 78%/34% in AOSP. In Cohort A, they were 75%/31%, respectively. Rates of

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any grade/grade 3–4 TRAEs leading to discontinuation in Cohort A1, PS2, and AOSP were 15%/12%, 14%/12%, and 17%/12%, respectively, and 18%/13% in Cohort A. Two treatment-related deaths occurred in Cohort A1 (interstitial diffuse pneumonitis [n=1] and polymyositis [n=1]; both in PS2) and 2 occurred in Cohort A (grade 5 cardiac failure secondary to immune-mediated grade 3 rhabdomyolysis of heart and other muscles [n=1]; Guillain–Barré syndrome [n=1]). ORR (95% CI) in cohort A1, PS2, and AOSP was 25% (19.4–31.9), 20% (13.8–27.8), and 37% (25.0–50.9), respectively, and in Cohort A was 35% (30.1–39.7). Median PFS (95% CI) in cohort A1, PS2, and AOSP was 3.9 (2.8–5.4), 3.6 (2.8–5.4), and 4.2 (2.6–9.6) months, respectively, and in Cohort A was 6.0 (4.7–8.1) months. In both cohorts, TMB  $\geq 10$  mut/Mb and PD-L1 expression  $\geq 1\%$  or  $\geq 50\%$  were associated with numerically longer median PFS.

**Conclusion:** First-line flat-dose nivolumab plus weight-based ipilimumab showed a consistent safety profile in special populations with advanced NSCLC, including those with ECOG PS 2. Patients with either high TMB or higher tumor PD-L1 expression appeared to exhibit improved efficacy.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-135

**Poster Title:** Impact of non-polyethylene lined infusion tubing on leaching and sorption with chemotherapeutic agents

**Poster Type:** Evaluative Study

**Submission Category:** Oncology /Hematology

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**Purpose:** Select chemotherapeutic agent labeling recommends the use of polyethylene(PE)-lined infusion tubing to reduce leaching and sorption. Leaching may result in compounds from tubing plastic entering the fluid pathway. For example, PE-lined tubing is recommended for Paclitaxel that includes the vehicle Kolliphor EL which leaches Di(2-ethylhexyl)phthalate (DEHP) from polyvinylchloride (PVC) tubing. Sorption may result in a reduced dose of medication delivered to the patient. The data supporting these labeling recommendations may not be fully available for assessment of clinical significance. This study compares leaching and sorption of PE-lined tubing versus non-PE-lined tubing when exposed to a panel of chemotherapeutic agents.

**Methods:** This study was conducted in a laboratory setting. Three types of infusion tubing were evaluated: PVC tubing with a propriety non-DEHP plasticizer (non-DEHP PVC tubing), polyurethane tubing, and PE-lined PVC tubing with a proprietary non-DEHP plasticizer (PE-lined PVC tubing). Each tubing set was exposed to 0.9% sodium chloride and chemotherapy placebos representing: Docetaxel, Valrubicin, Paclitaxel, Temsirolimus, and Teniposide. Simulated intravenous fluid administration sets were constructed and evaluated in static and dynamic dwell conditions. In static dwell, the sets were primed and stored at room temperature. In dynamic dwell, the sets were primed and set in an infusion pump circular loop. At completion, the dwelled fluid and administration sets were collected for analysis.

Leachable assessment of the fluids was completed for semi-volatile and non-volatile leachable compounds using chromatographic and spectroscopic techniques. Sorption was assessed by a before and after dwell administration set weight comparison. The primary study outcome was



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an assay for the presence of toxic leachable compounds for the non-DEHP PVC tubing. Secondary study outcomes were an assay of leachables below the toxic threshold and a comparison of leachables and sorption by tubing material.

**Results:** Data from the leachable study was analyzed for toxicity under normal conditions of use and worst-case total daily intake (TDI). Based on the toxicologic analysis, the leachables for non-DEHP PVC tubing are considered non-toxic with negligible risk to patients. These non-toxic results are considered equivalent to that of the PE-lined PVC tubing and the polyurethane tubing. PE-lined PVC tubing (industry standard) and polyurethane tubing (USP class VI) have established safety profiles for use with chemotherapeutic drugs.

Sorption study data showed that non-DEHP PVC tubing has similar sorption characteristics to PE-lined PVC tubing and polyurethane tubing. For all tubing materials, sorption was below 0.2 ml over 24 hours dwell in all simulated testing conditions. It should be noted that tubing material is one of many materials that are used for the construction of IV sets and these materials and components, such as cassettes and connectors, can influence sorption.

**Conclusion:** This study evaluates the impact of a proprietary non-DEHP PVC tubing material on leaching and sorption with a panel of placebo chemotherapeutic agents. The results suggest that leaching and sorption with the non-DEHP PVC tubing is equivalent to polyurethane and PE-lined PVC tubing and may have equivalent clinical performance in applications analogous to these testing scenarios. These results in the laboratory setting enhance the information available to clinicians to evaluate infusion therapy material options. Further study is required to confirm and evaluate the implications of these results.

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**Session-Board #** - 4-136

**Poster Title:** Implementation of a dose optimization strategy for biological and cytotoxic substances at a rural ambulatory infusion center

**Poster Type:** Descriptive Report

**Submission Category:** Oncology /Hematology

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**Purpose:** Containing cost within the ambulatory infusion model is a high priority for many healthcare systems struggling with lower reimbursement and increased drug cost. An opportunity was identified within a rural ambulatory infusion center to reduce waste per dose by implementing a dose optimization strategy based on the hematology/oncology pharmacist association's (HOPA) position statement of dose rounding all biological and cytotoxic substances within ten percent to the nearest vial size.

**Methods:** An assessment was done on the past biological and oncological agents in 2017 to determine a project cost savings for the infusion center if the policy was implemented. Key discussions were made with administration, our hematology/oncology physician, and the pharmacy and therapeutics (P&T) committee to discuss the position statement by (HOPA) and the research surrounding the topic. A policy was approved by the P&T committee and medical executive team to allow pharmacist to enact the dose rounding changes for both biological and cytotoxic substances of 10% for all agents. The pharmacists would modify the orders without having to consult the physician unless there was already a change in dosage based on other patient specific factors. The pharmacists would then document the intervention and how many units of the drug (e.g. mg, mcg) were saved.

**Results:** The projected cost savings of the infusion center from 2017 was estimated to be \$33,866. Since the policies implementation in July of 2018 through March of 2019, \$174,631.71 were saved based on this dosing policy on 235 difference patient orders. The projected savings estimation was exceeded by 515%. The orders were from many different practices and varied

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between both biological and cytotoxic. The highest cost savings on an individual drug was for brentuximab vedotin and most commonly dose rounded was paclitaxel.

**Conclusion:** Dose optimization for biological and cytotoxic substances has a large impact on infusion centers looking to save direct drug cost by reducing waste. Based on the results since implementation, the goal was vastly exceeded. This was attributed in part due to the infusion center volume increasing by 20% as well as many high costing agents being focused on. There has been no outcome or issues noted so far with this change. Overall, the policy change has been very well received and will continue to be used as a standard for the health system.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-137**

**Poster Title:** The use of proteomics in establishing the potential use of statins in breast cancer prevention

**Poster Type:** Evaluative Study

**Submission Category:** Oncology /Hematology

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**Purpose:** Of the four primary subtypes of breast cancer, approximately 10-15% of breast cancer is classified as triple-negative breast cancer (TNBC). TNBC is the most aggressive and difficult to treat due to its lack of three receptors that are common chemotherapy targets, making prevention crucial for TNBC. With the rise of proteomics in recent years, statins have been extensively studied for prevention in patients with a high risk of developing breast cancer. The purpose of this study was to analyze the changes in protein expression in TNBC cells treated with lovastatin to determine potential mechanisms for the antiproliferative effect of statins.

**Methods:** Two sets of TNBC treated with two different concentrations of lovastatin were cultured and collected. The cells were then lysed open using a sonication and a TFE solution and protein concentration was determined using Micro-BCA Assay. A “short-stack” sample clean-up was performed using 100 ug of each sample into a 4-15% Tris-Bis gel for approximately 2 cm, followed by an in-gel digestion using trypsin. The resulting peptides were extracted from the gel using 60% acetonitrile/0.1% formic acid. Samples were then dried of all liquid followed by fractionation using a strong cation exchange (SCX) Stage Tip using resulting in 11 fractions. Each sample fraction was resuspended in 0.1% formic acid and analyzed by LC-MS analysis on a Thermo LTQ mass spectrometer to be using data-dependent analysis. Proteins were identified from the LC-MS data using the MyriMatch search algorithm and the human complement of the UniprotKB database. The data were filtered for confident identifications using IDPicker 3.0. Identified proteins were then further investigated for function utilizing the UniProt database.

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Once the biological functions of the proteins were determined, potential hypotheses as to how lovastatin causes cancer cell apoptosis could be postulated.

**Results:** A total of 260 proteins were confidently identified from the samples. The upregulation of heat shock proteins indicate that the lovastatin-treated cells were under stress. An explanation for this stress could include the upregulation of peroxiredoxin leading to increased reactive oxygen species (ROS) within the cells and eventual apoptosis. While, a downregulation of proteins associated with replication and transcription such as ribosomal protein L11 and basic transcription factor 3 also offer explanations for the cell's apoptosis. Other possible cellular processes that appear to be disturbed by lovastatin are cell adhesion, migration, and division evident by the alteration in proteins associated with actin filaments. A decrease in keratin proteins with an increase in filamin proteins leads to a dysregulation of the actin cytoskeleton and actin activity causing the cell shape to be deformed and the cell to lose ability to migrate and divide leading to cell death. Finally, cell viability was disturbed as seen by the upregulation of 14-3-3 protein beta/alpha which is a negative regulator of MAP kinase activation. The inhibition of MAP kinase activation blocks multiple downstream signaling pathways leading again to cell death.

**Conclusion:** Upon reviewing the changes in protein expression, it is postulated that lovastatin causes its antiproliferative effect through a variety of potential mechanisms. Some of these mechanisms include increasing the amount of ROS, altering replication and transcription, altering actin formation, and blocking the activation of MAP kinase. Further research is needed to look more into these potential pathways and confirm the exact mechanism that lovastatin causes cell its antiproliferative effect. However, for this future research proteomics should be utilized because of the depth of information of potential mechanisms that can be found by examining protein expression, as seen in this study.

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**Session-Board # - 4-138**

**Poster Title:** The cost of adverse events for FDA-approved/NCCN category 1 treatments for medicare fee-for-service patients with metastatic pancreatic cancer

**Poster Type:** Descriptive Report

**Submission Category:** Oncology /Hematology

**Primary Author:** Jared Hirsch, Milliman Inc.; **Email:** jared.hirsch@milliman.com

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**Purpose:** Adverse events (AEs) related to cancer therapy reduce patients' quality of life and generate substantial healthcare costs. There is limited real-world evidence regarding the AE costs for patients with metastatic pancreatic cancer (m-PANC) who receive FDA-Approved/NCCN Category 1 treatments. We analyzed the costs of three of the most common AEs for patients receiving FDA-Approved/NCCN Category 1 treatments: neutropenia, anemia, and thrombocytopenia in the Medicare fee-for-service (FFS) population by chemotherapy regimen and line of therapy (LOT).

**Methods:** We identified patients with m-PANC using ICD-9/10 diagnosis codes in the 2013-2017 Medicare 100% Limited Data Set claims, which include all Medicare FFS Part A and B claims, except professional services, for 45 million beneficiaries. Patients in our study had multiple claims with a pancreatic cancer (PANC) diagnosis more than 30 days apart and one+ claim(s) with a secondary malignancy (metastasis) diagnosis on/after the first PANC diagnosis date. We defined the index date as the earliest metastasis diagnosis date. We excluded patients with pre-index non-PANC malignancies and those without six-month pre-index and three-month (or until death, if earlier) post-index Medicare FFS enrollment. LOTs were assigned based on the order of therapies used. LOTs ended when a new regimen began, 28 days after the last chemotherapy (if no new regimen), or upon death.

We identified AEs using ICD-9/10 diagnosis codes occurring during LOTs. We randomly sampled control patients in the same LOT and regimen without an AE and assigned them shadow AE dates. We calculated 30-day costs after the AE onset or shadow AE date. For LOTs and regimens with at least 80 patients (cases and controls), we estimated 30-day AE incremental costs using

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log-link generalized linear models and gamma-distributed errors. We predicted mean 30-day AE incremental costs relative to controls using recycled projections and bootstrapped 95% confidence intervals to determine statistical significance relative to zero.

**Results:** Anemia was the most common AE, ranging from 41% of patients receiving first line (1L) gemcitabine/nab-paclitaxel to 32% of patients receiving second line (2L) liposomal irinotecan. Mean 30-day anemia incremental costs were \$3,924 for 1L gemcitabine/nab-paclitaxel, \$3,080 for 1L gemcitabine monotherapy, \$3,725 for 1L FOLFIRINOX, and \$3,257 for 2L liposomal irinotecan, all of which were statistically significant.

Neutropenia was observed for 20% of patients receiving 1L gemcitabine/nab-paclitaxel, 16% of those receiving 1L gemcitabine monotherapy, 32% of those receiving 1L FOLFIRINOX, and 19% of patients receiving 2L liposomal irinotecan. Mean 30-day neutropenia incremental costs were \$2,503 for 1L gemcitabine/nab-paclitaxel, \$1,610 for 1L gemcitabine monotherapy, and \$2,322 for 1L FOLFIRINOX, all of which were statistically significant. The mean 30-day neutropenia incremental costs for (2L) liposomal irinotecan were \$1,284, which was not statistically significant, possibly because there were few cases (42).

The occurrence of thrombocytopenia ranged from 18% of patients receiving 1L FOLFIRINOX to 8% of those receiving 2L liposomal irinotecan. Mean 30-day thrombocytopenia incremental costs were \$2,678 for 1L gemcitabine/nab-paclitaxel, \$3,291 for 1L gemcitabine monotherapy, and \$3,721 for 1L FOLFIRINOX, all of which were statistically significant. There were too few 2L liposomal irinotecan patients with thrombocytopenia to estimate incremental costs.

**Conclusion:** AEs impose substantial costs for Medicare FFS patients with m-PANC receiving FDA-Approved/NCCN Category 1 treatments. For 1L regimens, we observed statistically significant incremental costs associated with three of the most common m-PANC AEs: anemia (mean incremental cost: \$3,080-\$3,924), neutropenia (mean incremental cost: \$1,610-\$2,503), and thrombocytopenia (mean incremental cost: \$2,678-\$3,721). Among 2L liposomal irinotecan patients, only anemia incremental costs (\$3,257) were statistically significant; neutropenia incremental costs were not statistically different from zero, and there were insufficient thrombocytopenia cases to estimate incremental costs.

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**Session-Board # - 4-139**

**Poster Title:** Symptom tracking in oncology patients: leveraging intervention through education (STOPLITE)

**Poster Type:** Evaluative Study

**Submission Category:** Oncology /Hematology

**Primary Author:** Erin Hoag, Indiana University Health Arnett; **Email:** ehoag@iuhealth.org

**Additional Authors:**

**Purpose:** With the roll out of rule CMS-OP 35, oncology centers now face the challenge of reducing 30 day re-admissions. As reimbursements shrink, costs increase, and treatments become more complex, oncology pharmacies must evolve. Practice sites must strike a balance between the complexity of cancer treatment, high cost of therapy with reduced reimbursement, and the high level of patient acuity. The purpose of this study is to retrospectively evaluate if our symptom management program, which includes pharmacist led patient education, chart reviews, and phone call follow-ups, has been effective in reducing the number of emergency department (ED) visits and hospital admissions.

**Methods:** Our project is a single center, retrospective, chart review study. All patients over the age of eighteen who received chemotherapy between February of 2018 and February of 2019 at Indiana University Health Arnett Cancer Center were eligible. We implemented a new symptom management program that includes a preliminary chart review with pharmacist intervention for missing ancillary medications, in-depth pharmacist-led patient education, the creation of a Stoplight Handout to help patients determine if they need to alert the provider about a problem, and a follow-up phone call 48 hours after cycles one and two of chemotherapy. Our primary objective was to track the percentage of patients who visited the hospital within 30 days of chemotherapy for any of the eligible reasons. Per CMS-OP 35 guidelines, ED visits and hospital admissions must include at least one of the following as the reason for admission in order to be reviewed: anemia, pain, fever, sepsis, neutropenia, pneumonia, nausea, emesis, diarrhea, or dehydration. Any visits for other reasons were not included. Admissions and ED visits also had to have occurred within 30 days of when the patient last received chemotherapy. Secondary outcomes include decreasing adverse effects of



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chemotherapy and improving tolerance, improving patient knowledge of when to call about problems, and to quantify which patients may be at highest risk of visiting the hospital.

**Results:** We looked at 2072 chemotherapy encounters, 302 of which were for the purposes of baseline data. At baseline, our average monthly admission rate was 15.2%. Following implementation of our program, we had 197 hospital visits, and 49 of those patients were ultimately admitted. Our symptom management program has completed the education of 316 patients. Within a year's time we called 310 patients for chemotherapy follow-up and gave 310 new patients the Stoplight Handout. The pharmacist chart review has resulted in approximately 140 prescriptions for ancillary medications such as ondansetron and dexamethasone. We have reduced our overall admission rate from 15.2% to 11.00%. We have reduced our admission rates enough to maintain full reimbursement from Medicare, and have – based on an average of 147 infusion encounters per month – prevented an estimated total of 72 hospital visits per year. We also observed that patients who are at high risk of needing hospital intervention have metastatic or advanced disease, or are receiving cycle one or two of chemotherapy. The most common reason for admission was overwhelmingly due to infectious causes, with approximately 75% being related fever, pneumonia, neutropenia, or sepsis.

**Conclusion:** In order to keep up with new regulations, our oncology center started a symptom management project which added several new methods of pharmacist intervention. These take place through up-front education and chart review, handouts, and post-chemotherapy phone calls. While we have not observed a statistically significant percentage reduction in hospital visits, our percentage has been reduced enough to maintain our full rate of reimbursement from Medicare. We are pleased that we are now providing better care with more knowledgeable patients, improved chemotherapy tolerance, and reduced visits to the hospital.

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**Session-Board # - 4-140**

**Poster Title:** Decreasing intravenous acetaminophen administration to surgical patients undergoing tonsillectomy, adenoidectomy and tympanostomy tube placement in the operating room

**Poster Type:** Descriptive Report

**Submission Category:** Operating Room Pharmacy

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**Purpose:** Intravenous (IV) acetaminophen is administered to surgical ENT patients in the Operating Room when a dose of oral acetaminophen is not administered in Perioperative Admit. IV acetaminophen is more expensive than oral acetaminophen but is not clinically superior to oral acetaminophen. Our aim is to decrease the use of intraoperative IV acetaminophen in the surgical ENT population from 24% of total intraoperative IV acetaminophen administrations to < 5% of total intraoperative IV acetaminophen administrations via the implementation of a nursing driven standing order policy for the ordering and administration of oral acetaminophen upon arrival in Perioperative Admit.

**Methods:** A standing order was written and approved to allow nursing driven ordering and administration of oral acetaminophen per protocol. All patients presenting to Perioperative Admit for adenoidectomy, tonsillectomy, and tympanostomy tube placement receive a dose of oral acetaminophen if no contraindications exist.

After implementation of the standing order, dispense data from Tableau Interactive Data Visualization Software was obtained for the initial trial period of 7 weeks (February to March 2019). Rates of IV acetaminophen administration in our target population before and after implementation of the standing order were assessed. To confirm the trend of decreased rates of IV acetaminophen administration by observing increased rates of oral acetaminophen administration, Omnicell dispenses of oral acetaminophen from February to March 2019 were compared to the same period one year prior (February to March 2018).

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**Results:** Dispense data was analyzed for a 7-week trial period of February 11 to March 31, 2019 following implementation of the standing order policy allowing nursing driven ordering and administration of oral acetaminophen to patients arriving in Perioperative Admit. One dose (264mg) of IV acetaminophen was administered to a surgical ENT patient intraoperatively due to a contraindication to receiving oral acetaminophen preoperatively. The one dose administered to the surgical ENT patient accounted for 1.7% of IV acetaminophen administrations in the Operating Room for all patients undergoing all procedures during the trial period.

During the same 7-week period in 2018, surgical ENT patients accounted for 24% of all intraoperative IV acetaminophen administrations in the Operating Room.

16,406.8mg of IV acetaminophen was administered during the 7-week baseline period in 2018, 264mg was administered in the 7-week trial period in 2019. This is a 98.4% reduction. This reduction translates to cost savings estimated to be \$3473.60 annually for our institution.

**Conclusion:** Implementation of a standing order policy allowing nurses in Perioperative Admit to order and administer oral acetaminophen preoperatively decreased administration of IV acetaminophen intraoperatively in surgical ENT patients at our institution. Rates of oral acetaminophen preoperatively increased with implementation of the standing order policy. Reduction in doses of IV acetaminophen translated into cost savings for our institution.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-141**

**Poster Title:** Impact of liposomal bupivacaine on opioid utilization, pain management, and length of stay in patients receiving total knee arthroplasty

**Poster Type:** Evaluative Study

**Submission Category:** Pain Management/Palliative Care

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**Purpose:** Assess how liposomal bupivacaine administration postoperatively impacted opioid utilization, pain management, and length of hospital stay.

**Methods:** A retrospective chart review was conducted comparing patients who received liposomal bupivacaine (n=60) to patients receiving standard therapy (n=60) after TKA. Both treatment groups received the standard perioperative pain management protocols and postoperative physical therapy. The primary outcome of this study was comparing effectiveness of postoperative pain control by determining the total number of rescue postoperative oral/intravenous opioid doses and pain scale assessment on a range of 0 (no pain) to 10 (severe pain). The secondary outcome of this study was length of hospital stay

**Results:** The total number of rescue postoperative opioid doses in treatment group versus standard therapy group on the day of surgery, post-op day 1, and post-op day 2 were 267 vs. 322, 370 vs. 363, and 253 vs. 306, respectively. There was no statistically significant differences in total doses administered between groups (total dose:  $F= 1.71$ ;  $P=0.194$ ). The average minimum pain scale scores in the treatment group versus the standard therapy group were 5.46 vs. 5.58, 5.32 vs. 5.21, and 5.66 vs. 5.3, respectively. The average maximum pain scale scores were 7.55 vs. 8.06, 7.55 vs. 7.79, and 7.54 vs. 7.67, respectively. There were no patients discharged in the from the treatment group on post-op day 1, compared to 3 patients discharged in the standard therapy group. On post-op day 2, there was a decreased length of

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hospital stay in the treatment group with 12 patients discharged, compared to 6 patients discharged in the standard therapy group. There was no significant reduction in pain scales: average minimum pain scale score (F=1.71, P = 0.324) and average maximum pain scale score (F =0.048; P =0.824).

**Conclusion:** The use of postoperative opioids, reported pain scale scores, and overall hospital length of stay in patients receiving liposomal bupivacaine compared to standard therapy showed no significant reductions. More patients were discharged on post-op day 1 in the standard therapy group compared to patients receiving liposomal bupivacaine.

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**Session-Board # - 4-142**

**Poster Title:** Impact on the use of Pharmacy compounded joint cocktail vs liposomal bupivacaine vs baseline on pain and length of stay for total knee arthroplasty

**Poster Type:** Evaluative Study

**Submission Category:** Pain Management/Palliative Care

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**Purpose:** Assess the impact of Pharmacy compounded cocktail (Ketorolac 30 mg, Ropivacaine 0.5 %, Epinephrine 0.5 mg, Clonidine 0.08 mg) in Total Knee Replacement.

**Methods:** A retrospective chart review was conducted comparing patients who received liposomal bupivacaine (n=35) to patients receiving standard therapy (n=35), and a pharmacy compounded joint cocktail (n=35) after TKA. All groups received the standard perioperative pain management protocols and postoperative physical therapy. Statistical analysis was performed on day of surgery, post-operative day 1, and post-operative day 2. P value of < 0.05 was consider to be statistically significant. Results are presented as a multivariate analysis of treatment time and also with procedure performed for doses and pain level. The primary outcome assessed were the use of opioids, level of pain, and length of stay

**Results:** A pairwise comparison demonstrated that there was a statistically significant difference ( $p < 0.05$ ) between orthopedic cocktail (OC), liposomal bupivacaine (LB) and standard of care (SOC) Groups for minimum and maximum pain scores, total doses and milligrams morphine equivalents (MME). However no statistical significance was found when comparing between LB and SoC for minimum ( $p = 1.0$ ) and maximum ( $p = 0.688$ ) scores. Similarly, comparison between LB and SoC showed no statistically significant difference in PO dose ( $p = 0.704$ ) or MME dose ( $p = 0.090$ ). However, IV dose was found to be statistically different for this comparison group.

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**Conclusion:** Orthopedic cocktail show superiority over LB and SoC in lowering minimum and maximum pain scores. It was also effective in lowering the total number of doses of opioid pain medications and overall MME. During our initial assessment, no significant difference was found between Exparel and SoC.

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**Session-Board # - 4-143**

**Poster Title:** Opioid-free postoperative recovery in patients undergoing herniorrhaphy with HTX-011 as the foundation of a scheduled non-opioid, multimodal analgesic regimen

**Poster Type:** Evaluative Study

**Submission Category:** Pain Management/Palliative Care

**Primary Author:** Jackie Evans-Shields, Heron Therapeutics, Inc; **Email:** jevansshields@herontx.com

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**Purpose:** HTX-011 is a novel extended-release dual-acting local anesthetic combining bupivacaine with low-dose meloxicam in a Biochronomer polymer. In a Phase 3 herniorrhaphy study (EPOCH 2), treatment with HTX-011 without background multimodal analgesia (MMA) provided superior pain relief, significantly reduced the incidence of severe pain and total opioid consumption, and resulted in significantly more opioid-free patients through 72 hours than either placebo or bupivacaine hydrochloride. This follow-on study was conducted to evaluate the efficacy and safety of HTX-011 when given as the foundation of a scheduled non-opioid MMA regimen that includes nonsteroidal anti-inflammatory drugs (NSAIDs) and acetaminophen.

**Methods:** This was an open-label follow-on study to the Phase 3 trial in patients undergoing unilateral, open inguinal herniorrhaphy including 2 sequential cohorts. In both cohorts, patients received HTX-011 300 mg/9 mg (bupivacaine/meloxicam) administered via needle-free application into the surgical site. The nonopioid MMA regimen consisted of preoperative oral acetaminophen 1 g and postoperative oral ibuprofen 600 mg and oral acetaminophen 1 g, each given every 6 hours (alternating every 3 hours) throughout the 72-hour inpatient postoperative period. Patients in cohort 2 also received intravenous ketorolac intraoperatively as part of the MMA regimen. Upon discharge, patients were instructed to manage pain with oral ibuprofen 600 mg every 6 hours as needed and add oral acetaminophen 1 g every 6 hours if needed. The



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primary efficacy endpoint was the proportion of patients who remained opioid-free through 72 hours after surgery. Secondary endpoints included the proportion of patients who remained opioid-free through recovery on days 10 and 28, total opioid consumption, and the proportion of patients in severe pain (numeric rating scale [NRS]  $\geq 7$ ) at any time through 72 hours after surgery.

**Results:** Across both cohorts 63 patients were treated. More than 90% of patients who received HTX-011 and a non-opioid MMA regimen did not require opioids to manage their postoperative pain for 72 hours after surgery; in comparison, 51%, 40%, and 22% of patients were opioid-free from the Phase 3 study who received HTX-011, bupivacaine hydrochloride, and placebo, respectively, when no MMA was employed. Among the patients who were opioid-free through 72 hours in this study, 96.5% remained opioid-free through Day 10 and 91.2% remained opioid-free through Day 28. Mean  $\pm$  SE total postoperative opioid consumption was  $0.9 \pm 0.41$  milligram morphine equivalents overall. The proportion of patients with severe pain during the 72-hour postoperative period was 17.5% across both cohorts. Mean pain scores were mild throughout the 72-hour period (NRS  $< 4$ ). Intravenous ketorolac did not provide additional efficacy benefit. Overall, 24 (38.1%) patients experienced an adverse event (AE); this number was comparatively lower than the incidence of AEs observed in the Phase 3 study, because of the lower rates of opioid-related AEs. There were no new safety signals associated with the use of ibuprofen, acetaminophen, or ketorolac together with HTX-011, including no evidence of NSAID-related cardiovascular, gastrointestinal, or renal toxicity.

**Conclusion:** The use of HTX-011 as the foundation of a scheduled non-opioid MMA regimen enabled the majority of patients to remain in mild pain with more than 90% of patients remaining opioid-free through 72 hours. This may translate to a reduced need for opioid prescriptions at discharge. The high proportion of opioid-free patients led to fewer opioid-related AEs and fewer overall AEs than in the Phase 3 study. This study demonstrated that HTX-011 can safely be administered with other NSAIDs and acetaminophen.

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**Session-Board # - 4-144**

**Poster Title:** HTX-011 as the foundation of a non-opioid, multimodal analgesic regimen reduces the need for opioids following herniorrhaphy in a real-world study

**Poster Type:** Evaluative Study

**Submission Category:** Pain Management/Palliative Care

**Primary Author:** John Fanikos, Brigham and Women's Hospital, Harvard Medical School; **Email:** jfanikos@bwh.harvard.edu

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**Purpose:** HTX-011, an extended-release dual-acting local anesthetic containing bupivacaine and meloxicam in a Biochronomer polymer, has enabled over 90% of patients to be opioid-free after herniorrhaphy when used as the foundation of a non-opioid multimodal analgesia (MMA) regimen in a prior study. This MMA regimen included over-the-counter ibuprofen and acetaminophen. Patients were required to remain in the facility for 72 hours postoperatively. Here, we present Part 1 of a Phase 3b open-label study evaluating 2 HTX-011-based postoperative non-opioid MMA regimens following herniorrhaphy in a real-world setting in which patients were discharged 2-3 hours following surgery.

**Methods:** In this study in patients undergoing open inguinal herniorrhaphy, patients were randomly assigned (1:1) to 1 of 2 parallel cohorts evaluating 2 non-opioid MMA regimens. All patients received preoperative oral ibuprofen 400 mg and oral acetaminophen 1 g, and intraoperative HTX-011 300 mg/9 mg (bupivacaine/meloxicam). After surgery, patients were instructed to follow their assigned postoperative non-opioid MMA regimen consisting of oral ibuprofen 600 mg every 6 hours plus oral acetaminophen 1 g every 6 hours alternating every 3 hours (Cohort 1) or taken together (Cohort 2) for 5 days; after Day 6, patients could continue their MMA regimen as needed. Patients were discharged per institution's practice and followed up on Days 15 and 29. Patients who had a numeric rating score (NRS) pain intensity score  $\geq 6$  or who received a postoperative opioid before discharge, were provided with a prescription for oxycodone (ten 5-mg pills). The primary endpoint was the proportion of patients who do not

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receive an opioid prescription through Day 15. Secondary endpoints included the proportion of patients receiving an opioid prescription at discharge or postdischarge through Day 15, number of oxycodone pills taken between discharge and Day 15, pain intensity scores at discharge, number of patient-initiated callbacks, mean total Treatment Satisfaction Questionnaire for Medication score, and safety.

**Results:** A total of 93 patients from Part 1 were included in this analysis; the average time to discharge was 2.4 hours, reflective of the real-world setting. The majority of patients (89% in Cohort 1 and 94% in Cohort 2) were discharged without an opioid prescription. No patient discharged without an opioid prescription called back to request an opioid prescription. Of the 8 patients provided with an opioid prescription, only 2 from Cohort 1 and 1 from Cohort 2 took any oxycodone pills between discharge and Day 15. Through Day 15, only 1 of these 8 patients initiated a callback for an opioid prescription refill. Mean pain scores at discharge were mild (NRS < 4) in both cohorts. Patients indicated an overall high satisfaction in all 3 domains (effectiveness, convenience, and global satisfaction) with both MMA regimens. Similar to previous studies, there were no new safety signals associated with the use of ibuprofen and acetaminophen with HTX-011, including no evidence of nonsteroidal anti-inflammatory drug-related cardiovascular, gastrointestinal, or renal toxicity.

**Conclusion:** In this real-world setting, the use of HTX-011 as the foundation of a non-opioid MMA regimen enabled 91% of patients to be discharged without an opioid prescription and remain opioid-free in the postoperative recovery period following herniorrhaphy. The decrease in opioid use was not accompanied by an increase in patient-initiated callbacks. Both MMA regimens, alternating and concurrent administration, were effective and had similarly high levels of patient satisfaction. HTX-011 used together with ibuprofen and acetaminophen was well tolerated. HTX-011 as the foundation of a non-opioid MMA regimen may eliminate or reduce the need for opioids following herniorrhaphy.

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**Session-Board #** - 4-145

**Poster Title:** Pharmacists and health personnel attitudes and beliefs of dispensing naloxone either with a prescription or via a physician-approved protocol in Ohio

**Poster Type:** Evaluative Study

**Submission Category:** Pain Management/Palliative Care

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**Purpose:** The objective of this study was to evaluate the attitudes and beliefs of dispensing naloxone either with a prescription or via a physician-approved protocol policy that was implemented in Ohio. Following the increasing opioid-related overdoses in Ohio, pharmacists are recognized as important healthcare professionals capable of influencing overdose death prevention through naloxone distribution. In 2015, Ohio passed a policy (House Bill 4) that permits a pharmacist or pharmacy intern (under the supervision of a pharmacist) to distribute intramuscular, injection and intranasal formulations of naloxone under a physician-approved protocol.

**Methods:** An electronic survey was sent to a random sample of pharmacies and community naloxone distribution sites (Project DAWN) in Ohio. The Contextual Interaction Theory (CIT) was used as framework to develop the survey. The CIT uses motivation, information, and power of the policy implementer and target to evaluate an implementation process. Descriptive statistics were calculated to summarize survey responses.

**Results:** The overall survey response rate was 31.3%. Seventy percent of survey respondents stated they were able to dispense naloxone via a physician-approved protocol, leaving 30% of respondents dispensing naloxone with a prescription. Most respondents (84%) agreed/strongly agreed that the policy has allowed individuals who want/need naloxone to have access through their workplace. Around 44% of sites indicated that they always/sometimes proactively identify

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candidates to receive naloxone via protocol. Most respondents felt very comfortable/comfortable dispensing naloxone to an individual who works with people at risk of an opioid overdose (90.7%) or felt very comfortable/comfortable dispensing naloxone to a family member or friend of a person at risk of an opioid overdose (88.3%). However, around 38% of respondents felt that an opioid overdose reversal with naloxone encourages future misuse of opioids.

**Conclusion:** This study identified the attitudes and beliefs of pharmacists and health personnel dispensing naloxone either with a prescription or via a physician-approved protocol established by policy (House Bill 4) in Ohio. Generally, participants showed a supportive and positive attitude toward the policy, but some respondents felt that overdose reversal with naloxone encouraged future misuse of opioids.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-146

**Poster Title:** Palonosetron alleviates multiple-day chemotherapy-induced nausea and vomiting

**Poster Type:** Evaluative Study

**Submission Category:** Pain Management/Palliative Care

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**Purpose:** Patients on multiple-day chemotherapy often experience acute and delayed nausea and vomiting during the treatment period. However, no effective method for preventing multiple-day chemotherapy-induced nausea and vomiting has been determined. This study aimed to explore the efficacy of the second-generation 5-HT<sub>3</sub> antagonist palonosetron for multiple-day chemotherapy-induced nausea and vomiting compared with that of first-generation 5-HT<sub>3</sub> receptor antagonists.

**Methods:** This case-control study enrolled patients administered 5-day cisplatin-based combination chemotherapy (bleomycin 30 U IV weekly plus etoposide 100 mg/m<sup>2</sup> IV and cisplatin 20 mg/m<sup>2</sup> IV, both on days 1-5; every 21 days) who were given aprepitant, dexamethasone and first-generation 5-HT<sub>3</sub> antagonist, granisetron or ramosetron, or the second-generation palonosetron. The patients were then divided into two groups: the first generation group comprised patients given first-generation drugs (granisetron 3 mg or ramosetron 0.3 mg once daily as intravenous dose) before chemotherapy initiation on days 1-5, while the palonosetron group comprised patients given palonosetron 0.75 mg once before chemotherapy initiation on day 1. The proportions of patients with complete response, complete control, or total control during the overall (0-216 h), remedial (0-120 h), and after (120-216 h) phases were evaluated. The remedial phase was further divided into early (0-24 h) and later (24-120 h) phases. Additionally, we evaluated patient's nutritional status using calories per day according to oral intake.

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**Results:** A total of 43 patients were enrolled. The first-generation drugs and palonosetron were administered in 21 and 22 patients, respectively. The complete response rate of the later phase was significantly higher in the palonosetron group (17/22; 77.3%) than that in the first-generation group (10/21; 47.6%) ( $P=0.04$ ). The number of patients who achieved, complete control and total control were significantly higher in the palonosetron group than that in the first-generation group in the after phase (complete control:  $P = 0.05$ , total control:  $P=0.03$ ). Additionally, caloric oral intake was higher in the palonosetron group than that in the first-generation group. Regarding nutritional status, dietary calorie intake in the treatment period was lower than that before BEP therapy, and the decreased calorie intake lasted in the after treatment period. However, the decrease in the palonosetron group was milder than that in the first-generation group. Particularly, caloric intake in the later phase and after phase were significantly higher in the palonosetron group than that in the first-generation group (later phase:  $1351.8 \pm 618.6$  kcal/day vs.  $885.5 \pm 722.0$  kcal/day,  $P=0.03$ ; after phase:  $1377.3 \pm 574.5$  kcal/day vs.  $885.8 \pm 743.2$  kcal/day,  $P=0.02$ ).

**Conclusion:** Palonosetron significantly reduces vomiting during chemotherapy and maintains dietary intake. Therefore, palonosetron is more effective for controlling multiple-day chemotherapy-induced nausea and vomiting.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-147**

**Poster Title:** Opioid-free postoperative recovery in patients undergoing bunionectomy with HTX-011, an extended-release local anesthetic

**Poster Type:** Evaluative Study

**Submission Category:** Pain Management/Palliative Care

**Primary Author:** Jia Hu, Heron Therapeutics, Inc.; **Email:** JHu@herontx.com

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Gwo-Chin Lee

**Purpose:** HTX-011, an extended-release dual-acting local anesthetic combining bupivacaine with low-dose meloxicam in a Biochronomer polymer, has demonstrated effectiveness through 72 hours in multiple types of surgical models. In a previously conducted Phase 3 bunionectomy study (EPOCH 1), treatment with HTX-011 without background multimodal analgesia (MMA) provided superior pain relief, reduced the incidence of severe pain, significantly reduced total opioid consumption, and resulted in significantly more opioid-free patients through 72 hours than either placebo or bupivacaine hydrochloride. The current follow-on study was designed to assess the efficacy of HTX-011 when used as the foundation of a scheduled non-opioid MMA protocol.

**Methods:** We prospectively evaluated 31 patients undergoing bunionectomy using HTX-011 along with scheduled ibuprofen and acetaminophen. HTX-011 (60 mg/1.8 mg bupivacaine/meloxicam; 2.1 mL) was applied without a needle into the surgical site at the end of surgery before closure. Patients were kept in house for 72 hours and given a postoperative MMA regimen of oral ibuprofen 600 mg and oral acetaminophen 1 g, each given every 6 hours (alternating every 3 hours) throughout the 72-hour inpatient postoperative period (total 2400 mg ibuprofen and 4 g acetaminophen per day). Rescue opioids were available upon request. Upon discharge, patients were instructed to use 600 mg ibuprofen every 6 hours as needed and to add acetaminophen (1 g) every 6 hours if pain persisted. Only patients who received  $\geq 10$  mg oxycodone within 12 hours before discharge were to be provided an opioid discharge prescription. Efficacy assessments included pain intensity (assessed using an 11-point [0 to 10]



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Numeric Rating Scale [NRS]) and opioid use (assessed via concomitant opioid use while inpatient and opioid daily diary after 72 hours through Day 28). Safety assessments included adverse events and clinical laboratory tests.

**Results:** Baseline characteristics (mean age, 49 years; 94% female; 87% white) were similar to those of patients who received HTX-011 in the initial Phase 3 study (mean age, 48 years; 88% female; 78% white). Mean NRS pain intensity remained  $< 3$  (out of 10, mild pain,  $< 4$ ; moderate pain, 4-6; severe pain,  $\geq 7$ ) at all time points through 72 hours. A total of 24 patients (77.4%) required no opioids (ie, opioid-free) through 72 hours and all remained opioid-free through the 28-day recovery period. To compare, in the Phase 3 study 29% who received HTX-011, 11% who received bupivacaine HCl, and 2% who received placebo were opioid-free through 72 hours. In this study AEs were reported by 20 patients (64.5%); none were severe and the most common were nausea (23%) and vomiting (10%). There was no evidence of gastrointestinal, renal, or hepatic toxicity.

**Conclusion:** HTX-011 when used as the foundation of a non-opioid MMA regimen including scheduled ibuprofen and acetaminophen was able to maintain pain in the mild range resulting in the elimination of postoperative opioid use in 77% of patients after bunionectomy through the 28-day recovery period. Use of HTX-011 demonstrated reduced opioid prescriptions upon discharge. This study also provided evidence that ibuprofen and acetaminophen can safely be administered with HTX-011.

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**Session-Board # - 4-148**

**Poster Title:** Impact of pain stewardship and palliative care programs on reducing opioid utilization and improving management of pain at a suburban community hospital

**Poster Type:** Evaluative Study

**Submission Category:** Pain Management/Palliative Care

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**Purpose:** Pain stewardship programs serve to assure proper pain management in patients by utilizing multimodal analgesia and reduce opioid utilization in response to the growing opioid epidemic in the United States. Multimodal analgesia includes use of non-opioid analgesics and non-pharmacologic interventions has shown to reduce doses of opioids, reduce risk of opioid-related adverse events, shorten length of stay, reduce pain during rest and activity and improve patient satisfaction. The purpose of this study was to determine whether implementation of pain stewardship and palliative programs in a 130-bed suburban hospital reduced opioid utilization over a 28 month period.

**Methods:** In order to reduce opioid prescribing and utilization, hospital leadership initiated both a pain stewardship program and a palliative care program to meet the needs of the patient population. A multidisciplinary pain management committee was created outlines steps needed to reduce opioid use, including reviewing pain assessment techniques, developing an opioid risk tool, education of nurses, implementing various hospital-wide non-pharmacologic interventions, as well as the creation of pain-order sets in the electronic medication record to assist with analgesic prescribing and preventing therapeutic duplications. Non-pharmacologic interventions implemented included use of warm and cold packs as part of physical therapy, as well as use of aroma therapy, music therapy, pet therapy, distraction techniques, quiet time and spiritual support. Patients who present with opioid dependence would be referred to receive proper assistance through the social work department. Additionally, the committee established metrics which would be used to assess outcomes, including opioid administration per 1000 patient-days, use warm and cold compresses per 1000 patient-days as well as naloxone use,

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opioid-related adverse events and pharmacist-driven pain interventions, including therapeutic duplications. The hospital also established a palliative care consult team, consisting of a qualified physician and nurse who assess and manage patients who have complex pain management requirements and require symptomatic care or need an evaluation for end-of-life care.

**Results:** Although the interventions were implemented at various times during 2018, a number of trends have been identified. Primarily, between January 2017 and April 2019, the overall change in opioid administrations was a 14.8 percent decrease. This trend was driven by a 44.4 percent decrease in hydromorphone and a 37.1 percent decrease in tramadol administrations. Morphine saw a 3.0 percent decrease, while fentanyl and oxycodone increased by 7.6 and 6.7 percent, respectively over the study period. Naloxone administrations had decreased by 41.4 percent for admitted patients, while increasing by 23.4 percent for all patients, including those in the emergency department. When evaluating non-opioid analgesics, it was found that total acetaminophen utilization increased 47.5 percent, which included a 288 percent increase in intravenous acetaminophen use. Non-steroidal anti-inflammatory drugs (NSAIDs) showed an overall increase of 38.4 percent, with increases of 25.6 and 46.3 percent in ibuprofen and ketorolac, respectively being the primary contributors. Additionally, purchasing records of warm and cold packs were evaluated as well. There was a 463 percent increase in warm packs and 33.1 percent increase in cold packs, indicating that non-pharmacological modalities play an increasing role in pain management in patients.

**Conclusion:** Establishment of pain stewardship and palliative care programs have been effective in reducing opioid utilization hospital-wide. A combination of multidisciplinary interventions including increased use of non-opioid analgesics, proper pain assessment and various non-pharmacologic interventions have shown to curb the use of opioids hospital-wide. Although efforts to date have shown progress, more work must be done to further reduce opioid use. Future initiatives to further curb opioid use include creation of order sets for the emergency department to better manage acute pain, increase the use of intravenous acetaminophen to manage post-operative pain and expand our palliative care program.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-149**

**Poster Title:** In vitro assessment of known CES1 inhibitors on CES1 activity and heroin metabolism

**Poster Type:** Evaluative Study

**Submission Category:** Pharmacokinetics

**Primary Author:** Tara Gilliland, University of Florida College of Pharmacy; **Email:** tgilliland@ufl.edu

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**Purpose:** Heroin is involved in more than one third of opioid-related overdose deaths in the US and is derived from morphine. Upon administration, heroin is primarily and rapidly deacetylated to form the active metabolites 6-monoacetylmorphine (6-MAM) and morphine. Studies have indicated that a delay of heroin hydrolysis in plasma can lead to increased 6-MAM and morphine exposure in the brain, and thereby increased drug effects. In this study, we assessed the contribution of the major hepatic hydrolase, carboxylesterase 1 (CES1), to heroin metabolism and evaluated the potential influence of known CES1 inhibitors on the hydrolysis of the drug in the liver.

**Methods:** In vitro systems using S9 fractions from either human liver or human embryonic kidney 293 cells stably expressing wild-type CES1 were employed in our assessment. Depletion of heroin and formation of 6-MAM and morphine were monitored by LC-MS/MS. Kinetic parameters were derived from nonlinear regression analysis.

**Results:** Under our experimental conditions, 6-MAM was formed by both liver and cell S9, while morphine was only formed by liver S9. By employing the relative activity factor approach, the contribution of CES1 to the first-step hydrolysis of heroin in the liver was determined as 4.35%. Co-incubation with CES1 selective inhibitor valproic acid had limited effects on heroin metabolism. The major cannabinoids ( $\Delta^9$ -tetrahydrocannabinol (THC), cannabidiol (CBD), cannabinol (CBN)), exhibited potent in vitro inhibition on both 6-MAM and morphine formation at 5  $\mu\text{g/ml}$ , but had insignificant influence at their physiological concentrations.

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**Conclusion:** These results suggest positive, although limited involvement of CES1 in the conversion of heroin into 6-MAM in the liver. Due to its limited contribution, drugs with known activity-modifying effects toward CES1 are not expected to cause significant influence on heroin disposition. Cannabinoids, which have recently been proposed to fight opioid addictions, may have the potential to interact with heroin and thereby should be used with cautions for this purpose.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-150

**Poster Title:** Population pharmacokinetics and renal toxicity of cisplatin for cancer patients with renal dysfunction

**Poster Type:** Evaluative Study

**Submission Category:** Pharmacokinetics

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**Purpose:** Pharmacokinetics of cisplatin (CDDP) has not been investigated for patients with renal dysfunction and creatinine clearance (Ccr) of  $< 60$  mL/min. In this study, we performed population pharmacokinetic analysis of CDDP in the patients with renal dysfunction, and investigated the effect of renal dysfunction on the pharmacokinetics of CDDP. Additionally, CDDP-induced nephrotoxicity was researched.

**Methods:** Twenty three patients (Ccr: 35.1-59.9 mL/min) were treated with CDDP (35-80 mg/m<sup>2</sup>) via intravenous constant infusion for 60 min. Blood samples were taken at 2-4 time points per patient. Population pharmacokinetic analysis was performed by nonlinear mixed effect modelling using NONMEM (Version 7.2). The final model was evaluated using nonparametric bootstrap analysis.

**Results:** A one-compartment structure model adequately described the CDDP data. The population mean values for CDDP clearance (CL) and distribution volume (Vd) were 19.1 L/h (%CV 19.4) and 13.8 L (%CV 41.0), respectively. In the final model, body surface area (BSA) was identified as a significant covariate for CL. However, no significant covariates were found for Vd. With regard to the nephrotoxicity, no one experienced severe renal dysfunction wherein serum creatinine (Scr) was increased to grade 3 or 4.

**Conclusion:** Renal dysfunction does not affect the pharmacokinetics of CDDP. The dose adjustment of CDDP due to renal dysfunction may not be necessary for pharmacokinetics.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-151**

**Poster Title:** Accreditation of an international pharmacy residency program: Qatar's experience

**Poster Type:** Descriptive Report

**Submission Category:** Pharmacy Law/Regulatory/Accreditation

**Primary Author:** Rasha Al Anany, Hamad Medical Corporation; **Email:** relenany@hamad.qa

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**Purpose:** Hamad Medical Corporation (HMC) postgraduate year one (PGY1) pharmacy residency program is the first American Society of Health-System Pharmacists (ASHP) accredited program in Qatar and among few accredited programs outside United States (US). HMC is the leading provider of secondary and tertiary healthcare in Qatar and the only healthcare system outside the US to have all of its hospitals accredited by Joint Commission International (JCI). Developing a pharmacy residency program and attaining ASHP accreditation is considered a cornerstone in the pharmacy profession advancement in Qatar.

**Methods:** Methods

A team of executive director of pharmacy, residency program director (RPD), residency program coordinators and pharmacists representing HMC hospitals was appointed as the residency advisory committee (RAC) to lead the program establishment and development. The RAC established a firm selection process of residency preceptors and residents; designed the learning experiences curriculum, monitored the program progress, and arranged the accreditation procedures. The ASHP accreditation survey report went through extensive reviews on regular meetings by the residency team to prepare for the program's official response report. The program applied a rigorous process to ensure compliance with 2014 ASHP accreditation standards.

**Results:** The first recruitment was in 2015 summer, and the first patch of two residents started a twelve months residency program with an ASHP accreditation candidate status. The ASHP surveyors were hosted on October 2016 seeking full residency program accreditation. The

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survey schedule included visits to different HMC facilities that are integrated with the corporate pharmacy department besides meeting the residency team. The ASHP accreditation survey report was received on Jan 2017 and did not include any areas of noncompliance to the accreditations' standards. The program's survey response report covered areas of partial compliance findings the majority of which have been involved in the residency program development and advancement and incorporated within pharmacy department strategic plans. Few remaining challenging areas for partial compliance were related to different HMC corporate levels have been worked up through various meetings and committees. Moreover, ASHP survey response incorporated consultative recommendations that inspired our residency program to go beyond the accreditation standards and go extra miles in getting the most out of this program. The official accreditation was received in April 2017 for three years (2017-2020).

**Conclusion:** HMC PGY1 pharmacy residency program successfully achieved ASHP accreditation in two years and created an opportunity to foster Qatar's pharmacy practice. Such international accreditation assures that the advanced training will provide our pharmacists with the knowledge, skills, and experience they need to excel in their careers, which will further enhance pharmacy clinical practices and the quality of patients care. The program is considering plans for pursuing a PGY2 program establishment and its accreditation.



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**Session-Board #** - 4-152

**Poster Title:** Student pharmacist involvement on the legislative team for the state pharmacy association to expand access to tobacco cessation products

**Poster Type:** Descriptive Report

**Submission Category:** Pharmacy Law/Regulatory/Accreditation

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**Purpose:** To encourage student pharmacists and residents to be involved in advocacy, and to describe the process of drafting, introducing and promoting legislation to enhance pharmacists' scope of practice to include prescriptive authority for tobacco cessation products.

**Methods:** Nine states in which pharmacists can currently prescribe tobacco cessation products were identified through the National Alliance of State Pharmacy Associations (NASPA). The statutes and regulations from these states identified were compiled and analyzed by a student pharmacist selected to serve as the Legislative Student Liaison for the Rhode Island Pharmacists Association. Exemplar parts of each state's regulations were adapted and cobbled together to form a cohesive draft of a bill for introduction in the Rhode Island General Assembly. Each segment of the bill was selected based on the utility and prospective fit for the patient population of Rhode Island. States with exemplar laws upon which the majority of the RI bill was drafted included Colorado, Idaho and Arizona. A Representative and Senator to sponsor the bill were selected based on previous collaborations with RIPA and their Policy Analyst worked with the Legislative Team to finalize the bill language for introduction.

**Results:** House Bill 5558 and Senate Bill 0306 were introduced into the House Committee on Health, Education and Welfare and the Senate Committee on Health and Human Services in February of 2019. They were both subsequently scheduled for hearing in front of the committees in March of 2019 and recommended to be held for further study. Student pharmacists, practicing pharmacists, insurers, chain pharmacy lobbyists and members of the public attended the hearings and testified on behalf of the bills. The Rhode Island Medical

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Society signed in as opposed the legislation. Currently the bills are being tracked for consideration by the committees and potential referral to the House and Senate for full vote.

**Conclusion:** Student pharmacists, residents and pharmacists can effectively collaborate with state pharmacy associations and local elected officials to draft and introduce legislation that will enhance public access to tobacco cessation therapy through pharmacist prescriptive authority.

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**Session-Board # - 4-153**

**Poster Title:** Implementation of United States Pharmacopeia (USP) 797 and 800 compliant sterile compounding pharmacies at a large multihospital health system

**Poster Type:** Descriptive Report

**Submission Category:** Pharmacy Law/Regulatory/Accreditation

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**Purpose:** In 2017 as part of the preparation for the new USP 800 and revised USP 797, a large multi hospital health system completed a USP 797 and 800 gap analysis for all pharmacy sterile compounding areas. The information collected in this activity was used to determine the level of adherence to the USP standards, identify next steps, and develop action plans necessary to create a compliant sterile compounding pharmacy enterprise with the goal of 100% compliance by the enforceability date of December 1st, 2019.

**Methods:** Information collected from the gap analysis activity was compiled into system level trend documents and presented to the health system board of directors to gain capital budget approvals for construction necessary to address the facility design deficits. Entity specific finding were distributed to site level pharmacy managers for review and action. Construction prototypes were developed for cleanroom design with input from the pharmacy leadership group and USP content experts. A multidisciplinary system level USP steering committee was created to guide action, vet solutions, and promote standardization in practice throughout the system pharmacies. System level policies were enacted to support the standardized compliance expectations. Subcommittees; the Assessment of Risk Workgroup and the USP 800 Taskforce, were created to approve and standardize the new processes and work practices the USP 800 Chapter will require. Continuous readiness surveys were developed and completed to review local entity USP 797 and 800 related practices. Action plans are created for each site from these surveys. The surveys are completed for all sterile compounded product preparation areas at least annually and reported out to the USP Steering Committee.

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**Results:** In 2018 a survey tool was developed and executed to assess compliance rates, overall USP 797 compliance at UH was 85.2%. We reassessed compliance in the first quarter of 2019 and showed an 8.5% increase in compliance, the overall 2019 average USP 797 compliance rate for UH is 93.9%.

In 2018 the overall compliance for USP 800 practices was 66%, while USP 800 facility requirements was 64%. The 2019 survey for USP 800 practices will be redone one year after the initial assessment, in September 2019. The 2019 USP 800 facilities survey shows 100% compliance for areas that have construction complete.

**Conclusion:** The initial gap assessment was completed in 2017. A number of pharmacy sites require the construction project completion before they will be able to achieve 100% compliance with either USP 797 or USP 800 chapters. The system construction project is on track and set to complete in November 2019. With the conclusion of the system level construction project and the standardization work completed within the multi-hospital multidisciplinary USP committees, the health system is on track to demonstrate 100% compliant pharmacies.

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**Session-Board #** - 4-154

**Poster Title:** Alaska's pathway to pharmacist medical provider status: are statutes and regulations already in place

**Poster Type:** Descriptive Report

**Submission Category:** Pharmacy Law/Regulatory/Accreditation

**Primary Author:** Renee Robinson, Idaho State University College of Pharmacy; **Email:** robinsonrf@yahoo.com

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**Purpose:** Decades of research has proven the value of pharmacists in improving health outcomes, lowering healthcare costs, and increasing access to care. However, the compensation pharmacists receive from insurers are based on an antiquated model of pharmacist-provided patient care that does not consider the ever-expanding scope of pharmacist-provided healthcare services. Therefore, pharmacists are either denied or do not receive equal compensation for the same services rendered by other healthcare providers resulting in compensation discrimination.

**Methods:** In July 2018, the Alaska Pharmacist Association sponsored the Sustainable Education & Training Model under Pharmacist-Provider Reimbursement demonstration project to identify and address factors contributing to compensation discrimination.

**Results:** For pharmacists to bill for healthcare services provided within their scope of practice, they must be credentialed as a "provider" by insurers. In Title 21 of Alaska Statute on Insurance Regulation, a provider is: "a person licensed ... to provide medical care services" (AS 21.07.250). Under AS 08.08, a licensed pharmacist is a "health care provider" and provider of "medical care services" (Alaska's Pharmacy Practice Act, Title 8). A "person with an active license under AS 08, or under the laws of the jurisdiction in which the person provides [medical care or health] services, [is an] Eligible Medicaid Provider ..." (7 AAC 105.200).

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**Conclusion:** Based on Alaska statutes and regulations, pharmacists are medical providers and are therefore eligible for reimbursement for pharmacist-provided healthcare services through insurers at the same rate as other healthcare providers. Through the provision of equal compensation for healthcare services, insurers will contribute to the sustainability of the expanding scope of pharmacist-provided healthcare services to underserved patient populations.

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**Session-Board #** - 4-155

**Poster Title:** Technology-check-technician: our journey in Massachusetts

**Poster Type:** Descriptive Report

**Submission Category:** Pharmacy Law/Regulatory/Accreditation

**Primary Author:** Erin Taylor, Baystate Health; **Email:** erin.taylor@baystatehealth.org

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**Purpose:** The 2015 National Association of Boards of Pharmacy identified fifteen states with approved regulations that remove the requirement for pharmacist visual verification in an institutional setting. Michigan passed regulation to support technology-check-technician processes when automated dispensing machines (ADMs) and bedside barcode scanning verification are used. A 2016 study by Wang and colleagues demonstrated technology to be more accurate than pharmacist validations, and when leveraged, allowed for reallocation of over 1400 hours of Pharmacist time. Massachusetts regulations do not allow certified pharmacy technicians to perform dispensing process validations. Given these advantages, we explored introducing a technology-check-technician program in Massachusetts.

**Methods:** Two academic, tertiary medical centers partnered to pilot changes to pharmacy regulations governing pharmacy technician responsibilities related to dispensing process validation in Massachusetts. In order to better establish the ideal process, we worked with members of the ASHP government relations team and referenced the 2015 National Association of Boards of Pharmacy (NABP) survey of pharmacy law data to appreciate the various scopes of pharmacy technician regulations. A literature review was helpful to understand the pros and cons of different approaches, and primarily focused on workflows that leveraged technology to replace the visual verification step in the dispensing process. A survey was distributed to institutional members of the Massachusetts Society of Health System Pharmacists (MSHP) gathering information on the type of technology used at each site, scanning compliance rates, and interest in pursuing a technology-check-technician program. Choosing a strategy that utilized barcode validation technology, the two medical centers collaborated on a proposal to pilot a technology-check-technician process. In order to proceed

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with the pilot, we needed to obtain a waiver from the Massachusetts Board of Registration in Pharmacy that would outline the scope and workflow, as well as the data to be collected related to quality and safety outcomes and technician employee training. The results of this pilot would help determine next steps in making formal changes to the technician regulations in Massachusetts.

**Results:** The MSHP survey captured data from eighteen facilities, identifying comprehensive use of barcode scanning at the time of ADM replenishment and at the bedside at the time of dose administration, as well as strong interest in pursuing a technology-check-technician process. The waiver proposal was presented to the Massachusetts Board of Registration in Pharmacy and approved for a twelve month pilot. Our technology-check-technician process begins when a medication is removed from the pharmacy's electronic inventory management system for dispensing to an ADM. The scope included medications dispensed from the electronic inventory management system for ADM inventory replenishment, excluding schedule II through V and patient-specific (including compounded) medications. Monthly audits were conducted to track accuracy and scanning compliance, and trend errors at the point of dispensing from the electronic inventory and after loading into the ADM. The data demonstrated continued compliance with scanning processes and no trends suggesting patient safety risks. Following pilot completion, the data was presented to the Massachusetts Board of Registration in Pharmacy and we gained waiver approval to continue our process. Since that time, the Board of Pharmacy approved an advisory that allows other acute care institutions in the state to mirror our technology-check-technician process.

**Conclusion:** At the onset of our journey we utilized various resources to best understand the ideal workflow that was not only supported by literature, but was also progressive to capture practice advancement initiative concepts. Partnering with members of the Board of Registration in Pharmacy helped us understand our options for implementing change and any potential barriers to our proposal. Having the opportunity to collaborate across organizations helped demonstrate the positive impact of these practice changes at different organizations.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-156

**Poster Title:** Impact of a pharmacy-driven admission medication history service at a rural community teaching hospital

**Poster Type:** Descriptive Report

**Submission Category:** Pharmacy Technicians: Competencies/Development/Other

**Primary Author:** L. Megan Brown, Cardinal Health for TJ Regional Health; **Email:** Leslie.Brown01@cardinalhealth.com

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**Purpose:** A complete and accurate list of a patient's medications upon admission to the hospital is vital to preventing discrepancies in hospital medication orders. Discrepancies may include unintentional additional or omitted medications or variations in dosage, frequency, or route from the patient's home list and the intended hospital medication orders. Such discrepancies can interfere with tests, treatments and medications administered throughout the admission and potentially negatively impact outcomes. A pharmacy-driven admission medication history service was implemented with the primary goal to reduce discrepancies during medication reconciliation and, thereby, improve the safety and quality of care in a rural community teaching hospital.

**Methods:** Our hospital completed an evaluation during fall 2017 to determine the rate of unintentional medication discrepancies per medication upon hospital admission and discharge. To validate the quality of medication histories obtained upon admission, a pharmacist or pharmacy intern collected the gold standard medication list for 15 randomly identified patients admitted to a medical-surgical or stepdown unit. Post discharge, a retrospective chart review was completed comparing medication histories along with admission and discharge medication reconciliation lists to the gold standard list. Data collected included the number of gold standard home medications, time to complete the medication history interview with appropriate documentation, and frequency and description of medication discrepancies. Discrepancies were classified as addition, omission, incorrect dosing, frequency, or route of administration. A pharmacy-driven medication history service was implemented summer 2018 and data collected from October 1, 2018 to March 31, 2019. The service consists of pharmacy

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technicians who collect admission medication histories on more than 90% of hospital admissions. The service is staffed 0800 to 2000 weekdays and 0700 to 1530 weekends. The admission medication histories may initially be obtained by either nursing or medical staff during non-routine hours of the pharmacy service and confirmed by a pharmacy technician within 24 hours of admission. The same evaluation process was utilized as a component of the performance improvement plan for the recently developed pharmacy-driven service.

**Results:** Prior to implementation of a pharmacy-driven admission medication history service, 44.9% of medications listed in medication histories upon admission, 29% of medications reconciled upon admission and 18.2% of medications reconciled upon discharge contained at least one discrepancy. Pharmacy technician ownership for collecting medication histories has resulted in decreased unintentional discrepancies in the medication reconciliation process. When collected by pharmacy technicians, our study demonstrates unintentional discrepancy rates in 5.5% of medications listed in the histories, 13.5% upon admission reconciliation, and 9% upon discharge reconciliation. Based on these improved quality and patient safety outcomes, pharmacy technicians now collect medication histories on more than 90% of patients within 24 hours of admission as part of our organization's standard of care during hospital admission. Before implementation, nurses and medical staff within our institution reported spending 15 minutes or less per admission completing a medication history interview and documentation; pharmacy technicians spend an average of 30 minutes per admission interviewing the patient or caregiver, reviewing pharmacy dispensing records and documenting the medication history. This pharmacy-driven service has allowed nurses to reallocate an additional 1,262 hours to direct patient care over the 6-month evaluation period which may have otherwise been devoted to medication history collection.

**Conclusion:** A pharmacy-driven admission medication history service was implemented at a rural community teaching hospital. This service demonstrated a reduction in medication discrepancies during admission and discharge medication history and reconciliation, such that more complete and accurate information was available during inpatient admission. Not only did this expand direct pharmacy patient care services, but it also provided additional role and skill development opportunities for pharmacy technicians in our institutional setting. Further, pharmacy ownership of the admission medication history process enabled our organization to recapture substantial nursing time to be reallocated to direct patient care in their respective scope of practice.

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**Session-Board # - 4-157**

**Poster Title:** Expanding pharmacy's presence: adding pharmacy technicians to take over medication handling and procurement in ambulatory surgery centers in a health system

**Poster Type:** Descriptive Report

**Submission Category:** Pharmacy Technicians: Competencies/Development/Other

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**Purpose:** With the growth of ambulatory surgery centers in a health system, the management of medications needed for procedures has become more difficult to manage in locations distant from the hospital hub at the Cleveland Clinic. Add in the health system acquisitions of private practice group owned ambulatory surgery centers and the medication needs for offsite locations increased greatly. We implemented a strategy to request pharmacy technician's and pharmacy storage space/automated dispensing equipment at all procedural and ambulatory surgery centers affiliated with the main hospital.

**Methods:** We began to focus our efforts on newly acquired ambulatory surgery centers. A number of private practice groups were acquired over the course of several years that had ambulatory surgery centers attached. Pharmacy was brought to the table early in private practice acquisition practice to advise and make recommendations on the medication handling process. Based on the review of the types of practices that were being acquired by the Cleveland Clinic pharmacy was able to make recommendations for the quality measures that needed to be implemented with the types of medications used. These may include adding a pharmacy technician to support the practice and purchasing automated dispensing cabinets and medication quality audits. A second approach of this project was to address existing surgery centers in which pharmacy was supporting these practices through drug transfers from the main hospital. Various presentations to key stakeholders over these practices through Nursing and Physician leadership occurred to show the value of pharmacy on site in ambulatory surgery centers.

**Results:** Pharmacy was able to request for additional pharmacy technicians in 7 ambulatory center locations over the course of 3 years as a result of pharmacy's methodology to having

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pharmacy supporting all ambulatory surgery centers. Additional automated dispensing cabinets were approved to bring to these new and existing procedural areas(s) so that every procedure room had the appropriate medication storage equipment. Drug wholesale accounts were setup for each surgery center location for next day local delivery of all medications that are stocked on site. After this initiative every off site ambulatory surgery center had a pharmacy technician either full time or part-time responsible for medications at the site bringing the total number of sites supported to 12.

**Conclusion:** Adding pharmacy support to an ambulatory surgery center has proved to be such a great strategy that it has now become the standard of practice for all new offsite procedural area projects. Some of the real value was also shown during a national opioid shortage in 2018 in which every ambulatory surgery center was able to eliminate the reliance on opioid procurement from the main hospital which was the old standard to better allow the hospital to maintain sufficient supplies for its patients. Having a pharmacy technician and automated dispensing cabinets in every ambulatory surgery center has freed up nursing.

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**Session-Board #** - 4-158

**Poster Title:** Cleanroom gemba safety walk: promoting a sanitary environment for compounding

**Poster Type:** Descriptive Report

**Submission Category:** Pharmacy Technicians: Competencies/Development/Other

**Primary Author:** Kathleen Forbis, Cone Health; **Email:** kathleen.forbis@conehealth.com

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**Purpose:** The Food & Drug Administration (FDA) recently drafted guidance for insanitary conditions at compounding facilities due to numerous outbreaks of infections and deaths found to be the result of drug products that were contaminated because they were produced under insanitary conditions. Insanitary conditions apply to sterile and non-sterile drugs and could cause a drug to become contaminated with filth or rendered injurious to health. A drug that is contaminated with any filthy, putrid, or decomposed substance is deemed to be adulterated. For this reason, compounding facilities require continuous auditing to avoid insanitary condition to provide safe compounded products.

**Methods:** Moses H. Cone Memorial Hospital utilized the insanitary conditions FDA guidance document to educate the pharmacy technician staff which helped to identify when conditions were not appropriate to safely complete compounding. The safety gemba walk is a physical walk through of all compounding areas that is done on every shift and is pharmacy technician driven. We utilized the acronym CLEAN to help drive our safety walk and remedy any findings. C-checklist: construct a checklist of items to look for during the safety walk, which was adapted by the FDA insanitary conditions draft. L-look: during each shift cross-over (3 times per day), have staff walk the sterile and non-sterile compounding areas. E-evaluate: staff evaluate what they found and if there were any concerns that need to be addressed. A-address: staff immediately address any insanitary conditions and communicate with the team. N-note: staff notates any findings on the safety walk and uses a web-based application to document and notate remedied actions taken.

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**Results:** With the implementation of the daily safety walks, the pharmacy technician staff were recognizing, documenting, and taking action to resolve the insanitary conditions found in both sterile and non-sterile compounding areas. Opportunities were identified to improve workflow issues of aseptic practices, and the anteroom design, and the difficulty to maintain a “state of control” with an International Organization for Standardization (ISO) class 7 anteroom in which the “dirty” side of the line of demarcation was requiring constant remediation after clean room certifications. This helped to redesign our new clean room space to have two anterooms, based on the newest major revision of United States Pharmacopeia (USP) . We also discovered the further opportunities to advance hands-free functions to reduce contamination of clean room staff’s gloves. This prompted us to take action to provide hands-free door entry into the clean room space, hand-rub dispensers, remote activated intercom system, and a hands-free sink. Moses H. Cone Memorial Hospital developed a technician specialist role to provide support for the constant need for auditing of our compounding areas, environmental monitoring, managing staff competencies, and sterility testing and training.

**Conclusion:** Through implementation of the gemba walk our compounding environment was always able to maintain a state of control. The gemba walk also helped to determine the design of our new state-of-the-art cleanroom space to avoid common insanitary conditions, provide hands-free devices to ensure glove sterility, and make cleaning easier. Making these changes has helped to become more focused on providing safe, clean compounds for our patients.

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**Session-Board #** - 4-159

**Poster Title:** Controlled substance audit and compliance specialist technician: career growth for the pharmacy technician

**Poster Type:** Descriptive Report

**Submission Category:** Pharmacy Technicians: Competencies/Development/Other

**Primary Author:** Sadie Hammond, Cone Health; **Email:** Sadie.hammond@conehealth.com

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**Purpose:** To provide a brief overview of the pharmacy technician career ladder at a multi-hospital health system and describe the importance of having a controlled substance audit and compliance specialist technician (CS ACST). Career ladders help promote technician involvement and growth in the pharmacy profession. One particular position within our career ladder is the role of the CS ACST. This pharmacy specialist technician focuses on controlled substance (CS) medication diversion monitoring and detection. The CS ACST also helps the pharmacy manager maintain compliance with the Drug Enforcement Agency (DEA) and the North Carolina Board of Pharmacy (NC BOP).

**Methods:** Our pharmacy technicians are required to maintain NC BOP registration and certification with the Pharmacy Technician Certification Board (PTCB). Once desired leadership traits are displayed and competences are obtained, a technician may be promoted to an advanced technician position. Advanced technicians who have specialized skills with expert level knowledge of an area may apply for a role as a specialist technician, limited number of specialists available. Technicians who have an associate degree in pharmacy technology, completed the appropriate training program, and pass the required assessments may apply for a role as a validation technician. This provides technicians an opportunity to grow skills and expand ownership within a specific niche of pharmacy. Specialist technicians exist for medication histories, sterile and non-sterile compounding, distribution training and automation, and CS auditing and compliance. The CS ACST monitors CS activity within the pharmacy department and throughout the hospital, maintains compliance with regulatory boards, and proactively researches diversion. The CS ACST is also a part of the medication diversion oversight committee (MDOC), consisting of representatives from employee health and wellness, employee education, pharmacy, security, human resources, and nursing. An

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auditing report generated by a third-party vendor is used to guide the CS ACST in investigating employees with statistically higher than average activity. Once a concern is discovered, the CS ACST reaches out to the MDOC and department leaders to escalate.

**Results:** During an average month, the CS ACST reviews 306 CS discrepancy resolutions for appropriateness, weekly CS inventory verification for 110 automated dispensing cabinets (ADC), 68 CS sale transactions, 238 receive transactions, and 222 expire/waste/recall transactions, including reconciliation with the reverse distributor. After reviewing these activities, the CS ACST will follow up with all stakeholders when clarifications on incomplete or inappropriate processes are observed. Numerous other routine audits are performed including monitoring closed nursing unit activity, ADC user access management, and manual medication administration record review for locations that do not have an ADC. The CS ACST researches suspicious CS activity including reconciling medication administration records (MAR) with ADC transaction for numerous users every month. The CS ACST also works closely with the pharmacy manager as the point person for any suspected/confirmed cases of diversion.

**Conclusion:** With the implementation of a career ladder in a large health system, this introduced new opportunities for pharmacy technicians to grow, develop their skills, and improve their leadership qualities. The creation of the CS ACST acknowledges the importance of maintaining complete, accurate, and compliant documentation of CS. Federal agencies and healthcare organizations are pushing for more stringent control and increased regulations around CS. A pharmacy technician dedicated to this work provides a necessary resource to take a step in the right direction.



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**Session-Board #** - 4-160

**Poster Title:** Pharmacy technician driven medication reconciliation program – a solution to California SB 1254

**Poster Type:** Descriptive Report

**Submission Category:** Pharmacy Technicians: Competencies/Development/Other

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**Purpose:** Beginning January 2019, California Senate Bill 1254 (SB 1254) mandates that hospital pharmacies in California obtain an accurate home medication list for each high risk patient. Pharmacy technicians and other pharmacy extenders serve as a solution to SB 1254. The purpose of the study is to evaluate the impact of pharmacy technician driven medication reconciliation program in obtaining an accurate patient medication profile.

**Methods:** : Retrospective chart review from January 2018 to June 2018. Mercy San Juan Medical Center is a 370-bed, level II trauma center located in Carmichael, CA. The charts for 171 patients who were interviewed by the Transitions of Care (TOC) pharmacy technician were reviewed for data analysis. It is the standard of practice that all the patients have medication histories obtained upon admission by a nurse prior to reconciliation by the admitting physician. The pharmacy technicians performed the Best Practice Medication History (BPMH) process after admitting medication reconciliation was completed. The technician obtained a medication list from the retail pharmacy and/or third party payer claims data and compared the list to the documented home medication list in the profile (created by the RN). The technician then interviewed either the patient or caregiver to clarify the discrepancies between the documented home medication profile and the BMPH. The home medication profile was then updated by the technician with the corrections. All of the changes post- BPMH were reviewed by a pharmacist. Patients included in the study were non-intensive care unit patients, age

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greater than 18 years, and admitted within the study period. The primary outcome is to determine the types of interventions the pharmacy technician can perform during medication reconciliation. The secondary outcome is to review the number of interventions.

**Results:** The collected data was analyzed using percentage and numerical distribution. 95% of BPMH (n=171) performed by technicians did not require further pharmacist intervention to obtain an accurate home medication profile. Technicians were able to accurately create a medication history list for patients with minimum to no assistance. The interventions performed by the pharmacy technician include adding omitted medications, removing discontinued medications from the medication list, and modifying existing entries. 81% of the patients had 1 or more medications added to the profile. 87% of the patients had medications removed from their profile, 66% of the patients had incomplete or inaccurate medication entries that were corrected (wrong dose, frequency, or directions). Most of the patients had a combination of various interventions. Of note, 64% of the patients had high risk medications as part of their medication history. High risk medications in this study refer to anticoagulants, diabetic agents and opioids.

**Conclusion:** Implementing SB 1254 will allow hospitals to obtain accurate medication histories and improve patient care for high- risk patients. 95 % of the Best Practice Medication Histories obtained by pharmacy technicians did not require further pharmacist intervention to complete an accurate home medication record. Hospitals can utilize pharmacy technicians to construct a more accurate home medication history record for high risk patients.

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**Session-Board #** - 4-161

**Poster Title:** It's Dynamite: a single hospital pharmacy's experience with a certified pharmacy technician training new technician (CPT-TNT) program

**Poster Type:** Descriptive Report

**Submission Category:** Pharmacy Technicians: Competencies/Development/Other

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**Purpose:** The Pharmacy Technician Certification Board (PTCB) administers a national certification process for pharmacy technicians via a standardized test. This test is challenging, with a 2018 passage rate of 57%. Institutions, including our own, have created educational programs to support eligible applicants' preparedness. Pharmacists have historically taught this program at our institution. In 2019, we transitioned to a program in which certified pharmacy technicians train new technicians (CPT-TNT) under the guidance of pharmacists. The purpose of this study was to evaluate test scores in our PTCB preparatory class prior to and following CPT-TNT.

**Methods:** This retrospective, single center, quality improvement project was completed over a three month period (January 2019 – March 2019). New pharmacy technicians participating in CPT-TNT were identified via a query of pharmacy records. New pharmacy technicians were included if they completed the baseline assessment and three month assessment test. Both tests were the same and were based on PTCB review materials. All data was collected anonymously using a standardized data collection form. Collected data included demographic information (age in years, gender, college education and employment history), percent score on baseline assessment test and percent score on three month assessment test. The primary outcome was difference in test scores between baseline and at three months. We analyzed

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data using the paired t-test and considered a p-value < 0.05 statistically significant. This project met criteria for exemption from institutional review board review.

**Results:** Seven new pharmacy technicians participated in CPT-TNT during the three month study period. Six were included in this analysis; the excluded new technician completed the baseline assessment test but did not complete the three month assessment test. Average age  $\pm$  standard deviation age was  $26 \pm 3.2$  years. Most participants were female (5/6, 83.3%) and most had a college education (5/6, 83.3%). Average  $\pm$  SD experience as a pharmacy technician was  $5.2 \pm 3.8$  years, and most had previous hospital experience (4/6, 66.7%). Mean  $\pm$  SD test results were significantly higher following CPT-TNT ( $69.3 \pm 15.6\%$  post vs  $52.7 \pm 16.5\%$  baseline,  $p=0.001$ ).

**Conclusion:** CPT-TNT improved scores on our preparatory test for CPhT examination. Certified pharmacy technicians appear to provide effective education to new pharmacy technician peers, creating a viable staff education strategy and possible career advancement pathways.

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**Session-Board #** - 4-162

**Poster Title:** Innovative education for health professional students addressing mental health stigma

**Poster Type:** Descriptive Report

**Submission Category:** Precepting/Preceptor Skills/Education and Training

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**Purpose:** There is an increased incidence of mental health issues among college and professional students. Nearly 60% of adults with a mental illness didn't receive mental health services in the previous year. Perceived stigma is a major deterrent for patients seeking mental healthcare. Other barriers include lack of knowledge about mental healthcare, inability to recognize symptoms in one's self, and inability to identify adequate healthcare resources for mental health symptoms. Approaches to educate professional students, who may need care and who will be involved in care of others, is imperative for ensuring appropriate access to mental health care in the future.

**Methods:** A unique, innovative event was offered to pharmacy students in conjunction with nursing and allied health students. A cabaret styled creative show entitled She's Crazy (McCamley, McCamley & Springfield, 2019, Feisty Broad Productions) was presented by three performers with a variety of mental health disorders. The 75-minute play addressed a number of disease states such as depression, anxiety, PTSD, OCD, BPD, bipolar disorder and others. Performers highlighted symptoms and provided moving examples of misguided public stigmas. All the performers also provided powerful insights through their personal testimony. After the performance, interprofessional groups of 8-10 students were led by a trained faculty member in discussion of the learnings from the play. Questions relating to how it affected their perception of mental illness, understanding myths of associated stigma, and how this

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information would be helpful in respective professions were discussed within the groups. Programmatic assessments were completed by all participants.

**Results:** Thirty-nine pharmacy students along with 58 students from the other professions participated in the event. Eleven program assessment questions on a 5-point Likert scale (1-strongly disagree to 5-strongly agree) were administered to the participating students. Overall average for all the question responses among pharmacy students was 4.74 (range 4.64-4.87) and very similar for all students of 4.75 (range 4.7-4.85). Two specific questions included: “Performance content was practical and was an effective way to learn about mental health” (mean 4.76) and “I have gained insights on how multiple professions can work together to support those effected by mental health illness” (mean 4.72). A number of positive remarks were made in the assessment by students. Two such comments were “this was an incredible different perspective in mental health education” and “this experience changed my view about mental illness”.

**Conclusion:** Continued education and awareness of mental health is important for improved care. Overall, this was an effective model for educating professional students regarding mental illness, associated stigma myths and insight regarding their professional role in addressing this issue.

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**Session-Board #** - 4-163

**Poster Title:** Impact of peer-to-peer teaching on medical student knowledge, confidence, attitudes in medication adherence

**Poster Type:** Evaluative Study

**Submission Category:** Precepting/Preceptor Skills/Education and Training

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**Purpose:** Medication non-adherence is an important barrier to achieving optimal clinical outcomes for patients. Healthcare providers can help patients by addressing and resolving factors that contribute to non-adherence. Currently, there is limited data on the methods used to train medical students about medication adherence as well as the effectiveness of using a peer-to-peer educational session to teach medication adherence. In this study, we aim to assess the knowledge, confidence, and attitudes of 1st-year medical students on medication adherence before and after a pharmacy student-led educational session.

**Methods:** First year medical students from the College of Osteopathic Medicine at Touro University California were invited to participate in one of three educational sessions held in May 2019. A third-year pharmacy student served as a peer educator and received training from Touro University California College of Pharmacy faculty on how to deliver the sessions. Each session took approximately 50 minutes to complete. The session included a pre-presentation survey, a presentation using the American Medical Association (AMA) STEPS Forward™ Medication Adherence module, a presentation on practical approaches to medication adherence, and a post-presentation survey. Survey items included demographics, knowledge, confidence, and attitudes on medication adherence, and attitudes towards the peer-to-peer educational format. Each participant who completed the session received a \$10 gift card. Statistical comparisons of pre-presentation and post-presentation knowledge, confidence, and attitudes on medication adherence were made using paired t-test, McNemar's test, and

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Wilcoxon signed rank test. Data analysis was conducted using STATA version 14 statistical software (College Station, TX). P-values < 0.05 were considered statistically significant. The study was approved by Touro University California IRB and informed consent was obtained from all subjects.

**Results:** Of the 135 students invited, 23 students participated in and completed the study (response rate=17%). Medication adherence knowledge scores improved after the education session (77.4 +/- 17.4 vs. 92.2 +/- 10.0;  $p < 0.05$ ). Among the five knowledge questions, students improved the most on the question identifying cost as the top reason for intentional non-adherence ( $p < 0.05$ ). Confidence improved after the educational session with all seven questions ( $p < 0.05$ ). Medical students had more positive attitudes towards medication adherence after the educational session, with eight out of ten survey items in this domain showing improvement ( $p < 0.05$ ). Most of the students had a positive attitude towards the peer-to-peer educational format, indicating that they agreed or strongly agreed that it was an effective format to provide education (100%) and they would recommend it to others (95.7%). The students' opinions of pharmacists were also positive as they indicated on multiple survey items they were more likely to consult about several drug issues (>95%) and medication adherence counseling (100%) after the session.

**Conclusion:** The pharmacy student-led peer-to-peer educational session was effective in increasing knowledge and confidence in medication adherence among 1st-year medical students. Future medical and pharmacy school programs may wish to incorporate this type of interprofessional activity to encourage collaborative practice.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-164

**Poster Title:** Assessment of prevalence and severity of depression symptoms in fourth year pharmacy students

**Poster Type:** Evaluative Study

**Submission Category:** Precepting/Preceptor Skills/Education and Training

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**Purpose:** Students enrolled in graduate school programs, such as the Doctor of Pharmacy Program, may experience a high degree of stress due to an intensive workload coupled with economic and social factors. Experiencing one or a combination of these stressors can result in depression or worsen existing depression. The incidence of depression and possible interventions have been studied in other college student populations; however, they have not been extensively studied in the pharmacy student population. With this data, we can potentially identify the population at risk and implement specific programs as well as reinforce resources to deal with this mental illness.

**Methods:** In a time-series study conducted during 2018, pharmacy students from the University of Louisiana Monroe College of Pharmacy were invited to participate in a series of online surveys (administered in June 2018, September 2018, and April 2019) via the professional online survey software eSurveysPro. The significance of the time-series design was to assess and compare depressive symptoms at different time points in the students' fourth year. A link to a survey of 6 demographic questions and 10 depressive symptoms questions was emailed to all fourth year pharmacy students. This study was approved by the Institutional Review Board. After providing informed consent, each participant then reported demographic data and information on perceived family support. The survey incorporated the 9-item depression screening component of the Patient Health Questionnaire (PHQ-9), and descriptive statistics were then used to report the rates of depression and depressive symptoms.

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**Results:** There were 44, 16, and 11 respondents in the June, September, and April surveys, respectively. The overall response rate ranged from 11.8% to 32.8%. Also, 18.2% of students from the June survey, 5.9% of students from the September survey, and none of the students from the April survey had a history of depression. Only 9.1% and 5.9% in the June and September surveys admitted to being on medication for depression. Among respondents to the June survey, 47.7% reported depressive symptoms, with 22.7% being classified as moderate-to-severe depressive symptoms. Among respondents to the September survey, 75% reported depressive symptoms, with 43.8% classified as moderate to moderately severe. In the April survey, 45.5% of respondents had depressive symptoms with 27.3% of all participants having moderate to moderately severe symptoms. The rates of severe depressive symptoms were lower in the June survey (6.8%) compared to the September and April surveys (0%). In regard to the ability to do work, perform activities of daily living, and interact with other people, 16% of respondents reported these actions to be very to extremely difficult in the June survey. For September and April surveys, 12.5% and 18.1% reported the same outcome.

**Conclusion:** As indicated by the responses provided by current fourth year pharmacy students, depressive symptoms are present in this population. These symptoms and the effect on their daily lives remain prevalent over the course of several months. However, some limitations exist in this study, including a low response rate to the second and third surveys, a limited study population, an inability to recognize duplicate responses, and survey fatigue. It is our hope that this data can be used as the foundation for future depression outreach programs for pharmacy students.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-165

**Poster Title:** Effect of a student-led interprofessional clinical reasoning case studies group and competition on student perception of interprofessional education

**Poster Type:** Evaluative Study

**Submission Category:** Precepting/Preceptor Skills/Education and Training

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**Purpose:** The use of interprofessional healthcare teams is becoming standard of practice. Therefore, team-based care should be implemented into health professions education. Cases are important in helping students apply didactic knowledge to real-world contexts. This study assessed the impact of the student-led clinical reasoning club (CRC) or competition on students' perception and knowledge of working as a team and their confidence on clinical rotations.

**Methods:** The study was reviewed by Creighton University's IRB and deemed exempt. Surveys were sent to all third- and fourth-year medical students and fourth-year pharmacy students (n=437). General demographics captured include gender, profession, year in school. The survey included the Student Perceptions of Interprofessional Clinical Education-Revised (SPICE-R) instrument which assesses perceptions of appropriateness and benefits of interprofessional education (IPE). All students were asked the four Likert scale questions. All students were asked to identify what aspects of clinical rotations they were most and least competent. Those that completed a CRC activity were asked to comment on how they have used interprofessional collaboration information/skills gained from the CRC on rotations. Mean SPICE-R scores were compared between students that participated in the CRC versus those that did not using Student's t test. Qualitative response data were compiled for independent analysis by five experts. Key phrases that exemplified themes were identified and final themes were mapped to the Interprofessional Education Collaborative (IPEC) core competencies.

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**Results:** Of 437 students contacted, 201 (46%) responded. Of respondents, 82 (41%) participated in >1 CRC activity and 119 (59%) had not. There was no significant difference in mean SPICE-R scores between those who participated in CRC versus those that did not (43.8+4.8 versus 43.2+4.4,  $P=0.37$ ). There were also no significant differences in scores when stratified by type of CRC activity or profession.

Independent t-tests were also used to compare scores on the four Likert scale questions. While no significant differences were found between cohorts, the difference in understanding of roles and responsibilities trended towards significance ( $P=0.08$ ), suggesting that CRC participation may have impacted this.

For both cohorts, students reported that they were most confident with patient interactions. Students in both cohorts reported they were least confident presenting to a team (CRC 22% versus non-CRC 18%). Nearly twice as many students in the non-CRC group were least confident communicating with a prescriber compared to the CRC group (11.7% versus 6%). For students in the CRC cohort, the most common themes from skills used on clinical rotations were roles and teamwork. Only three students referenced a skill that aligned to values.

**Conclusion:** CRC did not affect students' perceptions of IPE but may have improved understanding of roles and responsibilities. CRC may have improved confidence in communicating with a prescriber. The fact that both cohorts were least confident in presenting to a team may be related to the Socratic pedagogy on clinical rotations. Values may have been unrepresented in the skills obtained from CRC because it's implied in other IPEC competencies. In addition, CRC is typically completed in the first two years of the curriculum, the cases do not have explicit values and ethics components.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-166

**Poster Title:** Evaluating return on investment for a medical information rotation for pharmacy students

**Poster Type:** Descriptive Report

**Submission Category:** Precepting/Preceptor Skills/Education and Training

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**Purpose:** The Medical Information (MI) Student Affairs Team at Pfizer has been an integral component to the development of medical information skills of pharmacy students currently enrolled in a PharmD curriculum. While students have reported that the knowledge and insight they have attained during their rotation has been invaluable and critically important to their careers and professional development, there is little data to show how these students bring value to the MI department at Pfizer. As such, the purpose is to report the valuable benefits that pharmacy rotation students bring to the business.

**Methods:** A list of all US pharmacy rotation students in MI between March 2018 and April 2019 was procured for this analysis. Students that completed a Medical Information Activity (MIA) Tracker during their rotational experience were included. MIA Trackers were counted for several traditional MI activities. Next, the amount of time it typically takes an MI colleague to complete the listed activities was averaged amongst MI managers (MIMs) completing these tasks. The Pfizer MI estimated total compensation rate (including wage, health contributions, etc.) for full time employees was obtained. MIMs that served as preceptors were asked to provide the average number of hours they spent with rotation students.

Return on Investment (ROI) was calculated by taking the aggregate data of MI activities completed by students and multiplying it by the average number of hours it takes MIMs to complete these same tasks. Finally, the average number of hours preceptors spent with students was subtracted. Number of hours was then multiplied by average hourly wage of a

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MIM to provide a dollar value. While a monetary value was extrapolated, the true value was realized in free capacity which enabled colleagues to focus on innovative and creative thinking and ideas.

**Results:** A total of 15 students were included in the final analysis. In totality, students completed 232 MI core tasks (99 literature searches; 33 localizations of global documents; 32 summarizations of one article; 48 custom inquiry response documents authored; 1 development of a Scientific Response Document (SRD); 9 creations of Patient Response Documents (PRD); 10 fact-checking opportunities). This equated to ~750 hours of MIM work. A range of ~\$18,000.00- \$20,000.00 was determined to be the value added, utilizing the predetermined ROI calculation method. The assistance provided by students has allowed MIMs to participate in activities such as providing actionable insights and developing innovative ways to provide information to patients and health care providers.

**Conclusion:** Pfizer's Student Affairs Team commitment to providing a unique and insightful experience to pharmacy students on rotations is mutually beneficial to the students and the MI staff's learning and development. Activities completed by rotation students has enabled colleagues to influence the external environment through focus on innovative content, and spending time on analyzing insights and trends. Over the past year, Pfizer MI's dedication to the development of students has resulted in a positive ROI.

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**Session-Board #** - 4-167

**Poster Title:** Evaluate the effectiveness of pharmacist-led anti-drug educational programs developed by quality control circle (QCC)

**Poster Type:** Descriptive Report

**Submission Category:** Precepting/Preceptor Skills/Education and Training

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**Purpose:** According to Taiwan National Institute of Health's report in 2017, the average age of first drug users was 12.5 years. The highest incidence, 23%, was found on campuses. Campus drug abuse is an urgent issue. To establish an anti-drug educational foundation, pharmacists implemented health policy and anti-drug educational activities.

**Methods:** QCC as a tool. Firstly, a 15 item questionnaire, designed to understand the current students' drug literacy e.g. drug knowledge, symptoms and consequences of drug addiction and how to find help. Utilizing the 80/20 rule, we sorted students' problems. Secondly, pharmacists designed anti-drug educational programs: drama and games for elementary school students, board games for junior high students, lectures and prized Q&A for senior high students, aimed at building anti-drug concepts and skills. A 30 item pretest-posttest questionnaire for evaluating program effectiveness was designed. Statistical analyses were performed using SPSS v24.

**Results:** 121 students completed the first questionnaire. The mean age was 13.8±2.6 years, 55.4% female. The accuracy of elementary students was 42.9%, junior high students 44.6%, senior high students 52%. We designed anti-drug educational programs based on results. To evaluate the effectiveness of programs, from 2019/03 to 2019/05, we held 6 educational programs. 232 valid questionnaires showed: elementary students(14.7%) accuracy increased 52.1%, junior high students(30.1%) accuracy increased 38% and senior high students(55.1%) accuracy increased 32%.

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**Conclusion:** QCC is an effective tool for designing educational programs. Significant improvements were observed. Therefore, pharmacists should be proactive in providing anti-drug education, establishing a safer environment for students.



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**Session-Board # - 4-168**

**Poster Title:** Climbing the pyramid of teaching: how to create and implement a preceptor development program

**Poster Type:** Descriptive Report

**Submission Category:** Precepting/Preceptor Skills/Education and Training

**Primary Author:** Catherine Korte, Truman Medical Centers; **Email:** catherine.korte@tmcmcd.org

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**Purpose:** ASHP has developed and modified their accreditation standards to ensure the development and maintenance of high quality residency programs for pharmacists. The standards address the responsibilities of the program to the resident, design of the program, along with requirements for the residency sites. They also address the importance of preceptor professionalism and development. The opportunity to elevate our preceptor development program was identified during an ASHP site survey. A formalized program was developed which included program objectives, requirements, active learning activities, pre and posttests for all topics, and the creation of a Preceptor Development Handbook.

**Methods:** A formalized program was developed which included program objectives, requirements, active learning activities, pre and posttests for all topics, and the creation of a Preceptor Development Handbook. All chapters within the handbook are based off the ASHP Preceptor Playbook which provides videos and presentation handouts for each topic. In addition to this material, an active learning activity was developed for each topic accompanied by a pre and posttest assessing preceptor comfort and confidence with each objective. As the preceptor group gathers on a monthly basis, a new topic is covered from the program handbook. The handbook contains two years' worth of material and will be revamped each two year cycle. The program objectives and requirements will also be reassessed based on ASHP requirements and preceptor feedback.

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**Results:** Pharmacy preceptors were surveyed before and after each preceptor development session. A five-point Likert system questionnaire was used to specify pharmacists' level of agreement or disagreement. Each preceptor was provided with a pre-test and a post-test questionnaire at the preceptor development session. The questionnaire pre-test questions were answered before the lecture and the post-test questions were answered after the lecture. Each preceptor rated their current understanding on the subject matter compared to having knowledge of the subject matter after listening to the lecture. A total of twelve learning session questionnaires were evaluated. Each learning session showed improvement in test scores; however, all did not show a statistical significance. A paired T-Test was performed for each learning session by comparing the average score from the pre-tests to the average score from the post-tests. A statistically significant difference was identified among the individual lecture series results ( $P < 0.05$ ). Additionally, an Independent sample t-test was performed overall from all twelve learning session answers. Again, the average score from the pre-tests and average score from the post-tests were compared. The overall result showed a statistically significant difference in improved understanding or utilization of new teaching methods discussed during the twelve session lecture series.

**Conclusion:** The results of this survey suggest that preceptor development is a valuable learning opportunity for pharmacy preceptors. Preceptor development programs can be a valuable asset to provide pharmacists with valuable teaching tools needed to improved teaching techniques. Offering learning sessions can provide the necessary training for pharmacists to become comfortable precepting during challenging situations. Pharmacists submitted written positive feedback regarding their learning experience. Those offering feedback recognized that the sessions helped to improve preceptor skills and teaching strategies. Continued use of the remaining learning sessions can help preceptors understand and mitigate various obstacles in teaching students and residents.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-169

**Poster Title:** Development and implementation of a health-system pharmacy intern certificate program in a tertiary medical center to inspire and influence pursuit of pharmacy advancement

**Poster Type:** Descriptive Report

**Submission Category:** Precepting/Preceptor Skills/Education and Training

**Primary Author:** Maari Loy, Essentia Health; **Email:** maari.loy@essentiahealth.org

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**Purpose:** Pharmacy interns are a significant contributor to the pharmacy department's workforce. Pharmacy department leadership identified a gap of knowledge of global health-system pharmacy practice, a lack of engagement and awareness of pharmacy advancement initiatives, and perceived lower than desired residency applications to national programs from the department's graduating pharmacy interns. A voluntary health-system pharmacy intern certificate program was initiated to inspire and influence pharmacy interns through formal education opportunities within the health-system.

**Methods:** The health-system pharmacy intern certificate program was offered to all inpatient pharmacy interns (pre-pharmacy through third year pharmacy students). The health-system inpatient pharmacy employs 60 pharmacy interns. Primary objectives of the program were to strengthen understanding of health-system pharmacy and demonstrate the value of pharmacy residency training. Minimum requirements of the program included: attend greater than 60% of the monthly meetings, identify a mentor, complete and have a curriculum vitae (CV) reviewed by a mentor and submitted to the program lead, volunteer to serve in the intern certificate program at least once (ex: be a meeting panel facilitator, submit questions and/or content, present content at a meeting, work on a project, recruit speakers etc.), and be employed by the department throughout the program and at the end of the program. Meetings occurred monthly for ten months (academic calendar) and included Advanced Pharmacy Practice Experience (APPE) planning and navigation; identifying and paralleling a mentor; CV building with a personal statement; hands-on experiences such as shadowing, projects, research, publications, and posters; careers in pharmacy practice; and residency training preparation with mock residency interviews. At completion of the program, a formal

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certificate was provided by pharmacy leadership to each pharmacy intern at a concluding ceremony.

**Results:** At the beginning of the program, 34 pharmacy interns indicated intent to participate in the certificate program; 23 pharmacy interns completed the program (68%). At the completion of the program, a formal evaluation was distributed (N= 13) and utilized a Likert scale of 1-5, strongly disagree to strongly agree, respectively. Questions included and responses averaged: I strengthened my understanding of health-system pharmacy through this program (4.69), the value of pharmacy residency training was well-explained through this program (5), I learned about pharmacy careers through this program (4.61), I furthered my understanding of Medication Use through this program (3.38), and this intern certificate program should be continued (5).

**Conclusion:** A formal health-system pharmacy intern certificate program in a tertiary medical center provides opportunities for pharmacy interns to strengthen their understanding of health-system pharmacy and demonstrates the value of pharmacy residency training to pharmacy interns.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-170

**Poster Title:** PharmD pharmaceutical industry advanced pharmacy practice experience in medical information

**Poster Type:** Descriptive Report

**Submission Category:** Precepting/Preceptor Skills/Education and Training

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**Purpose:** To evaluate the impact of the Medical Information (MI) rotation experience, on pharmacy students' perception of MI, in the pharmaceutical industry as well as their professional development and career aspirations.

**Methods:** An 18-question survey, consisting of open- and closed-ended questions, was conducted from October 2016 to March 2019. All students (N=33) responded to the survey upon the completion of their individual Pfizer MI advance pharmacy practice experience rotation. This survey indicated the reflections of their industry experiences and provided insights into the students' perception of MI in the industry. In addition to the survey, unstructured essays (reflection papers [RPs], n=16) were implemented to allow students to provide a more personalized response at the end of their rotation. The essays were evaluated for themes and insights, topics of interests, and continuous quality improvement.

**Results:** All 33 student surveys reported an increased understanding of the processes involved in providing medical communication services. All said their respective preceptor's feedback assisted their drug information skills development. 97% reported improvement in ability to search and evaluate medical literature and 94% reported a change in perception of the pharmaceutical industry at the end of their rotation. 73% said the rotation helped them decide whether to pursue a residency/fellowship, with 18% reporting "maybe". 94% said they would

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consider employment within the industry at some point in their career. Majority of surveys (94%) indicated a positive change in their perception of industry, with students noting that patient centricity remains a key driver in this MI setting.

Evaluation of 16 RPs found that 38% mentioned the global aspect of the practice setting and 43% mentioned team work while having a positive attitude when working on assignments. Additionally, 63% said they were interested in pursuing a career in the industry and 25% were interested in pursuing fellowship. 44% stated that the rotation changed their perspective of the industry. Lastly, 69% noted that the rotation clarified the many roles pharmacists could have in the industry and 63% noted the patient-focused aspect of the setting.

**Conclusion:** The students' responses to the survey highlighted Pfizer's reputation as a global innovative company, with a strong emphasis on teamwork and putting the patient first. As this was one of the few industry experiences that many students have had, with some being their first introduction into industry, the rotation clarified the role pharmacists have in industry and solidified this rotation as not only informative but crucial in educating future pharmacists. Overall, students improved their understanding of MI professionals' core responsibilities ultimately impacting patient care and health outcomes via improving literature searching capabilities and drug information skills including evaluating the literature.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-171**

**Poster Title:** Evaluation of patient counseling and communication skills among pharmacists in Qatar

**Poster Type:** Descriptive Report

**Submission Category:** Professionalism and Career Development

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**Purpose:** Patient counseling is a fundamental element of pharmaceutical care. Available evidence suggests variable quality of counseling services delivered by pharmacists and unsatisfactory pharmacists' confidence related to patient counseling and communication skills. Little is known about such practice in Qatar.

The aim of this study is to Assess pharmacists' self-perceived counseling and communication competencies and explore gaps between such competencies and their application in practice. Information regarding previous training and/or education on counseling and communication skills and relevant areas of interest for future continuing professional development (CPD) programs were also explored.

**Methods:** A single-center cross-sectional survey. An electronic survey distributed via e-mail was designed based on guidelines of good pharmacy practice in patient counselling. Respondents were requested to rank self-perceived competency and application of elements of proper counseling skills in daily practice on a scale from 1(Not competent; never applied) to 5 (strongly competent; always applied). Barriers to application, previous education/ training in counseling and communication skills and professional development needs to improve such skills were also assessed.

**Results:** A survey invitation was sent to over 70 pharmacists with 67% response rate. The majority of respondents (82.6%) had more than 5 years experience . Most pharmacists (67.4%) received structured training in patient counseling and communication skills, which was rated as

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very useful by 48.7% of respondents. However, only 35.6% pursued professional development related to patient counselling.

Overall, pharmacists reported high self-perceived competency in patient counseling skills, which was reflected in high reported application rates.

The lowest rates on both competency and application were related to identifying need for referral to physicians (23.26; 32.14% respectively) and self-introduction at the beginning of a counseling session (22.73%, 38.71%).

When compared to competency, application was lower with regards to explaining purpose of counseling (81.8% vs. 66.7) and describing instructions for missed doses (82.2% vs. 62.1). Most common barriers to proper counseling were high workload/limited time (84.8%) and language barriers (69.6%). Most respondents (54.4%) believed that they need further training on patient counselling and communication. Training on handling difficult patients (78.3%); using effective communication skills in building patient rapport (71.7%) and dealing with health illiteracy and language barriers (65.2%) were highly demanded skills to improve counseling practice.

**Conclusion:** Pharmacists in Qatar showed high self-reported competency and application of patient counseling skills. Further training especially in communication skills is needed. Findings of this survey will serve as the basis of a future related professional development program to enhance these skills and optimize patient care.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-172**

**Poster Title:** Advancing person-centered care: equipping pharmacists with knowledge to engage patients in cost of care conversations

**Poster Type:** Descriptive Report

**Submission Category:** Professionalism and Career Development

**Primary Author:** Nicole Braccio, National Patient Advocate Foundation; **Email:** nicole.braccio@npaf.org

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**Purpose:** Almost half of adults younger than 65 have high-deductible health plans (HDHPs) which require them to pay the full cost of medications and treatment until their deductible is met. Patients with HDHPs are far more likely than those with traditional plans to forgo or delay needed care due to high upfront costs and confusion about their financial responsibility throughout the year. This project was designed to determine differences in out-of-pocket (OOP) costs between two insurance plans and propose practical tips that pharmacists can employ to improve medication use among patients by personalizing health care cost conversations.

**Methods:** A pharmacist and clinical nurse case manager utilized aggregate data from Patient Advocate Foundation's case management program to create a breast cancer patient profile. Cost implications for medications and other covered services and procedures were compared between two typical insurance plans offered by employers: traditional preferred provider organization (PPO) and a HDHP. Treatment selections were based on peer-reviewed clinical practice guidelines such as the National Comprehensive Cancer Network (NCCN) guidelines. OOP costs for each treatment and service were estimated using Healthcare Bluebook and the insurance plan's benefit design for a 45-year-old female receiving in-network treatment in Washington DC. A series of experiments were performed to simulate the expected annual and monthly OOP costs pursuant to a PPO or HDHP across three scenarios with diagnosis and treatment initiation in: January at the beginning of the plan year, July (mid-year) and November near the end of the plan year. Non-medical living costs including food, housing and

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transportation were layered upon health care costs to illustrate the financial liability a patient would experience every month throughout the course of treatment. The team hypothesized that under the conditions described above, the traditional PPO plan would be more cost effective than a HDHP, potentially spreading OOP costs throughout the year.

**Results:** The patient's financial obligations for health care spanned 24 months or two plan years in the first scenario and 36 months or three plan years in the second and third scenarios. Contrary to our hypothesis, total annual health care costs including premiums and OOP spending were greater under a PPO plan by approximately \$3,000 for a majority of plan years. Total annual costs were greater under a HDHP only in one plan year when treatment was initiated in November. Across three scenarios, the patient would experience higher monthly OOP costs for a greater number of months in the PPO plan compared to HDHP. OOP costs were concentrated among two to four months of the year in the PPO plan and among one to two months of the year in the HDHP. Monthly health care costs would likely place substantial financial stress on the patient's ability to afford non-medical living costs. The financial impact of treatment and services were directly influenced by the diagnosis date within an insurance plan year.

**Conclusion:** A patient's ability to afford and adhere to treatment is dependent on insurance plan selection prior to diagnosis. This illustrative case highlights the nuances of insurance benefit design and how one treatment plan could have two substantially different financial obligations. Pharmacists as members of interdisciplinary care teams are positioned to serve as conduits to financial and safety net resources. As HDHPs continue to gain popularity and policy solutions move towards improving health care cost transparency, pharmacists have a unique opportunity to educate patients about their health insurance options to improve medication selection and adherence as well as minimize financial distress.

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**Session-Board #** - 4-173

**Poster Title:** The value of completing a biopharmaceutical fellowship

**Poster Type:** Evaluative Study

**Submission Category:** Professionalism and Career Development

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**Purpose:** The purpose of this study was to help student pharmacists evaluate the benefits when evaluating various post graduate training options. Currently, there is minimal measurable data available that describes the impact a pharmaceutical industry fellowship program has on the progression of a pharmacist's career path in the industry. Therefore, we are looking to assess what the value is of completing a fellowship program through an electronic survey.

**Methods:** Upon approval from the University IRB committee, an anonymous electronic survey was sent using the Qualtrics platform to alumni of the fellowship program.

The 32 question survey asked participants to provide information regarding the following areas:

- Demographic data and sponsor company information
- Functional area during and after fellowship
- Success in obtaining a job offer from sponsor company
- Starting salary after completing the fellowship and current salary
- Level of personal satisfaction with first job obtained after fellowship completion
- Number of years of work experience required for starting and current positions
- Level of satisfaction with other experiences throughout the program such as scholarship, teaching, and networking opportunities

**Results:** The survey was sent to approximately 100 alumni that completed the MCPHS biopharmaceutical industry fellowship program. Currently, there are 33 respondents that have completed the survey, and remains open for additional respondents. Preliminary results indicate that 28 alumni came into the fellowship program with prior industry experience, either through APPE rotations or internships. Upon completion of the fellowship program, 24 (75%)

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received an offer from their sponsor company, and 22 of 24 respondents accepted the offer. When asked about how many years of experience was required for their first job post-fellowship, 13 (40%) indicated 2-3 years and 18 (56%) indicated 3-5 years of work experience. Sixteen respondents (50%) indicated that they were hired as a Manager or Senior Associate (6; 19%), and that their salary range was between 100K-120K (15; 47%) or 120K - 140K (11; 35%). When asked if the network created through the fellowship program has provided them job opportunities, 20 (63%) of respondents said yes.

**Conclusion:** From preliminary results, it can be seen that the fellowship program does indeed provide the fellow with the ability to enter into positions above entry-level. It can also be seen that a 1 or 2 year fellowship program equates to 2-5 years of work experience, and the training received during the fellowship program proves to be valuable. In addition, the network created within the fellowship program provides opportunities for growth and development.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-174

**Poster Title:** Identifying predictor variables for burnout among pharmacy students

**Poster Type:** Evaluative Study

**Submission Category:** Professionalism and Career Development

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**Purpose:** The impact of stress and burnout among pharmacy students is an issue that has received little attention in the published literature. However, traction is gaining on the importance of research in this area. Identifying predictors of stress among pharmacy students can help administrators develop programs to alleviate this issue. The objective of this research project was to evaluate the prevalence of burnout among pharmacy students in two colleges of pharmacy and to identify predictor variables of burnout based on demographic variables collected.

**Methods:** The project measured burnout scores in pharmacy students at a single point in time from all classes (PS1-PS4) at two local colleges of pharmacy using the Maslach Burnout Inventory – General Survey for Students (MBI-GS-S). The MBI-GS-S is a validated 16-item instrument considered to be the gold standard tool for evaluating burnout. This instrument assesses three major aspects of burnout: emotional exhaustion, cynicism, and professional efficacy. Demographic information collected via a supplemental survey, included: age, perceived stress, organizational involvement, outside employment, perceived support, career goal, and overall health (i.e., sleep patterns, exercise patterns). Statistical analysis was performed to determine differences across campuses and to assess the relationship between demographic variables and the burnout scores using ANOVA and univariate linear regression, respectively.

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**Results:** There was no significant difference between colleges for the outcomes of emotional exhaustion (EE) or cynicism (C). Although one college had a slightly higher mean on the professional efficacy (PE) domain score (24.81 vs. 23.50 vs. 22.97,  $p=0.0352$ ,  $0.041$ ), the magnitude was small. For both colleges, female gender was associated with higher scores in the EE domain ( $B=3.61$ ,  $p<0.0001$ ). Leadership positions (EE:  $B=0.768$ ,  $p=0.0029$ ; C:  $B=0.676$ ,  $p=0.0178$ ), getting less sleep per night (EE:  $B= -1.34$ ,  $p<0.0001$ , C:  $B= -0.529$ ,  $p=0.0301$ ), and worrying about finances (EE:  $B= -1.62$ ,  $p<0.0001$ , C:  $B= -1.306$ ,  $p<0.0001$ ) was associated with higher scores in both the EE and C domains, respectively. Having less emotional support (EE:  $B=1.92$ ,  $p<0.0001$ , PE:  $B= -1.50$ ,  $p<0.0001$ , and C:  $B=2.26$ ,  $p<0.0001$  for PE) and worrying about academics (EE:  $B= -3.15$ ,  $p<0.0001$ , PE:  $B=1.20$ ,  $p<0.0001$  for PE, and C:  $B= -2.30$ ,  $p<0.0001$ ) was associated with higher scores in all 3 domains. Participation in mindfulness/meditation ( $B=1.55$ ,  $p=0.0006$ ) or prayer/spiritual activities ( $B=1.21$ ,  $p=0.0297$ ) was associated with higher PE scores. Scores for EE, PE, and C were better in the P1 and P4 year, but worse in the P2 and P3 year ( $p<0.05$  for all assessment points).

**Conclusion:** This data can be shared with students, faculty, advisors, and support staff to help educate on self-care or institutional strategies to alleviate or prevent burnout. Future research should focus on interventional approaches to reduce modifiable risk factors.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-175**

**Poster Title:** Pfizer post-doctoral industry fellowship program: a commitment to pharmacist talent development and retention

**Poster Type:** Descriptive Report

**Submission Category:** Professionalism and Career Development

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**Purpose:** Communicate Pfizer's commitment to pharmacist talent development and retention, through participation in post-doctoral fellowship programs in collaboration with various institutions – Rutgers University Ernest Mario School of Pharmacy, Massachusetts College of Pharmacy and Health Sciences (MCPHS) University, and University of California, San Diego (UCSD) Skaggs School of Pharmacy and Pharmaceutical Science. The aim of the Pfizer Post-Doctoral Industry Fellowship program is to prepare pharmacy graduates for careers in the biopharmaceutical industry. Through 1- or 2-year project assignments, fellows further their understanding of the pharmaceutical industry, develop core required capabilities, enhance technical skillsets, and expand their professional networks.

**Methods:** A pooled analysis was conducted evaluating the retention rate of post-doctoral Pharmacy fellows within Pfizer, using data from 2009 to 2019. To be included in this analysis, fellows were required to be recruited through the formal process, be affiliated with one of the three schools' programs, and have successfully completed their 1- or 2-year fellowship within the reporting period. The analysis excluded data from fellows that initially accepted the offering but did not complete the full term of the assignment. Additionally, the analysis excluded current fellows that have not yet completed the full term, and new fellows beginning their assignments in 2019.

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Retention rate is reported as a percentage of the number of fellows that were offered a position at Pfizer upon successful completion of their fellowship versus the total number of fellows completing their assignment during the reporting period.

**Results:** A total of 62 potential fellowship completions were identified during the reporting period. Of those, 57 were included in the final analysis. Five fellows did not complete their assignments due to securing alternate permanent industry roles (n=3), or for personal reasons (n=2).

Of the 57 fellows included in the analysis, 22 completed a 1-year fellowship assignment, while 35 completed a 2-year assignment. Assignments spanned multiple functional groups including Medical Affairs (n=25), Clinical Pharmacology (n=10), Clinical Research (n=8), Clinical Supply Chain (n=7), Quality Assurance (n=2), Medical Affairs/Medical Information (n=2), Marketing & Commercial Development (n=1), Regulatory Affairs (n=1), and Global Health & Value (n=1). Upon completion of the fellowship, 51% (29 out of 57) of fellows accepted permanent roles at Pfizer. Of the 29 fellows – 10 had completed a 1-year fellowship, while 19 had completed a 2-year fellowship. Retention rate in the department where the fellowship originated was 72% (21 out of 29). The remaining 28 fellow graduates accepted roles elsewhere - 46% (26 out of 57) accepted roles in other pharmaceutical companies and 3% (2 out of 57) accepted roles in other areas.

**Conclusion:** Pfizer's commitment to pharmacist talent development is evident through the support of the Post-Doctoral Industry Fellowship program. For more than a decade, the program has offered fellows a wide array of experiences, across multiple functions; thereby enhancing their skillsets in support of advancing the business. Successful completion of the program, along with availability of permanent offerings, is correlated with high talent retention rates at Pfizer, especially in the department of original assignment.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-176**

**Poster Title:** Impact of time allocation on attainment of an initial interview for postgraduate training programs in two graduating classes of P4 pharmacy students

**Poster Type:** Evaluative Study

**Submission Category:** Professionalism and Career Development

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**Purpose:** As competition for postgraduate training increases, students continue to explore options to diversify time and efforts during pharmacy school to improve chances of obtaining postgraduate training. While placement in these positions often related to interview performance, attainment of an initial interview is often determined by application materials, which depict a candidate's involvement during their professional years of pharmacy school. Due to lack of available literature on this topic, this study evaluated two graduating classes of PharmD candidates to determine a correlation between time allocation during the professional years of pharmacy school with obtaining an initial interview for a postgraduate position.

**Methods:** An anonymous survey, composed of 45 questions, was administered to two graduating classes of PharmD candidates at a single institution one week prior to graduation. This survey assessed each students' time allocation among various activities during the professional years of pharmacy school including but not limited to: the professional pharmacy setting in which students worked (community, hospital, industry...etc), the number of pharmacy organizations involved with, the number of leadership positions held within these organizations, and involvement with research activities throughout the P1 to P4 years. Additionally this survey also assessed average number of hours spent per week working in a pharmacy setting in addition to hours performing activities related to professional and non professional organizations. The number of interviews attained as well as the acceptance rates for postgraduate programs was also assessed. Student data was divided into three groups:

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those who applied to residency, those that applied to fellowship and the aggregate of both. To determine if a students' level of activity throughout the professional years of pharmacy school correlates to being offered an interview for postgraduate training, the data within each of these groups was quantified and subsequently compared between those who were offered an interview and those who were not. Trends in data were then assessed between groups to evaluate any correlations that may have occurred.

**Results:** A total of 537 graduating PharmD students completed this survey. One hundred and eighty five students applied for postgraduate training (41 fellowship, 156 residency, and 6 both). Among applicants, 155 were offered interviews: 39 (95 percent) for fellowship and 120 (77 percent) for residency. Of all candidates who received an interview for postgraduate training 95 percent had a grade point average (GPA) of 3.0 or greater. Of those who attained at least one interview, 23 percent of fellowship and approximately 33 percent of residency applicants performed research during the P3/P4 years, compared to 16 percent of all applicants who did not receive any interviews. Regarding leadership roles within professional pharmacy organizations, approximately 50 percent of all applicants offered at least one interview (residency or fellowship) held one or more position(s) during the P2/P3 year compared to only 25 percent of all applicants that did not receive any interviews. Forty percent of applicants who achieved an interview were employed as an intern in the hospital setting versus less than 20 percent of those who did not receive any interviews. Ultimately, 87 candidates were offered positions: 16 (41 percent) fellowship position and 71 (59 percent) residency.

**Conclusion:** This study, evaluating two years of students graduating from a large school of pharmacy, suggests that there are multiple variables that influence a candidate's chance of attaining an interview for postgraduate training. The likelihood of attaining an interview appears to be correlated to achieving a high GPA, involvement in professional pharmacy organizations, participating in research, as well as work experience (specifically hospital work) during their professional years. Based on these results, students should continue to seek additional opportunities outside the academic environment to be considered strong candidates for these increasingly competitive positions.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-177**

**Poster Title:** Pharmacists' knowledge of the use of anticholinergic medications in the elderly: survey of community pharmacists

**Poster Type:** Descriptive Report

**Submission Category:** Professionalism and Career Development

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**Purpose:** Elderly patients are more susceptible to the anticholinergic side effects of medications as a result of physiological changes with aging. In Singapore, many drugs with anticholinergic effects (DACEs) are classified as Pharmacy-only Medicines for the treatment of minor ailments. The sale of these DACEs is primarily based on pharmacists' discretion. It is a concern that inappropriate long-term use of DACEs by the elderly may bring about more harm than good. This study aimed to assess the knowledge of community pharmacists in ensuring the appropriate use of medications in geriatrics. It also sought to examine the effectiveness of a pharmacists' training.

**Methods:** In this IRB-approved exploratory survey study, questionnaires were administered to pharmacists from a community chain before and after the training to assess their knowledge of DACEs, anticholinergic side effects, as well as the dispensing habits of pharmacists. Pharmacists were not allowed to refer to any references when attempting the questionnaire. The training comprised a 30-minute presentation on immediate and long-term anticholinergic effects, the list of Pharmacy-only medicines with anticholinergic effects available in the community chain and alternative medications suitable for geriatric use. Chi-square test was employed to compare the number of pharmacists who provided the correct responses before and after the training.

**Results:** A total of 30 pharmacists participated in the survey, of which 9 pharmacists (30%) had at least 5 years of practice. Analysis of baseline knowledge showed that while each first-generation anti-histamine available in the community pharmacy chain (promethazine,

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diphenhydramine, dimenhydrinate, chlorpheniramine or promethazine) was correctly identified as a DACE by at least 28 pharmacists (93.3%), only up to 18 pharmacists (60%) were aware of the anticholinergic activity of antispasmodics (such as hyoscine or dicyclomine). Constipation, dry eye, urinary retention and dry mouth were correctly identified as anticholinergic side effects by at least 28 pharmacists (93.3%), while only 5 pharmacists (16.7%) recognized dementia as a long-term complication of DACE use. Checking for patients' medical conditions and drug allergies were practiced by at least 28 pharmacists (93.3%), while checking for patients' age during dispensing was performed by only 11 pharmacists (36.7%). Half of the pharmacists would attempt to offer safer alternative medications when encountering elderly patients buying DACEs for themselves. After the training, 24 pharmacists (80%) correctly identified central nervous system (CNS) anticholinergic effects. Results of the Chi-square test revealed that the increase in the number of pharmacists providing the correct responses after the training was statistically significant ( $p < 0.05$ ).

**Conclusion:** This study demonstrated gaps in community pharmacists' knowledge of anticholinergic effects and DACEs. While the training was effective in enhancing pharmacists' knowledge in the short-term, there may be a need for continuing training to ensure proper use of medications in the growing geriatric population.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-178**

**Poster Title:** Pharmacy student attitudes towards substance use and substance users: the changing trend in marijuana use permissiveness from 2015 to 2018

**Poster Type:** Evaluative Study

**Submission Category:** Professionalism and Career Development

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**Purpose:** This study involved utilizing a standardized Substance Abuse Attitude Survey (SAAS) to measure explicit attitudes of early-level pharmacy students towards social drug use and substance users. The main question investigated here was whether students' approval of recreational marijuana use (i.e. marijuana permissiveness), as compared to alcohol and other substances, has increased over the last four years. A second question was whether exposure to substance abuse education or a 12-step recovery program interacted with demographic factors (age, gender) to impact students' attitudes towards substance use.

**Methods:** Participants in this study were pharmacy students at Western New England University College of Pharmacy and Health Sciences who were either enrolled (intervention group) or not enrolled (control group) in a 15-week elective course focusing on drug abuse and addiction. The validated SAAS instrument with 49 Likert-type questions was administered online during the first week (baseline) and final week of the fall semester each year from 2015-2018. Data was collected anonymously in both groups and no incentives for completing the survey were provided. Individual rater scores and group mean scores were analyzed along two continuums: degree of permissiveness towards social drug use and adherence to popular stereotypes. Chi-square test for trend was used to assess whether trends over time were more pronounced than expected by chance. Between-group significance for each attitude subscore was determined using the Sidak corrected t-tests. Multiple regression analyses were run with permissive or stereotyped subscores as the dependent variable, and age, gender, drug abuse education and 12-step recovery program exposure inserted as predictor variables.

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**Results:** In total, 335 participants completed the survey from 2015-2018 (35% - 40% response rate). Nearly a third of all participants were concurrently enrolled in the elective course and 68% were not. Across the study period, the percentage of students endorsing marijuana legalization significantly increased from 48% in 2015, 56% in 2017, and 68% in 2018 ( $p < 0.05$ ). In parallel, endorsement of teenage use of marijuana as 'healthy experimentation' increased from 1% in 2015 to 7% in 2018 ( $p < 0.05$ ). While males accounted for a significantly greater proportion of students endorsing social use of marijuana or alcohol from 2015-2017, the effect of gender on marijuana permissive attitudes was lost after 2017. When comparing the intervention group to the control group, no difference in marijuana permissiveness scores was seen between the two. However, at the end of the semester, students enrolled in the drug abuse course disapproved more significantly of negative stereotypes towards substance users than students not enrolled. Controlling for the effects of age and gender variables, a multiple regression analysis confirmed that only exposure to 12-step alcohol recovery programs significantly predicted more permissive attitudes toward marijuana use.

**Conclusion:** Pharmacy student attitudes towards marijuana legalization have become more approving over time, while at the same time social use of this substance has become more acceptable, particularly among female students. The data suggest that brief exposure to didactic content on drug abuse pharmacology was insufficient for inducing more restrictive attitudes towards marijuana, but was effective in reducing popular stereotyped attitudes held by students towards substance users. The enactment of the state law legalizing recreational marijuana in 2018 may have undoubtedly contributed to the survey results, showing a more broadly accepting attitude towards recreational marijuana use among professional pharmacy students.

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**Session-Board # - 4-179**

**Poster Title:** Novel and comprehensive design of mock residency interviews for fourth professional year doctor of pharmacy students

**Poster Type:** Descriptive Report

**Submission Category:** Professionalism and Career Development

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**Purpose:** Pharmacy post-graduate residencies remain in high demand and due to the number of students seeking residencies growing faster than the number of available residency positions, residencies are becoming increasingly difficult to obtain. On-site pharmacy residency interviews consist of many situations in addition to traditional one-on-one and panel interviews. Interviews may include student presentations, patient cases or demonstrations of clinical skills, and a meal. In 2015, our school of pharmacy developed a mock interview design to fully immerse students in the tense interview environment and prepare them for residency interviews.

**Methods:** The faculty-organized mock residency interviews at our school of pharmacy place students in the following interview settings: two separate traditional 1-on-1 interviews, 3 interviewers with 1 candidate, 2 interviewers evaluating a 5-minute formal candidate Powerpoint presentation, a clinical case where candidates have 15 minutes to evaluate and develop written recommendations, a follow-up 1-on-1 interview to discuss the clinical case, and a group lunch scenario with other candidates and current pharmacy residents. Each interview setting lasts 15 minutes and 24 students rotate through all areas over the course of 2 hours and 40 minutes. The mock interview event takes place on one evening in early January, before actual residency interviews begin. 24 fourth-professional year pharmacy students can participate in this process, with a total of 38 faculty members, pharmacists, and current residents acting as interviewers. Candidates submit their CVs in advance to be reviewed by their interviewers. Feedback is not provided live in order to preserve the realistic atmosphere of the event. Each interviewer provides written feedback which is compiled, de-identified, and

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returned to students after the conclusion of the event. Each student received 2-3 pages of strengths and weaknesses.

**Results:** Our school of pharmacy has held this event annually for five consecutive years. The event has expanded from 12 to 24 students and new interview scenarios were introduced over time. The two greatest strengths of the above format are the lengthy time candidates spend in a formal interview format without breaks and the variety of situations they experience during the evening. Pharmacy residency interviews can be quite lengthy and a short mock interview session, although valuable, does not prepare candidates for the mental fatigue associated with remaining in a performance mode for hours. Possible areas for further development include expansion to involve more candidates, standardization of interview questions, and more areas of assessment or addition of objective assessment items. At this time, it is unknown how this residency mock interview design impacts students and whether it improves their performance on real interviews or confidence leading into real interviews, therefore this does not allow assumption that this particular mock interview design improves student outcomes. Significant participation by pharmacists, preceptors, and faculty members is essential to run a large scale mock interview simulation. Otherwise, minimum infrastructure is required to develop the interview program.

**Conclusion:** This pharmacy residency mock interview format describes a comprehensive design intended to be similar to actual pharmacy residency interviews. This particular event has been successfully hosted by our school of pharmacy for five years and allowed many students to practice interviewing in an environment similar to what they may experience on actual residency interviews. Implementation of this or a similar process relies on a precise schedule and widespread participation of faculty members and pharmacists to act as interviewers and provide feedback.



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**Session-Board #** - 4-180

**Poster Title:** Naltrexone for the treatment of psychogenic polydipsia

**Poster Type:** Case Report

**Submission Category:** Psychiatry/Neurology

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**Purpose:** Reported in up to twenty percent of psychiatric patients, psychogenic polydipsia, or compulsive water drinking, involves a disturbance in thirst control not attributed to impaired production or release of antidiuretic hormone. The etiology of psychogenic polydipsia is unclear. Complications include hyponatremia (sodium less than 135 mEq/L), and water intoxication that can lead to seizures, coma, and death. Treatment for psychogenic polydipsia includes a combination of behavioral modifications, such as fluid restriction and cognitive behavioral therapy, and pharmacologic modalities. Atypical antipsychotics such as aripiprazole, clozapine, risperidone, and olanzapine improved psychogenic polydipsia in case reports. Beta-blockers, clonidine, diuretics, angiotensin-converting enzyme inhibitors, and angiotensin receptor blockers have been shown to decrease water consumption. Naltrexone, a mu-opioid receptor antagonist FDA approved for the treatment of alcohol dependence and the prevention of relapse in opioid dependence, modulates the mesolimbic dopaminergic pathway, preventing the increased dopamine release responsible for the pleasurable reinforcing effects of substance abuse. Limited evidence supports the safe and effective use of naltrexone as monotherapy or as an augmentation agent in treating patients with compulsive behaviors. Naltrexone may offer an alternative treatment option for psychogenic polydipsia.

This case report describes the use of naltrexone in a thirty one year-old male with a history of schizoaffective disorder-bipolar type, polysubstance abuse disorder (dextromethorphan, cannabis, nicotine) and hyponatremia attributed to psychogenic polydipsia. The patient has a history of numerous inpatient psychiatric hospitalizations due to an inability to remain safe in the community. He drinks excessive amounts of fluid in an effort to get high, because he feels numb, or due to a feeling of anxiety in his chest. The current admission has been characterized

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by the need for emergent care on two occasions due to hyponatremia. Interventions have included placing the patient on constant observation, a fluid restriction, limiting bathroom access, and initiating sodium supplementation. Sodium levels are monitored on a regular basis. In the hope of reducing the craving and the pleasurable reinforcing effects the patient was experiencing from hyponatremia attributed to psychogenic polydipsia, naltrexone was initiated at an oral dose of 50mg daily. Since beginning naltrexone, the patient reports that it has been helpful in reducing his craving for excessive fluid. Sodium levels have remained within normal limits. The patient was enthusiastic about the addition of naltrexone, thinking that it may also help reduce the urge to drink alcohol after discharge. The patient is no longer on constant observation, and the fluid restriction has been eased. Discharge planning has been initiated.

**Methods:**

**Results:**

**Conclusion:**

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-181

**Poster Title:** Reintroduction of clozapine in a patient with chronic eosinophilic pneumonia

**Poster Type:** Case Report

**Submission Category:** Psychiatry/Neurology

**Primary Author:** Brianna Englett, Cardinal Health; **Email:** brianna.englett@gmail.com

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**Purpose:** Clozapine is an atypical antipsychotic notable for its superior efficacy in treating refractory schizophrenia. Potentially serious adverse effects associated with clozapine use include the development of blood dyscrasias, including eosinophilia (blood eosinophil count  $>500/\mu\text{L}$ ). While mostly transient and absent of systemic reactions, myocarditis, or organ-specific disease, rarely it can result in life-threatening end-organ damage. Despite the occurrence of eosinophilia during clozapine treatment being well-described in the literature, there is limited information on the use of clozapine in patients with chronic eosinophilic pneumonia (CEP). CEP is a rare disorder characterized by an abnormal accumulation of eosinophils in the lung interstitium and the presence of peripheral eosinophilia. Symptoms are typically managed effectively with glucocorticoids, however relapse is common and serious complications can occur. Use of clozapine in these patients may complicate the management of CEP due to the risk of associated eosinophilia.

In 2014, a 62-year-old Chinese American male residing in a long-term psychiatric care facility was admitted to an acute care hospital after presenting with cough, hemoptysis, and shortness of breath for two weeks. Past medical history was significant for asthma, hypertension, right lower lobe (RLL) lobectomy, and schizophrenia treated with clozapine, venlafaxine, and fluphenazine. Bronchoalveolar lavage (BAL) cell count revealed 59% eosinophils; peripheral differential showed an eosinophil count of  $900/\mu\text{L}$ . The patient was initiated on levofloxacin. Bacterial blood cultures resulted in no growth and fungal and acid-fast bacilli (AFB) cultures were negative. Chest CT showed a multifocal right lung ground glass nodularity and a preexisting right upper lobe nodule. The patient was discharged with diagnoses of healthcare-associated pneumonia (HCAP), allergic pneumonitis, and eosinophilia and venlafaxine was discontinued due to eosinophilia. The patient was readmitted in 2017 for fever and shortness of

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breath after a choking incident. Prior to this admission, he had been diagnosed with chronic obstructive pulmonary disease (COPD). The chest x-ray was significant for right middle lobe and RLL infiltrates and the unchanged pulmonary nodule. The patient was started on piperacillin-tazobactam and vancomycin. Bacterial blood cultures resulted in no growth, fungal and AFB cultures were negative, and BAL cell count was elevated at 24% eosinophils with a peripheral eosinophil count of 900/ $\mu$ L. The BAL eosinophil count was likely falsely suppressed due to recent use of prednisone. Discharge diagnoses included sepsis secondary to HCAP, acute COPD exacerbation, chronic diastolic heart failure, and eosinophilic pneumonia with recommendations to psychiatric care physicians to discontinue clozapine, sertraline, and aspirin. Clozapine was discontinued after 5 months following the patient's inability to wean from prednisone without worsening of the eosinophilic pneumonia. The eosinophilia resolved after clozapine discontinuation. In 2019, 14 months after discontinuation of clozapine and worsening psychiatric symptoms despite trials of aripiprazole, fluphenazine, olanzapine, quetiapine, and thiothixene, the patient was reinitiated on clozapine.

This patient's history of chronic eosinophilia and recurrent pneumonias was complicated by clozapine treatment and COPD. Following the discontinuation of clozapine his eosinophilic pneumonia resolved, however he decompensated psychiatrically. Alternative antipsychotics were trialed but were unsuccessful. The decision was made to reinitiate clozapine due to poor quality of life, altercations with peers, and risk for being a danger to himself. Given his history of eosinophilic pneumonia and comorbidities, a slow titration was followed. Symptom improvement was noted, even at lower initial doses. Risks of clozapine reinitiation include a recurrence of eosinophilia and associated organ-specific disease, such as eosinophilic pneumonia. Eight weeks after restarting clozapine there was a noted increase in the peripheral blood eosinophils from a baseline of 400/ $\mu$ L to 800/ $\mu$ L. This case describes the effective management of a patient with chronic eosinophilia who relies on clozapine for the treatment of schizophrenia symptoms. Due to the potential for severe complications secondary to eosinophilic pneumonia, close monitoring is warranted during clozapine treatment and should be continued for the duration of clozapine treatment.

### **Methods:**

### **Results:**

### **Conclusion:**

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-182**

**Poster Title:** Community pharmacy walks: an innovative way to provide medication education

**Poster Type:**

**Submission Category:** Psychiatry/Neurology

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**Purpose:** Around the world, hospital pharmacists provide a wide range of patient-centered services. In an international survey of hospital pharmacy practice, pharmacists' noted that their daily workload consists of both clinical activities (e.g., medication prescribing, influence on prescribing, and medication related outcome monitoring) and operational activities (e.g., medication procurement, and dispensing). Operational activities are more consistently provided by hospital pharmacists worldwide; whereas clinical activities are more prominent in developed countries. Despite limited availability, clinical pharmacy services are integral in optimizing patient care and advancing evidence-informed practice. In Canada, patient education during hospitalization and at discharge are Clinical Pharmacy "Key Performance Indicators". Patient education can be provided by pharmacists through various means; one example is Medication Education Groups. Studies show that pharmacist-led Medication Education Groups can improve cardiovascular risk factors in individuals with diabetes, and medication adherence in older adults. Medication Education Groups are also beneficial in psychiatry and have been shown to

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reduce hospital readmission rates. It has been demonstrated that patients with mental illness have lower health literacy as compared to the general population. Furthermore, they report having inadequate knowledge about medications and dissatisfaction with the information they receive about their medications. While benefits of pharmacist-led inpatient psychiatric Medication Education Groups have been described in the literature, anecdotally, they may not always achieve their intended outcome. For example, there are frequently concerns with low attendance and engagement. Furthermore, patients can be disruptive, argumentative, exaggerate side effects, and/or attempt to derail the group entirely. With this experience, a need was identified to create an innovative way to deliver medication education that improves health literacy and empowers patients to take ownership of their own physical and mental health. One such model that was developed and trialed at the Centre for Addiction and Mental Health involved taking medication education outside of the hospital, and into the community. Led by a Clinical Pharmacist, inpatients with off-ward privileges are invited to participate in weekly visits to a nearby community pharmacy. These “Community Pharmacy Walks” aim to arm patients with knowledge, skills and attitudes to make informed choices related to Over-the-Counter products upon discharge. For example, the Clinical Pharmacist compares and contrasts the plethora of laxatives available in the pharmacy. They would then highlight that, for example, bulk-forming laxatives are dangerous in the management of clozapine-induced constipation, and that osmotic laxatives would be preferred. Patients have had extremely positive responses to the group, and are keen on participating

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regularly. “Community Pharmacy Walks” began as a way to engage patients to discuss medications, and have now transitioned as a way for patients to proactively integrate with the community. Future directions of this novel medication education group format involve consistent measuring of medication knowledge, and attitudes pre- and post-group participation.

**Methods:**

**Results:**

**Conclusion:**

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-183**

**Poster Title:** Misuse of prescription stimulants and prevalence of Internet Gaming Disorder (IGD) among adult video gamers

**Poster Type:** Evaluative Study

**Submission Category:** Psychiatry/Neurology

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**Purpose:** Cognitive-enhancing drug use has been reported among various populations, including chess and poker players. Although prescription stimulant medications have been used by chess and poker players for performance enhancement, little is known regarding its use among video gamers. Anecdotally, professional video gamers utilize prescription stimulants at tournament competitions. Prescription stimulant misuse among video gamers (a population exceeding 175 million worldwide) may have a substantial impact upon public health. The objectives of this study are to determine if prescription stimulants are misused by adult video gamers for performance enhancement and to determine the prevalence of the Internet Gaming Disorder (IGD) diagnosis.

**Methods:** A 40-item Internet-based survey was administered through Qualtrics via various social forums and discussion boards between May 8 and June 12, 2019. Specific variables assessed included the following: demographics, video gaming behaviors/patterns, misuse of prescription stimulants, and rate of IGD. The validated 9-item Internet Gaming Disorder Scale-Short Form (IGDS9-SF) questionnaire was used to screen for IGD; a score of  $\geq 36$  out of a possible 45 met criteria for IGD. Participants who were  $\geq 18$  years old and reported playing video games within the past 12 months were included. Participants who completed the survey had the option of being included in a random drawing for one of 15 \$10 gift cards.



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**Results:** A total of 399 participants completed the survey. Most participants were male (83.9%) with a mean age of  $24.7 \pm 4.7$  years, who reported playing video games  $17.7 \pm 16.0$  hours/week for  $5.5 \pm 1.8$  days/week. The majority of respondents classified their race as white (55.7%), followed by Asian (21.2%), and Hispanic (11.3%). Fifty-four (13.6%) participants reported using a prescription stimulant for any purpose; 19 (4.7%) used a prescription stimulant specifically to enhance video gaming performance. Of the 19 prescription stimulant users, Adderall/amphetamine salts (47.4%), Ritalin/methylphenidate (26.3%), and Vyvanse/lisdexamfetamine (21.0%) were the most commonly reported. The most highly rated reason for using prescription stimulants was to improve concentration while gaming ( $4.53 \pm 0.84$ , out of 5.0 scale). Nine participants (2.3%) met criteria for IGD.

**Conclusion:** This study is the first to confirm prescription stimulant misuse among adult video gamers, with 4.7% misusing prescription stimulants to enhance gaming performance. IGD is present among adult video gamers, but with lower prevalence than the general pediatric population. This information may aid clinicians and researchers in the identification of high-risk patients and the development of interventional strategies decreasing prescription stimulant misuse among video gamers.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-184**

**Poster Title:** Cognitive enhancing drug use, lifestyle, and stress among five United States doctor of pharmacy programs

**Poster Type:** Evaluative Study

**Submission Category:** Psychiatry/Neurology

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Mitchell Barnett

**Purpose:** Multiple studies have reported nonmedical prescription stimulant use among medical, physician assistant, dental, and Doctor of Philosophy (PhD) students. Limited studies have analyzed nonmedical prescription stimulant use in Doctor of Pharmacy (PharmD) students. Cognitive enhancing drugs (CEDs) can encompass prescription stimulants as well as other prescription medications, supplements, and agents. The objectives of this study are to analyze the current trends in CED use, lifestyle, and stress levels among United States (U.S.) pharmacy students.

**Methods:** A 35-item web-based survey was administered through Qualtrics to five PharmD programs across the U.S between May 8 and June 7, 2019. Student participants were recruited via a listserv email announcement sent by the faculty representative from each of the five PharmD programs. Specific variables assessed included the following: demographics, CED use, lifestyle (food and housing security, sleep, exercise, work, and extracurricular activities), and stress levels. Food and housing security were measured via the validated U.S. Department of Agriculture's Current Population Survey Food Security Supplement (CPS-FSS) which screens individuals for food and housing insecurity. Stress was measured via the validated Perceived Stress Scale (PSS) survey (out of 40 points) which screens individuals based on their current stress levels. Skip logic was employed throughout the survey to enhance subject motivation and alertness. Participants who completed the survey had the option of being included in a random drawing for one of 15 \$10 gift cards.

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**Results:** A total of 279 students completed the survey from the five PharmD programs. Most participants were female (69.1%) and single (89.1%) with a mean age of  $20.8 \pm 1.5$  years. The majority of respondents classified their race as Asian (48.4%), followed by white (20.7%), and Hispanic (12.2%). Prescription medication CEDs were misused by 9.3% of students to enhance academic performance, with stimulants being the most popular (8.2%); less common prescription medications included beta blockers, modafinil, and armodafinil. The highest rated reasons for using a prescription stimulant were to improve concentration ( $4.0 \pm 1.16$ , out of 5.0 scale) and perform better academically ( $3.7 \pm 1.4$ ). The majority of students used some type of supplement or agent (87.0%) to enhance academic performance of which caffeine drinks (78.1%) and energy drinks (32.2%) were most common. Roughly 1 in 5 students were always/usually worried about having nutritious food (22.5%) or paying rent/mortgage (18.2%). Students slept  $7.1 \pm 1.0$  hours on typical nights, slept  $5.6 \pm 1.6$  hours on days before exams/deadlines, exercised  $66.3 \pm 100.2$  minutes/week, worked for pay  $8.7 \pm 8.0$  hours/week, and took part in community service/organizations/leadership activities  $93.9 \pm 458.9$  hours/year. The mean PSS score was  $20.0 \pm 6.3$  (range 14-26), which is considered moderate stress and almost double the general population and U.S. pharmacy school faculty.

**Conclusion:** CED use, in particular prescription stimulants, continues to be prevalent among U.S. PharmD students. Student stress levels appear higher than the general population and may be attributed to food or housing insecurities as well as balancing academics, work, and extracurricular activities. This information may help pharmacy programs better understand their students and to consider a reassessment of student mental health and lifestyle resources available at their institution.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-185**

**Poster Title:** Implementing a pre-transition of care service line through pharmacy advocacy in the community to help promote public awareness, resident learning opportunities, and preceptor development

**Poster Type:** Descriptive Report

**Submission Category:** Small and/or Rural Practice

**Primary Author:** Patrick Divoky, University Hospitals Geauga Medical Center; **Email:** Patrick.Divoky@uhhospitals.org

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Dawn Damante

**Purpose:** Pharmacists expanding their clinical impact beyond the hospital and into the community is a grassroots way of advocating for positive pharmacy change. Engaging the community through medication discussions and educational opportunities helps promote public awareness to pharmacists' capabilities, and establishes a new level of expectations of a hospital pharmacist's role, responsibilities, and availability for a community member should they require hospital services. This new service line allows the hospital pharmacist to go into the community in order to advocate to the public the impact pharmacy has on providing quality patient care through their advanced training and improved patient availability.

**Methods:** In an effort to positively encourage the use of pharmacy education while in the hospital, pharmacy would go into the community to advocate for and set the expectation of pharmacy responsibilities with the patient population that would be most likely to utilize hospital services. With enhanced standards to maintain qualified preceptorship for residency purposes, community involvement through outreach and volunteerism, implementing a service line dedicated to local pharmacy advocacy through education would continually help preceptors development. Pharmacy residents continually expressed the desire to advocate for pharmacy services through knowledge sharing and community involvement. Getting to the patient before the patient becomes a patient, is a way that pharmacy could change how the public viewed and utilized pharmacy services.

Pharmacy services partnered with our hospital's senior outreach coordinator, underserved care coordinator, local assisted living directors of nursing, area fitness centers, local emergency

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medicine teams, and regional health fair representatives in an effort to schedule educational opportunities for the community, and as a way to have direct time with a hospital pharmacist. Care coordinators sent inquiries regarding topics and questions the community wanted to learn more about regarding medications, medical conditions, and other health care related concerns. Trends were communicated to the pharmacy team and a schedule was constructed and promoted through local flyers.

**Results:** After one event at each senior center and area fitness center, the overwhelmingly positive feedback from the community created the desire to host a different medical education topic to be delivered quarterly and that community members would promote the value of the information received to their community. Eighteen senior center visits have been scheduled, eight health fairs, three area EMS discussions, and two visits have been made to assisted living centers. Pharmacy residents received the additional advocacy training and direct patient care connection that they were looking for. Pharmacy preceptors were able to not only assess residents during outreach events, but also were able to spend time directly interacting and advocating for services provided. Patients have not only had more time to learn more about medications and the evidence supporting their use, but also have had the chance to sit down individually with a pharmacist and discuss medication lists, receive medication adherence support, and have a new resource they can expect with each visit to the pharmacy or the hospital.

**Conclusion:** Pharmacists have seen the positive impact that advocacy has had on the community through community feedback, care coordinator promotion of pharmacy utilization for additional learning opportunities. Implementing this service line assists the community, helps expand pharmacy resident presentation and advocacy experience, and assists preceptors in maintaining qualifications to continue to meet preceptorship standards in a volunteer, community-oriented way. Establishing a pre-transition of care service line has emphasized the need for preventive pharmacy education services in the community. Pharmacy will continue to help positively change the public's expectations of pharmacy's impact in the hospital and community.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 4-186

**Poster Title:** Study of the application of Japan “okigusuri” system for regional care

**Poster Type:** Descriptive Report

**Submission Category:** Small and/or Rural Practice

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**Purpose:** The traditional mechanism of Japan "Okigusuri" (household medicine) originated in Toyama, the Hokuriku region of Japan, about 300 years ago. It is a system that incorporates the sales method of "senyuy-kouri" (Use first, pay later) that the medicine box is borrowed for free at each home, and the price of the use is collected later. In modern Japan this system is retreating. However, iSHP is focusing on the old method from the Edo period and considering the application to regional care from a global perspective jointly by the United States.

**Methods:** We investigated and examined the references. To clarify the historical transition from the occurrence of the putting medicine to the present, the report of the Taisho, the Meiji era, and the Edo period was summarized in a common format style in the place and the episode etc. while the document like the case report took so much. Just to clarify what's behind the sale of drugs, check out the next ten items. "Self-medication, health knowledge, trust relationships, counseling, information, marketing, sense of mission, understanding of the region, thinking about tradition, and solving problems"

**Results:** The beginning of the medicine was the Edo period and the method which had been passed down to the present. The instruction of the Lord of Toyama "the use is made ahead, and it penetrates the ambition of the salvation widely even in the remote village where it is not bathed in the Niue of medical treatment. It is the one that became the shape. The number of cases reported in the report was 20 cases. Japan has been delivering medicine throughout the country, but it has been found that it is not just a salesman but a complete trust from its

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customers. It was found that there is a big advantage in the understanding of the advice about health and the method of taking it when there is trust. Moreover, the advice of the hospital consultation was done from the health consultation, and the lecture of health was done even if the resident was collected.

**Conclusion:** The mechanism of the "okigusri" is changing in the Japan in the modern style. However, it seems that it is possible to apply the method which encompasses the relationship and the trust relation with the customer until around the Showa era from the occurrence globally. Therefore, thought to be a reference of the Rural Pharmacy Practice in the United States. In addition, it seems that there is a possibility of the application of the "pharmacy vision for the patient" that the Government (Ministry of Health, Labour and Welfare) showed on October 23, 2015 in Japan.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 4-187**

**Poster Title:** Integrated pharmacy automation management reduced formula usage and improved exclusive breast-feeding rates in a Baby Friendly community hospital

**Poster Type:** Evaluative Study

**Submission Category:** Women's Health

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**Purpose:** Martin Luther King, Jr. Community Hospital (MLKCH), a 131-bed inner-city safety-net community hospital, cares for sixty Level One neonates monthly in its Perinatal Department. The Baby Friendly Hospital Initiative (BFHI), sponsored by WHO and UNICEF, designates hospitals as baby friendly when they have followed specific programmatic steps to support successful breastfeeding. MLKCH implemented components the BFHI in 2016 to provide nursing, parent, and medical staff education to improve couplet care. However, rates of formula usage continued to exceed organizational goals. MLKCH sought to leverage pharmacy automation and robotics in 2018 to reduce formula usage and further improve exclusive breast-feeding rates.

**Methods:** Prior to automation implementation, formula was stocked by materials management as a departmental supply item. As such, the product was readily available for staff provision and usage without digital controls or tracking. Upon project initiation, pharmacy acquired control of all formula distribution in the hospital and dispensed formula only from automated dispensing systems (BD Pyxis ES) in the Perinatal Department. With this additional level of control, formula required an order from the prescriber in the electronic health record (EHR) prior to dispensing from Pyxis. To avoid workflow disruptions or delays in care, MLKCH built the formula order within an electronic order set configured to auto-verify in the pharmacy's order management system (Cerner Millennium). At the Pyxis, formula was non-overrideable with a clinical data category warning constructed to query the nurse before removal. As such, nursing staff could



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only obtain formula subsequent to a physician order and after answering a query/reminder to prioritize use of breast milk. Data management techniques included tracking number of prescriber orders for formula, appropriateness of use by prescriber, barcode medication administration rates, as well as automated dispensing statistics linked to the respective prescriber orders and formula dispense activity.

**Results:** With increased focus on systems, data, and staff accountability during this initiative, formula purchases decreased by 70% relative to annualized Materials Management purchases. Relative to pharmacy project initiation baseline, monthly formula usage decreased by 25%, and percentage of neonates requiring formula decreased by 29%. In addition to the intended product management goal, treating formula as a medication orderable also resulted in improved safety processes with bar-code administration rates for formula exceeding 95%. As the project matured, MLKCH leadership observed via frequency analysis that a subset of neonates each month received less than three bottles total over their entire stay. A second round of education and addition of automation query messaging reduced the frequency of this low-usage formula consumption by 64%. Beyond reducing formula usage and cost, this initiative improved exclusive breastfeeding rates by 20%.

**Conclusion:** MLKCH sought to improve the care of neonates by collaborating with the BFHI to promote breast-feeding and prioritize the use of breast milk over formula. By implementing required EHR ordering of formula by prescribers, pharmacy dispensing automation, and nursing/medical staff education, formula usage decreased and exclusive breastfeeding rates increased without adversely affecting prescriber, pharmacy, or nursing staff workflow.

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**Session-Board # - 4-188**

**Poster Title:** Antimicrobial utilization at the largest tertiary care obstetric hospital in Qatar: application of point prevalence and defined daily doses (DDD) methodology

**Poster Type:** Descriptive Report

**Submission Category:** Women's Health

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**Purpose:** Antimicrobial resistance (AMR) is a major public health concern . The use of antimicrobials to prevent and treat maternal and fetal infections is well established in obstetric practice. To the best of our knowledge, this is the first Point Prevalence Survey from the middle east that focused explicitly on antimicrobial use among obstetric and gynecologic patients. The primary objective of this study is to determine the prevalence of antibiotic utilization among patients in Women’s Wellness and Research Center (WWRC) and to describe the prescription pattern of antibiotic use in the largest tertiary care obstetric hospital in Qatar.

**Methods:** The study was carried out at WWRC, a tertiary care obstetric and gynecologic hospital in the state Qatar. In conjugation with the local Antimicrobial Stewardship Program, a point prevalence cross-sectional survey was conducted to quantify and characterize the antimicrobial utilization. The Global point prevalence survey protocol was adapted to evaluate the antimicrobial. Patients were identified through a stewardship integrated program built in the Cerner (electronic medical record) and the list of patients on antimicrobials were generated electronically. The data extraction tool was built according to the Global Point Prevalence Survey GPPS. The data collection was mainly around prevalence of antimicrobial use, patients’ clinical diagnosis and indications for antibiotic use (documented in the notes), class of antimicrobial (Anatomical Therapeutic Chemical (ATC) classification system from the World Health Organization (WHO) Collaborating Centre for Drug Statistics Methodology, route of administration, compliance to the guidelines (if the antimicrobial of choice was in accordance

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with the local, national or international guidelines), stop/review date documentation of antimicrobials, eligibility for intravenous (IV) to oral conversion and duration of therapy (from the point of initiation to discharge) etc. A specialized antimicrobial stewardship pharmacist (BT) performed retrospective data collection A specialized antimicrobial stewardship pharmacist performed retrospective data collection for one day of antimicrobial use. The study also calculated daily defined dose of antimicrobials used for 6 months.

**Results:** On the day of the survey a total of 202 patients were admitted in the hospital, of whom 40 patients (19.8%) were receiving one or more antimicrobial agents. In total, 120 medication orders (1 order is equivalent to one item) were dispensed, majority of which originated from labor and delivery unit (43.3%) followed by antenatal (21.7%), gynecologic unit (15%), postnatal (15%) and high dependency unit (5%). Antimicrobials were used more frequently for definitive (44%) treatment, whilst 29% of the antibiotics reported were given for prophylaxis and only a quarter (26%) of the antibiotic prescriptions was written empirically. Most common indication for antibiotic use (Figure 1) were Group B streptococcus (GBS) followed by surgical prophylaxis (17.5%) and septic miscarriage (14.2%). Nearly half (47.56%) of the patients were reported to have no microbial growth (blood/urine/nasal/vaginal swab) in the culture, Streptococcus Group B (25%) was the most prevalent organism found followed by Streptococcus agalactiae (7.5%) and Bacteroides fragilis (2.5%). Beta-lactamase sensitive penicillins (such as amoxicillin/ clavulanate) (30%) were the most frequently prescribed class of medications followed by First generation cephalosporin (eg. cefazolin). Over the five months, the total antibiotic consumption in terms of DDD/1000 patient days varied from 351.37 – 452.05 (IQR 107).

**Conclusion:** The study provides important updates to the use of antimicrobials at the largest obstetric hospital in Qatar and provides the largest data set across middle east in terms of antimicrobial use explicitly in obstetric population. Although the actual dosing of antibiotics prescribing seemed appropriate and compliant to the local or international guidance further studies including larger samples are required to have a clear picture. As majority of antimicrobials were used for surgical prophylaxis, there is also the need to further explore the factors contributing to the high prevalence of antibiotic use in surgeries.

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**Session-Board #** - 8-001

**Poster Title:** Developing a process to integrate and consolidate pharmacy policies across a health system

**Poster Type:** Descriptive Report

**Submission Category:** Administrative Practice/Management/Financial Management/Human Resources

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**Purpose:** Develop and implement a formal process to review over 600 hospital site specific pharmacy policies to integrate and consolidate the information into new health system policies.

**Methods:** A project lead began by assigning each of the over 600 hospital site specific policies into 7 different groupings based on the themes of content. Two pharmacy content experts were assigned as co-leads for each of the policy groupings. Each of the co-leads then selected pharmacy representation from each of the hospital site locations to form a working committee to handle that section policies. All day working meetings were held for each policy groupings where draft health system policies were proposed to replace selected hospital site specific documents. An electronic depository was created to track the review process and status of every new proposed policy throughout the four month process. These completed draft health system policies were then assigned as tasks through committees for appropriate reviews and vetting. As the new documents were approved, a process was created to ensure education and implantation was completed at each location for these new health system pharmacy policies.

**Results:** During the four month process the original over 600 site specific policies were consolidated into 140 new health system policies. The established document review process identified and resolved significant deficiencies and variabilities in standard pharmacy operational process across the individual hospital site specific locations. Efficiencies were created allowing a single health system docuemnt to ensure established best practices were used at each location across the health system.

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**Conclusion:** A innovate and robust policy process was effective on taking over 600 documents and consolidating them into 140 new health system documents.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-002

**Poster Title:** Development of a comprehensive value assessment framework at an academic medical center

**Poster Type:** Descriptive Report

**Submission Category:** Administrative Practice/Management/Financial Management/Human Resources

**Primary Author:** Sapna Prasad, Yale New Haven Hospital; **Email:** sapna.prasad@ynhh.org

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Sagune Sakya

Molly Leber

**Purpose:** As increasing numbers of high cost oncology and specialty drugs are approved, many with marginal clinical benefit, the traditional approach to formulary management is no longer sustainable. Value is a key consideration in discussions about reducing costs in healthcare. The U.S. lacks a national program that provides comprehensive review of high cost medications. While leading organizations in the U.S. have released value frameworks, there is limited evidence showing their utility in decision-making. The purpose of this study was to pilot an evidence-based comprehensive value assessment at an academic medical center to look beyond the traditional approach to formulary management.

**Methods:** In January 2018, the Formulary Value Analysis Committee was established with multidisciplinary clinical representation across Yale New Haven Health System. A checklist was developed to allow for systematic identification of target drugs for value assessment. This process was designed to empower pharmacists to engage in the value assessment process. Further, we developed a step-by-step process for evaluation of a drug, and a standardized method of presentation called the Value Assessment Framework. We describe the steps taken to create the Formulary Value Analysis Committee, a structure that supports pharmacoeconomic inclusion in formulary decision making, and we illustrate the creation of the value assessment framework. A pilot drug was identified by the checklist and tested through the value assessment framework.

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**Results:** The results of the comprehensive value assessment process, along with the results of the pilot drug assessment were presented to the Formulary Value Analysis Committee for validation and feedback. A scorecard was developed to objectively summarize efficacy, safety, and level of evidence for the compared drugs and represent overall value of the drugs. The updated Value Assessment Framework is intended to be utilized by the Formulary Value Analysis Committee to make a formal recommendation to the appropriate pharmacy and therapeutics committees at Yale New Haven Health System. Practical requirements for developing a useful VAF involve ensuring the appropriate data is available and results are presented in a meaningful way.

**Conclusion:** Successful implementation of the Value Assessment Framework requires education and incremental culture change. Successful program development requires involvement of clinical champions in determining the guiding principles of the program. Moving toward a pricing system that matches the value of a drug will be challenging. We share these experiences to encourage a national conversation about the rising costs of health care. Future directions include continued iterations of the Value Assessment Framework, education around the benefit of the pharmacoeconomic perspective, and stakeholder buy-in for the new formulary management model.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-003

**Poster Title:** Leveraging pharmacoeconomics in formulary management: cost-effectiveness analysis of betrixaban

**Poster Type:** Descriptive Report

**Submission Category:** Administrative Practice/Management/Financial Management/Human Resources

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Sagune Sakya

**Purpose:** In response to unsustainable increases in drug pricing over the past decade, the inclusion of economic evaluation has emerged as a means of identifying the value of drug therapies. The purpose of this project is to provide a case study showing the novel process of integrating economic evaluation into formulary decision-making at an academic medical center.

**Methods:** In October 2016, Yale New Haven Hospital, an academic medical center, began development of an evidence-based pharmacoeconomics program to guide the provision of high value care from a cost-effective perspective. Cost-effectiveness analysis is a widely accepted and applied methodology for comparing costs and effects of drug therapy interventions. While the importance of pharmacoeconomic analysis in formulary decision-making has been discussed previously, there are few examples of its integration into practice. The goal of the pharmacoeconomics program was to operationalize the incorporation of pharmacoeconomics into formulary decision-making by developing a systematic and evidence-based process for evaluation, and a standardized method of presentation within the traditional drug monograph. We describe here the steps taken to create a structure that supports pharmacoeconomic inclusion in formulary decision-making, and illustrate the economic evaluation process using a pilot drug, betrixaban. The pilot drug chosen was selected to demonstrate that the incorporation of pharmacoeconomic evaluation is effective for both high cost and high utilization drug therapies.



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**Results:** Yale New Haven Hospital reviewed betrixaban as part of a review of anticoagulation drugs indicated for prophylaxis of venous thromboembolism. A decision analysis was developed to evaluate whether betrixaban was cost-effective when compared to subcutaneous enoxaparin or heparin for prophylaxis of venous thromboembolism in a hospitalized acute medically ill adult population. The analysis was conducted from a hospital perspective over a one year time horizon. The analysis results were incorporated into the traditional formulary drug monograph and presented to key stakeholders. Initial feedback has been positive, and a preliminary recommendation made regarding the addition of betrixaban to the health system formulary. A final decision is pending. Widespread implementation of the pharmacoeconomics program will require education and buy-in from key stakeholder groups. As familiarity of the pharmacoeconomic perspective increases among clinicians, economic evaluation can be expanded across the health system to target drug therapies in different disease areas. Through this expansion, additional improvements can be made to the review process to increase the applicability of pharmacoeconomic evaluation in day-to-day decision-making.

**Conclusion:** Pharmacoeconomic evaluation is a useful tool for formulary decision-making as a means of incorporating a more comprehensive assessment of the value of a drug. To our knowledge, no other institutions have incorporated a comprehensive pharmacoeconomic perspective in formulary decision-making. Clinical pharmacists, in collaboration with other stakeholders across Yale New Haven Health System, play a crucial role in the addition of pharmacoeconomic analysis to enhance the current formulary management process. Successful and sustained implementation of the pharmacoeconomic program requires education, oversight, guidance and buy-in from key stakeholder groups across the health system.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-004

**Poster Title:** Implementation of hypercalcemia of malignancy guidelines to reduce treatment associated costs

**Poster Type:** Descriptive Report

**Submission Category:** Administrative Practice/Management/Financial Management/Human Resources

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**Purpose:** The pharmacy cost reduction team was challenged to find new ways to reduce pharmacy supply costs. Calcitonin acquisition costs had been steadily increasing over the past several years. A shortage of bisphosphonates contributed to an acute increase in calcitonin use for hypercalcemia prompting further evaluation from the pharmacy cost reduction team. Review of hypercalcemia cases revealed an opportunity to optimize dosing and subsequently drive down cost associated with hypercalcemia therapy.

**Methods:** The pharmacy performed an evaluation to determine how calcitonin was used. Opportunities for improvement were identified for both selection of appropriate patients requiring calcitonin and optimizing the dose of calcitonin as well as other treatment agents. A hypercalcemia of malignancy treatment pathway template was developed and vetted with appropriate physicians identified as users of calcitonin in the use evaluation. The pathway was reviewed and approved by Nephrology Council and the Pharmacy and Therapeutics (P&T) Committee and, following approval, was implemented fully in February 2019. A dosing cap for calcitonin was also approved. An alert was built within the computer order entry system to notify the pharmacists when the dosing cap is exceeded to prompt a change in dose. Follow-up evaluations were performed to determine the clinical and economic impact of the change.

**Results:** During the baseline period, October 2017 to September 2018, the average monthly spend for injectable bisphosphonates and calcitonin was \$13,863. Following discussions with the appropriate stakeholders in October 2018, the average monthly cost of hypercalcemia

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treatment agents decreased to \$4,636 per month for the time period of October 2018 to January 2019. After full implementation of the pathway and alert, the average monthly cost for hypercalcemia agents further decreased to \$2,581 per month for the time period of February to May 2019. Overall cost savings from October 2018 through May 2019 is \$79,980. Patients are prospectively monitored for adherence to the pathway and appropriate dosing of calcitonin. Retrospective review of all calcitonin patients has shown appropriate response to therapy without any complications.

**Conclusion:** Use of a hypercalcemia pathway and calcitonin dose limits has resulted in \$79,980 of pharmacy supply cost savings in the first seven months and has optimized the treatment of hypercalcemia in this institution without negatively impacting patient care.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-005

**Poster Title:** Engagement of front line staff to develop a sustainable staffing strategy to manage unplanned absences due to employee call outs

**Poster Type:** Descriptive Report

**Submission Category:** Administrative Practice/Management/Financial Management/Human Resources

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**Purpose:** Unplanned absences due to employee call outs creates emergency staffing issues, especially during off hours. Over time, call outs lead to employee burn-out, increased employee turn-over, a reduction in the quality of pharmacy services provided, and negatively impact employee engagement. Collaborating with front line staff to develop a sustainable and standardized strategy to proactively manage call outs will help raise awareness of the impacts of unplanned absences, provide more transparency in call out coverage, reduce the immediate burden on the staff to find coverage to fill the staffing gap, sustain minimum staffing requirements and improve teamwork and engagement of employees.

**Methods:** The Pharmacy leadership team led meetings with front line pharmacists and technicians to review engagement survey results and historical call out data. Employees reflected on survey results related to unplanned absences and engaged in discussions about ideas to proactively prepare for these unplanned absences, how to appropriately triage a call out, and also addressed cultural issues that may be contributing to unplanned absences. A group of front line employees took information from the discussions and collaborated to identify strategies to manage unplanned absences, which were later presented to the staff for further discussion and selection. The employees chose a hold back method which would be used when no volunteers were willing to stay to cover the shift. The hold back list was prioritized by seniority and required the person on site, and in the position closest to the top, to

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cover at least four hours of the open shift. Once the shift was completed, the name of the volunteer or employee being held back was moved to the bottom of the list. The task group helped develop a policy and procedure document and led subsequent open forums to establish an implementation timeline, discuss barriers and concerns, and answer questions from the staff.

**Results:** Unplanned absence data was reviewed for a matched three month time frame (January, February, March) prior to implementation and post implementation. Excluding absences related to Family Medical Leave Act, a total of 103 shift call outs occurred in 2018, compared to a total of 67 in 2019. This represents a 35 percent reduction in total unplanned absences following implementation of the hold back program. A total of 29 shifts were categorized as unplanned absences unrelated to illness prior to implementation, compared to a total of 12 following program implementation, representing a 60 percent reduction. While finalized employee engagement survey data will not be available until August, pulse polls and follow-up open forums with the staff have suggested an improvement in employee engagement related to appropriate staffing and stress levels.

**Conclusion:** Using employee engagement survey results and historical call out data as a platform for the town hall discussions helped frame the issue and focus the solution on a sustainable action plan to manage unplanned absences. Inclusion of front line staff in the development, design and implementation of the plan helped establish ownership and accountability of the issue, garnered buy in from their colleagues, and also helped reduce the number of unplanned events, unrelated to illness based on awareness and transparency of the data.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-006

**Poster Title:** Setting the goal: assuring high quality pharmacy practice across a health system

**Poster Type:** Descriptive Report

**Submission Category:** Administrative Practice/Management/Financial Management/Human Resources

**Primary Author:** Robert Warhurst, Indiana University Health; **Email:** rwarhurst@iuhealth.org

**Additional Authors:**

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Adam Boon

**Purpose:** Accreditation and regulatory agencies review hospital pharmacies on a routine cycle. Often there is a ramp up of compliance related activities prior to an anticipated accreditation or regulatory visit. Between visits, attention to detail in practice standards may become lax. The system pharmacy leadership team implemented an annual performance audit tool to establish a process for consistent, high level of practice across the health system

**Methods:** The system pharmacy leadership team prepared a list of key metrics to measure pharmacy practice performance. The categories of focus included the following practice areas: regulatory compliance, controlled substance management, automation management, inventory management, general operations, sterile compounding management, medication safety, human resources, staff development, quality processes, pharmacy and therapeutics functions, clinical processes, and financial standards. Within each area, key metrics were determined and scoring criteria established. Critical metrics were scored as “pass/fail”; others were given a numeric value. An onsite assessment was conducted at each hospital by a third party. Each hospital received a report on their results as well as a system summary of the results. Upon completion of the summary report, the health system pharmacy leadership team reviews the results and determines what actions are required to correct identified gaps.

**Results:** The survey has been completed for three consecutive years. As anticipated, hospital scores have continued to improve year over year. The average score from 2016 through 2018 increased from 76% to 85%. Annually, assessment elements are reviewed and updated to reflect the most current and critical standards of practice.

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**Conclusion:** The annual survey has provided valuable insights to both system pharmacy leadership as well as local pharmacy leaders. System pharmacy leadership utilizes the information to set initiatives for the next fiscal year as well as to identify areas where additional support may be needed. Local pharmacy leadership has used the results to support initiatives at the site level. In addition, the audit results have provided quick insights for pharmacists stepping into a new hospital pharmacy leadership positions.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-007

**Poster Title:** Development of a single, automated hazardous drug risk assessment tool within an integrated delivery network

**Poster Type:** Descriptive Report

**Submission Category:** Administrative Practice/Management/Financial Management/Human Resources

**Primary Author:** Heather Weese, Community Health Systems Professional Services Corporation; **Email:** Heather\_Weese@chs.net

**Additional Authors:**

Michael Farrell

**Purpose:** United States Pharmacopeia General Chapter permits alteration of containment requirements outlined by the chapter for final dosage forms of compounded hazardous drug (HD) preparations and conventionally manufactured HD products that do not require any further manipulation other than counting or repackaging. Risk assessments must include an evaluation of the type of HD, its dosage form, the risk of exposure, packaging, as well as manipulation. Completion of a risk assessment requires a thorough review of the package insert as well as National Institute for Occupational Safety and Health (NIOSH) List manufacturer's safe-handling guidance (MSHG) and supplemental information.

**Methods:** Package inserts, MSHG, and supplemental information for each formulation of medications present on the NIOSH List were reviewed and compiled onto a spreadsheet. Data was analyzed to determine similarities between dosage forms based on NIOSH List table. Additional factors were also analyzed to determine how they should impact the handling of each HD.

Handling requirements outlined in NIOSH were analyzed to determine if it would be possible to place medications into categories with corresponding containment and Personal protective equipment (PPE) requirements. Each possible part of the medication life cycle was assessed to determine all possible points of exposure to HDs.

An pharmacy technician-programmer was consulted to determine feasibility of coding a tool with the capability to generated automated risk assessments using the medication information and corresponding handling requirements.



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**Results:** Risk assessments were rolled out to facilities in November 2018 in a webinar format. Logic was developed to assign an overarching risk level (cytotoxic chemotherapy high, high, moderate, or low) based on NIOSH List table, route, dosage form, coating, prepackaging, and manipulation to determine a standard handling procedure for each of the following settings: storage, receipt, repackaging/counting/labeling, splitting or crushing (contained), manipulation, dispensing, transportation, administration, splash, inhalation, and spills. PPE requirements were selected for each of the risk levels based on the NIOSH List.

A risk assessment form was developed to correspond with the containment requirements for each setting. Risk assessment forms included each possible formulation or dosage form that applied to a single drug from the NIOSH List with designations for NIOSH Table number, hazard type, NIOSH–specified risk of exposure, package insert risk of exposure, and PPE requirements. Code was written to map historical purchases for each facility to the NIOSH List, to populate risk assessments based on medication NIOSH List table, route, dosage form, coating, prepackaging, and manipulation. The final resulting Excel document was posted to the IDN intranet page. Risk assessments were then able to be exported by facilities to fulfill the requirement of risk assessment completion.

**Conclusion:** Risk assessments may be produced centrally in a standardized manner that permits sharing of resources throughout an organization. Logic may be developed to minimize the variability in handling strategies by NIOSH List table and dosage form. This strategy was helpful in gaining efficiencies for the organization as a whole.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-008

**Poster Title:** Physicians views on the use of international clinical guidelines for managing insomnia in Saudi Arabia

**Poster Type:** Evaluative Study

**Submission Category:** Clinical Services Management

**Primary Author:** Mohammed Abutaleb, Ministry of Health, Saudi Arabia; **Email:** abutaleb33@yahoo.com

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**Purpose:** While there are no national clinical guidelines for managing primary insomnia in Saudi Arabia, there are also no published studies of physicians' perceptions of and attitudes towards using international guidelines. The objectives of this study was to explore the knowledge, perceptions, and attitudes of physicians practicing in Saudi Arabia about using international guidelines for managing insomnia.

**Methods:** A qualitative study using in- depth, face-to-face, and semi-structured interviews with 15 physicians held in July 2017 at a tertiary care hospital in Jazan, the distal southwestern province in Saudi Arabia. Interviews were audio-recorded, transcribed verbatim, coded using the qualitative software NVivo11 and analyzed thematically.

**Results:** Results of this study identified three main themes: Knowledge, Resistance, Barriers and Facilitators. Participants acknowledged their lack of awareness of available guidelines and their lack of training and education about Cognitive Behavioral Therapy for Insomnia (CBT-I). They highlighted a lack of education for patients about insomnia and its treatment. Beliefs about dependence on hypnotics and the inappropriateness of international guidelines for Saudi Arabia inclined many to resist using them. Inability to document diagnosis and consultations due to limited time and lack of suitable electronic systems, lack of suitably trained practitioners for referral for CBT-I, and lack of accountability for practice were identified as key barriers to

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following international guidelines. Development of national guidelines was the most important facilitator suggested by participants.

**Conclusion:** The study concluded that health authorities in the government of the Kingdom of Saudi Arabia (KSA) should improve general public awareness about sleep disorders and provide training and seminars for specialists and technologists. Above all, KSA needs its own nationwide guidelines for treating sleep-disorders based on evidence-based clinical trials, consistent with its history, culture, socioeconomic conditions and traditions.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-009

**Poster Title:** Anticoagulation management in care transitions after hospital initiation of warfarin: a pharmacy driven initiative

**Poster Type:** Descriptive Report

**Submission Category:** Clinical Services Management

**Primary Author:** Eman Alhmoud, Hamad Medical Corporation; **Email:** ealhamoud@hamad.qa

**Additional Authors:**

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Rasha El Anany

**Purpose:** Evidence suggests that the majority of medication errors occur during times of care transitions and medication-related adverse events post-discharge are alarming. A standardized transition of care process for hospitalized patients on warfarin is necessary, but it lacks in our facility.

A patient with high thrombosis risk admitted with a thrombotic event who was initiated and discharged on warfarin with improper outpatient follow up triggered the development of this service. The goal of this pharmacy-driven transition of care initiative is to enhance continuity and quality of care for patients newly started on warfarin in a secondary care hospital in Qatar.

**Methods:** Defined roles and responsibilities were agreed among a team of multidisciplinary members of physicians, pharmacists, and nurses. The service was established in December 2018, first in cardiology, surgery, and internal medicine units for patients initiated on warfarin during the hospital stay. Patients who were discharged with an outpatient follow-up referral in another facility were excluded and were provided with regular standard care. A focused transition of care action plan from hospital admission to post-discharge care included interventions such as distribution of warfarin booklets (pocket educational/ follow up booklet), monitoring of dispensed warfarin quantities, patients education, early completion of discharge summary note, improving timeliness of post discharge follow up, and ensuring proper hands off communication through verbal and written endorsements to the anticoagulation clinic clinical pharmacy specialist.

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Clinical pharmacists covering the units conducted several staff education sessions and ensured that team members' roles were carried as described in the action plan and communicated with them in cases of discrepancies. The initiative was supported by agreement and active involvement of hospital's key decision-makers and frontline staff.

**Results:** In 6 months, transition of care plans of 21 patients successfully achieved a higher percentage of patients receiving warfarin booklets 76% (16), attending first anti coagulation clinic visit within 3 to 7 days of discharge 86% (18), and achieving therapeutic international normalized ratio (INR) within five days 57% (12). Majority of patients were diagnosed with atrial fibrillation (76%) or deep vein thrombosis (19%).

**Conclusion:** Proper communication is the key to the success of this service in our facility. We are planning to expand and integrate this model by connecting all of Qatar's anticoagulation clinics to serve as a national registry for patients on anticoagulants. Clinical pharmacists have unique roles ensuring safe and effective medication therapies and empowering those running transition of care services is of great significance.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 8-010**

**Poster Title:** Utilizing nominal group technique for planning and implementing professional development program for clinical pharmacists in Qatar

**Poster Type:** Evaluative Study

**Submission Category:** Clinical Services Management

**Primary Author:** Eman Alhmoud, Hamad Medical Corporation; **Email:** ealhamoud@hamad.qa

**Additional Authors:**

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Raja Barazi

Rasha El Anany

**Purpose:** Selection of continuing educational activities' topics within a clinical pharmacy team was based on presenter's preferences and a structured systematic needs assessment was lacking. Nominal group technique (NGT) is a decision-making tool that incorporates a unique combination of qualitative and quantitative data collection through structured group meeting. Unlike traditional brainstorming and focus groups; NGT allows participants to express their ideas equally which leads to higher number of ideas per group.

The purpose of this project is to develop an annual framework for continuous education program within a clinical pharmacy team in a secondary care hospital using NGT.

**Methods:** First, clinical pharmacists with varying practice specialties were asked to brainstorm and list top three educational gaps individually without group discussion. Subsequently, a comprehensive list of all suggested topics was compiled and all members were asked to vote and rank their top 3 priorities from the list.

A final list of most needed topics was created and clinical pharmacists were divided into working groups based on their area of expertise and interest. Working groups' responsibility was to create SMART learning objectives plus a pre and post assessment for each educational activities

**Results:** Fifteen clinical pharmacists participated in the NGT session in which forty five topics were identified and compiled into one list.

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Based on the voting, the top three gaps identified were; statistical analysis, Pharmacokinetics and Fluids/Total Parenteral Nutrition. Other topics included: leadership and project management, quality improvement, thyroid disorders and shock syndromes.

The project team used the result of voting to produce a final framework, which includes suggested speakers, preliminary schedule for weekly educational activities, as well as SMART learning objectives for each activity.

Effective implementation of this initiative was demonstrated by the successful completion of first few sessions which included an application-based workshop for basics of SPSS, introduction to clinical pharmacokinetics and thyroid disorders.

**Conclusion:** A structured team based needs assessment and education plan that utilized NGT was successful in identifying the needs, strengths and weakness of a clinical pharmacy team. The power of having varied, complementary knowledge, skills and experiences among different team members to improve team's productivity and dynamics and personal growth of its members should be emphasized.

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**Session-Board #** - 8-011

**Poster Title:** The implementation of an antimicrobial stewardship program managed by an infectious disease physician and pharmacists in a community hospital

**Poster Type:** Descriptive Report

**Submission Category:** Clinical Services Management

**Primary Author:** Jeanne Brady, Salinas Valley Memorial Healthcare System; **Email:** jbrady@svmh.com

**Additional Authors:**  
Mahendra Poudel

**Purpose:** The implementation of antimicrobial stewardship program (ASP) is one of the basis for the control of multidrug resistant bacteria (MDR), optimization of antibiotic use, minimization of adverse events, and reduction of unnecessary costs. We demonstrate the design, development, and participation in ASP program following CDC and Prevention Core Elements strategies.<sup>1,3,4</sup> The objective is to evaluate the impact of clinical pharmacists working in conjunction with Infectious Disease (ID) physician on tracking and documenting antibacterial utilization in per patient days, pharmacist clinical interventions, prescriber practices, and antibiotic purchases.

**Methods:** We conducted a multidisciplinary-team project of pharmacist-led prospective-audit-with-feedback ASP from 2015 to 2018. The ID physician and clinical pharmacist conducted patient care rounds twice weekly to make recommendations that include de-escalation, intensification of treatment, alternative therapy, dose optimization, order clarification, stop date/duration, additional monitoring, education, restriction enforcement, consult, IV to PO conversion, rejection of recommendation, and total monitored interventions requiring no changes.

Regular education to hospitalists, yearly patient safety fairs, employing rapid testing of blood culture using VeriGene, publication of yearly Antibiogram, mass emails to clinicians, and pharmacist managed renal dosing and vancomycin and aminoglycoside protocols are strategies we incorporated.



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**Results:** Pharmacist tracked between 150-200 interventions monthly through EMR system, reflecting both self-stewardship and during rounds with ID physician. Figures 2-8: Charts display the number of patient days of therapy per 1000 days at risk and yearly SVMH Antibacterial Utilization Rates compared nationally to other Teaching and Nonteaching hospitals. Below each graph exhibits yearly Drug Spend per patient Days of Therapy.

**Conclusion:** Antibiotic utilization rates decreased over four years, particularly with aztreonam, meropenem, and levofloxacin. The formalization of an antimicrobial stewardship partnership between ID physician and pharmacy team led to increases in pharmacist-recommended interventions, streamlining of antimicrobial therapy, as well as decreases in antimicrobial purchasing costs. Proactively working in conjunction with hospitalists allows the pharmacists to play a critical role in sustaining a robust ASP service at our community hospital. The ASP at SVMH can serve as a model for other community hospitals with similar resources.

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**Session-Board # - 8-012**

**Poster Title:** The transition from traditional pharmacy to E-pharmacy: strategies and challenges to promote the quality of pharmacy services

**Poster Type:**

**Submission Category:** Clinical Services Management

**Primary Author:** Huey-Ling Chang, China Medical University Hospital, Taichung; **Email:** olive\_chang@yahoo.com

**Additional Authors:**

**Purpose:** China Medical University Hospital (CMUH) is a Joint Commission International accredited (JCIA) 2111 beds teaching medical center in central Taiwan. Founded in 1977 and affiliated with China Medical University (CMU), CMUH has been advocated for the promotion of fundamental human health in becoming a world-leading Western and Chinese healthcare facility. In the past 3 decades, the hospital has achieved in establishing a quality and safe medical environment throughout China Medical Health System, strengthening the demanding services for emergency, critical care, and cancerous diseases, as well as developing modernized and evidenced-based Chinese medicine practice. With the equal visions of patient-centered care, the department of pharmacy at CMUH collaborates all medical teams to promote treatment optimization by following the criteria in JCIA Medication Management and Use. The department of pharmacy is responsible for providing comprehensive pharmaceutical services via the seamless collaborations with general pharmacy division, clinical pharmacy division, and traditional Chinese medicine (TMC) division. The duties of pharmacy division are composed of services in outpatient, emergency, and inpatient units. In the

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culture that majority of patients fill prescriptions in hospital, the routine operations of general pharmacy include outpatient drug dispensing, drug integration and consulting services, 24-hour emergency drug dispensing services, a single dose of drug dispensing services for inpatients. The clinical pharmacy in charge of diverse services in drug information provision, intensive care unit (ICU) and infectious disease care, total intravenous nutrient (TPN) preparation, chemotherapy drug dispensing, clinical trial drug dispensing, and adverse drug reporting. The traditional Chinese medicine pharmacy not only prepares and dispenses Chinese medicines but also creates a comprehensive electronic inspection system to regularly audit the quality of services and a medical order system to monitor medication overdose and adverse reactions in special populations such as children and pregnant women. Differing from the independent healthcare insurance systems in the United States, the health care in Taiwan is featured with National Health Insurance (NHI) that enables citizens and legal residents to have affordable and convenient medical assistance. In that, CMUH delivers healthcare services in accordance with Taiwan Food and Drug Administration (TFDA), drug safety alert released by Taiwan National Adverse Drug Reactions Reporting System and Drug Safety Information Risk Communication Form. The hospital also complies the annual missions of healthcare quality and patient safety set by the Joint Commission of Taiwan (JCT). Meanwhile, pharmacy integrates the correspond quality control initiatives with monthly evaluations to maintain Good Pharmacy Practice (GPP). CMUH continuously seeks improvement in pursuing excellence, efficiency, and cultural quality. In the

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coming years, the hospital aims to become a globally renowned high-tech medical center with the implementation of state of art artificial intelligence (AI) to selected areas to promote precise medicine.

The hospital-wide managements including pharmacy services will have synchronized modification to accommodate the change. It will be a tremendous challenge for staff training in knowledge and skills to keep up with relevant daily operations as the department has been facing shortage of staffing.

**Methods:**

**Results:**

**Conclusion:**

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**Session-Board #** - 8-013

**Poster Title:** Impact of a volunteer-based clinical pharmacy internship program at an academic medical center

**Poster Type:** Descriptive Report

**Submission Category:** Clinical Services Management

**Primary Author:** Megan Corsi, Intermountain Healthcare; **Email:** corsi.megan@me.com

**Additional Authors:**

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**Purpose:** The purpose of this program was to establish a volunteer-based clinical pharmacy internship in an academic medical center. The program was developed as a clinical and operational extension of the department of pharmacy including support for medication histories and drug shortages.

**Methods:** The CPI program increased medication history collection efforts during the summer months where there are little to no students on campus completing rotations. This period has previously been vulnerable due to collapse of student-based services provided in concert with rotational experiences for students due to academic scheduling. Five colleges of pharmacy were made aware of the program resulting in 31 applicants. A total of 12 pharmacy students were selected for the program with 11 students completing the full term of the internship. CPI were recruited from local colleges of pharmacy. CPI were educated through an online platform with twelve modules. The clinical pharmacy interns were credentialed in patient education and medication histories, Clinical pharmacy interns filled out a tracking form for all medication histories and discharge counseling sessions completed over the 8 weeks spent on campus providing care to patients. Other impact parameters were audited from custom tracking forms, self-assessments, and assignments completed/logged for drug shortage activities and automated dispensing cabinet optimization.

**Results:** Eighty-one medication histories were completed independently during the internship excluding training sessions. Medication history resulted in 1.93 new medications not previously

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listed on the medication history on average being added to the patient's profile per patient as a result of the CPI/patient encounter. Allergies information prior to the CPI medication history visit averaged 1.16 per patient. After CPI history collection the average was 1.23 per patient, 7 reactions were added for medication allergies that were previously unknown/unlisted. Vaccination history was collected during the medication history interview for 44 patients that previously had an unknown immunization status.

**Conclusion:** Mutual benefit can result from extending opportunities to pharmacy interns while preserving interest despite a volunteer-based model adding more stability to student-based patient care services along with additional support assistance when unexpected events occur such as needs within drug shortage management.

Launching a CPI program enhances medication safety through larger capture of medication histories as well as provide robust response to drug shortage issues and operational needs to deliver best care to patients.

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**Session-Board # - 8-014**

**Poster Title:** Impact of a bedside medication delivery program, ('Meds to Beds'), in reducing 30 Day re admissions for congestive heart failure , and acute myocardial infarction

**Poster Type:** Descriptive Report

**Submission Category:** Clinical Services Management

**Primary Author:** Barbara Greenberg-Schwartz, Newark Beth Israel Medical Center-Barnabas Health; **Email:** rphmom57@gmail.com

**Additional Authors:**

Sandra Richardson

**Purpose:** Post discharge medication adherence /compliance is a necessary component to avoid hospital re admissions. Centers for Medicare and Medicaid Services have reduced reimbursement for specific diagnosis's for less than 30 day readmissions, including congestive heart failure (CHF), and acute myocardial infarction (AMI) . A New England Journal of Medicine's article stated that 1 out of 5 patients are readmitted due to a patients' failure to obtain medications post discharge. Responsively evidence-based care transitions models include pharmacy to reduce re admissions. One model, a Meds-to-beds delivery service has shown to improve care transitions by providing medications at discharge, avoiding non-compliance/ non-adherence.

**Methods:** The objectives of this study was to increase hospital wide utilization of the 'Meds to Beds' service by 20% and to evaluate the impact the program had on re admissions of CHF and AMI patients. In order to meet the objectives of this study the Pharmacy Discharge Advocate is a Registered Pharmacy Technician who collaborated with nursing teams and the retail pharmacy to facilitate the prescription delivery to the patient's bedside at the time of discharge. As a means to improve and expand this service, the Transitions of Care Pharmacist, as part of her bedside medication counseling, offered the 'Meds to Beds' service to all high risk patients, including patients with a diagnosis of CHF and AMI. Patients discharged or transferred to facilities other than home and patients under the age of 18 were excluded. The pharmacy department and the transitions of care team developed educational in-services for the medical and nursing staff to heighten their awareness of the 'Meds to Beds' service and the positive

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advantages and benefits to patients. The Pharmacy Discharge Advocate was also given assistance to inform and enroll patients into the program.

**Results:** In calendar year 2016, there were 707 patients who enrolled in the Meds to Beds program. In 2017, a total of 937 patients utilized the program, resulting in a 32.53% increase in annual utilization. In 2017, the readmission rate for the AMI and CHF population who utilized the Meds to Beds service was 7.53% (11/175). Whereas, the readmission rate for the AMI and CHF population who didn't utilize the 'Meds to Beds' service was 15.68% (135/1,017). By using the Chi-Squared test, the study results demonstrated statistical significance with a p-value = 0.0092,  $\chi^2 = 6.784$ , and  $\alpha = 0.05$ .

In 2018, the number of patients enrolling in the Meds to Beds program continued to increase with 1003 patients enrolled with a 15.5% increase in the annual utilization of the program. The readmission rate for the AMI and CHF population who utilized the Meds to Beds' service was 8.28% (12/145). The readmission rate for the AMI and CHF population who did not utilize the 'Meds to Beds' service was 17.15% (172/1,003). By using the Chi-Squared test, the study results demonstrated statistical significance with a p-value = 0.0065.

**Conclusion:** Hospital wide utilization of the 'Meds to Beds' was increased by more than 20%. Also CHF and AMI patients who were enrolled were found to be half as likely to be readmitted as compared to patients not enrolled.

Under the assumption that AMI-CHF 'Meds to Beds' readmission rate is held constant for all AMI and CHF patients, in 2017, 85 readmissions could have been potentially prevented resulting with a financial impact of \$722,500. In 2018, 88 readmission could have been potentially prevented with savings of \$748,500 when using the CMS data of \$8,500 per readmission cost.



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**Session-Board #** - 8-015

**Poster Title:** An initial survey on research pharmacy clinical services

**Poster Type:** Descriptive Report

**Submission Category:** Clinical Services Management

**Primary Author:** Amber Johnson, Rockefeller University Hospital; **Email:**  
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**Additional Authors:**

**Purpose:** The role of the research pharmacist has significantly evolved over time. Investigational drug services vary from each hospital and usually reflects the needs of the hospital. Traditional research pharmacy services centers on dispensing investigational drug products and maintaining accountability records, with interactions with participants being limited or nonexistent.

The aim of this survey was to gain perspectives and information on current and future IDS clinical services to begin discussing the expansion of research pharmacy clinical services.

**Methods:** A survey was created and distributed to select research pharmacists via email. A total of 9 surveys were completed.

**Results:** 55.6% of respondents (5 of 9) answered 'Yes' when asked if their pharmacy practice provided clinical services. Of the respondents that answered yes, responses to the type of clinical services provided included teaching/presentations, medication reconciliation, protocol writing, consultations/training, and laboratory monitoring. Respondents were asked how often clinical services were performed, 2 respondents answered none (33%), 2 respondents answered 1-2 days (33%), 1 respondent answered 3-4 days (16%), and 1 respondent answered daily (16%). When asked what clinical services they would like to see implemented, the majority of responses noted patient counseling/education and medication reconciliation.

**Conclusion:** The American Society of Health-System Pharmacists (ASHP) recently published guidelines for the management of investigational drug products. These guidelines offer research pharmacies general guidance on facilitating clinical trials. There are many areas and opportunities available for research pharmacies to play a more active role with research

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participants. By defining research pharmacy clinical services and providing guidance on how to implement these services, research pharmacies can expand patient care services.

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**Session-Board #** - 8-016

**Poster Title:** Hyperkalemia and confounding medication use in a real-world analysis of a large integrated health system

**Poster Type:** Descriptive Report

**Submission Category:** Clinical Services Management

**Primary Author:** Jennifer Kammerer, Relypsa, Inc., a Vifor Pharma Group Company; **Email:** jkammerer@relypsa.com

**Additional Authors:**

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**Purpose:** Hyperkalemia (HK) may result from altered potassium homeostasis and lead to life-threatening arrhythmias and sudden cardiac death. Vulnerable patients include those with chronic kidney disease, heart failure (HF), diabetes (DM), and hypertension (HTN). Optimal treatment includes renin-angiotensin-aldosterone system inhibitors (RAASi), which further increase HK risk that results in dose lowering or discontinuation despite evidence demonstrating end organ and mortality benefits in such groups. Patients on submaximum doses or who discontinue RAASi have worse outcomes than patients on maximum doses. We describe retrospective analyses of RAASi and other medications in a representative population within a large integrated health system.

**Methods:** This study included adults with at least 2 non-urgent or emergency department encounters at least two years apart and a non-spurious potassium measurement between 1/1/2003 and 12/3/2018 (N=1,208,815). Patients were stratified as no-HK (never having a K > 5.0) (n=1,046,966; 87%) or HK (n=161,849; 13%), and further characterized by HK severity as mild (>5.0 to 5.5), moderate (>5.5 to 6.4) or severe (>6.4).

**Results:** The HK group was significantly older, more likely male, had cardiovascular risk factors, and on baseline medications that affect serum potassium (sK) (p<0.0001, each). Baseline diagnoses in the HK group included: HTN (63%), DM (33%), HF (20%), and renal insufficiency

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(16%). Severity of HK inversely correlated with renal function. Labs were reported on average 2.4+2.9 days after the highest reported sK, and 1.3+2.5 days after a severe HK episode.

At baseline and after HK episode, medications with potential to induce HK were used frequently in both groups although consistently greater in the HK group. Potassium supplement use in HK patients was double that in the no-HK group, and occurred in nearly half of patients with severe HK.

RAASi use was more common in the HK group at baseline and after HK episode. After HK episode, RAASi use trended in opposite manners for the no-HK and HK groups: angiotensin-converting-enzyme inhibitor and angiotensin receptor blocker use increased in the no-HK group and decreased in the HK group, whereas mineralocorticoid receptor antagonist use decreased in the no-HK group and increased in the HK group.

Chronic comorbidities were common in the HK population with a mean Charlson Comorbidity Index of 3.53+2.77.

**Conclusion:** HK occurs relatively frequently in a population with complex comorbidities, and with frequent confounders that increase HK risk. Follow-up patterns indicate even severe HK is addressed non-urgently. Concurrent use of potassium-confounding medications was relatively common after HK episodes whereas use of RAASi declined in a population with comorbid disease that would likely benefit from ongoing RAASi treatment. Analyses warrant further consideration of approaches to optimally and chronically manage HK while maintaining RAASi.

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**Session-Board #** - 8-017

**Poster Title:** The benefits of pharmacist-led counseling program for diabetes patients

**Poster Type:** Descriptive Report

**Submission Category:** Clinical Services Management

**Primary Author:** Minjung Kim, Pusan National University Yangsan Hospital; **Email:** pharm97@naver.com

**Additional Authors:**

**Purpose:** The purpose of this study is to evaluate the benefits of pharmacist-led patient counseling program and develop pharmaceutical care program in order to improve therapeutic outcomes for diabetic patients. Through individualized counseling program, greater emphasis is to expand role of the clinical pharmacist in addressing clinical inertia of diabetes management.

**Methods:** This was a prospective, randomized controlled study conducted in a public hospital's outpatient clinic, with 74 patients who had been diagnosed with type 2 diabetes (intervention group: 39, control group: 35). The program ran once weekly in outpatient diabetes clinic and each patient consultation lasted for 30~60 minutes. The intervention group was educated with a diabetes care program by clinical pharmacist every 3 months over a period of 9 months. But, control group was in the usual care. The criteria for referring patients to the pharmacist-led care program was the following: uncontrolled diabetes patients with HbA1c higher than 7 and newly diagnosed type 2 diabetes patients except age over 75 years old and serious illness. The database for all the referred patients included patient's medication history, characteristics of patients (gender, age, and duration of T2DM), and concomitant disease. Also, this study investigated HbA1c of participants at the time of 3, 6, and 9 months after the start of consultation. The care program of patients with diabetes included information about the definition of diabetes mellitus and HbA1c, therapeutic aim of diabetes mellitus, anti-hyperglycemic medications, management of hypoglycemia, and diabetes complication.

**Results:** After pharmaceutical care program, the mean HbA1c of the patients in the intervention group against the control group decreased significantly at the time of the 3 months ( $P < 0.05$ ). In the intervention group, HbA1c level between baseline and 3 months follow-up was decreased ( $8.7 \pm 1.1\%$  and  $7.8 \pm 1.3\%$  respectively). After 9 months counseling,

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patients in the intervention group showed an increase in HbA1c value compared to HbA1c value of 3 months ( $7.8\pm 1.3\%$  and  $8.6\pm 1.3\%$  respectively). The difference in the control group between baseline and 3 months was statistically nonsignificant ( $P=0.588$ ). The pharmacist-led care program in a hospital's outpatient diabetes clinic help diabetic patients reduce their blood glucose. The intervention group after the 3 months of care program achieved 33.3% for a glycemic target goal of  $HbA1c \leq 7.0$ . (47.6% of people with diabetes have  $HbA1c \geq 8.0$ ) However, the proportion of achievement of treatment goals at the end of 9 months is 11.1%, which may be partly due to clinical inertia. The intervention and control group compared for demographic characteristics (gender, age, and duration of DM) before educational program and no significant differences were investigated.

**Conclusion:** The result of this study means that it is difficult to maintain diabetes management by pharmacist alone. . Diabetes mellitus is a complex disease that requires specialized knowledge, training, and a team-based collaborative approach to care. For continuous management after 3 months of diabetes care program, clinical pharmacists have to focus on identifying gaps in care and establishing individualized diabetes care program in collaboration with medical staff.

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**Session-Board #** - 8-018

**Poster Title:** Pharmacy directed multidisciplinary management of anemia and bone mineral disorder (BMD) in patients with end stage renal disease (ESRD)

**Poster Type:** Descriptive Report

**Submission Category:** Clinical Services Management

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**Purpose:** End stage renal disease (ESRD) patients require complex treatment regimens to address complications like anemia and bone mineral disorder (BMD) that would benefit from a multidisciplinary approach. Adherence to treatment regimens is challenging due to cost, side effects, frequent dose adjustments, and regimen complexity. Pharmacists are trained to manage these challenges. The purpose of this study was to evaluate the impact of clinical pharmacist utilizing a phosphate binder, ferric citrate, to improve phosphate control in dialysis patients. Secondary objectives included stabilizing patients' hemoglobin (Hgb), reducing the usage of erythropoietin-stimulating agents (ESAs) and intravenous (IV) iron, and improving quality of life(QoL).

**Methods:** In October 2016, the Institutional Review Board approved this single site, retrospective, observational and informational study for the adult patients who were diagnosed with ESRD at least three months prior to the screening visit. Eligible patients had to be on any commercially available phosphate binder prior the enrollment and have a life expectancy greater than one year. Study design consists of a baseline visit and 12 months of treatment period followed by 12 months of follow up. For comparison purposes, 3 months of the retrospective data was collected for enrolled patients. The clinical pharmacist directed interventions included: monitoring of patients' laboratory parameters; dosing of ferric citrate, ESAs, IV iron, and doxercalciferol utilizing hospital approved protocols; collection of QoL at

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baseline and quarterly thereafter. Clinical pharmacist ensures the transition of care upon completion of the study. The study began in March of 2017. Currently we are in the follow up phase of data collection until February 2020. The impact of pharmacist intervention utilizing ferric citrate was examined using the paired t-test.

**Results:** Thirty-one patients (65% males, 51% aged > 55 years) were enrolled out of 101 screened at our Schwartz Dialysis unit at St. Mary's Medical Center. Eighty-two percent were Medicaid and/or Medicare beneficiaries. Results of the paired t-test showed that the declining phosphorous levels trend towards statistical significance (i.e. p values move from  $p=.740$  PO4 6.5 mg/dl at Visit 1 to  $p=.060$  PO4 4.9 mg/dl at Visit 12). At week 12, 16 patients use of IV iron decreased substantially from 468.75 mg/month to 250.00 ( $p<0.05$ ). Usage of ESAs for patients fluctuated monthly. Seventy-four percent of patients achieved the goal of  $Hgb>10$  g/dL. Mean scores for the QoL questionnaire increased, but there was no statistically significant difference between visits (QoL ranged from 36-39 physical scores and 45-49 mental scores).

**Conclusion:** The community standard for chronic dialysis facilities is to have a medical director, nephrologists, dialysis nurses, technicians, a dietitian and social worker. Typically, no pharmacist is present. With the implementation of a pharmacist as part of the dialysis interdisciplinary team at St. Mary's Medical Center, the number of anemic patients was reduced. The usage of IV iron has declined. Additionally, the pharmacist involvement in multidisciplinary patient assessment meetings, patient education, medication reconciliation and transition of care provides better patient understanding and adherence. The initial results of the pharmacist's role in ESRD patients care are promising for clinical and economic outcomes



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**Session-Board #** - 8-019

**Poster Title:** Quality assessment and cost saving of renal dosing recommendation by clinical pharmacists at a tertiary-care hospital in Thailand

**Poster Type:** Descriptive Report

**Submission Category:** Clinical Services Management

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**Purpose:** Renal dosage adjustment has been one of the core interventions implemented at the Siriraj Hospital, Mahidol University by the Pharmacy Department since 2011. Clinical pharmacist staff have been providing dosage adjustment service to help optimize medication therapy in several areas of the hospital. However, a formal evaluation on the quality and benefit of such interventions had not been performed. As a result, this study aimed to assess the quality of clinical pharmacists' interventions, physician acceptance rate and cost saving from such interventions among patients with either chronic kidney disease (CKD) or acute kidney injury (AKI).

**Methods:** We performed a retrospective, cohort study among patients admitted to medical wards of the Siriraj Hospital, a 2,500 bed tertiary-care university-affiliated hospital located in Bangkok, during October 2016 to December 2017. All patients admitted to the hospital's medical wards whose estimated glomerular filtration rate (GFR) were less than 60 mL/min/1.73 m<sup>2</sup> or presented with acute kidney injury (KDIGO criteria) on admission were included. The targeted medications were antimicrobial agents. Important baseline characteristics along with cost data were extracted from main hospital database. Data regarding pharmacists' interventions and physician acceptance rates were extracted from the Pharmacy Department database. The primary objective was the concordance between dosage suggestion by pharmacists and standard references for renal dosage adjustment based on creatinine

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clearance calculated from Cockcroft-Gault equation. Micromedex<sup>®</sup>, Drug Prescribing in Renal Failure, the Sanford Guide to Antimicrobial Therapy 2016, and the institution protocol for colistin dosing were used as the standard references. Physician acceptance was categorized into 1) accept and comply 2) partial accept and 3) not accept. The cost savings were analyzed by direct cost saving and cost avoidances based on the probability of adverse drug events occurrence.

**Results:** A total of 158 patients met the inclusion criteria and included into the data analysis. The mean age of the study population was  $69.96 \pm 18.23$  years while the mean creatinine clearance was  $24.21 \pm 18.93$  ml/min. There were 25.4% of patients requiring renal replacement therapy. Pharmacists provided a total of 190 recommendations, 90.5% of which were consistent with standard references. The most common dosage recommendations were provided on meropenem (25.3%), piperacillin/tazobactam (24.2%), antivirals (16.3%), colistin (8.4%), levofloxacin (7.4%), and vancomycin (4.2%), respectively. For physician acceptance rates, 89.5% of pharmacists' recommendation were accepted and complied while 10.5% were either partially accepted or not accepted. Pharmacist interventions led to a minimum cost savings of 116,263 baht and the maximum cost savings of 251,952 baht (the average cost savings of 184,108 baht or 1,497 baht per each intervention). Cost avoidances predicted in our study were 31,085 baht (US exchange rate at 1 USD (2019) = 31 Thai baht).

**Conclusion:** The quality of clinical pharmacists' interventions on renal dosing in our study was high and mostly consistent with standard references. Physician acceptance rate was appreciably high which may reflect physician's trust in the pharmacist's role on renal dosage adjustment. Pharmacist interventions led to a considerable monetary benefit from both cost savings and cost avoidances which is beneficial from the provider's perspectives. This information is useful in justifying the existence and expansion of clinical pharmacy service in the institution.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-020

**Poster Title:** Management of pickwickian syndrome in obese patients

**Poster Type:** Case Report

**Submission Category:** Clinical Topics/Therapeutics

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amy li

Simon Tarpav

**Purpose:** Title: Management of Pickwickian syndrome in obese patients

Authors: Pritesh Kalola, Pharmacy Student<sup>1</sup>; Amy Li, PharmD<sup>2</sup>, Simon Tarpav, PharmD<sup>2</sup>

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LH is a 49 y.o. female with a past medical history of diabetes mellitus, hypertension, ovarian cancer, thyroid cancer, chronic deep vein thrombosis, opioid abuse, osteoarthritis and Pickwickian syndrome (i.e. Obesity Hypoventilation Syndrome or OHS). The patient is currently morbidly obese at 184 kg (405 lbs) and has multiple admissions for hypercapnic respiratory failure. For the patient's current admission, her chief complaint was altered mental status. The patient reported taking MS Contin, Percocet, Neurontin and Klonopin before boarding the airplane. Upon arrival in the ED, the patient's blood pressure was 159/91 mmHg, ABG: pO<sub>2</sub>-61, pCO<sub>2</sub>-65, pH-7.33, HCO<sub>3</sub>-34, O<sub>2</sub> sat -88%. The patient was placed on biPAP for OHS. At admission, the patient also experienced encephalopathy and hypercapnic condition due to her Pickwickian syndrome as well as the adverse effects of multiple pain medications. Pickwickian syndrome can cause hypoventilation leading to low O<sub>2</sub> and high CO<sub>2</sub> levels. Cardinal symptoms of OHS include daytime sleepiness, lack of energy, breathlessness, and nighttime snoring. There isn't a specific cause for OHS, but studies indicate that morbidly obese patients have the highest risk of developing OHS, which can worsen over time if left untreated. Due to the lack of effective blood circulation in OHS, vital organs cannot get adequate oxygen supply in areas such as the brain, heart, joints and other essential organs. Thus, secondary health complications can develop, such as hypertension, diabetes mellitus, altered mental status, and osteoarthritis.

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Literature recommends that optimal management for OHS patients is the multidisciplinary approach with different medical and possibly surgical interventions. The first line treatment option recommended is extensive weight loss management. Diet, exercise, and sufficient sleep are recommended for weight loss treatment. The patient is currently managed by strict protein and calories diet. Upon discharge, the weight loss management education will be counseled to patient and family caregivers. The second suggested treatment is the positive pressure ventilation (PAP), which improves gas exchange and functional status in patients with chronic respiratory failure. It also alleviates daytime and nocturnal symptoms. The patient PaCO<sub>2</sub> and PaO<sub>2</sub> levels have improved with the use of BiPAP compared to the levels at admission. As far as pharmacological intervention, two agents were previously used for OHS treatment. They were medroxyprogesterone and acetazolamide. Medroxyprogesterone increases ventilation rates, which helps to drop the PaCO<sub>2</sub> level and raise the PaO<sub>2</sub> level. Acetazolamide is a weak diuretic that drives mild metabolic acidosis leading to a rise in minute ventilation. Thus, it leads to a reduction in the PaCO<sub>2</sub> level. However, due to non-existent long-term safety data, we currently do not recommend either agent for treatment of OHS. The best available treatment approaches which remain for OHS are weight reduction and positive air pressure.

The patient's encephalopathy and hypercapnia associated with Pickwickian syndrome have improved. Compared to PaCO<sub>2</sub> and PaO<sub>2</sub> levels at admission, current PaCO<sub>2</sub> and PaO<sub>2</sub> levels have improved with BiPAP therapy. Additionally, weight reduction therapy should be counseled to the patient. By losing weight and maintaining an ideal body weight, the patient's other chronic conditions will also improve.

**Methods:**

**Results:**

**Conclusion:**

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-021

**Poster Title:** Nursing perspective on intranasal verses intramuscular naloxone usage in the inpatient setting

**Poster Type:** Descriptive Report

**Submission Category:** Clinical Topics/Therapeutics

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**Purpose:** To evaluate current nursing practice and preference in the usage of naloxone, both intranasal and intramuscular, in the treatment of opioid (including heroin) overdose in an inpatient setting in a 275 bed community hospital. Current practice in the community hospital setting utilizes intramuscular naloxone in opioid overdose in both patients and visitors. With the increase in opioid overdose in both populations nursing counsel discussions focused on the optimal delivery method for naloxone, considering both efficacy and safety, as well as nursing preference.

**Methods:** Nursing counsel, comprised of nurse managers, nurse educators, staff level nurses, risk management and clinical pharmacy managers initiated discussion regarding treatment of opioid overdoses occurring in the inpatient setting, including patients and visitors. These discussions focused on utilization and outcomes data as well as demographically where the opioid overdoses were occurring and initial nursing feedback on patient and visitor access to and ease of treatment. Nursing counsel members agreed to more effectively and extensively survey nursing staff regarding their perceptions and preferences around the safety, efficacy, outcomes and ease of utilization of intranasal verses intramuscular naloxone in the treatment of opioid (including heroin) overdoses in patients and visitors. A brief nursing survey was developed and administered to nurses in acute care inpatient areas. Feedback from the survey was brought back to nursing counsel for consideration in the development of policy and practice changes.

**Results:** A literature search described safety, efficacy and cost as similar between the two dosage forms of naloxone being considered. Survey results revealed that nurses in areas where

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more opioid dependent and heroin addicted individuals were hospitalized preferred the option of intranasal naloxone as well as availability of the intramuscular formulation. Nurses in critical care inpatient areas did not report any desire to change current practice utilizing intramuscular naloxone only. Nurses in the emergency department indicated the need for both intranasal and intramuscular formulations given that they most often respond to opioid overdoses in visitors to the hospital.

**Conclusion:** Treatment of opioid overdose in the hospital setting, for both patients and visitors, continues to be a challenge for nursing staff in all areas, regardless of the acuity of the patient or the location of the visitor. Formulary and treatment algorithm changes should be considered based on nursing preferences to ensure optimal treatment of opioid overdoses consistently occurs. Since treatment costs and outcomes are similar, both formulations of naloxone should be available to nursing in all areas, regardless of the acuity of the patient population.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-022

**Poster Title:** A case of diffuse calciphylaxis

**Poster Type:** Case Report

**Submission Category:** Clinical Topics/Therapeutics

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**Purpose:** Case Report: This report describes a patient who developed calciphylaxis, a rare complication of end-stage renal disease (ESRD) associated with high mortality. The patient is a 48-year-old female who presented to the emergency department (ED) with altered mental status, metabolic acidosis, hypotension, bradycardia, and weakness secondary to missing several hemodialysis sessions. Her past medical history is significant for ESRD, peripheral vascular disease (PVD), atrial fibrillation, chronic pain, diabetes mellitus II (DMII), and hypertension (HTN). Upon examination, patient denies chest pain and no changes were noted in the electrocardiogram (ECG). A venous blood draw revealed  $\beta$ -natriuretic peptide (BNP) 1,679, anion gap (AG) 26, potassium 6.1, creatinine 7.0, and lactate 9.57. Arterial blood gas (ABG) revealed pH 7.1, partial pressure of carbon dioxide (pCO<sub>2</sub>) 43.6, partial pressure of oxygen (pO<sub>2</sub>) 31, and bicarbonate (HCO<sub>3</sub>) 16.9. In the ED, the patient received dopamine, atropine, fluids, and HCO<sub>3</sub>. After a consultation with pulmonology and nephrology, the patient was admitted to the intensive care unit (ICU) for management of her acute symptoms. On day 3 of admission, she was transferred to the floor for further care. In addition to her acute symptoms, the patient presented with multiple chronic, necrotic lesions on her lower extremities. Patient exhibited an active wound on her right great toe while the second and third toes were necrotic. A developing lesion was also noted on her right inner thigh that was tender, indurated, and erythematous. Wounds were biopsied and debrided on day 3 and were confirmed to be calciphylaxis by pathology. Repeat biopsy and debridement were conducted on day 8 of admission. On the same day, the patient was started on sevelamer 2,400 mg three times daily and sodium thiosulfate 25g three times weekly after dialysis for treatment of her wounds. On day 10, patient also started hyperbaric oxygen (HBO) therapy with a total of 15 treatments planned. On day 27, the patient underwent additional debridement and wounds were swabbed

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and cultured, revealing growth of *Stenotrophomonas maltophilia*, *Enterobacter cloacae*, and *Candida parapsilosis*. Patient was treated for her infection with a 14-day regimen of sulfamethoxazole-trimethoprim (SMX-TMP) 2.5 mg/kg every 24 hours (Q24H) and fluconazole 100mg once daily. Patient received a total of 11 inpatient HBO treatments; subsequent treatments were discontinued due to patient's intolerance to pain and lack of improvement in wound healing. Patient remained on sevelamer and sodium thiosulfate for management of calciphylaxis. Additionally, she was put on a schedule of twice weekly surgical debridement and dressing changes to facilitate healing of her wounds. After a two-and-a-half month stay at the hospital, patient was discharged to a long-term acute care (LTAC) facility to continue treatment for her lesions. Calciphylaxis is a rare and serious complication found in patients with kidney disease, more common in ESRD and after kidney transplantation. Case reports have been described in primary literature, but data is limited regarding effective therapeutic strategies, and the pathophysiology of the disease is poorly understood. There are no published guidelines detailing the diagnosis and treatment of calciphylaxis. Commonly, treatment involves both surgical and medical modalities.

**Methods:**

**Results:**

**Conclusion:**



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**Session-Board #** - 8-023

**Poster Title:** Impact of an intravenous to oral corticosteroid conversion program in patients with chronic obstructive pulmonary disease

**Poster Type:** Evaluative Study

**Submission Category:** Clinical Topics/Therapeutics

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**Purpose:** Exacerbation of chronic obstructive pulmonary disease (COPD) is a common reason for hospital admission. Guidelines recommend systemic corticosteroids during acute exacerbations to reduce the risk of treatment failure and relapse as well as improve lung function and breathlessness. Although guidelines recommend use of oral (PO) prednisone, many patients at Methodist Medical Center of Oak Ridge receive intravenous (IV) methylprednisolone. Investigators sought to assess the impact of an IV to PO substitution program on IV methylprednisolone use and length of stay for patients with COPD.

**Methods:** This was a single center, pre-post retrospective study evaluating the impact of a pharmacist-driven, automatic IV to PO corticosteroid substitution program on average IV methylprednisolone days of therapy (DOT) and average patient length of stay (LOS). All patients in a COPD diagnosis-related group (DRGs 191-193) were included in the study. Data were collected prior to substitution program implementation (May 2016-April 2017) and compared to data collected after implementation (May 2018-April 2019). Pharmacists screened all patients receiving IV methylprednisolone to determine eligibility for conversion to oral prednisone. Patients met criteria for conversion if they were receiving IV methylprednisolone doses of  $\leq 40$  mg for at least 24 hours, tolerating an oral solid diet, and taking other medications by mouth. Independent samples t-tests were used to compare pre-post data.

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**Results:** There were a total of 387 patients in the three COPD DRGs (191-193) in the post-implementation group and 467 in the pre-implementation group. The hospital experienced a significant reduction in the average IV methylprednisolone DOT after implementation [(4.2 ± 2.2 days) vs. (3.8 ± 2.3 days);  $p < 0.001$ ]. Additionally, there was a significant reduction in LOS [(5.5 ± 3.2 days) vs. (5.1 ± 3.3 days);  $p = 0.003$ ].

**Conclusion:** Implementation of a pharmacist-driven, automatic IV to PO corticosteroid conversion program in patients with COPD resulted in a significant reduction in the use of IV methylprednisolone and may have contributed to a significant decrease in length of stay.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-024

**Poster Title:** Pruritus outcomes with crisaborole by baseline atopic dermatitis severity

**Poster Type:** Evaluative Study

**Submission Category:** Clinical Topics/Therapeutics

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**Purpose:** Crisaborole ointment, 2%, is a nonsteroidal phosphodiesterase 4 inhibitor for the treatment of mild-to-moderate atopic dermatitis (AD). Efficacy and safety of crisaborole were established in 2 phase 3 trials (NCT02118766, NCT02118792), and additional analyses showed that crisaborole produced clinically relevant improvement in AD-associated pruritus. This pooled, post hoc analysis of the 2 phase 3 trials assessed pruritus outcomes stratified by baseline AD severity (mild or moderate) per Investigator's Static Global Assessment (ISGA).

**Methods:** Patients  $\geq 2$  years with mild-to-moderate AD were randomly assigned 2:1 to receive crisaborole (N=1016) or vehicle (N=506) twice daily for 28 days. Pruritus was measured using the Severity of Pruritus Scale (SPS; a 4-point rating scale ranging from 0 [no itching] to 3 [bothersome itching/scratching that disturbs sleep]), captured twice daily via electronic diary. Pruritus success was defined as weekly average SPS score  $\leq 1$  with  $\geq 1$ -point improvement from baseline. The proportion of patients with  $\geq 1$ -point improvement from baseline in weekly average SPS score was also assessed. Time to pruritus success was analyzed using daily average SPS score. Only patients with both average baseline and post-baseline assessments were included.

**Results:** All results presented as crisaborole versus vehicle. When stratified by baseline ISGA, mean baseline SPS score was 1.60 (N=297) versus 1.57 (N=138) in mild AD and 1.96 (N=465) versus 1.89 (N=230) in moderate AD. Significant differences in proportion of patients achieving pruritus success were observed from week 1 (17.5% vs 8.7%,  $P=0.0068$ ) through week 4 (37.4%

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vs 25.0%,  $P=0.0094$ ) in mild AD and from week 1 (19.1% vs 10.0%,  $P=0.0007$ ) through week 4 (34.8% vs 18.4%,  $P < 0.0001$ ) in moderate AD. Median time to pruritus success was 5 days (95% CI, 4-6) versus 8 days (4-13;  $P=0.1093$ ) in mild AD and 4 days (3-5) versus 11 days (7-17;  $P < 0.0001$ ) in moderate AD. Significant differences in proportion of patients with  $\geq 1$  point improvement in pruritus were observed from week 1 (25.9% vs 14.5%,  $P=0.0036$ ) through week 4 (42.7% vs 28.1%,  $P=0.0032$ ) in mild AD and from week 1 (32.7% vs 20.4%,  $P=0.0004$ ) through week 4 (45.9% vs 31.4%,  $P=0.0003$ ) in moderate AD. Median time to  $\geq 1$ -point improvement in pruritus was 3 days (95% CI, 3-4) versus 6 days (4-12;  $P=0.0583$ ) for mild AD and 3 days (2-3) versus 4 days (3-6;  $P=0.0002$ ) for moderate AD.

**Conclusion:** This post hoc analysis shows that patients  $\geq 2$  years with mild or moderate AD treated with crisaborole experienced statistically significant improvement in pruritus outcomes versus vehicle through week 4.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-025

**Poster Title:** Impact of the implementation of a pharmacist-driven chronic obstructive pulmonary disease exacerbation orderset in the inpatient setting

**Poster Type:** Evaluative Study

**Submission Category:** Clinical Topics/Therapeutics

**Primary Author:** Sarah Petite, University of Toledo; **Email:** sarah.petite@utoledo.edu

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**Purpose:** The Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines provide recommendations for the management of chronic obstructive pulmonary disease (COPD) exacerbation. Pharmacologic therapy includes a systemic corticosteroid treatment course of prednisone 40 mg orally daily for 5 days, short-acting muscarinic antagonists or beta-agonists, and antibiotics in select patients. Previous studies demonstrated a shortened hospital length of stay (LOS) with guideline-adherent systemic corticosteroids. There are no published studies that have evaluated the impact of an inpatient orderset on patient-oriented outcomes. The current study sought to determine the impact of an orderset with guideline-adherent recommendations on clinical outcomes.

**Methods:** This institutional review board approved quasi-experimental, single-center, cohort study included adult patients admitted to an internal medicine service for a documented COPD exacerbation from January 1, 2014 to December 31, 2015 (pre-orderset) and January 1, 2017 to December 31, 2018 (post-orderset). No orderset was available for use for the pre-orderset group. A pharmacy and therapeutics committee approved orderset with guideline-adherent systemic corticosteroids, scheduled short-acting bronchodilators and antibiotics was utilized in the post-orderset group. Education on appropriate orderset use was provided to the medical residents and attending physicians during a formal lecture and monthly at the start of each new internal medicine rotation. The primary outcome was hospital LOS. Secondary outcomes included 30-day all-cause and COPD-related readmission rates, systemic corticosteroid related adverse events and antibiotic use. Data were collected from date of hospital admission until 30 days following discharge. Data were analyzed using Chi-square or Fisher's exact test for categorical data and Student's t-test for continuous data.

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**Results:** Three hundred fifty-eight unique patient encounters were identified including 220 patients (61.5%) in the pre-orderset group and 138 patients (38.5%) in the post-orderset group. Hospital LOS was significantly shorter in the post-orderset group (4.3[3] vs. 3.4 [2.4]; P=0.004). Thirty-day all-cause (15.9% vs. 18.1%; P=0.58) and COPD-related (7.3% vs. 10.8%; P=0.24) readmission rates were not significantly different between groups. The mean systemic corticosteroid dose administered for the entire treatment course was 438.3 (381.7) mg of prednisone equivalents (PE) in the pre-orderset group and 341.3 (376.1) mg of PE in the post-orderset group (P=0.02). The number of short-acting bronchodilator doses administered was significantly higher in the post-orderset group (18.5 [17.8] vs. 24.1 [21.5]; P=0.01). Overall antibiotic use decreased in the post-orderset group (90.2% vs. 71%; P < 0.001) and significant increases in guideline-adherent antibiotics utilized were observed with doxycycline (2.3% vs. 10.5%; P=0.003) and azithromycin (20.1% vs. 39.5%; P < 0.001). There was a significant reduction in new blood glucose elevation (79.1% vs. 49.3%; P < 0.001); however, no significant differences in new blood pressure elevation (39.1% vs. 41.3%; P=0.68) were observed between groups.

**Conclusion:** A significant reduction in hospital LOS was found with the implementation of a pharmacist-driven COPD exacerbation orderset. No differences in 30-day readmission rates were observed. Use of a COPD exacerbation orderset was associated with lower total treatment course doses of systemic corticosteroids and subsequently lower rates of new-onset hyperglycemia. While more short-acting bronchodilator doses were administered, antibiotic utilization was reduced.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-026

**Poster Title:** Impact of a pharmacist-driven transitions of care program on hospitalized patients with chronic obstructive pulmonary disease exacerbation

**Poster Type:** Evaluative Study

**Submission Category:** Clinical Topics/Therapeutics

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**Additional Authors:**

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**Purpose:** In 2015, the Center of Medicare and Medicaid Services began withholding reimbursement to hospitals for all-cause 30-day unplanned hospital readmissions for chronic obstructive pulmonary disease (COPD) exacerbation. The national rate for unplanned 30-day all-cause COPD exacerbation readmission is estimated at 19.6%. Previous studies evaluating the impact of a pharmacist's intervention on COPD management were predominantly conducted in the outpatient setting. Pharmacist provided patient education on inhaler technique improves adherence and health-related quality of life. The current study aims to determine the impact of a pharmacist-driven transitions of care (TOC) intervention on patient-specific outcomes in patients with COPD exacerbation.

**Methods:** This institutional review board approved quasi-experimental, single-center, cohort study included adult patients admitted to an internal medicine service for a documented COPD exacerbation from January 2014 to December 2015 (pre-TOC group) and August 2017 to December 2018 (post-TOC group). No TOC program was available for the pre-TOC group. A multi-component TOC program was implemented in August 2017 that included: medication and general disease state counseling prior to hospital discharge, phone call follow-up at 15 days post-discharge to assess general disease state and medication issues, and a phone call or mailed survey at 30 days post-discharge to perform a COPD Assessment Test (CAT) questionnaire. Informed consent was obtained from all included patients in the post-TOC group. Results of the CAT questionnaire were used to assess maintenance medication appropriateness; the patient's provider was contacted with proposed medication regimen adjustments if opportunities were present for optimization. The primary outcome was time to 180-day COPD-related readmission. Secondary outcomes included rate of 30- and 180-day all-

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cause and COPD-related readmissions and maintenance medication recommendation acceptance rates. Data were collected from date of hospital admission until 180 days post-discharge. Data were analyzed using Chi-square or Fisher's exact test for categorical data and Student's t-test or Wilcoxon rank-sum test for continuous data.

**Results:** Three hundred thirty-four unique patient encounters were included [220 patients (65.8%) in the pre-TOC group and 114 patients (34.2%) in the post-TOC group]. One hundred forty-three patients were enrolled in the post-TOC group; however, 29 patients were unable to be contacted for at least one component of the TOC program. One hundred and two patients and 93 patients completed the day 15 and day 30 TOC program components, respectively. Therefore, the overall response rate for the post-TOC group was 79.7%. The median time to 180-day COPD-related readmission was not significantly different between groups (74.5 days [IQR 33.5-112.5] vs. 54 days [21-104];  $P=0.41$ ). There were no significant differences in 30-day all-cause readmission rate (15.9% vs. 14%;  $P=0.62$ ) and 30-day COPD-related readmission rate (7.3% vs. 7%;  $P=0.92$ ). The rate of 180-day all-cause readmissions was not significantly different between groups (38.6% vs. 34.3%;  $P=0.4$ ); however, the 180-day COPD-related readmission rate was significantly lower in the post-TOC group (31.8% vs. 21.7%;  $P=0.035$ ). The median CAT score for post-TOC patients completing the 30-day questionnaire was 17.5 (IQR 4.75-25), indicating most patients were COPD Group D (80/93; 86%). Forty-eight medication recommendations were made based on CAT score results and 8 (15.7%) were accepted.

**Conclusion:** No difference in time to 180-day COPD-related readmission and rates of 30-day all-cause and COPD-related readmissions was found. A significant decrease in 180-day COPD-related readmission rates was found with the implementation of a pharmacist-driven COPD TOC program. Opportunities for optimized maintenance medication prescribing were identified in a majority of included patients. Future research efforts should identify interventions to improve 30-day readmission rates and optimize maintenance medication therapy for patients at the time of hospital discharge.



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**Session-Board #** - 8-027

**Poster Title:** Transfer between dipeptidyl peptidase-4 (DPP-4) inhibitors is effective in type-2 diabetes mellitus patients

**Poster Type:** Evaluative Study

**Submission Category:** Clinical Topics/Therapeutics

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**Purpose:** When treatment with a particular dipeptidyl peptidase-4 (DPP-4) inhibitor is ineffective, then transfer to another DPP-4 inhibitor is possible. However, the effectiveness of such a transfer is unclear. Recently, DPP-4 inhibitors were classified into three categories on the basis of their binding subsites: vildagliptin and saxagliptin are in class 1, alogliptin and linagliptin in class 2, and sitagliptin and teneligliptin in class 3. The aim of the present study was to determine the effectiveness of transferring between DPP-4 inhibitors.

**Methods:** We performed a retrospective study based on the medical records of patients who were transferred from one DPP-4 inhibitor to another DPP-4 inhibitor. We enrolled 85 patients, who continued to take a DPP-4 inhibitor over 3 months before transferring to another DPP-4 inhibitor. Twenty-three patients were excluded for the following reasons: lack of glycated hemoglobin (HbA1c) data 3 months after changing DPP-4 inhibitor (n = 7); dose increase in DPP-4 inhibitor or transfer to another DPP-4 inhibitor within less than 3 months (n = 6); transfer to another anti-type-2 diabetes mellitus (T2DM) medication (n = 5); dose increase or receipt of another anti-T2DM medication (n = 4); or dose reduction in another anti-T2DM medication (n = 1). Finally, we evaluated 62 patients. The anti-hyperglycemic efficacy of DPP-4-inhibitor transfer was assessed retrospectively by considering the HbA1c level before and 3 months after transferring to another DPP-4 inhibitor.

**Results:** The overall mean change in HbA1c levels was  $-0.34\%$  (95% confidence interval (CI),  $-0.12$  to  $-0.56$ ; n = 62). The mean change in the HbA1c level between the different classes was

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-0.35 (95% CI, -0.12 to -0.58; n = 59). The mean change in the HbA1c level between each class of DPP-4 inhibitor was calculated. From class 3 to class 2 this was -0.45% (n = 25); from class 3 to class 1 -0.36% (n = 17); from class 1 to class 2 -0.24% (n = 7); from class 1 to class 3 0.33% (n = 4); from class 2 to class 1 -0.30% (n = 5); and from class 2 to class 3 -1.30% (n = 1).

Additionally, we investigated the reason for transferring between DPP-4 inhibitors, which was specified in the medical records of 24 of the enrolled patients. The reasons given were “poor glycemic control” (70.8%), “reduced renal function” (20.8%), “side effects” (4.2%), and “forgot to take the medicine” (4.2%).

**Conclusion:** Transferring between different classes of DPP-4 inhibitors resulted in a significant reduction in the HbA1c level. In this study, transferring between DPP-4 inhibitors with consideration of their DPP-4 binding site contributes to a reduction in the HbA1c level during T2DM treatment.

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**Session-Board #** - 8-028

**Poster Title:** Impact of serial blood glucose monitoring and treatment in patients with corticosteroid-induced hyperglycemia in the inpatient setting

**Poster Type:** Evaluative Study

**Submission Category:** Clinical Topics/Therapeutics

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**Purpose:** Corticosteroid use has been reported in approximately 12% of hospitalized patients with hyperglycemia being a significant complication, particularly at high doses. Basal-bolus insulin regimens are well-established for the treatment of corticosteroid-induced hyperglycemia in the inpatient setting. Corticosteroids primarily raise post-prandial blood glucose levels with minimal effect on fasting blood glucose. Since routine inpatient glucose monitoring consists of fasting blood glucose, corticosteroid-induced hyperglycemia can go unnoticed and untreated in this setting. The purpose of this study is to evaluate pharmacist impact on serial blood glucose monitoring and treatment in patients with corticosteroid-induced hyperglycemia in the inpatient setting.

**Methods:** This was a single-center, IRB-approved, bi-phasic study of adult patients receiving high doses of steroids (greater than or equal to prednisone 30 mg/day or its equivalent). Phase I was a retrospective chart review of 50 patients from July 2018 to September 2018. Phase II was a prospective review of 49 patients from February 2019 to April 2019. In phase II, patients were followed daily by a pharmacist and reviewed for the presence of point-of-care blood glucose monitoring and for the onset of hyperglycemia (point-of-care blood glucose level 180 mg/dL or greater). If two consecutive point-of-care blood glucose values were greater than or equal to 180 mg/dL, the pharmacist intervened to initiate or adjust insulin therapy in accordance with the hospital insulin protocol. The primary endpoints included incidence of point-of-care blood glucose monitoring, incidence of hyperglycemia, and average point-of-care blood glucose

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levels. Secondary endpoints included presence of common risk factors for corticosteroid-induced hyperglycemia and number of pharmacy interventions accepted in phase II. Descriptive and comparative statistics were utilized in the data analysis.

**Results:** A total of 50 patients were included in phase I of the study while 49 patients were included during phase II. The incidence of overall point-of-care blood glucose monitoring increased from 36% of patients to 88% of patients ( $p < 0.05$ ). Diabetic patients were more likely to have point-of-care blood glucose levels monitored in both phases. However, a large increase in monitoring (9% to 83%) was noted from phase I to phase II in non-diabetic patients. The average point-of-care blood glucose levels decreased from 206 mg/dL in phase I to 182 mg/dL in phase II ( $p = 3.66$ ). The incidence of hyperglycemia decreased from 74% to 53% ( $p < 0.05$ ). The most commonly identified risk factors for corticosteroid-induced hyperglycemia were age greater than 65 years and body mass index greater than 25 kilograms per meters squared. In the prospective interventional phase, a total of 48 pharmacy-initiated interventions were made, of which 38 (79%) were accepted by the physician. As a safety outcome, the incidence of hypoglycemia was assessed. The incidence of hypoglycemia was 1.1% in phase I vs. 0.9% in phase II ( $p = 0.5249$ )

**Conclusion:** Pharmacist intervention had a significant impact on increasing point-of-care blood glucose monitoring and improving glycemic control by reducing hyperglycemia incidence in patients on high doses of corticosteroids at risk for corticosteroid-induced hyperglycemia. This study serves as justification to propose a collaborative practice agreement that would allow the automatic ordering of point-of-care blood glucose monitoring in patients who meet specific criteria. This would allow clinicians to have blood glucose values available in the patient's chart to identify when hyperglycemia management is warranted.

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**Session-Board #** - 8-029

**Poster Title:** Analysis of risk factors of vascular pain caused by dacarbazine injection

**Poster Type:** Evaluative Study

**Submission Category:** Clinical Topics/Therapeutics

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**Purpose:** Vascular pain that accompanies the administration of dacarbazine is thought to be caused by photodegradation product of dacarbazine, 5-diazoimidazole-4-carboxamide (DIAZO-IC). However, the impact of DIAZO-IC level in the injection solution on the onset of vascular pain has not been clarified. In addition, although shading the injection solution for suppressing the production of DIAZO-IC is widely performed, the vascular pain is not sufficiently controlled. In this study, to clarify the cause of vascular pain, we investigated the impact of the DIAZO-IC concentration in the injection solution on the onset of vascular pain.

**Methods:** Ten skin cancer patients who received dacarbazine (total 95 administrations) were enrolled in this study. The relationship between patient backgrounds (concomitant drugs, medical history, body temperature and blood pressure at the time of administration), condition of dacarbazine administration (infusion rate, time required for preparation, time from preparation to administration completion) and the concentration of dacarbazine and DIAZO-IC concentration in the injection solution, and those impacts on the onset of vascular pain were assessed. Logistic regression analysis was performed to analyze factors affecting the onset of vascular pain, and factors affecting the concentration of DIAZO-IC in the drug were analyzed by multiple regression analysis. The concentration of DIAZO-IC in dacarbazine solution was measured by HPLC-UV method.

**Results:** In all cases, the injection solution was stored under shading conditions after preparation, and all bags and IV lines were shaded during administration. On the other hand,

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preparation was carried out without shading. The use of aprepitant ( $p < 0.001$ ) and infusion rate of DIAZO-IC ( $p = 0.043$ ) were found to be significantly associated with the onset of vascular pain. No factor affecting the rate of production of DIAZO-IC was detected.

**Conclusion:** DIAZO-IC was detected in the infusion, despite storage in the light shielding condition. Since the infusion rate of DIAZO-IC affects the onset of vascular pain, preventing the production of DIAZO-IC is thought to be important to avoid vascular pain. Although no factor affecting the production of DIAZO-IC could be detected, we thought that the absence of light shielding at the time of preparation of the injection solution might be one of causes. To develop the method for avoiding vascular pain due to dacarbazine administration, more detail study to clarify the factors affecting the production of DIAZO-IC is needed.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-030

**Poster Title:** Impact of implementing an intravenous (IV) levothyroxine dosing protocol during a drug shortage

**Poster Type:** Evaluative Study

**Submission Category:** Clinical Topics/Therapeutics

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**Purpose:** Levothyroxine injection has recently been affected by intermittent drug shortages leading to clinical initiatives intended to conserve remaining supply. Intravenous levothyroxine has a half-life of three to ten days depending on patient's thyroid function, with therapeutic effects lasting one to three weeks after discontinuation. Literature suggests patients who cannot receive oral medications can be safely maintained with IV levothyroxine dosed every 5-7 days. The purpose of this study is to assess the impact of levothyroxine injection conservation initiatives including an IV dosing protocol for patients unable to take oral medications.

**Methods:** An IV levothyroxine dosing protocol was implemented at 8 medical centers across the United States between 2016 and 2017. When the oral route was clinically appropriate, levothyroxine was given orally or through a feeding tube. If oral intake was restricted, IV levothyroxine was administered every one to seven days at 50-75% of the weekly oral dose depending on institution-specific protocol until the patient was able to resume oral therapy. In some instances, IV doses were rounded to the nearest vial size as approved per protocol by the Pharmacy and Therapeutics Committee at each medical center. Exclusion criteria included: new onset hypothyroidism requiring IV levothyroxine therapy, untreated hypothyroidism contributing to current hospitalization, Myxedema coma, signs and symptoms of clinical hypothyroidism, and potential organ donor status requiring continuous infusion levothyroxine per an established organ recovery protocol. IV levothyroxine could be administered at the

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discretion of the prescriber if any clinical signs or symptoms of hypothyroidism developed. The number of vials and cost per patient hospital day were tracked to assess compliance with the protocol and to calculate the cost savings during the time period between 2016 to 2018.

**Results:** The median number of levothyroxine vials used decreased from 214 (IQR 229) in 2016 to 66 (IQR 173) in 2018 following implementation of IV dosing protocols although this was not statistically significant ( $p=0.13$ ). The median cost for IV levothyroxine decreased significantly from \$0.38 (IQR \$0.34) to \$0.13 (IQR \$0.21) per patient day ( $p=0.04$ ) resulting in a combined cost savings of over \$104,000 for all hospitals. The acquisition cost during this time period remained consistent. Adverse events were not specifically tracked but provider discretion allowed for use of levothyroxine injection when deemed clinically appropriate.

**Conclusion:** Implementation of an IV dosing protocol led to reductions in levothyroxine injection utilization and a combined cost savings of over \$104,000.



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**Session-Board #** - 8-031

**Poster Title:** Comparison of probiotic regimen of bifidobacterium, lactobacillus, and streptococcus to saccharomyces boulardii in the prevention of antibiotic-associated diarrhea and associated healthcare costs

**Poster Type:** Evaluative Study

**Submission Category:** Clinical Topics/Therapeutics

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**Purpose:** Antibiotic-associated diarrhea (AAD) is a significant cause of morbidity within the hospitalized population. Its prevention is important to improving tolerability, adherence, and effectiveness of oral and parenteral anti-infective therapies. The purpose of this study was to compare the efficacy of the combined probiotic regimen of Bifidobacterium, Lactobacillus, and Streptococcus (VSL#3) to Saccharomyces boulardii (Florastor) in the prevention of antibiotic-associated diarrhea (AAD) in a rural inpatient hospital setting.

**Methods:** This single-centered, retrospective cohort study was approved by the institutional review board. Internal hospital reports were compiled to analyze patients who received VSL#3 in 2019 or Florastor in 2015 and their antibiotic use. Exclusion criteria included patients who were pregnant, had recently received laxatives, were age < 18 years old, had received chemotherapy, were intolerant of oral medications, or had no overlap of antibiotic and probiotic administration. The regimen for VSL#3 was 1 capsule by mouth twice daily and Florastor was 1 capsule (250 mg) by mouth twice daily. Data collected included age, gender, antibiotic and probiotic name, dose, route, frequency, and length of treatment. Patients were classified into probiotic categories and notes were analyzed for bowel patterns, including diarrhea presence, frequency, and its timing in relation to the administration of antibiotics and probiotics. Statistical significance was analyzed via the chi-squared test and association was

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determined by risk ratio (RR). The student T-test was used to calculate the statistical significance between the associated healthcare expenditures for a 14-day course of probiotic therapy.

**Results:** In total, 397 patient charts were reviewed; VSL#3 (n=197) and Florastor (n=200). The VSL#3 group had 158 patients meet inclusion criteria, with 4 confirmed AAD outcomes. The Florastor group had 176 patients meet inclusion criteria, with 6 confirmed AAD. The chi-squared test confirmed that there was no statistically significant difference ( $p = 0.882$ ) in AAD between the two study groups; RR = 0.743 (CI: 0.213 – 2.584). The student T-test confirmed that there was a statistically significant reduction in probiotic treatment cost when using VSL#3 as compared to Florastor ( $p < 0.0001$ ).

**Conclusion:** The results showed that 2.5% of patients on VSL#3 and 3.4% of patients on Florastor had experienced AAD while inpatient. Our study suggests that VSL#3 and Florastor are equally efficacious when given concurrently with antibiotics in the prevention of AAD. There is a statistically significant reduction in costs associated with the use of VSL#3 (\$2654) compared to Florastor (\$3400). This data can assist clinicians when choosing probiotics for their patients on antibiotic therapy based on effectiveness, cost, or formulary restrictions.

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**Session-Board #** - 8-032

**Poster Title:** Evaluation the use of antiepileptic drugs for seizure prophylaxis after traumatic brain injuries

**Poster Type:** Evaluative Study

**Submission Category:** Critical Care

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**Purpose:** Posttraumatic seizure (PTS) is one of complications after traumatic brain injury (TBI), and up to 12% patients with severe TBI will develop PTS. In the 2017 “seizure prophylaxis in patients with TBI” guideline recommended that phenytoin or levetiracetam is effective in decreasing risk of early PTS in patients with severe TBI. The two studies from 1999 and 2000 recommended against use of valproate due to lack of benefit and the potentially higher mortality. In Wanfang hospital, valproate is often used for PTS prophylaxis. Our objective is to evaluate the effectiveness and safety of valproate in general and severe PTS patients.

**Methods:** This was a retrospective observational study. TBI patients were included between Jan, 2016 to Jun, 2017. Patients were excluded if they are pregnant, age less than 20, spinal injured, followed less than 7 days. Patients who had seizure before TBI prophylaxis, history of brain injure, and received cancer treatment 3 month prior to TBI event were also excluded. Baselines and outcomes including seizure rate, length of stay in ICU or hospital, functional outcome at the discharge from ICU or hospital, and in hospital mortality were compared between patients treated with valproate (VPA) and without valproate (No VPA). Side effects between VPA used > 7 days and < 7 days were also compared.

**Results:** There were 101 patients in VPA and 174 in No VPA group. There were no significant difference between VPA and No VPA group in terms of seizure rate (HR=1.15, CI=0.39-3.37), length of stay (ICU: HR=0.8, CI=-0.60-2.20; Hospital: HR=1.04, CI=-2.46-4.54), functional outcome (ICU: p=0.52; Hospital: p=0.42), and mortality (HR=1.03, CI=0.34-3.13). In patients with

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severe TBI, there were also no significant difference between VPA and No VPA groups in terms of seizure rate (HR=9.61, CI=0.83-111.32), length of stay (ICU: HR=1.26, CI=-8.79-11.30; Hospital: HR=-5.16, CI=-31.45-21.13), functional outcome (ICU: p=0.26; Hospital: p=0.72), and mortality (HR=0.72, CI=0.17-3.01).

**Conclusion:** Valproate does not reduce seizure rate or show additional benefit in general or severe group patients.

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**Session-Board #** - 8-033

**Poster Title:** Evaluation of extracorporeal membrane oxygenation (ECMO) survival rates at a community hospital

**Poster Type:** Descriptive Report

**Submission Category:** Critical Care

**Primary Author:** Daniel Padgett, Baptist Healthcare; **Email:** dpadg55@gmail.com

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**Purpose:** Extracorporeal life support (ECLS) provides advanced respiratory or cardiac support for patients who fail conventional life support therapies such as mechanical ventilation. There are two modalities of ECLS. Venovenous (VV) ECMO provides respiratory support and is indicated for hypoxic respiratory failure with mortality risk of 80% or greater. Venoarterial (VA) ECMO provides circulatory and respiratory support and is indicated for cardiogenic shock. In June 2017, Baptist Health Care launched the only ECMO center in Northwest Florida. The purpose of this study was to compare ECMO survival rates at Baptist during the inaugural year to national survival rates.

**Methods:** The institutional review board approved this retrospective chart review. All patients initiated on ECMO from July 1, 2017 to June 30, 2018 were included in this study. Baptist Health Care data was imported from local electronic health records (EHR) and analyzed in a spreadsheet utilizing pivot tables. EHR data collected included patient age, ECMO modality and duration, and date of expiration or discharge. National ECLS data was retrieved from the Extracorporeal Life Support Organization (ESLO) registry. Data collected from the registry included number and type of ECMO runs, duration, and survival by support mode from January 2014 to January 2019. The primary outcome was ECMO survival and survival to discharge or transfer at a community hospital compared with national survival rates.

**Results:** Baptist Health Care had a total of 13 runs of ECMO during its inaugural year of providing ECLS. Nine patients were initiated on VV ECMO for respiratory support and four patients on VA ECMO for circulatory support. The average age was 44 years, the youngest

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patient was 16 and the oldest was 75. The average run time was six days. The shortest successful run was three days and the longest was 16 days. Baptist VV ECMO survival rate was 78% (n= 7), and survival rate to discharge or transfer was 67% (n= 6). Comparatively, the national ECLS registry reported 7,793 pulmonary runs over a five-year period and the survival rate was 69% (n= 5,445), and survival rate to discharge or transfer was 60% (n= 4,732). An absolute difference of 9% and 7% respectively for pulmonary support. Baptist VA ECMO survival was 50% (n=2) and survival to discharge or transfer was also 50% (n=2). Comparatively, the national ECLS registry reported 9,711 runs and the survival rate was 58% (n= 5,703), and survival to discharge or transfer was 42% (n= 4,159). An absolute difference of 8% for both measures of cardiac support.

**Conclusion:** Baptist Health Care ECMO survival rates were comparable to ESLO national registry outcomes. This study validates ECLS programs can be established at a community hospital successfully. Effective implementation at similar facilities will provide easier accessibility to life saving ECMO services for patients in various geographical locations.

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**Session-Board #** - 8-034

**Poster Title:** Albumin use evaluation in a tertiary care hospital in United Arab Emirates

**Poster Type:**

**Submission Category:** Critical Care

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**Purpose:** Albumin is widely used in the critical care units although its approved indications are limited. In 2016, medication use evaluation (MUE) was conducted for appropriate use of albumin at

Tawam hospital. The MUE prompted albumin prescribing interventions due to high cost in the hospital

with significant increase in critical care units. Method: After the MUE analysis in 2016, critical care

management-initiated communication and discussions regarding prescribing pattern versus evidencebased

practice. Albumin guidelines were implemented in collaboration with clinical pharmacy. Post intervention data of 2017 was pulled retrospectively using hospital information system (HIS).

**Results:**

The data showed decrease of inappropriate prescribing as per the guidelines especially in critical care

units. The cost of Albumin dropped by 128,808 USD (16%), with 73% (94,139 USD) reduction achieved in

the critical care units. Conclusion: A significant change of albumin prescribing practice was observed

after albumin guidelines implementation and evidence-based practice awareness. Pharmacy verification

based on the albumin guidelines has impact on albumin use optimization and cost minimization.

Reference: Tawam hospital information system data.

**Methods:**

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**Results:**

**Conclusion:**



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**Session-Board #** - 8-035

**Poster Title:** Medication reconciliation within the intensive care unit (ICU): pharmacist involvement at every turn

**Poster Type:** Descriptive Report

**Submission Category:** Critical Care

**Primary Author:** April Seitler, OhioHealth Riverside Methodist Hospital; **Email:** downeya32@gmail.com

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**Purpose:** Critically ill patients are subjected to approximately 1.7 medication errors per day. Pharmacy involvement in medication reconciliation has been described in the literature as one mean of reducing errors. Within our institution, emphasis has been placed on medication histories for patients admitted from the emergency department or discharged from general medicine units. A multidisciplinary group was established to ensure appropriate medication reconciliation for all ICU patients with pharmacists playing a significant role in all transitions of care. The purpose of the study is to highlight the role of the ICU pharmacist in transitions of care in promoting medication error reduction.

**Methods:** A multidisciplinary group consisting of attending intensivists, medical residents, advanced practice providers (APPs), and critical care pharmacists was established to create a standard work flow for patient admission, transfer, and discharge medication reconciliation. Areas of opportunity identified by the group for our institution included direct admission patients who bypassed the emergency department, transfer out of the ICU, and discharges to other facilities or home directly from the ICU. For patients admitted to the ICU, pharmacists were responsible to review of admission medication list, obtain an accurate list if not previously done, and complete standardized documentation within the EMR via a progress note for visibility. For patients transferring from the ICU, post multidisciplinary round huddles with providers and pharmacists were to occur and pharmacists would ensure appropriate home medications were ordered or held, stop dates for antimicrobials and other applicable drugs were in place, and unnecessary medications were discontinued. At discharge, after visit

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summaries (AVS) were reviewed by the pharmacist for accuracy and high risk patients identified by the institution's readmission reduction scoring were considered for discharge counseling if appropriate. An analysis of three months pre- and post-implementation was conducted.

**Results:** The medication reconciliation process began in December 2018 in four intensive care units. Prior to implementation of a formal documentation process, 314 medication reconciliation activities were documented by a critical care pharmacist in the preceding three months. Of those activities documented, more than half lacked an allotted time spent or a standard format. In the 90 days following application of the standardized process, documented medication reconciliation capture rate increased by 52.9% in all ICUs. Critical care pharmacist documentation for the medical and neuro ICUs increased by approximately 45.6% and 46.4%, respectively, and more than doubled in the surgical ICU. Resources used by pharmacists for medication reconciliation, including time, prior to a formal documentation process was virtually unknown. After standardization, 83.9% of the recorded activities reflected time spent by the critical care pharmacist. Pharmacists spent approximately 11.13 minutes per patient on medication reconciliation, with a range from 5-45 minutes. In total, 89 hours were devoted by critical care pharmacists to review patients' medication lists at critical points in transitions of care including admission, transfer and discharge over the 3 month time period.

**Conclusion:** Multidisciplinary attention to the medication reconciliation process and increased pharmacist involvement greatly impacted patient care for ICU patients at our institution. In addition to other patient care activities, critical care pharmacists provided 89 hours of documented medication reconciliation time that previously would not have been captured with previous institution workflows. Multidisciplinary team engagement increased buy-in to the process and is reflected in current daily ICU care. Identified opportunities for continuous improvement of the process include communication regarding new admissions, transfers, and discharges as well as electronic medical record optimizations to help facilitate more timely review by critical care pharmacists.

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**Session-Board #** - 8-036

**Poster Title:** Retrospective analysis of intravenous calcium administration at an academic medical center

**Poster Type:** Descriptive Report

**Submission Category:** Critical Care

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**Purpose:** Intravenous calcium is a commonly used electrolyte and both products (calcium gluconate and calcium chloride) have been recently on shortage. The goal of this project was to evaluate intravenous calcium replacement strategies in hospitalized patients in order to understand current practice including common trends and potential problems.

**Methods:** This retrospective chart review of patients receiving intravenous calcium was approved by the Institutional Review Board. Inclusion criteria included adults (age  $\geq 19$  years) who had an active order for intravenous calcium chloride or intravenous calcium gluconate. Patients were excluded if they were under the age of 19 or on dialysis. The primary endpoint was to identify the indication for intravenous calcium replacement and the secondary endpoint was to evaluate if the total calcium or ionized calcium lab value (if applicable) was the trigger for supplementation. Descriptive statistics was utilized to describe the study cohort and to summarize all outcomes of interest.

**Results:** 1736 patient charts between July 1, 2017 to June 30, 2018 had an active order for IV calcium. 100 of these patient charts were included in this study. The main reasons patients were excluded was due to either active dialysis or no clear indication for use. Of these 100 subjects, the average age was 59 years with 57% being of male gender. It is also important to note that 42% of these patients were also on concomitant vasopressors or potassium

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supplementation. Over half of these patients were being treated in an intensive care unit. 10% of patients required two or more doses with 1 patient receiving 7 total doses. 48% of the orders were for 2 grams of calcium gluconate and 42% were for 1 gram of calcium gluconate. 1 gram of calcium chloride was found to be ordered the least (10%). 47% of the time, the indication for intravenous calcium was clinically relevant hypocalcemia (total calcium less than 6.5 mg/dL or serum ionized calcium less than 1 mmol/L), followed by 27% for general hypocalcemia and 24% for hyperkalemia. Of the 70 patients with general hypocalcemia/clinically relevant hypocalcemia, 40% had ionized calcium drawn and was the trigger for supplementation.

**Conclusion:** Assessing the use of intravenous calcium in this medical institution proved that it has been used appropriately. Its use was mostly for critically ill patients with the proper indications and adequate lab values to support it. Using critical medications in times of shortage such as IV calcium should be routinely assessed to better appropriate its use. It is also vital that clinicians be made aware of drug shortages throughout the system. A quality review such as this one can serve to improve healthcare by identifying problems, implementing a corrective action plan, and monitoring for remediation if necessary.

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**Session-Board #** - 8-037

**Poster Title:** Outcomes of implementation of the ABCDEF bundle in a neurological critical care unit

**Poster Type:** Evaluative Study

**Submission Category:** Critical Care

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**Purpose:** The ABCDEF bundle (Assess, prevent, and manage pain; Both spontaneous awakening trials [SAT] and spontaneous breathing trials [SBT]; Choice of sedation and analgesia; Delirium assessment, prevention, and management; Early mobility and exercise; and Family communication and involvement) is a multidisciplinary and evidence-based approach to help apply the Pain, Agitation, and Delirium Guideline from the Society of Critical Care Medicine (SCCM). The purpose of this study is to track compliance with the bundle and to evaluate patient outcomes including intensive care unit (ICU) length of stay (LOS) and ventilator-free days in a neurological ICU (NICU).

**Methods:** The institutional review board approved this study. The training programs for the Confusion Assessment method for the ICU [CAM-ICU], the ABCDEF bundle, and the bundle checklist were provided by the ICU pharmacists from February to December 2018. CAM-ICU has been adopted to identify patients with delirium since April 2018. The ABCDEF bundle and its checklist have been performed since August 2018 and Jan 2019, respectively. The bundle was addressed each morning during rounds, and then documented on the checklist by the multidisciplinary team. Adult NICU patients (20 years old and above) with mechanical ventilation (MV) were eligible for the study. Patients who were extubated within less than 48 hours from MV were excluded. Data were collected retrospectively five months from January to May 2018 (pre-bundle) and prospectively from January to May 2019 (bundle). Demographic and clinical variables were collected from the first ICU day until the patient was designated to a non-ICU unit, was discharged or the patient died. The primary outcomes are ICU LOS and

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ventilator-free days. The secondary outcomes are in-hospital death and compliance with each bundle element, based on the documentation on the checklist. ABCDF compliance were measured on the days that the patient was intubated for a full 24 hours. E element compliance was measured from day five of MV. Comparisons were based on the chi-square test and the independent sample t-test.

**Results:** Data were collected on 104 patients in the study. Fifty-three percent were male with an age of  $68 \pm 15$  years in the bundle phase ( $n=77$ ), and 59% were male with an age of  $52 \pm 12$  years in the pre-bundle phase ( $n=27$ ). There was no significant difference between the two groups with regard to APACH II score ( $20.2 \pm 6.0$  [bundle] vs.  $18.0 \pm 6.2$  [pre-bundle],  $p=0.09$ ). After the ABCDEF bundle care, it was found that ICU LOS was shorter in the bundle phase ( $14.2 \pm 10.1$ ) than the pre-bundle phase ( $18.3 \pm 18.7$ ) with a decrease of 4 days in average, though not statistically significant ( $p=0.15$ ). Ventilation-free days were similar in both phases ( $3.8 \pm 5.0$  [bundle] vs.  $4.1 \pm 6.0$  [pre-bundle],  $p=0.80$ ). Overall, patients who were in the bundle phase had a trend towards lower mortality rate than pre-bundle phase (58.4% vs. 66.7%,  $p=0.45$ ). According to the documentation from the checklist, the average compliance with each element are 94.2% for A and C, 91.1% for SAT, 74.4% for SBT, 44.3% for E, and 69.2% for F. In the bundle phase, 100% of the patients received daily CAM-ICU assessment and the results are documented in the nurse system. However, the compliance with D element on the checklist is 88.8%.

**Conclusion:** In conclusion, we have shown that implementation of the multidisciplinary ABCDEF bundle for adult patients admitted to NICU with mechanical ventilation non-statistically reduction in ICU length of stay and in-hospital mortality. The key to success is improving health-care workers' compliance to the bundle. The comprehensive checklist is helpful for understanding which elements of the ABCDEF bundle require improvements.

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**Session-Board #** - 8-038

**Poster Title:** Treatment of thrombocytopenia with avatrombopag prior to elective procedures; single center real world experience

**Poster Type:** Descriptive Report

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** Thrombocytopenia is common in patients with cirrhosis, affecting up to 84% of patients and worsens with the degree of cirrhosis. Invasive procedures are often deferred due to the risk of life threatening bleeding and the requirement of transfusion blood products. Avatrombopag is a thrombopoietin receptor agonist molecule that mimics the biological effects of thrombopoietin. The ADAPT studies concluded that avatrombopag can increase platelet counts by 91 -102 percent. The objective of the study is to evaluate the efficacy of avatrombopag in thrombocytopenic patients requiring elective endoscopic procedures.

**Methods:** This is a single center, retrospective, observational study to evaluate the efficacy of avatrombopag in increasing platelet count before and after elective procedures. Data was collected using the electronic medical records for patients undergoing procedures and treated with avatrombopag from July 2018 to March 2019. All data was recorded confidentially and de-identified. The primary endpoint was the percentage increase in platelet count. Secondary endpoints included assessment of bleeding and the requirement of a transfusion.

**Results:** A total of 5 patients and 8 incidences were included in the study undergoing the following procedures: upper endoscopy, liver biopsy, chemoembolization, and radiofrequency ablation. Patients were given 40 mg once daily for 5 days (x=5) or 60 mg once daily for 5 days (x=3). The average pre-avatrombopag platelet count was 44.3 K/uL. The average post avatrombopag platelet count was 80.6 K/uL. The average increase of platelet count for patients that received 40 mg and 60 mg of avatrombopag were 67% and 133%, respectively. The average increase of platelet count for all incidences was 92%. None of these patients required a

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transfusion of blood products. The average hemoglobin prior to procedures was 12.2 g/dL and 12.3 g/dL post treatment.

**Conclusion:** Avatrombopag was effective in the treatment of thrombocytopenia prior to elective procedures. There was no change in patients' hemoglobin count and no adverse events reported. All patients who received avatrombopag were able to have their procedures performed without major adverse events or the requirement of platelet transfusions. The use of avatrombopag can be advantageous in preventing the need for platelet transfusions. Thrombopoietin receptor agonists can allow patients to undergo procedures that may have been otherwise deferred.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-039

**Poster Title:** Safety study of cefazolin sodium pentahydrate for injection clinical application

**Poster Type:** Evaluative Study

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** Cefazolin sodium pentahydrate for injection is an antibiotics commonly used perioperative prophylaxis and therapy, but it lacks accurate safety data, which has been available since 2004 in China. The purpose of the study is in order to obtain the clinical application and safety status of cefazolin sodium for injection as a whole, and provide more data for its rational and safe application in clinical use.

**Methods:** The hospital that led the study passed an ethical audit of medical research. In order to investigate the incidence of ADR above 0.1%, and including the rate of loss of follow-up in the study was also considered, an at least 3,600 cases real-world small-scale prospective clinical observation and an embedded case-control study was conducted to evaluate the use of cefazolin sodium pentahydrate for injection and adverse events in a short-term time frame (6 months) without any intervention. Through the two-stage cluster sampling method, 5 hospitals in 2 to 3 provinces and municipalities were randomly selected, and a total of 50 clinical departments were included. From March 1, 2018, inpatients using cefazolin sodium for injection were included, including both prophylactic and therapeutic use. For inpatients with adverse reactions/events found in the study, the doctors provided preliminary comments, which were reviewed by the specialist team. Put gender, age and clinical department as the matching condition for cases group, the control group were selected in a ratio of 4:1 to cases group as nested case-control study method to determine the difference in exposure between the two groups. Data are expressed as means with 95 percent confidence intervals, and

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evaluation of Positive and control group counts data utilized analysis of variance and measurement data utilized analysis of t test.

**Results:** A total of 15 effective ADR/E were collected from 3641 valid cases. The incidence of ADR/E was 4.12‰. The Poisson distribution was used to estimate the injection of cefazolin sodium ADR/E for injection. The 95% confidence interval for the incidence rate was (2.31‰, 6.78‰). In the study, 3641 patients who used cefazolin sodium pentahydrate for injection, 3220 of them were used according to the instructions and the guidelines for the treatment, and 14 of the 15 cases with ADR/E were used according to the instructions. The incidence of adverse drug reactions was 4.35 ‰. The clinical symptoms of ADR/E occurred were rash (7 cases), itching (4 cases), vomiting (3 cases), maculopapular rash (2 cases), palpitations (2 cases), dizziness (2 cases) and etc. Adverse reactions / event status are average. The relevance evaluation was "very likely to be related" in 9 cases and "probably related" in 6 cases. After treatment, they with ADR/E all improved or healed.

**Conclusion:** This study found that the overall adverse reaction rate of cefazolin sodium pentahydrate for injection was "occasional" which is similar to normal cefazolin sodium. Symptom of ADR/E status were general, and ADR/E can be improved or cured within 8 days after stopping, changing or not processing. The study also found that there are some unreasonable medications in the clinic, including long medication courses, preventive administration time, unreasonable frequency, less frequent administration of daily doses, more single dosages, and less reasonable delivery ways, and the most prominent one is the unreasonable volume of infusion.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-040

**Poster Title:** Patients' willingness to pay for pharmacy services: a cross-sectional study in a foreign investment private hospital in Guangzhou

**Poster Type:** Descriptive Report

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** This study was to investigate the patients' cognition of and their willingness to pay (WTP) for pharmacy services in a private hospital in Guangzhou, and thus provide the groundwork for the rollout of paid pharmacy services within the hospital.

**Methods:** The structured questionnaires were presented to the patients or their family members during a short-time face-to-face interview. In addition, the questionnaires were also distributed online to a WeChat customer group. The Contingent Valuation Method (CVM) was employed to measure respondents' WTP. Chi-square and Fisher's exact test were performed to examine the factors related to the participants' WTP.

**Results:** 51 valid questionnaires in total have been collected in this research. 60.78% participants or respondents were female and the average age of the patients is 36 years old. 82.35% of patients were willing to pay for the pharmacy service and 52.94% of them were willing to pay 100CNY or less.

**Conclusion:** Most of the respondents valued the pharmacy services in this hospital and were willing to pay for them. The maximum amount would be 100 CNY.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-041

**Poster Title:** Safety study of Ulinastatin for injection clinical application

**Poster Type:** Evaluative Study

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** To investigate the actual use of Ulinastatin in the clinical department in hospital through an open-label prospective clinical observational study, to initially calculate the incidence of ADR/E and to study the suspicious influencing factors of ADR/E, to provide a reference for next larger trial and some information for clinical rational use.

**Methods:** The study was collected two types of inpatients, which were normal inpatients and ICU inpatients. After medical ethics review, 10,000 cases were collected and a two-stage sampling method was used to conduct a large-scale, multi-center, prospective drug safety combined with nested case-control study. Inpatients who had been used at least once Ulinastatin during the hospitalization period were included in the study, and patients who did not use Ulinastatin for injection at the same time were not included as controls. All safety events found in the study were reported by the attending physician, and then reviewed and finally determined the relevance of safety to Ulinastatin by experts. All data were processed by SPSS 18, in which the measurement data was to be tested by two independent samples t test, and the count data was calculated by chi-square test; logistic regression was used to calculate the OR value and 95% confidence interval of risk factors.

**Results:** A total of 11252 valid cases were collected in this study, including ICU 7009, and 11 ADR/E cases, including 9 ICU inpatients and 2 normal inpatients. The incidence of ADR/E of Ulinastatin for injection during the study period was 0.98‰, and after the rejection of irrational use, the incidence of adverse reactions was calculated to be 3.06‰, which was “occasional”. It’s involved in the system classification of skin and its attachment damage, digestive system

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and blood. The relevance evaluation is “very likely relevant” in 1 case and “possibly relevant” in 10 cases. The severity of adverse reactions was graded up to 8 in grade 1, 2 in grade 2, and only 1 in grade 4. The time of ADR/E occurred within 6 days after administration; most of the ADR/E cases were discontinued the Ulinastatin, and most of them were not treated. Only one case of rash was coated with calamine lotion. All ADR/E inpatients were cured or improved within 11 days after ADR/E happened.

**Conclusion:** This study found that the incidence of adverse drug reactions of Ulinastatin is less than 5%, and the rate of adverse reactions is low, and ADR involves limited sites, mainly in the skin and its attachment damage, digestive system, blood. Afterwards, in most ADR cases, the symptoms of ADR will gradually improve or cure after stopping the drug. The clinical application of the drug is still unreasonable, and these may bring the risk of drug use.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-042

**Poster Title:** Drug use evaluation of the polypharmacy of long-acting injectable antipsychotics at Saint Elizabeths Hospital

**Poster Type:** Evaluative Study

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** Schizophrenia is a chronic complex, disability mental illness which is characterized by positive symptoms (delusions, hallucinations and disorganized speech), negative symptoms, and cognitive impairment. Long-acting antipsychotic injection formulations are reserved for patients who prefer this route of administration or when poor adherence is a clinical priority, therefore indicated in the central treatment strategy for the management of schizophrenia. The purpose of this study was to review long-acting antipsychotic injections prescribing trends at Saint Elizabeths Hospital and how they correspond to clinical practice guidelines.

**Methods:** Using data retrospectively collected from the hospital's electronic records, patients were identified during the following four months: October 2017 (baseline), May 2018 (study period 1), December 2018 (study period 2), and March 2019 (study period 3). The data collected included the number of patients on long-acting antipsychotic injections (LAIs), the number of LAIs prescribed, the rate per average monthly census, duplicate LAIs details, and total LAIs spending were evaluated. The primary outcome is to decrease the usage of polypharmacy LAIs to one LAI, in order to become 100% compliance based on the recommendation from the pharmacy department per evidence-based clinical guidelines.

**Results:** The number of patients treated with LAIs was 68 at baseline, 75 in periods 1 and 2, and 66 in period 3. The rates of patients receiving LAIs per average daily census were 24.7%

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(68/275), 28.9% (75/260), 27.8% (75/270) and 23.9% (66/265) respectively. Eleven patients received duplicate LAIs; 4 at baseline, 5 in period 1, 2 in period 2, and none in period 3. Haloperidol Decanoate and Invega Sustenna were prescribed for 7 patients respectively; haloperidol Decanoate and Risperdal Consta were prescribed for 2 patients respectively; Fluphenazine Decanoate and Invega Sustenna were prescribed for one patient respectively, and; Fluphenazine Decanoate and Risperdal Consta were prescribed for 1 patient respectively. None of the patients received more than two LAIs during the same treatment period. Polypharmacy LAI prevalence was 1.5% (4/275) at baseline, 1.9% (5/260) in period 1, 0.7% (2/270) in period 2, and 0% in period 3. Total LAI purchasing in 2018 decreased from 2017 (\$1.14 million versus \$1.37 million). Considering the inflation rate of 9.6%, an estimated \$364,167 in cost savings was achieved by implementing new guidance on LAIs.

**Conclusion:** This pharmacist quality improvement DUE lead to a collaboration between the Pharmacy and Therapeutic Committee and the Psychiatry team in developing, implementing, and monitoring the use of LAIs, therefore it yielded a dramatic change in the prevalence of polypharmacy and total spending. Almost 25% of Saint Elizabeths Hospital patients were treated with LAIs during the study period and implementation of new guidance and continued monitoring resulted in estimated cost savings of \$364,167 in the past year.

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**Session-Board #** - 8-043

**Poster Title:** Evaluating the use of an oral vitamin K antagonist in a county health system and assessing the appropriate shift to direct acting oral anticoagulants

**Poster Type:** Evaluative Study

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** The advantage of direct acting oral anticoagulants (DOACs) over vitamin K antagonists include reduced number of drug interactions, no routine blood testing of the INR required and no dietary restrictions. A county health system added rivaroxaban and apixaban to their formulary in 2012 and 2017 respectively. Rivaroxaban and Apixaban are FDA approved for nonvalvular atrial fibrillation and venous thromboembolism. The ambulatory clinical pharmacists in the anticoagulation clinic assess all new warfarin patients for DOAC eligibility. This review will reveal all remaining patients on warfarin and those that are potentially eligible to be switched to a DOAC.

**Methods:** A retrospective electronic chart review was conducted on two hundred and eighty-five patients receiving warfarin from January 2018 through October 2018. An outpatient utilization report for warfarin for this time frame was obtained from Epic Business Intelligence. The report characteristics included patient demographics, dispensing location, documented indications, warfarin status, DOAC eligibility and reason not on a DOAC.

**Results:** There were two hundred and eighty-five outpatients on warfarin from January 2018 through October 2018. Fifty-nine percent (168/285) of patients were male and forty-one percent (117/285) were female. The average age was 60 years of age. Twenty-four percent (68/285) of the patients had a documented indication of atrial fibrillation with a mitral or aortic valve replacement. Thirty-eight percent (108/285) had a pulmonary embolism or a deep vein thrombosis as well as thirty-eight percent (109/285) also had non-valvar atrial fibrillation or



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flutter. Eighty-six percent (246/285) are currently on warfarin while fourteen percent (39/285) were discontinued due to either presently being on a DOAC, lost to follow-up, pregnancy, no longer requiring anticoagulant therapy or an adverse drug event. The reasons the two hundred and forty-six patients remain on warfarin include the following. Twenty-seven percent (67/246) of the patients had valve replacement, twelve percent (30/246) was due to patient preference, one percent was because of advanced age, less than one percent had a high BMI, twenty-one percent was due to renal impairment or dialysis, two percent had a drug interaction or contraindication and four percent was due to cost. The remaining nine percent (23/246) were formerly on a DOAC but discontinued.

**Conclusion:** There were only twenty-two percent (54/246) of warfarin patients who were potentially eligible to be switched to a DOAC. The names of these patients were forwarded to the ambulatory clinical manager for further review. Although DOACs are typically more expensive, warfarin and rivaroxaban have comparable pricing in this 340 B institution. This county health system has successfully and appropriately switched the majority of their patients on warfarin to one of the DOACs currently on the formulary.

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**Session-Board # - 8-044**

**Poster Title:** Development of a medical information (MI) team to support a large injectable product portfolio

**Poster Type:** Descriptive Report

**Submission Category:** Drug Information/Drug Use Evaluation

**Primary Author:** Prachi Parmar, Pfizer; **Email:** prachi.parmar@pfizer.com

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**Purpose:** Describe Pfizer Medical Information's (MI) strategy in managing a large portfolio (~150) of injectable products, across various therapy areas and share learnings on how an MI injectables team creates accurate, timely, and balanced response documents to fulfill customer requests. In 2015, Pfizer acquired Hospira and with this acquisition inherited a large and growing Sterile Injectables (SI) business. Pfizer MI needed to assess and understand how best to support this portfolio and ensure health care professionals (HCPs) had the critical information needed to make an informed decision to serve their patients.

**Methods:** It was determined that the formation of a new, SI focused therapy team would be best suited to manage the complex and unique medical inquiries received on this portfolio. Members of this team had varied professional backgrounds such as hospital pharmacy, emergency nursing, and pharmacology, as well as extensive MI experience from both Hospira and Pfizer. Colleagues needed to establish team norms, outline daily operations, train on the product knowledge, determine the usability of existing resources and develop new ones as appropriate, and importantly incorporate two distinct company cultures into one. Additionally, a critical component of MI management of the SI product inquiries included the call center operations, ensuring that the frontline colleagues had the knowledge, resources, and training required to successfully provide solutions to customers. Another consideration taken into account was the global structure of Pfizer MI and how to best leverage this in the SI space. Finally, MI needed to work closely with members of the SI Business Unit in order to be kept abreast of the critical key communications involving recalls, shortages, backorders, new presentations, and more. The team gathered insights in order to appropriately address customers' and patients' needs and expectations.

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**Results:** The experts on the SI team were well equipped to support a vastly versatile portfolio including anti-infectives, biosimilars, anesthetics, surgicals, opioids, as well nutritional support products, among others. In North America, the team managed approximately 10,895, 11,460 and 4,624 inquiries from HCPs and patients in 2017, 2018 and 2019 (through May 2019), respectively. Primary topics of interest were stability, compatibility, availability, dosage and administration. To address the high volume of stability and compatibility inquiries, a set of guidelines were developed and converted to verbal responses to be leveraged by the call center to efficiently respond to customers. Additionally, a stability template was utilized to create scientific response documents (SRDs). Both HCPs and patients rely heavily on the access of these products due to their use in the hospital and critical care settings. The nature of these medications necessitates clear and consistent communication when product availability situations arise. MI colleagues worked diligently with the Pfizer business to make information available as quickly as possible. For digital customers, a variety of self-service options were also offered by publishing the SRDs on an external facing website and on a chatbot; furthermore select SI were featured on a chat live function within the website.

**Conclusion:** Pfizer MI's commitment to the support of a large SI portfolio is clear, with the swift establishment of a dedicated therapy team structured to specifically meet the needs of customers on SI. Collaboration with the SI Business Unit and other relevant business partners in the company ensured that HCPs received the most accurate and timely responses to their questions in order to make informed decisions that impact patients.

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**Session-Board #** - 8-045

**Poster Title:** Evaluation of the reading level of commonly used drug information tertiary references

**Poster Type:** Evaluative Study

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** Health literacy refers to the degree at which patients are able to obtain and comprehend health information to make informed decisions about their care. To address the dynamic needs of patients and to provide guidance for hospitals, the Joint Commission released a report titled, “Advancing Effective Communication, Cultural Competence, and Patient- and Family-Centered Care: A Roadmap for Hospitals.” This report recommends that patient education materials be written at or below a fifth grade reading level. The purpose of this study is to evaluate the compliance of commonly used tertiary drug references to the Joint Commission standard.

**Methods:** This comparative drug information study generated a list of 100 of the most commonly prescribed medications in 2019. Patient information handouts were obtained from Micromedex CareNotes, Micromedex Med Essential Fact Sheets, Lexi-Comp “the Basics,” www.drugs.com, and Medline plus. The reading level of each medication from each reference was evaluated using the Flesch-Kincaid Grade Level test, which is a mathematical test that incorporates sentence length and word length to approximate the reading level necessary for a reader to comprehend a given text. The primary endpoint was the average reading level in each database and was compared using a one-way ANOVA using correlated samples and Tukey’s post-hoc HSD test for significance between groups. The secondary endpoint was the frequency at which each database is at or below a fifth grade reading level.

**Results:** The overall average reading level was  $7.8 \pm 2.7$ , correlating to nearly an eighth grade reading level. The average reading levels for the 5 databases, in ascending order, included Lexi-

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comp at  $4.2 \pm 0.3$ , Micromedex CareNotes at  $7.5 \pm 0.8$ , Micromedex Med Essential Fact Sheets at  $7.8 \pm 3.7$ , www.drugs.com at  $9.3 \pm 1$ , and Medline Plus at  $10.4 \pm 0.7$ . Differences in databases were significant ( $p < 0.01$ ) for all post-test comparisons except for the two Micromedex databases. Lexi-comp achieved a reading level at or below fifth grade in 99% of medications while Micromedex Med Essential Fact sheets was the next highest at 33%, a difference of 67%,  $p < 0.0001$ . No other database contained drug information at or below a fifth grade level.

**Conclusion:** Lexi-comp “the Basics” consistently met the Joint Commission recommendation for medical information at or below a fifth grade reading level whereas Micromedex Med Essential Fact Sheets met this recommendation approximately a third of the time. When providing drug information resources to patients, healthcare providers should be diligent in selecting sources that meet the Joint Commission recommendations.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-046

**Poster Title:** Estimating renal function for drug dosing: equations matter

**Poster Type:** Evaluative Study

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** Suggestions for drug dose adjustments according to renal function are a significant part of the pharmaceutical intervention (PI). The most commonly used equations for estimating glomerular filtration rate (GFR) in adults are the Cockcroft-Gault (CG) equation and, more recently, the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) equation. The latter is a more accurate estimate of actual GFR, and is now recommended for staging CKD. However, regarding drug dosing, there are some conflicting recommendations. To assess the impact of the differences between the two GFR estimation formulas (CG and CKD-EPI) in drug dosing recommendations.

**Methods:** PI of the 1st semester of 2017 aiming drug dosing recommendations for renal impairment or renal function recover, were selected from de PI database. The information collected included drug identification and dosing recommendation made (dose reduction / increase/ drug suspension). Age, weight, height, and creatinine were added and GFR was calculated using the above two equations. Finally, we analyzed the impact of the result on the dosing suggestion made, according to the GFR cut-off value for each drug dosing recommendation.

**Results:** A total of 149 interventions were included, covering 115 patients with a median age of 85 years. The recommendations for dosing alteration or drug suspension focused mainly on antibiotics (Meropenem, Piperacillin/tazobactam, Co-amoxiclav), anticoagulants (Enoxaparin,

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Rivaroxaban, Dabigatran) and NSAIDs. The mean difference in estimated GFR between the two formulas was 8 ml/min. However, larger differences appear to be associated with older age and body weight limits. There were 36 (24%) cases of discrepancy between the recommendations to be made depending on the formula used.

**Conclusion:** The choice of the GFR estimation formula may have a significant impact on the recommendations of dose adjustments, namely in the elderly and in extremes of body weight. Because each formula has its limitations, it is crucial to interpret the result as range of probability rather than an absolute value, and consider the complete patient context in the decision.

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**Session-Board #** - 8-047

**Poster Title:** Knowledge, attitude and practice of generic drug substitution by Lebanese community pharmacists

**Poster Type:** Evaluative Study

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** Generic drug substitution is nowadays one of the cornerstones in economic savings in many countries due to the significant differences in the price between generic and brand medications. In Lebanon, a unified medical prescription is adopted, and pharmacists recently can substitute brand-generic and generic-generic without referring to the prescribing physician. Thus, this study was conducted to evaluate the knowledge, attitude and practice of Lebanese community pharmacists towards generic drug substitution.

**Methods:** This prospective study was approved by the institutional review board; and was conducted in community pharmacies in Beirut and Mount-Lebanon. Pharmacists were asked to fill a questionnaire that assessed their demographics, their education level and their experience in the community pharmacy field. The questionnaire also targeted the pharmacists' knowledge and attitude, as well as their daily practice towards generic substitution. The primary endpoint was to evaluate the knowledge about generic drug substitution expressed as the score of knowledge. Secondary endpoints included assessment of the pharmacists' attitude and practice toward this substitution.

**Results:** A total of 200 community pharmacists were included over a 4-month period. According to our questionnaire, the maximum score of knowledge that can be statistically reached was defined as 60. The majority of pharmacists showed good knowledge with a mean score of 50.48 (plus or minus 5.20). In addition, 58 percent of pharmacists believed that there should be a



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standard national guidelines to pharmacists on brands and generics substitution process. On the other hand, only 45 percent of our participating pharmacists believed that they should perform generic substitution without consulting the prescribing physician. When coming to practice, 93 percent of the pharmacists dispense generic medications in their daily practice; however, only 58.5 percent perform this substitution without referring to the prescribing physician.

**Conclusion:** Good overall knowledge was found among Lebanese community pharmacists with respect to brand-generic and generic-generic drug substitution. In addition, most pharmacists also favor the concept of generic drug substitution. This study could be implemented to further set clear national guidelines and educate community pharmacists about applicable generic drug substitution.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-048

**Poster Title:** Retrospective evaluation of the appropriateness of use of ceftolozane/tazobactam at a tertiary-care teaching hospital

**Poster Type:** Evaluative Study

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** The objective of this medication use evaluation (MUE) is to retrospectively assess the appropriateness of use of ceftolozane/tazobactam (C/T) at a tertiary-care teaching hospital throughout the years 2017-2018.

**Methods:** A retrospective observational MUE was conducted at the American University of Beirut Medical Center, a 400-bed tertiary-care teaching hospital in Lebanon. The study included all patients who received at least one dose of C/T from August 1, 2017 through October 31, 2018. A pharmacy-generated list identified patients eligible for the study. Data were gathered from the patients' medical records using a structured data collection form. The latter included patient demographic information, co-morbidities and past medical history, site(s) of infection(s) and corresponding culture results, indication(s) for the use, dosing information, laboratory results, concomitant medications received, drug-drug interactions, and documentation of ADEs. Appropriateness of use of C/T was based on the indication for which it was prescribed, the relevance of its initiation as empiric therapy, and proper de-escalation to a narrower-spectrum antibiotic or switching after cultures results were out. If any of these criteria was not met, the use of C/T was considered inappropriate.

Appropriateness of dosing was based on the initial regimen used for the indication and patient's renal function, as well as the daily regimen based on the patient's changes in kidney function.

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Descriptive statistics such as mean values, percentages, and standard deviations, when applicable, were used to summarize to data. Statistical data were generated using SPSS, version 24. Informed consent was waived due to the study design, which aims at quality improvement.

**Results:** A sample of 111 patients was included and analyzed. The main indication of C/T was nosocomial pneumonia for 71/111 (63.96%) of the patients. Other indications included cUTI (8.11%), cIAI (8.11%), skin and soft tissue infections (6.31%), bacteremia (0.9%), and unknown focus (12.6%). Following clinical appropriateness, C/T was found to be properly used in 85.59% of the time. As for dosing, appropriate regimens were used in 79.28% of the cases. All patients received C/T intravenously and at a frequency of “every eight hours”, both of which are 100% appropriate. Furthermore, the duration of use of C/T was suitable in 98.95% of the cases. Concerning the use of metronidazole, it was prescribed in 55.55% of the cases in which it was indicated (5/9 patients). Moreover, no adverse drug reactions were found with the use of C/T. Finally, regarding drug-drug interactions, two patients (1.8%) were on acenocoumarol, which can interact with C/T.

**Conclusion:** Overall, the study showed that C/T is appropriately prescribed and administered at the medical center. These results may be further optimized by increasing the education of healthcare professionals and using effective antimicrobial stewardship practices. Finally, it is crucial to highlight that pharmacists have a major potential to aid in antimicrobial decision-making and improving patient outcomes.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-049

**Poster Title:** Retrospective evaluation and risk factors of trastuzumab related adverse cardiac events

**Poster Type:** Evaluative Study

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** Most of the current studies focus on the effect of trastuzumab on left ventricular systolic function, little literature is concerned about the adverse effects on left ventricular diastolic function, right heart function and other aspects of cardiac function. The aim of this research was to comprehensively evaluate the cardiac safety of trastuzumab targeted therapy in the patients with HER2 positive tumors.

**Methods:** The clinical data of adult HER2 positive breast cancer and gastric cancer patients who had been treated by trastuzumab at least once in our hospital from November 2015 to October 2018 and accept regular cardiac function examination were collected retrospectively . The cardiac safety was evaluated according to clinical manifestations and examination results (electrocardiogram and echocardiography). The criteria and classification of this study were determined according to the National Cancer Institute Common Terminology Criteria for Adverse Events (NCI-CTCAE v5.0). P wave, PR interval, QT interval, left ventricular ejection fraction (LVEF), pulmonary artery systolic pressure (PASP), atrioventricular structure, valvular regurgitation and pericardial effusion were used as the main indexes to evaluate trastuzumab related adverse cardiac events. Normally distributed continuous variables were expressed as the mean  $\pm$  standard deviation (SD), and groups were compared using the independent Student's t-test. Non-normally distributed continuous variables were presented as the median (quartile spacing) [M (Q1, Q3)], and groups were compared using the rank-sum test. In

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addition, categorical variables were expressed as numbers (percentages) and analysed using the chi-squared test or Fisher's exact test. Further, logistic regression models were used to assess independent risk factors for adverse cardiac events. Multiple logistic regression models were used to identify variables with P value less than 0.2 in descriptive analysis; these variables were further examined in multivariate analysis to identify independent risk factors.

**Results:** 163 of 210 cases HER2 positive cancer patients treated with trastuzumab were eventually included, of which 58 (35.58%) showed arrhythmia, including 22 (13.49%) sinus bradycardia, 20 (12.27%) sinus tachycardia, 18 (11.04%) premature contraction, 15 (9.20%) atrioventricular block and 14 (8.59%) arose QT interval prolongation. 33 (20.25%) cases turned up valvular reflux (added or aggravated) while 24 (14.72%) appeared abnormal cardiac structure. 15 (9.20%) emerged increased PASP, 7 (4.91%) had pericardial effusion and 6 (4.29%) accompany with LVEF reduction. Multiple logistic regression analysis showed that age ( $P=0.015$ ,  $OR=2.768$ ) was an independent risk factor for valvular regurgitation, and the type of tumor2s ( $P=0.014$ ,  $OR=3.148$ ) was an independent risk factor for cardiac structural abnormalities.

**Conclusion:** Though the incidence of adverse cardiac events is high, trastuzumab do less severe harm to cardiac structure or function in HER2 positive cancer patients, the general safety is good. The cardiac function evaluation and monitoring should be carried out regularly during and after the treatment so as to effectively prevent and promptly respond to the potential adverse cardiac events. Some patients failed to follow up regularly and had potential safety hazards. Clinical pharmacists should cooperate with doctors to strengthen the medication education of patients, promote regular follow-up of patients, and ensure the safety, especially cardiac safety of trastuzumab treatment.

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**Session-Board #** - 8-050

**Poster Title:** Benchmarks, baselines, and brass tacks: using data to change physician prescribing practices

**Poster Type:** Evaluative Study

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** Indiana University Health is a sixteen-hospital system challenged with managing costs. The system has established robust contracting practices, a system Pharmacy & Therapeutics (P&T) Committee and a system formulary. In an effort to gain additional cost savings, clinical councils were implemented to drive prescribing best practices and reduce unwarranted practice variation.

**Methods:** To accompany the long-established system Pharmacy and Therapeutics (P&T) Committee, nineteen clinical councils were implemented to address variable drug use practices across the system. Implemented clinical councils included the following specialties: Anesthesia, Cardiology, Critical Care, CV Surgery, Emergency Medicine, General Surgery, GI, Infectious Disease, Medical Oncology, Neurology, Neurosurgery (Spine), Newborn, OB-GYN, Ortho Fracture, Ortho Joint, Palliative Care, Transplant, and Vascular. In order to achieve significant cost savings, a method to standardize prescribing practices for selected agents was established. Agents for evaluation were identified by reviewing overall drug costs for the system, the breadth of use across hospitals, and comparing costs to both internal and external benchmarks. Once an agent was identified for a cost savings initiative, drug use practice data was needed. Many drugs have multiple indications, so understanding which clinical practices were the primary users was key to directing it to the appropriate clinical practice council. Use of practice data from the electronic medical record facilitated this analysis. This practice data not only helped identify which clinical specialty boards the initiative was directed to, but also helped identify stakeholders. One or more of these stakeholders could become the initiative champion

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as the initiative moved through the clinical specialty boards toward implementation. Tracking the results of each initiative and sharing that data back to the clinical specialty boards was important in keeping these groups engaged.

**Results:** The team approved and implemented six initiatives through the clinical specialty boards within the first year. Practice areas and their respective initiatives included:

- OB-GYN: dinoprostone conversion to misoprostol;
- OB-GYN: hydrocortisone acetate 1% and pramoxine hydrochloride 1% foam conversion to benzocaine spray;
- Medical Oncology: development of utilization criteria for intravenous calcitonin
- Medical Oncology: removal of the intravenous formulation of allopurinol from formulary;
- Ortho Joint: restriction of liposomal bupivacaine;
- Anesthesia: restriction of sugammadex.

Annualized savings for these ongoing initiatives are expected to exceed two million dollars. Cost savings are monitored by tracking changes in cost per pharmacy adjusted patient days (PAPD) for twelve months. For example, the calcitonin initiative is anticipated to reduce cost per PAPD by 40% yielding a twelve month savings of over \$500,000.

**Conclusion:** Each successful practice change was influenced by engaging physician champions. This process has resulted in significant cost savings as well as establishing a standard of care and reducing practice variation.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-051

**Poster Title:** Evaluation of intravenous vitamin K 10mg versus other doses and routes in the treatment of coagulopathy in cirrhosis patients

**Poster Type:** Evaluative Study

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** Patients with liver failure and cirrhosis often present with coagulopathy due to impaired production of coagulation factors. Vitamin K is frequently used in these patients to correct coagulopathy despite a lack of supporting evidence and optimal dosing regimen. We hypothesized that if vitamin K is to have any benefit in reducing the international normalized ratio (INR), the 10mg dose given intravenously would be most likely to demonstrate an effect. The purpose of this study is to validate the efficacy of intravenous vitamin K 10mg dosing in hospitalized patients with coagulopathy and cirrhosis versus other doses and routes of vitamin K.

**Methods:** A retrospective chart review was conducted to evaluate all patients admitted to our institution between March 2017 to September 2018 who received vitamin K via any route. Patients were included if they were at least 18 years of age and had cirrhosis related coagulopathy defined as INR greater than 1.5 at any point during their hospitalization. Patients who received any blood products on the same day or within 72 hours of the vitamin K dose or received it for any indication other than coagulopathy in cirrhosis were excluded. Included patients were divided into two groups: 1) patients who initially received 10mg vitamin K intravenously and 2) patients who received vitamin K in any other dose or route. The major outcomes measured were the percentage decrease of INR within 72 hours of the last dose of vitamin K and whether an INR of less than 1.5 was achieved. A secondary analysis was also performed that compared intravenous and oral vitamin K irrespective of the dose and evaluated the same outcomes. Data was analyzed using the Fisher's exact test and the Mann-Whitney U test. This study was approved by our local institutional review board (IRB).



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**Results:** A total of twenty-two patients with a documented diagnosis of cirrhosis were included in our analysis with a mean age of 56.8 years. The average baseline initial INR was 2 and the average vitamin K dose given via any route was 9.6mg. Seven patients (31.8 percent) received oral vitamin K and the remaining fifteen patients (68.2 percent) received it via the intravenous route. Of those fifteen patients, seven patients (46.6 percent) received a 10mg intravenous dose. The average percentage decrease in INR within 72 hours in the 10mg intravenous group was 15.6 percent versus 14 percent in the second group ( $p=0.19$ ). Two patients (28 percent) achieved an INR less than 1.5 within 72 hours in the 10mg intravenous group versus six patients (40 percent) in the second group ( $p=0.67$ ). As for the secondary analysis irrespective of the dose given, the intravenous vitamin K group had an average decrease in INR within 72 hours of 19.4 percent versus 4.1 percent in the oral vitamin K group ( $p=0.03$ ). Six patients (40 percent) of the intravenous group achieved an INR less than 1.5 within 72 hours versus two patients (28 percent) in the oral group ( $p=0.67$ ).

**Conclusion:** The results of this study suggest that vitamin K was poorly effective in reversing coagulopathy in cirrhosis. If used, intravenous vitamin K might be more effective in decreasing the INR in patients with cirrhosis related coagulopathy versus the oral route. However, the optimal dose is unknown.

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**Session-Board #** - 8-052

**Poster Title:** Knowledge and awareness of use and safety of isotretinoin among Lebanese patients in community setting: a cross-sectional study

**Poster Type:** Descriptive Report

**Submission Category:** Drug Information/Drug Use Evaluation

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**Purpose:** Isotretinoin is a widely used drug for the treatment of severe cases of acne vulgaris. Its use is common in Lebanon and can even be purchased without prescription although it is associated with severe adverse events. Only few studies in Lebanon have shown inadequate knowledge of community pharmacists about acne and its treatment, however none has assessed patients' knowledge on acne medications specifically isotretinoin. This study was done to assess patients' knowledge in Lebanon on the use and safety of oral isotretinoin in community pharmacy setting.

**Methods:** This is a six month, multi-center, cross-sectional community- based research on drug utilization. The study was conducted in twenty two different community pharmacies in South Lebanon. Patients, 16 years or older, that have already received isotretinoin therapy or are currently using it were included in the study. A data collection sheet was used to assess various factors about knowledge and practice of isotretinoin from February to May 2019. It included three main parts: patient demographics, knowledge on isotretinoin and practice. Data was analyzed using statistical package for social science (SPSS) version 21. Means, standard deviations and percentages were used.

**Results:** A total of one hundred and seven patients with mean age of  $24.06 \pm 5.62$  were enrolled. 55.1% knew that isotretinoin should be used in severe cases of acne. Most patients identified skin dryness (95.3%), lip dryness (94.3%), increase in liver function tests (76.3%) and sunburn (69.9%) as possible side effects. However, only few of them knew about the increase in

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glucose levels (35.6%), visual disturbances (45.1%), depression (45.2%) and increase in triglyceride levels (55%). 84.8% of the total patients were aware of the teratogenicity of isotretinoin, 92.3% of the female patients knew that pregnancy test was required, but 29.2% of them didn't know there's a need for contraception. 91.6% of the patients received isotretinoin prescriptions by a dermatologist. Blood tests were regularly done by patients (84.9%), however 32.3% of the female patients didn't perform pregnancy test before using isotretinoin.

**Conclusion:** Findings of the study revealed that knowledge on isotretinoin use and safety should be increased to guide patients toward the appropriate use of the drug. Proper counseling should be implemented by physicians and pharmacists to enhance the safe use of isotretinoin, especially in female patients.

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**Session-Board #** - 8-053

**Poster Title:** Thrombotic events and reanticoagulation in major bleeding patients treated with andexanet alfa: an ANNEXA-4 sub-analysis

**Poster Type:** Evaluative Study

**Submission Category:** Emergency Medicine

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**Purpose:** Andexanet alfa was developed as a specific reversal agent for the treatment of patients with major bleeding associated with the use of factor Xa (FXa) inhibitors. While thrombotic events (TEs) have been reported in patients receiving andexanet alfa, the scope, nature, and timing of these events have not been fully characterized. In this secondary analysis of the ANNEXA-4 study, the occurrence of TEs and restart of anticoagulation was investigated.

**Methods:** The ANNEXA-4 study was a prospective, single-arm, open-label clinical trial that evaluated the safety and efficacy of andexanet alfa in patients with acute major bleeding, including intracranial hemorrhage, gastrointestinal bleeding, and other critical site bleeding. Patients presenting with acute major bleeding within 18 hours after their last dose of FXa inhibitor were treated with a bolus plus infusion of andexanet alfa. The andexanet alfa dose was based on the identity, amount, and timing of the last FXa inhibitor dose. Safety outcomes, including the occurrence of TEs (investigator-reported and independently reviewed by an adjudication committee), were evaluated over 30 days after enrollment. The timing of restart of any anticoagulation (oral or parenteral) and specifically oral anticoagulation were recorded, in order to evaluate timing of TEs with respect to timing of anticoagulation restart.

**Results:** Among 352 patients treated with andexanet alfa, a total of 34 (9.7%) experienced one or more TEs within 30 days of enrollment. Strokes (4.0%) and deep vein thrombosis (3.7%) were

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the most frequent TE types, while myocardial infarctions (2.0%), pulmonary emboli (1.4%), and transient ischemic attacks (0.3%) were less common. Among patients with arterial TEs, 77.3% and 27.3% had been anticoagulated for atrial fibrillation and venous thromboembolism, respectively. The median time to first TE was 10.5 days. For various subgroups (e.g., age, sex, region of enrollment, medical history, baseline anti-FXa activity, FXa inhibitor dose, andexanet alfa dose), no factors were significantly associated with the occurrence of TEs. 220 (62%) patients received at least one dose of either parenteral or oral anticoagulant therapy during the 30 days after andexanet alfa treatment, with 145 (41%), 46 (13%), and 29 (8%) restarting at < 6 days, 6-14 days, and 15-30 days after the bolus, respectively. Of these patients, 8 (2%) had a TE after restarting any anticoagulation; the remainder occurred before anticoagulation was restarted. 100 (28%) of the 220 patients were restarted on oral anticoagulation during the 30-day follow-up. No TEs occurred after oral anticoagulation had been restarted.

**Conclusion:** In patients with acute, FXa inhibitor–associated major bleeding treated with andexanet alfa, TEs occurred in 9.7% of patients. Although TE rates were numerically greater in patients with intracranial bleeding than in those with gastrointestinal bleeding, no factors were significantly associated with the occurrence of TEs. No patient experienced a TE after restarting oral anticoagulation.

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**Session-Board #** - 8-054

**Poster Title:** Hemostatic efficacy and anti-factor Xa reversal with andexanet alfa in spontaneous intracranial hemorrhage

**Poster Type:** Evaluative Study

**Submission Category:** Emergency Medicine

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**Purpose:** Andexanet alfa (coagulation factor Xa [recombinant] inactivated-zhzo) is a recombinant modified human Factor Xa (FXa) decoy protein developed to specifically reverse the anticoagulant effect of FXa inhibitors. This study evaluated the hemostatic efficacy and anti-FXa reversal with andexanet in patients with spontaneous intracranial hemorrhage (ICrH).

**Methods:** The ANNEXA-4 study was a single-arm, prospective, open-label study of andexanet in patients presenting with major bleeding within 18 hours after taking either apixaban, rivaroxaban, edoxaban, or enoxaparin. We performed a subgroup analysis of patients with spontaneous (nontraumatic) ICrH. Brain imaging was performed at baseline, and at 1 and 12 hours post andexanet treatment. Subdural hemorrhage (SDH) and subarachnoid hemorrhage (SAH) thickness and intracerebral volumetric analysis were performed using Quantomo software. Patients were considered evaluable for efficacy if they had a baseline anti-FXa activity  $\geq 75$  ng/mL ( $\geq 0.25$  IU/mL for enoxaparin-treated patients). The co-primary efficacy outcomes were change in anti-FXa and the proportion of patients with excellent or good hemostatic efficacy (defined as volume or thickness increase from baseline  $\leq 35\%$ ) at 12 hours.

**Results:** Of 352 patients enrolled in ANNEXA-4, nontraumatic ICrH was present in 128 patients, including intracerebral +/- intraventricular ICrH in 99 patients, SAH in 5 patients, and SDH in 14 patients. In this cohort, the mean age was 78 years (SD 9.2); the median time from last FXa

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inhibitor dose to andexanet administration was 11.9 hours (IQR 7.9-15.3); the median time from symptoms to CT was 2.6 hours (IQR 1.2-2.7); and the median time from CT to andexanet administration was 1.8 hours (IQR 3.8-17.5). The median intraparenchymal volume in intracerebral bleeds was 9.5 mL (IQR 3.9-21.3).

Among 99 patients evaluable for efficacy, excellent or good hemostasis occurred in 77 (79%; 95% CI 70-87) patients at 12 hours post-treatment overall. The median reduction in anti-FXa activity in apixaban- and rivaroxaban-treated patients was 93.5% (IQR 91.4-95.1) and 93.0% (IQR 90.4-95.3), respectively. Within 30 days, thrombotic events occurred in 14 (10.9%) of 128 patients, and death occurred in 24 (18.8%) of 128 patients.

**Conclusion:** Andexanet reduced anti-FXa activity in patients with nontraumatic intracranial bleeding related to FXa inhibitor use and had a high rate of hemostatic efficacy up to 12 hours after treatment.

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**Session-Board #** - 8-055

**Poster Title:** Contribution of coagulation factors in prothrombin complex concentrates to tissue factor–initiated thrombin generation in normal and factor Xa inhibitor–anticoagulated plasma

**Poster Type:** Evaluative Study

**Submission Category:** Emergency Medicine

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**Purpose:** Tissue factor–initiated thrombin generation (TF-TG) is dependent on several key enzyme complexes (e.g., factor Xa [FXa]/factor Va [FVa], IIase), leading to the activation of prothrombin to thrombin. Inherited or acquired (e.g., anticoagulation) deficiencies in these factors can lead to bleeding. Whereas factor replacement therapies have established clinical benefit for hemophilia and vitamin K antagonist–treated patients due to factor deficiencies, the effectiveness of this strategy (use of prothrombin complex concentrates [PCCs]) is unclear for reversing the direct FXa inhibitor (DOAC)-induced anticoagulation. The aim of this study was to establish the relationship between DOAC concentration and PCC-mediated TF-TG in vitro.

**Methods:** TF-TG was measured using a calibrated automated thrombogram (CAT, 5 pM TF, Diagnostica Stago). Purified plasma proteins, human plasma (PPP), and a commercially available 4-factor PCC (Kcentra) were used. TF-TG was measured in PPP spiked with purified plasma proteins, PCC (0-1.0 IU/mL), PCC + rivaroxaban (0-250 ng/mL) or apixaban (0-125 ng/mL). Five CAT parameters were collected, and the endogenous thrombin potential (ETP) was used for the comparisons.

**Results:** In normal PPP, addition of prothrombin or PCC caused similar broadening of the CAT profiles and increased ETP (~2x at 1.0U/mL), whereas FIX/FX increased mainly peak thrombin. Therefore, TF-TG was dependent on both the prothrombin concentration and the IIase activity. Inhibition of IIase by rivaroxaban and apixaban dose-dependently dampened ETP, with IC50



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being 116 ng/mL and 158 ng/mL, respectively. PCC (up to 1.0 IU/mL) showed no apparent reversal activity with inhibitor concentrations at 250-75 ng/mL. ETP increased only when the inhibitor concentrations were sufficiently low ( $\leq 37.5$  ng/mL, < 30% inhibition of ETP), likely due to increased prothrombin level from PCC addition.

**Conclusion:** TF-TG at therapeutic levels of FXa inhibitors was limited by the level of active FXa, which limits the contribution of PCC to thrombin generation. Effective and rapid reversal of DOACs likely requires direct sequestration of the inhibitors and restoration of the FXa enzymatic activity.

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**Session-Board #** - 8-056

**Poster Title:** Implementation of antimicrobial stewardship project in emergency department

**Poster Type:** Evaluative Study

**Submission Category:** Emergency Medicine

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**Purpose:** The impact of antimicrobial stewardship (ASP) is well established in the inpatient setting. There is a set of challenges to implement ASP in the emergency department (ED) due to overcrowding and high turn over rate. Since 2012, there has been a call for action to expand ASP in the ED as it significantly impacts antimicrobial resistance in the community. Several studies report that antimicrobial prescribing is inappropriate in the emergency department globally. At Al Wakra Hospital (Hamad Medical Corporation), we demonstrate an initiative to implement ASP in the ED.

**Methods:** The implementation of ASP project was initiated by a comprehensive review of local and international guidelines. A number of Infectious Diseases (ID) champions were selected to lead the project, conduct data analysis and provide education. A simplified guide was created for physicians followed by extensive education composed of a series of lectures, visual aids, handouts and reminder emails. Project goals included: offer standardized process, improve quality of care, decrease un-necessary prescription broad spectrum antimicrobials, decrease prevalence of multiple drug resistant organisms, adhere to local antimicrobial guidelines and provide a methodology for continuous prospective and retrospective monitoring of antimicrobial prescribing. A compliance rate for each physicians is calculated and individual education is provided based on their compliance rate. A clinical pharmacist is present during one shift per day for prospective monitoring and active intervention and on call for the rest of the day for consultation. Data collection include analysis of most commonly prescribed antimicrobials, analysis of prescribing pattern for urinary tract infection, skin and soft tissue infection and upper respiratory tract infection, analysis of IV antimicrobials prescription by ED

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physicians as outpatient. This report is a retrospective observational analysis of antimicrobial prescribing for the main infectious diseases in the ED over a period of one month (July 2018).

**Results:** The overall adherence of antimicrobial prescribing is 68%. Inappropriate outpatient prescription is 32%. Post implementation of ASP in the ED, the most common antimicrobial prescribed for urinary tract infection is nitrofurantoin (44%) which is appropriate. The project contributed to significant success in treating upper respiratory tract infections. Prior to implementation, ciprofloxacin was widely utilized which is not appropriate as per local or international guidelines. Post implementation, the main antimicrobials prescribed for upper respiratory tract infection are Amoxicillin clavulanate (41%), azithromycin (26%) and clarithromycin (18%) which is appropriate according to local guidelines. Antimicrobial prescribing for skin and soft tissue infection is mostly inappropriate with IV ceftriaxone being the main antibiotic prescribed (52%). It was noted that Emergency Department physicians are liberally prescribing IV antimicrobials for various indications in an outpatient setting with a low appropriateness rate of 20%. Ceftriaxone was the most common antimicrobial prescribed antibiotic and is prescribed for inappropriate indications such as skin and soft tissue infection and tonsillitis.

**Conclusion:** Implementation of antimicrobial stewardship in the ED is a challenging process that requires continuous monitoring and education. At Al Wakra Hospital, there is a structured antimicrobial stewardship program in which the clinical pharmacist plays a vital role towards its success. The ASP program proved its efficiency in improving antimicrobial prescribing for urinary tract infection and upper respiratory tract infections. However, improvement is still required for IV antimicrobial prescribing and treatment of skin and soft tissue infections.

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**Session-Board #** - 8-057

**Poster Title:** Use of andexanet alfa for intracranial hemorrhage at a community hospital

**Poster Type:** Case Report

**Submission Category:** Emergency Medicine

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**Purpose:** Andexanet alfa was approved for intravenous administration by the U.S. Food & Drug Administration (FDA) in May 2018 for the reversal of apixaban or rivaroxaban. Since its approval, there has been minimal experience with its use, as well as limited published literature on outcomes at other healthcare centers. This case illustrates the initial use of andexanet alfa for apixaban reversal in a community hospital setting. The patient was an 82-year-old female taking apixaban 5 mg by mouth twice daily for stroke prevention in atrial fibrillation. She presented to the Emergency Department from home with expressive aphasia. She met the hospital initial inclusion criteria for administration of andexanet alfa, which included the ingestion of apixaban within 18 hours of presentation. Upon results from computed tomography angiography (CTA), the patient was found to have left-sided acute parietal/occipital intracerebral hemorrhage with surrounding edema. The decision to initiate andexanet alfa was guided by strict hospital criteria in addition to an interdisciplinary team consisting of the emergency department physician, neurosurgery, teleneurology, an intensivist and emergency room pharmacist. The case had a positive outcome and the patient was discharged to subacute rehabilitation after an 8-day hospital stay. This case will provide guidance to other hospitals and healthcare centers that are in the process of considering the addition of andexanet alfa to their formulary with regards to appropriate criteria for its use.

**Methods:**

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**Results:**

**Conclusion:**

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-058

**Poster Title:** Implementation of a pharmacist-driven discharge culture review service for a remote site emergency department

**Poster Type:** Descriptive Report

**Submission Category:** Emergency Medicine

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**Purpose:** Utilizing emergency medicine clinical pharmacists to review emergency department discharge cultures has become a well-established practice. Pharmacist staffing in all emergency departments however, especially in rural hospital settings, is not feasible at this time. Clinical pharmacists currently working in an emergency department endeavored to expand their emergency department discharge culture review service to include reviewing cultures at a remote site hospital with no dedicated pharmacist coverage.

**Methods:** The service expansion was requested by emergency medicine physicians who practiced at the remote site and were accustomed to pharmacists reviewing discharge cultures. The current process for reviewing cultures at the home site was the backbone for establishing the process at the remote site hospital. Both hospitals are under the same parent company and use the same computer system, thereby providing easy access for the pharmacists to view the emergency department visit records at the remote site. Access was granted to the pharmacists within the computer system to the online in-basket with the positive culture results from the remote site. Education was given to the physicians and other staff at the remote site hospital so they were aware of what to expect with regards to pharmacists following up on their discharge cultures. The note template and documentation process for the remote site hospital was the same process the pharmacists had been using for years to review cultures from their home site emergency department.

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**Results:** Once online culture access was obtained and education provided to staff, the pharmacists took responsibility for discharge culture review at the remote site hospital. During the initial phase of implementation, one of the challenges found was that physicians would follow up on cultures with variable documentation of their actions, resulting in duplicated work and more pharmacist time needed during review. Consistent communication with the physicians and reminders of the process helped decrease the physician interruption of the process. Another unforeseen hurdle was cultures routing according to different algorithms at the separate sites, resulting in decreased efficiency; information technology (IT) support was important to adjust in-basket access. The documentation of culture review was consistent with the process at the pharmacists' home site. Culture results involving complicated patients or visits were discussed with a physician at either the remote site or home site. After four months of coverage at the remote site, the service was reviewed through a quality assurance process. A total of 106 cultures were reviewed over the first four months, with an average time of 9.6 minutes spent per culture reviewed; this finding demonstrated more time was spent per culture reviewed at the remote site than the home site.

**Conclusion:** Emergency medicine pharmacists currently involved in a collaborative practice agreement-based culture review process at their own hospital have successfully implemented the service at a remote site hospital. Communication between the pharmacists and staff at the remote site, as well as thorough documentation by both parties was found to be an extremely important component to success. The workload and time spent per culture was higher than anticipated for the remote site emergency department. Based off this experience, expansion of an established pharmacist-driven discharge culture review service to a remote site emergency department within the same hospital system is feasible.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-059

**Poster Title:** Ensuring readiness for emergencies

**Poster Type:** Descriptive Report

**Submission Category:** Emergency Preparedness

**Primary Author:** Jennifer Brandt, MedStar Washington Hospital Center; **Email:**  
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**Purpose:** Emergencies, from mass casualties to occupational exposures to technology outages, can happen at any time. Hospitals are required to have plans for these events and conduct periodic drills. At many hospitals, these drills occur during weekdays, when staffing is optimal. However, hospitals should be prepared on all shifts. At this large, tertiary care hospital with a burn and trauma center, the Department of Pharmacy has worked to ensure an adequate response on all shifts. This requires not just adequate supplies, but also ensuring appropriate training of the staff in both response and in leadership roles in an emergency situation.

**Methods:** Working with other clinicians, the Department of Pharmacy has assembled necessary supplies that would be needed during an emergency event. Multiple sets of boxes have been prepared for deployment to the emergency room and other areas of the hospital. The hospital also maintains a large supply of antidotes. All supplies are kept in the Critical Care pharmacy, the only 24-hour pharmacy in the hospital. These supplies are checked monthly by either the pharmacy residents or Critical Care staff.

Staff undergo inservices on emergency preparedness during orientation and participate in refresher courses at least twice a year. These sessions include a tabletop drill, in order to help reinforce the information previously taught and to run through potential scenarios. During hospitalwide drills, the position of Pharmacy Unit Leader is rotated through critical care and senior pharmacists in order to prepare them for the role if ever needed. The pharmacists responding to the emergency room are also rotated as well. Binders have also been developed for all of the emergency-specific positions in an effort to provide necessary information for anyone filling the roles.



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**Results:** As a result of this program, the pharmacy is ready to respond to any event that occurs. All staff has all received initial training, and a majority of the staff have participated in multiple refreshers. Routinely reviewing the material and incorporating scenarios into the training has allowed for the staff to feel more comfortable if an event should occur. Rotation of the positions used during a response has ensured that the pharmacy will be effectively led if the event occurs if the leadership is not available. The added benefit of having multiple people fill the various roles is that they are able to provide feedback that is used to constantly improve the level of readiness.

**Conclusion:** Ensuring that the Department of Pharmacy is ready for all emergency events is a difficult proposition. Preparing and assembling necessary supplies in a central location helps ensure that they are readily available during an event. Providing regular, case-based education also ensures that all staff are prepared for a response. Participation in drills by a variety of staff guarantees that there can be a leader in the event that department leadership is not available.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-060

**Poster Title:** Managing occupational exposures across a health system with a multidisciplinary and standardized approach

**Poster Type:** Descriptive Report

**Submission Category:** Emergency Preparedness

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**Purpose:** Establish a standard process for managing the medication dispensing process for occupational exposures to infectious diseases in collaboration with Employee Health Services across the health system. The process would meet all regulatory requirements specific to prescribing, labeling and dispensing and would ensure the employees received treatment in a timely manner.

**Methods:** Members from Acute Care and Ambulatory Pharmacy Services, Employee Health Services, Infectious Diseases and Infection Control formed a working group to develop an ideal state workflow and identify gaps relative to our current process for triaging and managing the medication dispensing process for the main hospital campus and the regional entity sites. The group reviewed regulations to ensure labeling and documentation met all requirements. The standard processes were outlined in a policy and procedure document and a standard operating procedure which is specific to Acute Care Pharmacy workflows and responsibilities.

**Results:** Shortly after development, communication and education on the new process, we were able to implement the new workflow for a large scale occupational exposure and for several instances at our regional sites. Members of the pharmacy and employee health services debriefed following the initial exposure incident noting that the policy and standard operating procedures helped clearly outline the roles and responsibilities of each stakeholder and helped

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expedite treatment for exposed individuals. Since implementation we have treated over 15 exposure events and over 50 employees across the health system.

**Conclusion:** Developing standard workflows and clearly establishing responsibilities for processes provides necessary structure during events that can be very complex and involve many different stakeholders. We were able to reflect on previous occupational exposures and leverage the resources participating in the working group to develop a comprehensive workflow that is realistic and meets the needs of each entity in the health system, while also providing excellent and timely care to our employees.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 8-061**

**Poster Title:** A two-month pilot of an antimicrobial stewardship rotation at a university medical center in

Lebanon

**Poster Type:**

**Submission Category:** Infectious Disease/HIV

**Primary Author:** Wissam Kabbara, Lebanese American University; **Email:** wissam.kabbara@lau.edu.lb

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**Purpose:** Antimicrobial stewardship is a program that ensures appropriate infection control and antimicrobial use. It promotes adequate selection, dosing, route of administration and duration of antimicrobial therapy. Antimicrobial stewardship's primary goal is to optimize clinical outcomes while minimizing unintended consequences. Unintended events include antimicrobials' side effects, toxicities, and emergence of resistant microorganisms. Hence, this program improves quality of care, assure patient safety, and reduce health care costs. From January till February 2019, a two-month pilot APPE antimicrobial stewardship rotation was conducted at the Lebanese American University Medical Center in Lebanon, in collaboration with the infectious disease physicians, infection control department, and the pharmacy department. The Lebanese American University school of pharmacy follows a facultybased model of clinical practice at the university medical center. The activities included: collection and gathering of information on patients receiving non-restricted antimicrobial therapy in all wards of the

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hospital, optimal empirical and definitive antimicrobial regimen selection (dose, route, and duration), monitoring of laboratory and clinical efficacy and safety parameters for antimicrobials, participating in the discharge plan for patients receiving antimicrobial therapy, recommending appropriate clinical pharmacokinetic monitoring for narrow therapeutic window antimicrobials, counseling patients, recommending IV to PO conversion for antimicrobials, and documentation of clinical interventions for the service. Over this time period, patients on non-restricted antibiotics were followed and monitored for appropriateness of their antimicrobial therapy. A patient list for follow-up was sent daily by e-mail from the hospital pharmacy. Restricted broad spectrum antimicrobials are followed up by a different team during the infectious diseases APPE rotation. Infectious disease team consult is required for patients who are prescribed restricted antimicrobials for more than 2 days at our institution. A total of 439 patient cases prescribed non-restricted antimicrobials were followed-up and 194 interventions were made. 47 (24%) of these interventions were accepted and 137 (70%) were rejected (the remaining patients were lost to follow up). 54.6% (19 accepted vs 87 rejected) of the interventions were inappropriate antimicrobial choice, dose, and/or duration for surgical prophylaxis followed by antimicrobial duration of therapy (5 accepted vs 15 rejected interventions), and de-escalation of antimicrobials (10 accepted vs 8 rejected interventions), dose adjustments (10 accepted vs 4 rejected). It was an opportunity to show the need to improve the use of non-restricted antimicrobials at our institution albeit with many challenges. The relatively low rate of intervention acceptance could be due to: physician reluctance, lack of awareness for the newly formed antimicrobial stewardship team, and

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insufficient workforce. Antimicrobial stewardship rotation implementation at our university medical center shed the light on areas of improvement that can be promoted by pharmacists for optimal patient care.

**Methods:**

**Results:**

**Conclusion:**

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-062

**Poster Title:** The effect of an indication-based default antimicrobial stop-date initiative on the duration of treatment for intra-abdominal infections

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** To determine if the implementation of an indication-based default antimicrobial stop-date initiative decreased the duration of antimicrobial therapy for the treatment of intra-abdominal infections.

**Methods:** This was an IRB approved retrospective cohort study evaluating the duration of treatment for intra-abdominal infections due to perforation before and after the implementation of an indication-based 7-day default stop-date initiative at four not-for-profit community hospitals. All patients 18 years and older admitted for complicated intra-abdominal infection who underwent a procedure to achieve source control with one of the corresponding MS-DRG codes between March 2016 and September 2016 for the pre-intervention group and March 2018 to September 2018 for the post-intervention group were included in this study. Patients were excluded based on the following: age under 18 years old, active cancer, life expectancy under 30 days, non-specified MS-DRG codes, did not undergo a source control procedure, advanced age (> 80 years old), pregnant women, or had a concurrent infection requiring antimicrobial treatment. The primary outcome was the duration of inpatient antimicrobial therapy. Secondary outcomes included: duration of outpatient antimicrobial therapy, total duration of antimicrobial therapy, and re-admission, re-intervention, mortality or development of C. difficile within 30 days of discharge. A sample size of 42 patients per study group were required to meet a 90% power and all p-values < 0.05 were considered statistically significant. Categorical data was compared using the Chi-square test. Continuous data was

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compared using the Student's t-and non-normally distributed continuous data had the medians analyzed utilizing the Mann-Whitney test.

**Results:** Of the 414 patients screened for the study, 314 failed to meet inclusion criteria with the primary reasons being lack of adequate source control and no reported perforation. Both the pre-intervention group and the post-intervention group had 50 patients that were included and analyzed in the study. There were no statistically significant differences in baseline characteristics between the groups. In regards to the primary outcome, there was a slight decrease in the duration of inpatient antimicrobial duration from 8 days in the pre-intervention group to 7.5 days in the post-intervention group, however, these findings were not statistically significant (p-value = 0.56). The outpatient days of therapy decreased from an average duration of 7 days in the pre-intervention group to 3.5 days in the post-intervention group (p-value = 0.02). The total days of antimicrobial therapy decreased from an average of 14.5 days to 8 days (p-value = 0.035). There were no statistically or clinically significant differences in the length of stay or readmissions due to intra-abdominal infections, number of patients with *C. difficile*, or mortality within 30 days of discharge. However, the number of patients requiring re-intervention was lower in the post intervention group (16% vs 2%; p-value = 0.03).

**Conclusion:** There was no difference in the duration of inpatient antimicrobial therapy for the treatment of intra-abdominal infections after the implementation of an indication-based 7-day default stop-date initiative. However, there was a significant decrease in both outpatient and total duration of antimicrobial therapy.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-063

**Poster Title:** Impact of utilizing a once weekly non-infectious disease trained pharmacist on the implementation and execution of antimicrobial stewardship program at a small community hospital

**Poster Type:** Descriptive Report

**Submission Category:** Infectious Disease/HIV

**Primary Author:** Susan Lewis, University of Findlay; **Email:** slewis@findlay.edu

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**Purpose:** Published data on successful Antimicrobial Stewardship Programs (ASP) often pertain to large medical centers with dedicated ASP pharmacists, often with advanced formal infectious disease (ID) training. However, most small hospitals with less than 200 beds are lacking an ID-trained pharmacist or full-time ASP pharmacist, presenting a challenge to establish and maintain an effective ASP. This observational study describes the utilization of a non-ID trained pharmacist once weekly to implement ASP at a small hospital and its positive impact on antimicrobial utilization.

**Methods:** A part-time pharmacist (0.2 full-time equivalent) with postgraduate year 1 training was employed to implement an early stage of ASP at a 128-bed community hospital on July, 2016. Multidisciplinary support from administration, an ID physician, pharmacy and nursing was available, but consistent ASP activities were not in place. Once weekly (e.g. 8 hours per week), the ASP pharmacist reviewed electronic health records (EHR) for patients receiving systemic antimicrobials for >48 hours, initially for respiratory tract and urinary tract infections. After 6 months, EHR reviews included antimicrobial use for all infections. The ASP pharmacist identified antimicrobial-related issues based on ASP principles and best practices, and communicated recommendations to the ordering providers via various processes such as writing ASP progress notes or direct prescriber contact. In order to establish the credibility of the ASP pharmacist, all recommendations were subsequently reviewed by the ID physician for one year. The ID physician's agreement to ASP pharmacist's recommendations exceeded greater than 95%. Total recommendations to prescribers were tracked by the ASP pharmacist.

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Recommendations were considered “accepted” if enacted by the end of the following inpatient day. Additionally, the ASP pharmacist reported details of interventions/outcomes, assisted in educational efforts for providers, participated in order set revision, and performed drug use evaluations for broad spectrum antimicrobials.

**Results:** From August 2016 to December 2018, the ASP pharmacist made a total of 480 recommendations with an increasing average number per month of 9.4 in 2016, 13.4 in 2017 and 22.7 in 2018. The acceptance rate was also improved from 57.4% in 2016, to 72.7% in 2017, and 68.0% in 2018. Days of Therapy (DOT)/1000 patient days for all antimicrobials decreased by 25.5% during this time (876.4 in 2016, 676.1 in 2017 and 652.8 in 2018), indicating overall improvement of antimicrobial utilization. Particularly, DOT/1000 patient days for meropenem and vancomycin were reduced from 21.4 and 91.9 respectively in 2016 to 8.7 and 58.1 in 2018, while that of piperacillin/tazobactam slightly increased from 67.5 in 2016 to 71.7 in 2018.

**Conclusion:** Consistent utilization of a once weekly non-ID trained pharmacist in conjunction with an active ID physician and administrative support was a successful practice model to implement ASP and to improve overall antimicrobial utilization in a small community hospital setting with limited resources.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-064

**Poster Title:** Implementation of a multidisciplinary strategy to reduce meropenem utilization at a community hospital

**Poster Type:** Descriptive Report

**Submission Category:** Infectious Disease/HIV

**Primary Author:** Kevin Maeda, Cardinal Health; **Email:** kevin.maeda@cardinalhealth.com

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**Purpose:** In 2013, the Centers for Disease Control reported carbapenem-resistant Enterobacteriaceae (CRE) as an urgent antibiotic resistance threat. Carbapenem utilization has been shown to significantly increase the risk of CRE. Implementing efforts to enhance appropriate utilization of meropenem is an important antimicrobial stewardship strategy. At the present study hospital, an initial medication use evaluation performed (MUE) in Dec 2017 (n=30) found only 3% of patients received meropenem for an appropriate indication. Investigators sought to assess the impact of a multidisciplinary approach on meropenem utilization.

**Methods:** This was a single center, retrospective study comparing meropenem utilization before (Jan-Dec 2017) and after (Jan-Dec 2018) implementation of a multidisciplinary intervention. The intervention included development of appropriate criteria for meropenem use, education to prescribers via various committees including antimicrobial stewardship, critical care, and Pharmacy and Therapeutics (Jan-Mar 2018), removal of meropenem from hospital guidelines and order sets (Jan 2018) and implementation of pharmacist prospective audit and intervention on meropenem orders not meeting criteria within 3 days (Apr 2018). Criteria for appropriate meropenem use included history of, or confirmed, ESBL infection, severe sepsis or septic shock in a febrile neutropenic patient, or empiric therapy for a positive *Acinetobacter* spp. culture. To assess the impact of the intervention, meropenem utilization (days of therapy per 1000 adjusted patient days, DOT/1000 AdjPD), annual expenditure, and antibiogram susceptibility were assessed pre- and post-implementation.

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**Results:** Post-implementation, a reduction in meropenem DOT/1000 AdjPD (mean+SD, 4.5+16.4 vs. 21.3+4.2;  $p=0.0027$ ) and annual expenditure (\$5,650 vs. \$16,952) was experienced. Pharmacists and providers successfully de-escalated meropenem in 50% (34/68) of eligible patients in the post-group. Additionally, meropenem susceptibility vs. *Pseudomonas aeruginosa*, *Escherichia coli*, and *Klebsiella pneumoniae* increased roughly 5% post-implementation.

**Conclusion:** Use of a multidisciplinary strategy focused on appropriate use, education, and modifications of current guidelines and order sets was effective in reducing meropenem utilization and enhancing appropriate use.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-065

**Poster Title:** Impact of clinical pharmacy implementation in surgical ward- Qatar

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** Surgical site infection is one of the leading causes of healthcare associated infections. As per the ASHP guidelines, it is recommended to administer the proper type of antimicrobial based on surgical site and risk factors. It was noted that surgeons are not compliant to guidelines.

This retrospective analysis is designed to evaluate the impact of clinical pharmacy intervention and education on prescribing pattern of antimicrobial prescription for urological surgeries

**Methods:** Clinical pharmacists at Al Wakra Hospital initiated a quality project to improve antimicrobial prophylaxis in surgical department. International guidelines and primary articles were reviewed which influenced national Hamad Medical Corporation guidelines. Data was collected retrospectively including patients who underwent elective or emergent urological surgery from 1st November 2017 to 1st of December 2017. Demographics, previous culture, antibiotic prophylaxis, and antibiotics at discharge data were obtained. This data was then compared to previous medication use evaluation conducted in 2016.

**Results:** A total of 72 patients were included. The average patient's age was 42 years, and of these 86.1% were male. A total of 58.91%, 8.22% and 32.87% underwent ureteroscopy, cystoscopy, and other urological surgeries, respectively. Urine culture was done in 55 patients. Antibiotic prophylaxis was appropriate in 69 patients (95.8%). Antibiotics used were mainly cefuroxime for ureteroscopy, cefazolin or amoxicillin/clavulanate for penile repair, and ertapenem for biopsy. All patients scheduled for prosthesis received vancomycin plus

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gentamicin which is appropriate. This was compared to a low compliance rate in 2016 (17% compliant). However, many patients were still discharged on antimicrobials when not required. Physicians were educated about this and are in process of changing their practice.

**Conclusion:** Clinical pharmacists positively impacted Antimicrobial prescribing in urology surgeries. The overall, antimicrobial prescribing pattern for urological surgeries is appropriate. However, antibiotics prescribed at discharge were mostly inappropriate. Plan to improve antibiotic use at discharge is to stop prescribing antimicrobials for patients with no growth in culture, and those who require only skin incision prophylaxis

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-066

**Poster Title:** Impact of a pharmacy resident rotation on outpatient parenteral antimicrobial therapy (OPAT) prior to patient discharge

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** Outpatient parenteral antimicrobial therapy (OPAT) allows for patients to be discharged from the hospital while still receiving intravenous therapy for their infections. Oftentimes, patients are seen by the inpatient infectious diseases (ID) team and enrolled in OPAT in advance of their discharge. Enrollment may take place anywhere from several days to several weeks before actual discharge, and patients' clinical condition may change in the interim. The purpose of this study was to describe the impact of a dedicated pharmacy resident on an OPAT rotation on the antimicrobial regimens of OPAT-enrolled inpatients.

**Methods:** Two pharmacy residents spent 4 weeks each on OPAT rotations (4/23/18 to 5/11/18 and 3/11/19 to 4/12/19). The rotation consisted of reviewing charts of patients who were enrolled in OPAT but not yet discharged, speaking with and orienting patients to the OPAT program, communicating any interventions with the primary and ID teams, documenting their interventions, and entering pharmacy consult notes in the online medical record. Residents were on rotation Monday through Friday. Resident interventions and consult notes were reviewed and data compiled, using descriptive statistics to summarize findings. This retrospective medical record review received exempt approval from the institutional review board.

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**Results:** Since initiation in 2015, approximately 3300 patients have been enrolled in the OPAT program. During the resident rotation time period, 109 patients were enrolled in OPAT and eligible for study inclusion. Of those, 77 patients (70.6%) were reviewed by the residents. Most patients were male (57%), with a mean age of 62.6 years (standard deviation 16.9). The most common infectious indications for OPAT were osteomyelitis (29.0%), bacteremia (28.0%), and abscess (10.8%). Most patients (55.8%) were discharged on one antimicrobial agent, although 33.8% were discharged on two agents and 10.4% were discharged on three agents. The most common antimicrobial OPAT regimens included vancomycin (28.6%), ceftriaxone (20.6%), cefazolin (20.8%), daptomycin (14.3%), metronidazole (11.7%), cefepime (7.8%), and meropenem (7.8%). The residents performed a total of 85 patient visits (range 0-5 visits per patient). Sixty-three interventions were recommended, with 50 (79.3%) accepted by the team(s). The most common interventions included dosing recommendations (23.8%), coordination of care (20.6%), antibiotic choice (12.7%), monitoring (12.7%), and duration of therapy (7.9%). Fifty-five interventions involved medications, with the most common being intravenous vancomycin (25.5%), daptomycin (21.8%), ceftriaxone (10.9%), cefazolin (9.1%), and metronidazole (7.3%).

**Conclusion:** Establishing a pharmacy resident rotation on an OPAT service resulted in a high number of interventions identified and accepted by the primary team(s). The interval between OPAT enrollment and patient discharge presents opportunity to maximize antimicrobial stewardship principles.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-067

**Poster Title:** Ceftriaxone versus levofloxacin for the treatment of urinary infections in hospitalized adults

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** The emergence of antimicrobial resistant strains has made the treatment of urinary tract infections (UTIs) more challenging. There is limited research to compare the effectiveness of ceftriaxone versus levofloxacin in treating UTIs. Fluoroquinolones (FQ) are often preferred for the empiric treatment of urinary tract infections; however, FQ resistance continues to increase. At our institution, resistance is relatively low with resistance rates of *Escherichia coli* to levofloxacin at 15% and to ceftriaxone at 3%. Despite the setting of low resistance rates, we hypothesized that ceftriaxone therapy would result in less clinical failure than levofloxacin therapy in hospitalized adults treated for UTIs.

**Methods:** The institutional review board approved this single center, retrospective cohort of adult patients over a 5 year span (1/1/2012 to 12/31/2017) with a primary or secondary ICD-10 diagnosis code for any UTI. Included patients required at least 48 continuous hours of levofloxacin or ceftriaxone and a positive urine culture. Patients with urologic hardware, recent urologic procedures, history of a multi-drug resistant organism, pregnant, or who received any other antibiotic in the initial 48 hours were excluded. Patients were analyzed from therapy initiation until therapy discontinuation or discharge. The primary endpoint was clinical failure defined as a composite of attributable mortality, in vitro resistance, and change of empiric antimicrobial class. All significant variables from bivariate analysis were included in a multivariate regression model completed in the backwards stepwise method to determine predictors of clinical failure.

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**Results:** There were 138 levofloxacin and 187 ceftriaxone treated patients included. In the final multivariate model, ceftriaxone therapy was protective of clinical failure (OR 0.51; 95% CI 0.27 to 0.96, p0.04) when controlling for chronic kidney disease (CKD), history of UTIs, cirrhosis, and fever at therapy initiation.

**Conclusion:** Patients treated with ceftriaxone experienced significantly less clinical failure than patients treated with levofloxacin, despite a high baseline susceptibility to FQ agents. Hospitalized patients with UTIs can be effectively treated with ceftriaxone as empiric therapy. Choice of empiric antibiotic therapy should be based on local antibiogram data.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-068

**Poster Title:** Lefamulin versus moxifloxacin for community-acquired bacterial pneumonia: by-region results of lefamulin evaluation against pneumonia (LEAP) 1 and LEAP 2 double-blind noninferiority phase 3 clinical trials

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** In the United States, pneumonia is the second most common cause of hospitalization and is a leading cause of infectious death. Macrolide and beta-lactam resistance, combined with safety concerns associated with fluoroquinolones, have created a need for new treatment options for community-acquired bacterial pneumonia (CABP). Lefamulin, a first-in-class systemic pleuromutilin antibiotic in development for IV and oral treatment of CABP in adults, was evaluated in 2 global noninferiority phase 3 trials (LEAP 1 and LEAP 2). We report efficacy and safety from pooled study data stratified by geographic region.

**Methods:** In LEAP 1, adults with CABP (Pneumonia Outcomes Research Team [PORT] risk class III–V) received lefamulin 150 mg IV q12h for 5–7 days or moxifloxacin 400 mg IV q24h for 7 days, with optional IV-to-oral switch (600 mg lefamulin q12h or 400 mg moxifloxacin q24h). In LEAP 2, adults with CABP (PORT II–IV) received lefamulin 600 mg oral q12h for 5 days or moxifloxacin 400 mg oral q24h for 7 days. Both studies assessed the early clinical response (ECR) at 96±24 hours after first study drug dose in the intent-to-treat (ITT; all randomized patients) population (US Food and Drug Administration [FDA] primary endpoint) and the investigator assessment of clinical response (IACR) at test-of-cure (TOC) 5–10 days after last study drug dose in the modified ITT (mITT; received ≥1 dose of study drug) and the clinically evaluable (CE; required to meet predefined evaluability criteria) populations (European

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Medicines Agency [EMA] coprimary endpoints). Pooled analyses used a 10% noninferiority margin. The study protocol and amendments were approved by an independent ethics committee or institutional review board at each study site, and every patient (or legally authorized representative) provided written informed consent.

**Results:** In the ITT population, 1289 patients were randomized to lefamulin/moxifloxacin (non-European Union Europe [non-EUE], n=313/313; EU, n=175/155; Rest of World [RoW], n=103/118; Latin America [LA], n=42/44; United States [USA], n=13/13). For ECR, lefamulin was noninferior to moxifloxacin (pooled rates: lefamulin 89.3% [577/646] vs moxifloxacin 90.5% [582/643]; difference -1.1%; 95% confidence interval [CI] -4.4%, 2.2%). ECR rates in both groups by geographic region were: non-EUE (lefamulin 88.5% vs moxifloxacin 92.0%), EU (90.3% vs 92.3%), RoW (90.3% vs 85.6%), LA (97.6% vs 90.9%), USA (61.5% vs 76.9%). For IACR success at TOC, lefamulin was noninferior to moxifloxacin in the mITT population (lefamulin 85.0% [545/641] vs moxifloxacin 87.1% [558/641]; difference -2.2%; 95% CI -5.9%, 1.6%), with high response rates in both treatment groups regardless of geographic region: non-EUE (lefamulin 84.6% vs moxifloxacin 90.1%), EU (84.3% vs 84.4%), RoW (84.5% vs 86.3%), LA (92.9% vs 79.5%), USA (84.6% vs 76.9%). IACR results in the CE-TOC population were similar. Treatment-emergent adverse event (TEAE) incidences for lefamulin/moxifloxacin were 34.9%/30.4% overall and by region (non-EUE: 28.0%/21.7%; EU: 37.2%/36.4%; RoW: 44.7%/43.6%; LA: 45.2%/27.3%; USA: 61.5%/61.5%). Gastrointestinal disorders were the most frequently reported TEAEs, both overall and by region; diarrhea, nausea, and vomiting trended as most frequent events.

**Conclusion:** In pooled analyses of the LEAP 1 and LEAP 2 pivotal phase 3 trials that enrolled patients with CABP (PORT risk class II-V), lefamulin was noninferior to moxifloxacin for both the FDA primary endpoint (ECR) and EMA primary endpoint (IACR success at TOC). Efficacy rates with both lefamulin and moxifloxacin were high and similar across all geographic regions, although the number of patients enrolled from the USA was small. Safety/tolerability were similar between treatment groups and across geographic regions. Lefamulin, a first-in-class pleuromutilin, offers a promising alternative to fluoroquinolones as an IV and/or oral monotherapy for empiric treatment of CABP.

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**Session-Board #** - 8-069

**Poster Title:** Targeted education of evidence based usage guidelines to drive down inappropriate fluoroquinolone and ceftaroline prescribing

**Poster Type:** Descriptive Report

**Submission Category:** Infectious Disease/HIV

**Primary Author:** Kelly Mueller, Alton Memorial Hospital; **Email:** kelly.mueller@bjc.org

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**Purpose:** In 2016, our hospital was identified as an outlier in use of fluoroquinolones and ceftaroline within our health system. The antimicrobial stewardship team focused on ensuring these antimicrobials were being used appropriately within the hospital. The team had concerns with overuse of fluoroquinolones due to safety concerns associated with the class. With regards to ceftaroline, the stewardship team felt narrower spectrum therapy would be appropriate for many of the indications where it was used, and also considered that use of ceftaroline was cost prohibitive. Quinolone usage was targeted first due to the concerns for patient safety.

**Methods:** A baseline medication use evaluation (MUE) was performed in October 2016 to identify prescribers and ordering patterns. Appropriate indications were established by evaluating current infectious disease practice guidelines and primary literature. The MUE results were reported to the hospital's stewardship team in February 2017. Hospitalists and emergency department physicians were the primary prescribers of fluoroquinolones, and the most common indications for use included treatment of pneumonia for levofloxacin and urinary tract infection (UTI) for ciprofloxacin. The lead hospitalist and emergency department chief both championed the initiative and assisted with prescriber education in May 2017. The prescriber education contained usage trends identified in the baseline MUE, system benchmarking, a review of the published evidence based guidelines for use and proposed internal guidelines for use. Alternative therapies were also identified and treatment pathways, highlighting the alternatives, were presented. Post implementation, periodic compliance reports and targeted education were presented to prescribers to assist with ongoing compliance. To determine the impact of the intervention, utilization was assessed before and after implementation via days of therapy per 1000 patient days (DOT/1000 PD). The process

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was repeated for ceftaroline with initial MUE results presented in June 2018 and education starting in July 2018, with continued post implementation monitoring.

**Results:** A decrease in mean DOT/1000 PD was experienced between 2016 and 2017 post-education of the appropriate uses of fluoroquinolone for both levofloxacin (30 vs. 46) and ciprofloxacin (46 vs. 55). The decrease in DOT/1000 PD was sustained for levofloxacin in both 2018 (34) and year to date (YTD) through May 2019 (29). Ciprofloxacin DOT/1000 PD continues to decrease year over year; 2018 (29) and YTD through May 2019 (25). A decrease in mean DOT/1000 PD was also experienced between 2017 and 2018 for use of ceftaroline (10 vs. 18) with further decreases seen YTD through May 2019 (6). Overall anti-infective DOT/1000 PD has trended down in the same period from 682 in 2016 to 650 YTD 2019.

**Conclusion:** Through targeted education of providers, we were able to correct inappropriate prescribing practices of ceftaroline and fluoroquinolones and decrease overall use of these agents. We were able to sustain the benefits of these efforts through continued education and feedback to prescribers by participating in monthly meetings and providing one on one feedback.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 8-070**

**Poster Title:** Prohibition on the use of vancomycin in combination with piperacillin/tazobactam arrested a cluster of acute kidney injuries in a community hospital

**Poster Type:** Descriptive Report

**Submission Category:** Infectious Disease/HIV

**Primary Author:** Kelly Mueller, Alton Memorial Hospital; **Email:** kelly.mueller@bjc.org

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**Purpose:** From March 2018 to March 2019, the hospital experienced eight cases of acute kidney injury (AKI) associated with the combination use of IV vancomycin and piperacillin/tazobactam. The antimicrobial stewardship team, with the support of hospital leadership, chose to restrict the use of piperacillin/tazobactam in combination with vancomycin in an effort to decrease risk in future patients.

**Methods:** All eight patients presented with normal renal function, SCr 1mg/dl or less, were treated for skin and soft tissue infections (SSTIs), and seven of the patients were under the age of 50. Within days of antimicrobial initiation, seven of the eight patients required short term dialysis for a duration of two weeks to four months. In January 2019, a prohibition on ordering the combination of vancomycin and piperacillin/tazobactam for the treatment of SSTI was approved by the stewardship team and Pharmacy and Therapeutics Committee. Education was provided to all emergency room providers and hospitalists in January 2019 regarding the dangers of the combination. Education included alternative therapies for the most common uses of piperacillin/tazobactam and vancomycin. In April 2019, all prescribers were instructed to stop using the combination in all patients as directed by hospital leadership and approved by the hospital's medical executive committee. The pharmacy department monitors all vancomycin orders to ensure the prohibition is upheld and all vancomycin patients are monitored continuously for renal function changes. To determine the impact of these interventions, utilization was assessed before and after implementation via days of therapy per 1000 patient days (DOT/1000 PD).

**Results:** Following the education in January 2019, one case of AKI was noted in March 2019. Subsequently another round of education was provided in April, with stronger language

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prohibiting the use of this drug combination in any patient. No acute renal injury has been noted in patients receiving vancomycin during this time period. Vancomycin use has decreased 37% this year compared to 2018 (DOT/1000 PD 55 vs. 87). Piperacillin/tazobactam use has decreased 41% in 2019 compared to 2018 (DOT/1000 PD 82 vs. 138). Overall antibiotic DOT/1000 PD decreased by 3% in 2019 compared to 2018.

**Conclusion:** The prohibition on the use of vancomycin in combination with piperacillin/tazobactam arrested a cluster of acute kidney injuries at a community hospital. No further vancomycin associated acute kidney injury has been reported.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-071

**Poster Title:** Impact of methicillin-resistant *Staphylococcus aureus* nasal screening on vancomycin utilization in respiratory diagnosis-related groups

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** Polymerase chain reaction (PCR) nasal screening is an effective strategy to rule out methicillin-resistant *Staphylococcus aureus* (MRSA) and decrease use of vancomycin in lower respiratory tract infections. At Methodist Medical Center of Oak Ridge, opportunity to optimize vancomycin usage was identified in 2016. Investigators sought to assess the impact of a pharmacy-driven MRSA nasal screening program on pharmacists' interventions and vancomycin utilization.

**Methods:** This single center, retrospective study evaluated the impact of a pharmacist-driven MRSA PCR nasal screening program on total vancomycin utilization, respiratory diagnosis-related group (DRG) vancomycin use, and length of stay in days (LOS) before (July 2016-June 2016) and after (July 2017-December 2018) implementation. Beginning in July of 2017, pharmacists screened all vancomycin and linezolid orders for known or suspected MRSA pneumonia, and subsequently ordered the nasal MRSA PCR test. Pharmacists contacted the prescriber for negative results to discuss discontinuation of anti-MRSA therapy. Patients were excluded if there was a concomitant infection requiring anti-MRSA therapy (e.g., empyema, cellulitis). Pharmacist intervention data was collected which included number of patients with MRSA nasal PCR ordered, nasal PCR test result, anti-MRSA agent used, discontinuation of the anti-MRSA agent, and the incidence of discontinuation within 24 hours of the nasal PCR order. Total vancomycin utilization, as measured by days of therapy per 1000 acute patient days

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(DOT/1000 PD) was determined before and after implementation. A DRG assignment for each patient screened for MRSA was determined, and the vancomycin days of therapy per 1000 DRG patient days (DOT/1000 DrgPD) and LOS were compared for the top 3 pneumonia related DRGs, as well as all respiratory DRGs that included MRSA PCR nasal screening patients. In addition, vancomycin DOT/1000 DrgPD and LOS were compared in all DRGs with vancomycin utilization.

**Results:** A total of 843 patients had an order for an MRSA PCR test in the post-implementation group. The results were negative in 673 patients (79.8%) and positive in 170 patients (20.2%). 640 patients (95.1%) had their anti-MRSA therapy discontinued, 546 (85.3%) within 24 hours. The agents prescribed were vancomycin in 823 patients (97.6%) and linezolid in 20 patients (2.4%). Post-implementation, there was no significant difference in mean ( $\pm$  SD) total vancomycin DOT/1000 PD [(225.4  $\pm$  14.1) vs. (229.2  $\pm$  16.3),  $p$ =NS] or DOT/1000 DrgPD in all DRGs [(176.8  $\pm$  12.2) vs. (175.5  $\pm$  14.1),  $p$ =NS]. A significant reduction in both mean ( $\pm$  SD) vancomycin DOT/1000 DrgPD was found in the top 3 pneumonia related DRGs [(214.8  $\pm$  62.6) vs. (127.8  $\pm$  47.8),  $p$ <0.001] and in all respiratory DRGs [(223.9  $\pm$  35.5) vs. (198.4  $\pm$  21.6),  $p$ =0.04]. No significant difference was found in length of stay for any DRG.

**Conclusion:** Implementation of a pharmacist-driven MRSA PCR nasal screening program in known or suspected pneumonia resulted in a high rate of vancomycin discontinuation in negative screen patients. Although no difference was observed in total vancomycin utilization in all DRGs, a significant reduction was observed for vancomycin within the top 3 pneumonia related DRGs as well as all respiratory DRGs, without negatively impacting length of stay. Determining vancomycin utilization in respiratory DRGs may be a useful strategy to assess the impact of a nasal screening program for pneumonia when no difference is observed in total DOT/1000 PD.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-072

**Poster Title:** Identification of risk factors for infections with multidrug-resistant organisms

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

**Primary Author:** Regine Padilla, San Joaquin General Hospital; **Email:** r\_padilla@u.pacific.edu

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**Purpose:** Infections with multidrug-resistant organisms (MDROs) have been associated with increased lengths of stay, costs, morbidity, and mortality. Because risk factors for development of an MDRO infection differ by facility, the CDC recommends monitoring of institution-specific trends of MDRO infections to quantify risk factors for the development of such infections. The objectives of this study were to determine the total incidence of MDRO infections in the adult inpatient population at San Joaquin General Hospital and to identify risk factors for the development of MDRO infections to direct antimicrobial stewardship efforts.

**Methods:** This was a retrospective, observational, chart review study of data collected from January 1, 2015 to December 31, 2018. A total of 200 MDRO isolates were randomly selected for chart review, comprised of 25 Gram-positive and 25 Gram-negative isolates from each year. Patients age 18 or older and who grew an MDRO that met laboratory-defined criteria were included in the study. Patients under the age of 18 or those who had positive cultures while not admitted as inpatients were excluded. The primary endpoint was to assess the overall prevalence of MDRO infections over the past four years. The data was normalized to reflect the incidence based on 100 patient admissions and compared between the four years. Secondary endpoints included the prevalence of risk factors (coexisting infection, prior antibiotic exposure, previous ICU admission, recent surgery, previous hospitalization, residence in a nursing home or long-term care facility, history of cancer or immunodeficiency, central lines or other hemodialysis access sites, and indwelling Foley or suprapubic catheter) and the burden of infection (all-cause mortality and length of stay). Subgroup analysis evaluated differences in risk factors and outcomes based on the culture source.

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**Results:** A total of 1990 MDRO isolates were reviewed, 1008 of which were excluded because they were duplicate cultures or were drawn from patients in the emergency room or outpatient clinics. Overall, there were 982 MDRO isolates, including 566 Gram-positive and 416 Gram-negative organisms. The total incidence of MDRO isolates normalized per 100 patient admissions ranged from 2.63% to 2.77% across the four year period. The risk factors of highest prevalence were recent surgery (66%), prior antibiotic exposure (52.5%), and presence of a urinary catheter (51%). The risk factor of lowest prevalence was history of cancer (8.5%). There were 5 deaths in the Gram-positive group and 12 deaths in the Gram-negative group. The average length of stay was longer for Gram-negative infection (17.9 days versus 13.7 days). Recent surgery was the most common risk factor associated with isolation of a Gram-positive or Gram-negative MDRO from blood, wound, and biopsy cultures.

**Conclusion:** The incidence of MDRO infection was similar from 2015 to 2018. There was a trend towards higher mortality and longer average length of stay in patients with Gram-negative MDRO infections. Recent surgery, prior antibiotic exposure, and presence of a urinary catheter were consistently identified as the top risk factors associated with the development MDRO infection.

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**Session-Board #** - 8-073

**Poster Title:** Current evaluation of pilonidal abscess microbiology in the emergency department

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

**Primary Author:** Emily Pavich, Indiana University Health Bloomington Hospital; **Email:** epavich@iuhealth.org

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**Purpose:** The most recent published pilonidal abscess microbiology data was collected prior to 2010. More recently, bacterial identification using precision diagnostic technology like matrix-assisted laser desorption ionization time-of-flight (MALDI-TOF) have been adopted across institutions like the one described in this report. MALDI-TOF bacterial identification is objective and accurate, detecting a wider spectrum of organisms than previous methods. Pilonidal abscess is not a common diagnosis in the emergency department, and not all cases require antibiotic therapy. However, characterization of pilonidal abscess isolates based on results from precision microbiology testing is needed to inform appropriate empiric treatment of this infection as needs arise.

**Methods:** This is a multi-site retrospective study, within a large health system. Inclusion criteria consisted of patients who presented to an emergency department between 2015 and May 2019 with the term “pilonidal” in their discharge diagnosis and a completed wound culture and stain. Exclusion criteria are patients with a “no growth” result from the wound culture, wound culture results identified as “mixed microbial flora” suggestive of contamination per the microbiology department, or any patient that had a repeat culture within a year that isolated the same pathogen. The primary objective of this study was characterization of pilonidal abscess microbiology and isolates per patient encounter. Secondary objectives include clinical analysis of isolates to determine the most common pathogenic cause of infection, excluding isolates considered to be contaminants and/or non-pathogenic, and corresponding empiric antibiotic recommendation. Isolates clinically determined to be contaminants and/or non-pathogenic were defined as cultures that produced 1+ (few) or fewer bacterial counts on culture for the isolates of Coagulase-negative Staphylococcus, Actinomyces, Corynebacterium,

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Dermabacter, Bacillus, or Lactobacillus species. Descriptive statistics were utilized to analyze data.

**Results:** 119 patient encounters were reviewed for inclusion and 22 patient encounters were excluded based on criteria. 97 patient encounters were analyzed for the primary endpoint with 148 total organisms seen. The primary outcome identified 42% (n=41) of encounters to be polymicrobial. The most common organisms were Streptococcus viridans 18.2% (n=27), Coagulase negative staphylococcus 17.6% (n=26), Actinomyces 14.9% (n=22), Corynebacterium 10.8% (n=16), and Beta-hemolytic Streptococci 10.8% (n=16). The secondary outcome further excluded isolates considered to be contaminants or non-pathogenic, leaving 75 patients and 98 total organisms for analysis. Given this adjustment, only 21% of cases considered clinically relevant were identified as polymicrobial. The most common isolates considered to be clinically pathogenic were found to be Streptococcus viridans 27.6% (n=27), Beta-hemolytic Streptococci 16.3% (n=16), Actinomyces 14.3% (n=14), Staphylococcus aureus 8.2% (n=8), and Escherichia coli 8.2% (n=8).

**Conclusion:** After clinical analysis of all isolates, removing likely contaminant and/or non-pathogenic strains, the most common bacteria identified were Streptococcus viridans, Beta-hemolytic Streptococcus, and Actinomyces. Based on known susceptibility data, recommended empiric oral antibiotic therapy for pilonidal abscess would be amoxicillin/clavulanic acid. Precision microbiology testing, such as MALDI-TOF, is evolving knowledge of causative organisms for infections. Prior to this report, published rates for Actinomyces in pilonidal abscess were less than 2%. As seen in this report, even when excluding certain MALDI-TOF detected isolates with 1+ (few) or less bacterial growth, Actinomyces still emerged as a potential pathogen in pilonidal abscess.

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**Session-Board #** - 8-074

**Poster Title:** Trend and effectiveness of hepatitis C therapy with direct-acting antiviral agents (DAAs) in Taiwan

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** Sofosbuvir/ledipasvir, elbasvir/grezoprevir and glecaprevir/pibrentasvir, a direct-acting antiviral agents (DAAs), are recommended as the first-line treatment for hepatitis C virus (HCV) infection in Taiwan. These agents achieve high and sustained virological response (SVR) rates in clinical trials. However, head-to-head comparison between these three antiviral agents in the real-world clinical practice remains unclear. To fill the gap, this study aims to evaluate the effectiveness and analyze prescription patterns of DAAs.

**Methods:** This was a retrospective cohort study by using the electronic medical records databases from 3 hospitals in northern Taiwan (8% of the population in this region). We enrolled the patients who newly started antiviral therapy between January 1, 2018 and October 31, 2018. The antiviral agents of study interest included sofosbuvir/ledipasvir, elbasvir/grezoprevir and glecaprevir/pibrentasvir. We followed these patients from the initiations of DAAs to May 31, 2019 or loss of follow-up.

The primary endpoint was sustained virological response at 12 weeks after therapy (SVR12). The secondary endpoint was rapid virological response (RVR) rates, which defined as no HCV RNA detection at fourth week after therapy. We also collected patients' characteristics included : sex, age, genotype, viral load, AST, ALT, estimated glomerular filtration rate (eGFR), liver cirrhosis, hepatitis B, combination of ribavirin. Descriptive statistics were used to characterize the information collected.

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**Results:** We enrolled a total of 71 (34.6%) sofosbuvir/ledipasvir users, 59 (28.8%) elbasvir/grezoprevir users and 75 (36.6%) glecaprevir/pibrentasvir users with 64.7 years old (SD 12.1), of whom 38.5% were men. Before initiation of DAAs, the mean HCV RNA was 3.4 (SD 6.2) million IU/ml at baseline.

198 (96.6%) patients achieved SVR12 and 7 failed (4 were on sofosbuvir/ledipasvir, 1 was on elbasvir/grezoprevir and 2 were on glecaprevir/pibrentasvir). 118 (57.6%) patients achieved RVR (52.1% were on sofosbuvir/ledipasvir, 52.5% were on elbasvir/grezoprevir and 66.7% were on glecaprevir/pibrentasvir).

**Conclusion:** Patients accepted these three antiviral agents had similar SVR12 rate. Patients with glecaprevir/pibrentasvir had a little higher RVR rate than other groups. Clinicians should consider patients' baseline profiles, like renal function, liver function and bill burden, when selecting DAA.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-075

**Poster Title:** Novel, effective and sustainable pharmacist practice model for antimicrobial stewardship

**Poster Type:**

**Submission Category:** Infectious Disease/HIV

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**Purpose:** How to develop a sustainable and effective antimicrobial stewardship practice model. To expand the antimicrobial stewardship program (ASP) using existing resources through the development of a novel pharmacist practice model and leveraging the electronic medical record's functionality. Assess the new model's efficacy based on the impact on antimicrobial usage and hospital-acquired Clostridium difficile infections (HACDI) rates.

**Methods:** Unit pharmacists underwent a comprehensive and structured in-house training program consisting of didactic lectures, online learning modules, competency assessments, an institution specific antimicrobial handbook and individualized training with the ASP team consisting of a pharmacist and an infectious disease (ID) physician. Pharmacist received continual mentorship by the ASP team through biweekly prospective audit and feedback reviews to nurture clinical excellence and as quality assurance. Several enhancements were made to the electronic medical record, the most significant being a customized antimicrobial navigator that allows for comprehensive and efficient clinical assessments. Additional modifications included standardized documentation templates, an antimicrobial usage and

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HACDI rate dashboard, electronic order sets and automatic ID consults for restricted antimicrobials.

**Results:** From implementation of the new model in 2017 until Mar of 2019, antimicrobial usage for all antimicrobials was decreased by 22% ( $p < 0.001$ ), fluoroquinolones by 21% ( $p = 0.01$ ), and ceftriaxone by 53% ( $p < 0.001$ ). HACDI rates decreased from 0.30 to 0.16 cases per 1000 patient days (47%,  $p = 0.12$ ). Since ASP implementation in 2012, total antimicrobial usage has been reduced by 35% ( $p < 0.01$ ), fluoroquinolones by 73% ( $p < 0.001$ ), ceftriaxone by 30% ( $p = 0.6$ ) and rates of HACDI by 73% ( $p < 0.0001$ ).

**Conclusion:** Developing a comprehensive in-house training program for unit pharmacists in combination with ongoing support from the ASP team, provides an effective and sustainable practice model that can greatly improve patient safety.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-076

**Poster Title:** Kansas antimicrobial stewardship initiative (ASI): a novel way to collect antimicrobial use and resistance data

**Poster Type:** Descriptive Report

**Submission Category:** Infectious Disease/HIV

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**Purpose:** Antimicrobial resistance is a major concern facing healthcare. The National Healthcare Safety Network (NHSN), from CDC, is a free database for hospitals to use for surveillance and submission of their antimicrobial use and resistance (AUR) data. Submission of AUR data is an option to attest to CMS Meaningful Use Stage 3, however, upload of AUR data to NHSN has been difficult. Through a cooperative agreement from CDC, funding was available to create an electronic integrated system to automate the pull and upload of AUR data from hospitals to NHSN.

**Methods:** The Epidemiology and Laboratory Capacity Cooperative Agreement from CDC provides funding to the Healthcare-Associated Infections and Antimicrobial Resistance (HAI/AR) Program at the Kansas Department of Health and Environment for antimicrobial stewardship efforts in the state. Using these funds, the HAI/AR Program had a cloud-based integration platform developed that can directly connect to a hospital's electronic health record (EHR) system. This platform automatically pulls AUR data and submits data to NHSN. This is done in three steps. First data is acquired, either by receiving it as part of the data feeds provided by the hospital or by querying the system for the required elements. Next, the data is aggregated and consolidated into one dataset. Mapping and logic are applied so only the data needed for the AUR modules will be sent in the required CDA format. Finally, the dataset is transmitted to the AUR modules. Once this integration is built for a particular EHR system, any hospital in KS using that EHR will be able to utilize it if desired. Use of this integration platform will give the facility and the HAI/AR Program access to their AUR data. This can help target stewardship

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efforts and evaluate effectiveness of implemented interventions. The HAI/AR Program has a goal to recruit KS hospitals using NHSN to participate in this project we have called the KS Antimicrobial Stewardship Initiative (ASI).

**Results:** One hospital in Kansas served as the pilot site for the ASI project. The following data elements were requested to be submitted to the NHSN AUR modules: susceptibility, specimen source, pathogen name, location of the patient and visit, patient ID, antimicrobial ordered, and route of administration. The integration was successful and NHSN continues to receive data from the pilot hospital. This was a much faster and less expensive method than has previously been reported by facilities who have begun uploading data to NHSN AUR modules through their EHR vendors. Data extracted can be aggregated to provide meaningful reports to clinicians to support their antimicrobial stewardship program (ASP). Days of therapy and dose per day as well as dispensing units and prescribers can be reported out of the NHSN dataset. Antimicrobial class, redundancy in therapy, de-escalation, and escalation are necessary data points for the hospital to evaluate opportunities for education and ASP improvement. Reports such as these are available through participation in the ASI.

**Conclusion:** Antimicrobial resistance is a major contributor to longer hospital stays, multiple readmissions, and patient deaths. The NHSN AUR module allows for aggregation and centralization of data from hospitals. A cloud-based integration platform can successfully be used to query a facility's EHR for required data, and to transmit the data to NHSN daily. Data transmitted can be used by the hospital to guide and evaluate the efforts of their ASP. The HAI/AR Program will aggregate this data to evaluate antimicrobial resistance and usage patterns throughout the state allowing for a more targeted approach in assisting and guiding antimicrobial stewardship in KS.

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**Session-Board # - 8-077**

**Poster Title:** Assessment of colistin-associated nephrotoxicity at a tertiary-care teaching hospital: a retrospective study

**Poster Type:** Descriptive Report

**Submission Category:** Infectious Disease/HIV

**Primary Author:** Cynthia Sadaka, American University Of Beirut Medical Center; **Email:** cynthia.sadaka@gmail.com

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**Purpose:** Colistin, also known as polymixin E, is a glycopeptide antibiotic associated with nephrotoxicity ranging from 21 to 76%. However, studies issued before 1955 report higher rates of nephrotoxicity compared to those published after that year. At the American University of Beirut Medical Center (AUBMC), there has been an increased use of colistin in response to the emergence of MDR gram negative bacterial infections. Thus, this study's objective is to assess the incidence of colistin-associated nephrotoxicity and to evaluate the impact of risk factors on the development of nephrotoxicity.

**Methods:** A retrospective chart review of inpatients who received colistin during the past three years was performed. Patients included were those aged  $\geq 18$  years who received colistin for at least 48 hours. Patients were excluded if they were receiving renal replacement therapy prior to the initiation of colistin treatment.

The primary outcome of the study is the incidence of IV colistin-associated nephrotoxicity. As for the secondary outcome, it is the impact of age, concomitant nephrotoxic medications, hypoalbuminemia, high dose of colistin, baseline CKD, reception of a loading dose, documented sepsis, duration of therapy, and ICU admission on nephrotoxicity. The KDIGO AKI guidelines were used to define nephrotoxicity in this study.

Descriptive statistics were used in analysis of data collected. Data are presented as percentages and means. In all comparisons, differences are considered statistically significant at  $P < 0.05$ .

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Microsoft Office was used for data collection. Statistical analyses were done using SPSS, version 24. The protocol was reviewed by the AUB Institutional Review Board (IRB).

**Results:** A final sample of 100 patients was included and analyzed. The patients were distributed among various units across the hospital, with the highest percentage of patients (48%) admitted to critical care areas. The mean patient age was 58.58 years, and 69% of the patients were males.

The most frequently identified microorganisms were *Acinetobacter* (44%) and *Escherichia coli* (20.8%). Concomitant nephrotoxic medications were received in 90% of the cases. Colistin was mostly used for pneumonia (33%). Other indications include sepsis, urinary tract infections (UTI), skin and soft tissue infections (SSTIs), etc. Loading doses were received by the patients in 59% of the cases, and inhaled colistin was used concomitantly in 41% of the cases.

AKI was found to occur in 45% of the patients. Concerning its management, 31.11% of the patients required a dose reduction of colistin therapy, and the same percentage of patients required its discontinuation. AKI took place at an average of 4.1 days from the start of therapy. Independent risk factors for the development of colistin-associated AKI in this study were age ( $p = 0.021$ ), baseline CKD ( $p = 0.002$ ), and documented sepsis ( $p = 0.019$ ).

**Conclusion:** The use of colistin in practice will most likely continue for the treatment of MDR pathogens until safer and more effective antibiotics are developed. Meanwhile, this study was able to identify a population of patients which needs to be closely monitored to avoid the occurrence of colistin-associated AKI.

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**Session-Board #** - 8-078

**Poster Title:** Superiority of clinical and economic outcomes with oritavancin versus comparators for treatment of acute bacterial skin and skin structure infections in a small community hospital

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** Oritavancin is a lipoglycopeptide with in vitro bactericidal activity against gram-positive pathogens that is indicated for use in acute bacterial skin and skin structure infections (ABSSSI). Its concentration-dependent activity in vitro and prolonged half-life provide a convenient single-dose alternative to multi-dose therapies for ABSSSI. This retrospective cohort study was conducted to quantify the clinical and economic advantages of using oritavancin compared to other antibiotic agents that have been historically effective for ABSSSI.

**Methods:** Ninety patients were treated between 2015 and 2018 with a single dose of oritavancin 1200 milligrams infused over 3 hours and included in cohort A. All patients in cohort A failed a recent course of other antibiotics (OAT). These patients were matched with a randomly selected cohort of 91 patients admitted during the same period for failure of recent therapy or first-time treatment for ABSSSI. Demographic data and clinical outcomes were obtained by chart abstraction. Economic data was provided by medical records. Failure of a recent course of OAT was defined as patients who had taken at least one dose of a prescribed antibiotic regimen and presented or returned to the hospital within 14 days due to worsening infection symptoms or lack of improvement. Patients were excluded from the study for any of the following: osteomyelitis, endocarditis, primary or secondary bacteremia, age < 18 years, length of inpatient stay exceeding 7 days, any ICU stay during hospital admission, and infections that required major surgical debridement and/or wound care. The primary clinical endpoint was defined as average length of stay (aLOS). The secondary endpoints included readmission

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rates for the same indication at 30 and 90 days after discharge and the average hospital charge (aHC).

**Results:** A total of 181 patients were admitted to the medical service mainly for treatment of recurrent ABSSSI with oritavancin, or recurrent or first episode of ABSSSI treated with comparator agents. Demographic characteristics of both the oritavancin and comparator groups were similar. Cellulitis was the predominant infection (83% and 69% for cohorts A and B, respectively). Clinical failure of first-line antibiotic choices was 100% by definition and these patients received oritavancin per protocol. Only 7 of 90 (7.8%) patients failed therapy with oritavancin therapy. The primary clinical endpoint showed significant decrease in aLOS between oritavancin group versus comparator (2.3 days versus 3.1 days;  $p < 0.05$ , CI 95%, -1.2 to -0.4) despite factors suggesting the oritavancin cohort exhibited a higher frequency of complicated infections and recurrent infection. The secondary endpoints were significant for lower readmission rates associated with oritavancin treatment at 30 and 90 days. All-cause readmission within 30 and 90 days for oritavancin was 11% and 13%, respectively, while for the comparator group was 31% for both timepoints ( $p = 0.0012$  and  $p = 0.0047$  for both timepoints). The average hospital charge was 24% lower for patients that received oritavancin.

**Conclusion:** The results of this study demonstrate that oritavancin provides not only a single-dose alternative to multi-dose therapies for ABSSSI, but also a clinical and economic advantage compared to other antibiotic agents.



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**Session-Board #** - 8-079

**Poster Title:** Monte Carlo analysis of cefepime-zidebactam, ceftazidime-avibactam, and ceftolozane-tazobactam against carbapenem-resistant Enterobacteriaceae and assessment of susceptibility breakpoints

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** The rising prevalence of carbapenem-resistant organisms have rendered previous gold-standard drugs ineffective. A beta-lactamase inhibitor (BLI) is used in an attempt to restore activity of beta-lactams against some of these resistant isolates. Several cephalosporin/BLI combinations have been marketed recently, thus, a comparative evaluation to assess their potential clinical utility is needed. We used Monte Carlo Analysis (MCA) to analyze three cephalosporin/BLI combinations against carbapenem-resistant Enterobacteriaceae (CRE): cefepime-zidebactam (FEP-ZID), ceftazidime-avibactam (CAZ-AVI), and ceftolozane-tazobactam (TOL-TAZ). As part of the analysis, an assessment of the susceptibility breakpoints was also performed.

**Methods:** Data for all three combinations were collected from peer-reviewed literature. MICs were selected from a global study that compared them against carbapenem-resistant Enterobacteriaceae (CRE, n = 1018). Pharmacokinetic (PK) parameters (volume of distribution, protein binding, and a CrCl vs. Cl regression) were collected. Two volumes of distribution were selected for each drug, the first representing infected patients in which the volume was similar to that of normal volunteers and the second representing patients with severe infections likely to increase the volume. Dosage regimens were selected from the product labels with the exception of cefepime-zidebactam which is still in development. Using our inpatient CrCl distribution, the PK parameters, and the dosage regimens, steady-state serum PK profiles (n=10,000) were simulated using a one-compartment model and integrated with the MIC values to assess the pharmacodynamic (PD) profiles. Two %fT>MIC PD targets were used: stasis (no

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net bacterial killing) and 2-log bacterial killing. From this, percent target attainment (%TA) was calculated. EUCAST susceptibility breakpoints for CAZ-AVI (8 mg/L) and TOL-TAZ (1 mg/L) were used to assess if %TA reached a threshold of  $\geq 90\%$ . Although there are no official breakpoints yet for FEP-ZID, a similar strategy was used for proposed breakpoints.

**Results:** At the lower stasis PD target, %TA for FEP-ZID, CAZ-AVI, and TOL-TAZ was 99, 79, and 18 respectively. At the higher 2-log killing target, %TA was 98, 78, and 15, respectively. Overall variability in %TA due to different volumes of distribution and dosage regimens was minimal. It appears that the breakpoints for CAZ-AVI and TOL-TAZ are conservative and higher breakpoints may be warranted. Breakpoints of 16 mg/L for both drugs would result in  $>95\%$  %TA. FEP-ZID had %TA=100 at a proposed breakpoint of 4 mg/L.

**Conclusion:** Of the cephalosporin/BLI combinations evaluated, FEP-ZID appears to be preferred for empiric therapy of suspected CRE infections; however, a substantial number of patients may respond to CAZ-AVI. Thus, CAZ-AVI may be useful in de-escalation or when patient-specific susceptibility results are known. Our results suggest that TOL-TAZ should not be considered for empiric coverage for CRE. Consideration should be given to alterations in susceptibility breakpoints for CAZ-AVI and TOL-TAZ.

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**Session-Board #** - 8-080

**Poster Title:** Point prevalence survey of health associated infections and antimicrobial use in a public health institution in Trinidad

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** The objectives of the study were to: estimate the prevalence of health associated infections and the scope of antimicrobial use in a tertiary institution in Trinidad, describe the antimicrobial agents prescribed and their indications, and determine if prescribers followed evidence-based antimicrobial policies subsequent to diagnoses for patients in the selected wards.

**Methods:** This was a cross-sectional study consisting of three data collection instruments. Ward data were collected to identify the types of ward (ICU, Adult Medical, and/or Surgical), number of patients in each ward, presence of alcohol hand hygiene dispensers, type of medical personnel (consultants, house officers, nurses and nurse assistants, pharmacists), single room with individual toilet facilities or communal (multiple-bed) room and adjacent toilet facilities, and the number of occupied beds. Each ward surveyed was completed within one day. Data were also extracted from several sources available on the ward at the time of survey and documented on the data collection instruments. These included nursing notes, medical notes, temperature charts, drug charts, electronic prescribing systems, surgical notes, laboratory reports, e.g. microbiology results and other relevant charts. Patients were defined as receiving antimicrobials if they were prescribed at the time of survey for treatment or medical prophylaxis and received at least one dose of surgical prophylaxis in the 24 hours prior to 8:00 am on the morning of the survey. Data was recorded for each antimicrobial: the name of medication, route of administration, dosage per day, indication for prescribing and diagnosis. The prevalence of the health associated infection, device use and antimicrobial prescribed were

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determined using the software HELICSwin.Net 1.3.8. Both the prevalence and 95% Confidence Interval for the prevalence were calculated by the software.

**Results:** Of the 130 patients surveyed, 30 had an infection that occurred within 48 hours of admission. The most commonly reported infection type was urinary tract infections, evident in 9 (30.0%) patients, caused by *Escherichia coli* in 7 patients and *Klebsiella pneumoniae* in 2 patients. Out of the 30 patients, 10 (33.3%) were awaiting laboratory reports at the time of survey. Resistance was noted for *Staphylococcus aureus* and *Escherichia coli*, both of which were seen in 2 patients, and an *Enterococcus* species in 1 patient.

**Conclusion:** The results of the survey imply that public health surveillance and prevention activities should address hospital acquired infections. Recommendations to minimize the risk of resistance include: improving the availability of alcohol-based hand rub, the provision of single room and isolation capacity, antimicrobial guidelines for treatment of infection, judicious prescribing and proper surveillance of prescribed antimicrobials.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-081

**Poster Title:** Identifying “low hanging fruit” antibiotic stewardship opportunities for pharmacists in small and critical access hospitals

**Poster Type:** Descriptive Report

**Submission Category:** Infectious Disease/HIV

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**Purpose:** Small and critical access hospitals (CAHs) encounter unique challenges in implementing antibiotic stewardship (AS) often due to limited resources. The Joint Commission (TJC) requires AS within hospitals, including CAHs. In December 2016, a small and rural hospital antimicrobial stewardship alliance (SARAA) was established with the purpose of providing expert AS consultation and resources. Phase one of the program consisted of identification of regulatory gaps and implementation of strategies to enhance compliance with regulatory requirements. In phase two of this analysis, investigators sought to evaluate the presence of “low hanging fruit” pharmacist AS activities at small and CAHs.

**Methods:** This was a multi-site survey assessing the presence of antimicrobial stewardship initiatives related to intravenous to oral conversion, renal dosage adjustments, and dose optimizations within small and CAHs. Using a basic Likert scale [0=not present, 1=present, 2=partially present], antimicrobial stewardship activities were assessed for individual hospitals and the entire cohort.

**Results:** Twenty-eight hospitals with an average (+SD) daily census of 14 (+10.7) completed the survey. Less than 50% of hospitals reported the presence of an IV to PO conversion program (38%), renal dosing program (48%), or cefepime and meropenem dose optimizations (14% and 17%, respectively). The top two opportunities identified were dose optimizations for cefepime and meropenem to which hospitals replied “not present” 83% and 69% of the time, respectively. A vancomycin and aminoglycoside dosing protocol or guideline were present in 76% and 72% of hospitals, respectively.

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**Conclusion:** This standardized survey identified “low hanging fruit” antimicrobial stewardship actionable initiatives for implementation in small and CAHs. Next steps to further the programs include a phased approach to implement these initiatives within all 28 hospitals.

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**Session-Board #** - 8-082

**Poster Title:** Pharmacist and provider education on beta-lactam allergies decreases aztreonam utilization in a community hospital

**Poster Type:** Descriptive Report

**Submission Category:** Infectious Disease/HIV

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**Purpose:** A drug use evaluation revealed that most aztreonam use in our facility was considered inappropriate and ordered mainly for patients labeled with a beta-lactam allergy. Due to the high cost, risk of resistance, and limited coverage of aztreonam, this project was designed to reduce our aztreonam utilization.

**Methods:** A committee of four pharmacists was formed to develop materials to educate both pharmacists and providers about beta-lactam allergies. Pharmacists were required to complete a continuing education course that focused on beta-lactam allergies and complete an accompanying quiz that the committee had created. A tool was also developed by the committee to assist pharmacists in reviewing aztreonam orders for appropriateness accompanied by alternative antibiotic options to recommend to providers. The decision for recommending alternative antibiotics focused on the risk of cross-reactivity between beta-lactams based upon the structure of their side chains. Education for providers highlighted how to minimize aztreonam use by carefully reviewing patients' allergy information (allergy versus intolerance), antibiotic history, and risks of beta-lactam cross-reactivity.

**Results:** Aztreonam use was monitored monthly by days of therapy which was reported through the antimicrobial stewardship metrics. The goal was to decrease aztreonam days of therapy by 5 percent with an intermediate stretch goal of 7.5 percent and a stretch goal of 10 percent for the year 2018. Aztreonam utilization was reduced by 44.4 percent in 2018 compared to 2017.

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**Conclusion:** Pharmacist and provider education resulted in a reduction in aztreonam utilization at our facility. Education to both pharmacists and providers improved knowledge gaps for antibiotic selection in patients with beta-lactam allergies.



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**Session-Board #** - 8-083

**Poster Title:** The association of clinical pharmacists' active participation in antimicrobial stewardship with the incidence of antimicrobial related adverse events in hospitalized patients: multicenter study

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** An antimicrobial stewardship program (AMS) has been implemented globally to combat the misuse or overuse of antimicrobials which is well known cause of antimicrobial resistance and antimicrobial related adverse events. Although specialized pharmacists have been proposed as essential member of AMS in several authoritative guidelines, many, but not all hospitals in Korea operate AMS without involvement of pharmacists due to shortage of hospital pharmacists. Therefore, we aimed to evaluate the association of active participation of clinical pharmacist as a team member of multidisciplinary AMS with the incidence of antimicrobial related adverse events.

**Methods:** Five tertiary teaching hospitals participated in this retrospective cohort study. We classified hospitals as AMS with pharmacist or AMS without pharmacist group according to the involvement of clinical pharmacist in AMS. Patients who used systemic antimicrobial agents more than one day during the first quarter of 2017 were identified. Among them, 1,000 patients were randomly selected from each participating hospital. Systemic antimicrobials included antibacterials (J01), antimycotics (J02) and antivirals for systematic use (J05AA, J05AB, J05AC, J05AD, J05AH). We excluded antituberculosis drugs, antiviral agents for hepatitis and HIV. The incidence of five categories of antimicrobial related adverse events were determined; allergic reaction, hematologic toxicities, nephrotoxicity, hepatotoxicity, and antimicrobial

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associated diarrhea including C.difficile associated diarrhea (CDAD). Multivariate logistic regression analysis was used to evaluate the impact of pharmacist involvement in AMS on the incidence of adverse drug events (ADEs).

**Results:** In total, 4,995 patients were included for the analysis after excluding 5 patients due to incomplete laboratory data. A total of 1,195 antimicrobial related ADEs occurred in 618 patients (12.4%). The overall rate of ADE occurrence was 17.4 per 1,000 patient-days. Hospitals operating AMS with pharmacist had significantly lower ADE incidence proportion than the others (8.9% vs. 14.7%,  $p < 0.001$ ). Rates of ADE occurrence per 1,000 patient-days were 15.1 and 18.3 in hospitals with and without AMS pharmacist, respectively ( $p=0.003$ ). Multivariate logistic analysis showed that active pharmacist involvement in AMS reduced the risk of antibiotic associated adverse reactions by 38% (adjusted odds ratio 0.62, 95% confidence interval, 0.50-0.76).

**Conclusion:** The results of this study suggest that the active involvement of clinical pharmacists in the multidisciplinary AMS can reduce the incidence of antimicrobial related adverse events in hospitalized patients. Therefore, a system should be introduced where infectious diseases clinical pharmacy specialist can play an active role in multidisciplinary AMS of the hospital to reduce the antibiotic related adverse reactions.

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**Session-Board #** - 8-084

**Poster Title:** Advancing the pharmacist's role in preventing healthcare facility-onset C. difficile

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** Clostridioides difficile infection (CDI) is a significant challenge in healthcare. Patients receiving broad-spectrum antibiotics are at increased risk of acquiring CDI, but further elucidation of compounding risk factors may offer prevention targets. The primary objective was to determine if a CDI risk prediction model initially developed at Novant Health accurately identified patients at high-risk for healthcare facility-onset CDI at two hospitals within Emory Healthcare.

**Methods:** We conducted a retrospective case-control study including adult patients admitted between July 1st, 2016 and July 1st, 2018 at a large academic medical center and community teaching hospital. Patients diagnosed with healthcare facility-onset CDI who received systemic antibiotics prior to diagnosis were included as cases, and they were matched 1:1 with controls. We collected data on known risk factors for CDI and compared the rates between the cases and the controls using students' t-test for continuous variables and chi-squared for categorical data. Only variables that were statistically significant ( $p$ -value < 0.05) in a univariate test and evaluable at hospital admission were included in the multivariate analysis. Multivariate logistic regression model was used to build a point-based tool with weighted risk factors. The weight of the risk factors is decided by dividing the adjusted odds ratio (OR) by half of the smallest OR and rounding it to the nearest integer. The performance of the model was assessed by calculating the positive predictive value, negative predictive value, etc and by calculating a ROC-AUC.

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**Results:** The study included 362 subjects (161 controls and 161 cases). In the univariate analysis, cases were more likely to have been hospitalized in the last 90 days (44.7% v 18.6%,  $p < 0.001$ ), to have a hematologic or solid tumor malignancy (34.8% v 24.2%,  $p = 0.038$ ), to have received a proton pump inhibitor (62.7% v 44.7%,  $p = 0.001$ ) or histamine-2 receptor antagonist (48.4% v 35.4%,  $p = 0.018$ ) while inpatient, and to have received either glycopeptide (84.5% v 47.8%,  $p < 0.001$ ) or carbapenem (26.1% v 6.8%,  $p < 0.001$ ) antibiotics. In the multivariate analysis, hospitalization within 90 days (OR: 3.51, 95% CI: 2.12-5.83) and hematologic or solid tumor malignancy (OR: 1.65, 95% CI: 0.99-2.73) remained important variables of CDI. The Novant Health model including advanced age and prior hospitalization demonstrated poor utility when applied to patients at Emory Healthcare with a ROC-AUC of 0.62. When creating a separate Emory-specific model, with the removal of age and addition of malignancy in the model, the AUC improved to 0.65. The Emory-specific model includes 4 points for hospitalization within 90 days and 2 points for hematologic or solid tumor malignancy. A score of 6 would have a positive predictive value of 82% and a specificity of 96% for predicting development of CDI.

**Conclusion:** Hospitalizations within the past 90 days and a diagnosis of hematologic or solid tumor malignancy were associated with increased risk of CDI in patients receiving broad-spectrum antibiotics at two hospitals within Emory Healthcare. Healthcare exposures were important in both the Novant Health model and Emory Healthcare models for predicting CDI, but the presence of a significant oncology population at Emory precluded utilization of the same model at both institutions. Going forward, pharmacists plan to use the Emory Healthcare model to screen patients at admission in order to identify those patients at highest risk for CDI, and to intervene when possible.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-085

**Poster Title:** Comparative Monte Carlo analysis of cefepime alone and in combination with VNRX-5133 against resistant Gram-negative pathogens

**Poster Type:** Evaluative Study

**Submission Category:** Infectious Disease/HIV

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**Purpose:** VNRX-5133, a novel cyclic boronate-based broad spectrum beta-lactamase inhibitor, enhances the activity of cefepime against difficult to treat pathogens, including cephalosporin and carbapenem-resistant Enterobacteriaceae (ENT) and *Pseudomonas aeruginosa* (PA) producing serine- and metallo-beta-lactamases from all Ambler Classes. Cefepime, in combination with VNRX-5133, began Phase 3 clinical trials in April 2019. A Monte Carlo Analysis (MCA) was performed on cefepime alone (FEP) and in combination with VNRX-5133 (FEP-VNRX) to assess their potential efficacy against resistant Gram-negative organisms.

**Methods:** MCA (n=10,000) was performed for FEP and FEP-VNRX using pharmacokinetic parameters, pharmacodynamic (PD) targets, and recent MIC distributions collected from peer-reviewed literature. Four resistant organisms were analyzed: cefepime non-susceptible PA (PA FEP NS), meropenem non-susceptible PA (PA MEM NS), NDM-producing Enterobacteriaceae (ENT NDM), and KPC-producing Enterobacteriaceae (ENT KPC). The MCA analyzed 2 volumes of distribution, representing normal (V1) and burn/septic (V2) patients, and 4 body weights (60, 70, 80, 90 kg). Total body clearance was estimated using a CrCl vs. Cl regression and simulated using our inpatient CrCl distribution. Two dosage regimens were assessed, both using a 2-hour infusion time and adjusted for renal function: cefepime product label (D1), and experimental regimen (D2). D1 had a slightly higher average daily drug exposure compared to D2. The PD target was the percentage of time the free serum concentration remains above the MIC in a dosing interval (%fT>MIC). Low (%fT>MIC ≥40%, LT) and high (%fT>MIC ≥70%, HT) PD targets (%fT>MIC), representing bacterial stasis (no net bacterial killing) and near maximal killing (2-

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logs of bacterial killing), respectively, were used. Target attainment (the percentage of simulated patients reaching each of these targets, %TA) was assessed.

**Results:** The following results with D1, V1, and an 80kg patient were: LT/HT %TA was 48/24 (FEP) and 82/76 (FEP-VNRX) for PA FEP NS, 60/47 (FEP) and 85/81 (FEP-VNRX) for PA MEM NS, 5/2 (FEP) and 96/88 (FEP-VNRX) for ENT NDM, and 22/15 (FEP) and 100/100 (FEP-VNRX) for ENT KPC. Across all variables, the median %TA ratio of FEP-VNRX to FEP for LT/HT was 1.7/2.7 for PA FEP NS, 1.4/1.7 for PA MEM NS, 19.0/30.7 for ENT NDM, and 4.5/6.1 for ENT KPC. Overall, volume and body weight minimally affected %TA of both drugs and dosage regimens. Difference in %TA due to variables was low:  $\leq 2\%$  (LT) and  $\leq 10\%$  (HT) for volume, and  $\leq 2\%$  (LT) and  $\leq 9\%$  (HT) for body weight. Interestingly, D1 and D2 produced similar %TA across all 4 organisms, with D2 usually having the same or higher %TA than D1 (differing  $\leq 1\%$  for LT and  $\leq 5\%$  for HT). The largest differences in %TA due to volume, weight, or dosing regimen were observed for HT with PA FEP NS.

**Conclusion:** The high target attainment for FEP-VNRX for all four pathogens suggests that it may be useful for empiric therapy. FEP alone showed poor %TA for resistant Enterobacteriaceae species, thus, it should not be used against those organisms. Interestingly, for *P. aeruginosa* organisms identified as resistant to FEP, the results suggest that some patients may still respond to FEP therapy. Thus, it may be considered for de-escalation therapy, or to treat pathogens in which susceptibility is known.

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**Session-Board #** - 8-086

**Poster Title:** Designing and implementing a CPR calculator to improve patient safety and enhance workflow efficiency

**Poster Type:** Descriptive Report

**Submission Category:** Informatics/Technology/Automation

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**Purpose:** To design and implement an electronic Cardiopulmonary resuscitation (CPR) calculator combined with clinical decision support system (CDSS) to improve patient safety and enhance workflow efficiency as a replacement for manual CPR calculation.

**Methods:** : The CPR calculator was developed in two stages: The first stage was creating a Excel. It calculates the 14 medication doses, the Cardioversion procedure doses and the length of endotracheal tube (ETT). The implementation of the Excel aimed to test the concept and process. The Excel was deployed in the paediatric section. The first version experienced many changes based on the feedback. Once the nurse enters the patient's weight, doses are instantly calculated. A paper copy is printed out, with all the drug doses.

The CPR medication doses are calculated according to the patient's weight. Therefore, it is vital that the accuracy of weight entry is double confirmed. However, there is a potential of entering a wrong patient's weight. For that reason, a software that link an average patient's weight based on the world health organization child growth chart with the patient's age using soft and hard limits for weight was used to minimise potential errors. The task force developed tables for the upper and lower limits of weight based on the patient's sex and age.

In the second stage, the CPR calculator was developed on web-based programs. The CPR calculator is integrated with the hospital information system. After entering the medical record number, the CPR calculator will retrieve the patient age and gender which are used to validate the patient's weight.

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**Results:** CPR calculator eliminates practice variation and enhances patient care. In Addition, it makes the calculation accurate and faster. The CPR calculator enforces physician compliance with hospital policies. Also, it stops incomplete orders or illegible hand writing, furthermore, it helps in removing prescribing errors e.g. calculation errors, in checking for patient factors (weight, age and gender) and medications aspects (dose and route).

**Conclusion:** In conclusion the implementation of the CPR medications calculator offers many advantages which include eliminating medication errors, improving service and response times, enhancing interaction between healthcare professionals, improving patient contact time and increasing productivity as well as efficiency.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-087

**Poster Title:** Development of electronic ordering process to ensure safe use of continuous subcutaneous insulin infusions in hospitalized patients

**Poster Type:** Descriptive Report

**Submission Category:** Informatics/Technology/Automation

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**Purpose:** A 2015 survey by the ISMP identified gaps in the management of hospitalized patients with continuous subcutaneous insulin infusions (CSII). Seventy-five percent of the respondents did not have a policy regarding the management and two-thirds indicated that nursing was expected to document at least daily on the medication administration record (MAR). However, many electronic medical records (EMR) fail to have adequate methods to support adherence to policies, ordering and documentation of CSII. The purpose of this project was to develop a method for continuation of CSII in hospitalized patients, including ordering and documenting the administration of insulin in the EMR.

**Methods:** A multidisciplinary workgroup was created to evaluate the recommendations from ISMP for the Safe Management of Patients with an External Subcutaneous Insulin Pump during Hospitalization. The recommendations were used to develop a policy and procedure (P/P) for the use of CSII in hospitalized patients that could be applied for the entire health-system. Following completion of the P/P, a pharmacist developed a draft medical power plan (MPP), or order set, outlining the components needed for electronic ordering of CSII in the EMR. Documentation requirements from the P/P, along with the draft MPP, orders identified as not currently available, alerts to providers to help guide appropriate ordering and tasks for healthcare team members to assist with appropriate monitoring, follow-up and documentation, was then utilized by the informatics team to create an electronic process to ensure all

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components of CSII use available in the EMR. This electronic process also involved the development of a Power Form, which is as intuitive electronic template, to ensure complete CSII therapy use could be documented, including basal rates, insulin sensitivity factors, insulin carbohydrate ratios and target blood glucoses. Additionally, alerts and tasks were created to prevent errors with ordering and tasks to notify nursing when/what to document in the EMR. Review and validation of the MPP and Power Form was completed by multiple disciplines involved in the care of the patient.

**Results:** The development of the electronic ordering process for CSII in hospitalized patients took more than 2 years to complete. Barriers encountered during the development included turnover in members of the multidisciplinary workgroup and obtaining approval from the various stakeholders in the process. The MPP developed included guidance as to which patients should and should not be considered for continuation of CSII while hospitalized, appropriate monitoring (blood glucose) while using CSII, orders for management of hypoglycemic events, orders for the CSII based on insulin used by the patient that was linked to the smart form to document the CSII settings, and instructions for nursing when to notify providers as patient's clinical status changed. The Power Form that was created is functionality that has only been utilized in one other medication order in the health-system's EMR and allows all members of the patient's care team to view the CSII settings, rather than the previously used generic order on the MAR that lacked details of the CSII settings. Implementation of the CSII MPP and Power Form into the EMR for use throughout the health-system will occur after the beginning of the new fiscal year.

**Conclusion:** A multidisciplinary approach to development of the CSII policy/procedure and MPP ensured all key stakeholders involved in the care of hospitalized patients with diabetes were represented and had a voice in what their needs for the care of these patients included. With implementation of the new MPP, Power Form, and alerts, we hope to promote the continuation of CSII in appropriate hospitalized patients while minimizing adverse outcomes, including poor glycemic control and hypoglycemic events, and improve patient satisfaction.

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**Session-Board #** - 8-088

**Poster Title:** Impact of a computerized intravenous chemotherapy concentration calculation program

**Poster Type:** Evaluative Study

**Submission Category:** Informatics/Technology/Automation

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**Purpose:** Pharmacists are responsible for verifying the prescription of intravenous chemotherapy and for the management of accurate compounding sterile preparations. However, pharmacists and staffs are burdened with increased in the number of cancer patients and unpredictable transmitted intravenous chemotherapy in routine work. Therefore, we developed a program to calculate the concentration automatically during the verifying prescription to reduce the workload burden.

**Methods:** We conducted before and after study to assess the effects of computerized intravenous chemotherapy concentration calculation program on duty time. It was established that intravenous chemotherapy were required fluid dilution and the dilution concentration range was designed in calculation program (intervention). If chemotherapy order concentration was exceeded, it was configured to be displayed as a check target on the screen in the program. The data in this study prospectively was gathered from March and August 2018 (for 16 weeks, before 8 weeks and after 8 weeks, except May and June when developing program period). It was consisted of the total working hours of per week (A) and time of monitoring and preparation of intravenous chemotherapy per week (preparation work time, B). The outcome was presented by percentage of B (minutes) divide A (minutes) and interrupted time series and segmented regression model were used for statistical analysis. The software package Statistical Analysis System version 9.4 (SAS Institute, Cary, North Carolina) and Office Excel 2010 were used for all statistical analysis.

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**Results:** The study findings showed that pre-intervention preparation work time ( $\beta_0$ ) was approximately 1.09 percent, and the preparation work time trend ( $\beta_1$ ) increased slightly by about 0.02 percent, but this was not statistically significant ( $p=0.2801$ ). Since the implementation of the program (intervention,  $\beta_2$ ), the preparation working time has decreased by about 0.66 percent and has been statistically significant ( $p<0.0001$ ). The preparation working time trend for time after-intervention ( $\beta_3$ ) was a slight increase of 0.02 percent, but not statistically significant change ( $p=0.2574$ ). For the most parsimonious segmented regression model, which removes non-statistically significant variables from full segmented regression, the implementation of the program (intervention,  $\beta_2$ ) has decreased by approximately 0.4 percent which means about 35.41 percent reduction in preparation working time per working week ( $p<0.0001$ ).

**Conclusion:** The computerized intravenous chemotherapy concentration calculation program has led to a reduction in the preparation work time. This study has limitations that the results cannot be generalized because seasonality was not identified due to the short collection data period and the workflow of each medical institution is different. The program also needs regular management and updates of new chemotherapy on the market by pharmacists. However, application of automated program suggests that it can reduce the burden of pharmacists' work and further prevent medication errors.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-089

**Poster Title:** Evaluation of the impact of enhanced virtual forms and gamification on intervention identification in a pharmacist-led ambulatory care clinic

**Poster Type:** Evaluative Study

**Submission Category:** Informatics/Technology/Automation

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**Purpose:** To determine the impact of utilizing digital intake forms enhanced with an algorithm for identifying interventions, with- and without aspects of gamification, on the identification of intervention opportunities in an ambulatory care pharmacy setting

**Methods:** Patients scheduled for a regular appointment were invited to complete visit intake forms using a mobile application. The application was enhanced with an algorithm designed to identify potential interventions based on patient age, sex, disease state(s), and other user-provided information. Application users were randomized to receive additional patient-specific health questions 1) with or 2) without elements of gamification. Elements included trivia questions, fun facts, and the chance to win a prize. Participants could opt out of the additional questions at any time. After the conclusion of recruitment, a retrospective review was used to assess the interventions identified for a random sample of patients, seen within the same time frame, who opted not to utilize the mobile application. The number of interventions was compared across groups utilizing ANOVA. T tests were used for a subgroup analysis of the gamification group.

**Results:** From January to May 2019, 329 potential interventions were identified for the 166 randomized study participants. A total of 24 interventions were identified in a retrospective review of 54 patient records. An average of 0.44 ( $\pm 0.82$ ), 1.8 ( $\pm 2.0$ ) and 2.1 ( $\pm 1.8$ ) interventions

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per participant were identified for the control, non-gamification, and gamification groups, respectively. The number of identified interventions was statistically significantly different across groups based on the results of a one-way ANOVA ( $F=17.46$ ;  $p<.001$ ). Post hoc comparisons revealed that statistically significantly more interventions were identified in the gamification group and non-gamification groups as compared to the control group. No other group differences were statistically significant. Furthermore, an additional analysis was conducted between participants in the gamification group who completed 50-100% of the additional health questions ( $n=32$ ) and those who completed less than 50% ( $n=19$ ). A t-test was calculated and there was a statistically significant difference between the number of interventions identified ( $n=93$ ) for those completing 50-100% and those completing less than 50% ( $n=18$ ;  $p<.001$ ).

**Conclusion:** Use of the application, irrespective of the incorporation of elements of gamification, was associated with a significant increase in the number of interventions identified. Incorporation of the specific elements of gamification used in this study did not increase the rate of potential interventions identified. However, completing a higher percentage of the additional health questions positively impacted the rate of intervention identification. This study demonstrates that automation of intervention identification can significantly enhance the recognition of opportunities for intervention.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-090

**Poster Title:** Automated dispensing cabinet management as an efficiency and cost savings initiative

**Poster Type:** Descriptive Report

**Submission Category:** Informatics/Technology/Automation

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**Purpose:** Historically, the 24 automated dispensing cabinets (ADCs) at our 186-bed rural community hospital in upstate New York have been reviewed monthly using the Min / Max Method which allowed for the determination of a minimum and maximum number of units to be stocked at any given time. However, the ADC inventory was not regularly reviewed for how long items remained stocked but unused other than to replace them with fresh stock when they expired. Over the past year, the value of our ADC inventory had increased greater than \$15,000.

**Methods:** This project was spearheaded by the hospital's pharmacy buyer. The department was divided into teams each under the direction of a specified Team Leader who could be pharmacist or a technician. Each team was then assigned a set of ADCs. In Phase One of the project, which ran from July to September 2018, the teams reviewed what was currently stocked in each of their assigned ADCs. Medications that were determined to be essential to that specific hospital unit (i.e., code medications, dextrose syringes, etc.) were marked as such in the ADC software so that they could not be unloaded. This Master Standard Medications list was then presented to and approved by the hospital's Pharmacy and Therapeutics and Medical Executive committees. The remainder of 2018 was used for Phase Two during which the teams visited each ADC and unloaded all non-essential medications that did not have a currently active patient order. After this initial cleanout, the ongoing project began as Phase Three in which daily reports are generated by the ADC software indicating which medications have been

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loaded for greater than 30 days without being dispensed. This report prints automatically in the pharmacy each day at 13:00, and technicians then take it with them as they round to each ADC and remove the specified medications.

**Results:** The hospital's full inventory including ADCs is completed each January. In 2018, the value of the inventory sitting in the hospital's 24 ADCs was \$164,610.34. This was up from \$149,018.34 the previous year. After the completion of Phase One and Phase Two of the project, the ADC inventory in January 2019 had been decreased to \$133,068.05. This is a savings of \$31,542.29. Monthly spot checks by the department's buyer have determined that this savings has been maintained throughout the first half of 2019.

Phase Three of the project will remain ongoing indefinitely in order to maintain the current inventory levels and attempt to further decrease them over time if possible. While it has not been specifically studied as a part of this project, anecdotal reports from pharmacy technicians indicate that the project has also decreased their overall workload as they now need to maintain fewer medications in the ADCs and are seeing fewer medications need to be removed and replaced due to expiration dating.

**Conclusion:** The majority of the medication doses at our hospital are dispensed via our ADCs. During the period in which we were not carefully monitoring their inventory, the volume and value of the medications they contained steadily climbed to a peak of nearly \$165,000 at which time we implemented this project. By limiting the ADC inventory to only medications that were determined to be essential for the specific unit's function, patient safety, or were in active use, we decreased the overall ADC inventory value by over \$30,000, and this success has been maintained for greater than six months.



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**Session-Board #** - 8-091

**Poster Title:** Efficiency of drug management after the introduction of automated dispensing cabinets (ADCs)

**Poster Type:** Evaluative Study

**Submission Category:** Informatics/Technology/Automation

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**Purpose:** With the reducing hospital maintenance costs, rapid and accurate drug dispensing, and efficient management of drugs become more important, the introduction of automated dispensing cabinets (ADCs) is increasing in Korea. In this study, we tried to compare between a conventional drug dispensing system and a drug dispensing system using ADC to find out the effect of reducing required time from preparation and dispensing in pharmacy to administration to the patient and on the reduction of medication error.

**Methods:** We compared the total number of monthly PRN injections preparation, the number of emergency reception, required time of PRN injections from dispensing to administration, and medication errors (name confusion, improper dose errors, wrong dosage-form errors and ADC errors) for PRN injections, from January to December 2018, for ADC-introduced Surgical A ward (16 beds) and non-ADC-introduced Surgical B ward (12 beds) and C ward (14 beds). The PRN injections order system of this hospital is operated by 'split-timed reception' that accepts a prescription at a set time and delivery it to the ward (8 times/day), 'emergency reception' that receives prescriptions from pharmacies by phone as needed and delivery it to the ward, and 'ADC system' that dispenses injections directly from a ward using an ADC. Each ward is analyzed by system and statistical analysis was performed using SPSS ver23.

**Results:** During the period of research, in the case of B and C ward, the time required from the dispensing to the administration of the PRN injections was shorter in case of 'emergency reception' (mean±SD, B: 236±356 min, C: 147±218 min) than 'split-timed reception' (B: 255±332 min, C: 241±296 min,  $p < 0.05$ ). In the case of A ward the time required for administration to the

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patient was significantly reduced when the injection was received using ADC( $152\pm 287$  min) rather than the 'emergency reception'( $360\pm 337$  min,  $p<0.05$ ). The total number of monthly PRN preparations was higher in A ward ( $2,378\pm 249$  cases) than in B ward ( $2,051\pm 185$  cases), but there was no statistical difference between C ward ( $2,202\pm 364$  cases,  $P=0.107$ ). In the case of 'emergency reception' among total number of preparations, A ward (898, 3%) was less than B ward (7,745, 31%) and C ward (10,708, 41%). In the number of errors reported during the analysis period, the errors in A ward were 5 cases, which was less than those in B ward ( $n=7$ ) and C ward ( $n=9$ ), and the errors were name confusion(A: 1, B: 5, and C: 4) and improper dose errors (A: 2, B: 2, and C: 3).

**Conclusion:** The introduction of ADC has shortened drug delivery time from pharmacy to wards and improved the efficiency of drug management. In addition, the introduction of ADC has made it possible the timely administration of the drug and improved patient safety by reducing the medical errors.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-092

**Poster Title:** Review of current digital health products for cardiovascular monitoring

**Poster Type:** Descriptive Report

**Submission Category:** Informatics/Technology/Automation

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**Purpose:** Cardiovascular diseases, such as hypertension and arrhythmias, may lead to poor patient outcomes, reduced productivity, and decreased quality of life. Monitoring these disease states can be problematic in an outpatient setting. Patients can now purchase wearable devices (e.g. Apple Watch, Fitbit, Garmin etc.) to monitor their cardiovascular health. These products may have the potential to improve patient outcomes but come with risks. The purpose of this poster is to review the current landscape of digital health, specifically in cardiology, to assess the risks and benefits of using such products, and the role that pharmacists may play soon.

**Methods:** This review will discuss the recent technologies that can monitor blood pressure (BP), heart rate (HR), electrocardiogram (ECG), along with sleep patterns and physical activity. The review of the products was completed via literature search through PubMed, company websites, news outlets, and press releases that discuss the new and upcoming products. Due to the recent emergence of these products, PubMed literature search led to limited results of clinical trials regarding these products, such as Apple Heart Study, and a trial by Widmer et al. An analysis of the special features including product usage, cost, FDA clearance, and country of origin was conducted. Using the gathered information, the pros and cons of these products were compared.

**Results:** Most wearables in the current market are able to continuously monitor BP, HR, sleep patterns, and physical activity, but there are wearables that may do all of this in addition to monitoring abnormal heart rhythms. Although these special features may result in positive patient outcomes, the reports from the devices may not always be accurate. False positive

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alarms could lead to unnecessary clinician or emergency room visits which in turn increases healthcare system burden. There also may be privacy concerns with these devices because the information may be shared with the company or third-party vendors.

**Conclusion:** An increasing number of patients are purchasing wearables due to convenience of real-time updates to and from their providers. As first line healthcare professionals who are accessible and trusted by patients, it is vital for pharmacists to be aware of these products as they provide opportunities to intervene in patients' medication lists and health conditions. Pharmacists will be able to monitor, adjust, and educate patients about their medication therapies as the interface matures. Although digital health products allow for better assessment of medication adherence and patient cardiovascular goals, they come with concerning challenges.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-093

**Poster Title:** Optimizing clinical decision support tools through a targeted evaluation of drug-drug interaction alerts in the © 2015 Epic electronic health record (EHR)

**Poster Type:** Evaluative Study

**Submission Category:** Informatics/Technology/Automation

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**Purpose:** Healthcare systems can reduce adverse drug events (ADE) and simultaneously improve patient safety by incorporating well-designed drug-drug interaction (DDI) warnings into clinical decision support tools (CDS). DDI alerts should be evaluated, optimized and customized in based on institution culture. An active surveillance program for DDI suppression by clinicians at Scripps Health is pending. Thus, we aimed to answer the following question: What is the etiology of the top ten DDI suppressions documented by prescribers and can they lead to patient harm?

**Methods:** Descriptive, multi-site, retrospective study at a five hospital system comprised of teaching and community hospitals. Evaluation of filtered DDI warnings in the Epic EHR reviewed from November 2018 to January 2019. Suppressed severe or contraindicated warnings were evaluated. First Databank AlertSpace® was used to obtain raw data on DDI suppressions which records and aggregates all DDI suppressions. Descriptive statistics were used to measure frequencies in responses to DDI alerts and to perform correlations. Measures of central tendency (mean, median, mode) quantified filtered suppressions.

**Results:** Total of 49,838 DDI were evaluated. Approximately 92% of alerts were overridden each month. Ondansetron interaction with QT prolonging agents was most common (44%). Prescribers reported “benefit of therapy outweighs risk” in 65% of the overridden DDI alerts. Of these, 3,152 (6%) of DDI suppressions came from a contraindicated combination of ketorolac plus nonsteroidal anti-inflammatory drugs. The latter were largely due to PRN prescribing on order sets. This represents over 10,000 contraindicated alerts overridden annually.

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**Conclusion:** Multiple opportunities exist to optimize CDS tools and minimize alert fatigue. Current suppression of stock DDI alerts appear low. Of the 50% of contraindicated alerts that have potential for patient harm, re-evaluation of order set compliance is key to minimize alert fatigue. Clinicians must consider the complete clinical presentation of each patient given the DDI software's inability to account for patient specific factors.

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**Session-Board #** - 8-094

**Poster Title:** Evaluation of stock outs after utilization of inventory optimization predictive analytics: multi-site retrospective data analysis

**Poster Type:** Evaluative Study

**Submission Category:** Informatics/Technology/Automation

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**Purpose:** Optimizing automated dispensing cabinets (ADCs) and minimizing labor resources remains a challenge. This study aims to compare, describe, and benchmark key performance indicators (KPIs) after utilization of inventory optimization predictive analytics and to subsequently estimate the potential financial impact at acute care health system pharmacies.

**Methods:** A retrospective database analysis to evaluate key performance indicators (KPIs) pre and post implementation of enterprise level inventory management with predictive analytics was performed. We focused on the percentage of stock outs KPI in the patient care and procedure areas.

All dispensing records from the ADCs available for research were aggregated using de-identified data between 2016 and 2019. Researchers were blinded to any information related to hospital name, location, number of beds, and any transactional information. KPIs were aggregated and analyzed from the queried data. Descriptive statistics and trends on these performance metrics were generated using Microsoft Excel.

**Results:** This retrospective data analysis included over 30 acute care health system pharmacies pre- and post-implementation of inventory optimization predictive analytics. Stock outs identify the areas with potential for improvement in inventory management, therefore improving the medication availability to nursing.

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The median stockout rate pre-implementation was 1.54% (0.34% standard error) versus median stockout rate post-implementation of 0.74% (0.26% standard error). The difference in pre- and post-implementation stockout rates was statistically significant at 0.8% ( $p < 0.05$ ).

Carrying too little inventory can create supply exhaustion (incidents of depleted stock at specific locations) that can result in a missing dose and delay in medication administration.

**Conclusion:** Inventory optimization is key to maximizing the benefits of ADC technology. This retrospective database analysis demonstrated that inventory optimization predictive analytics, which can recommend PAR level modifications and prioritize medication management, can potentially be used to drive reductions in stock outs and expired medication waste as well as optimize inventory storage. With continued rises in medication costs, medication inventory management is increasingly important. Big data can be leveraged to (1) help individual facilities optimize their technology (2) benchmark facilities across health-systems.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-095

**Poster Title:** Collaboration of clinical informatics and information services to create pharmacist training curriculum for an electronic health record inpatient oncology module implementation

**Poster Type:** Descriptive Report

**Submission Category:** Informatics/Technology/Automation

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**Purpose:** Implementation of an oncology module within the existing electronic health record (EHR) system provides a challenge for organizations. It is often difficult to make decisions on workflows and functionalities for a system that is not yet in place. We provide a framework for the development of inpatient pharmacist training across the pharmacy system by clinical informatics and information systems.

**Methods:** Provision of a generic curriculum template of a new EHR module was provided by the clinical informatics-education department. Nurses who worked in the clinical informatics-education department believed that curriculum development would be improved by a pharmacist. Subject matter experts provided context for workflows specific to a hospital or clinic within the health system. The training curriculum was revised by a clinical informatics pharmacy informaticist and an information systems pharmacy specialist, with additional help from an oncology pharmacy informaticist. The new functionality was demonstrated by the information systems pharmacy specialist to provide the knowledge needed to revise and customize the curriculum for pharmacy services. This activity facilitated questions to ensure key concepts were understood and added to the curriculum. It was imperative, as the first draft was missing key elements due to the lack of knowledge of the new module. The final draft of the curriculum was reviewed by the information systems pharmacy specialist to ensure accuracy. Test patients were created in the training environments and testing of workbook case exercises in the different environments were completed. The training environment was dependent on other roles, for example nurses or physicians, which complicated the ability for

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end users to work through the workbook case exercises and see the new functionality. A survey was completed by pharmacists who received the training to assess the usability of the curriculum.

**Results:** Collaboration between clinical informatics and information systems was crucial for the development of a training curriculum. Pharmacists on each team were valuable, as they previously worked within pharmacy services and could better integrate the training content to existing workflows. In addition, the oncology pharmacy informaticist provided relevant feedback and asked helpful questions regarding the curriculum that may have been asked during end-user training.

Seventy-three pharmacists were trained over 5 weeks, which comprised of 16 classes for 3 hours each. A pharmacy informaticist taught 14 classes. A nurse informaticist taught 2 classes and provided classroom support for several pharmacist-led classes. Sixty-eight pharmacists completed surveys rating the usability of the information in the course: 68% rated as excellent; 27.5% rated as good.

A number of challenges were identified: addressing the impact to pharmacy operations during the transition to electronic chemotherapy ordering; standardizing chemotherapy preparations between inpatient and outpatient pharmacies; duplicating new functionality with current workflows in the training environment; acknowledging other operational pharmacist workflow issues identified during training classes; empowering operations to troubleshoot post go-live; and ensuring enough training materials and support were available for large classes ranging from one to twelve trainees.

**Conclusion:** The development of training curriculum was dependent on pharmacists in clinical informatics and information systems. Both areas brought expertise and knowledge necessary to create pharmacist training curriculum for a new EHR oncology module, which included past experiences in the current hospital pharmacy service and in the oncology service line.

Knowledge of the build and functionality combined with application of the module for end users were essential for successful training. The valuable lessons learned from this process will be used as more EHR modules are implemented in the future.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-096

**Poster Title:** Application of days-supply-on hand algorithm defines par levels to right-size pharmacy inventory in a community hospital pharmacy

**Poster Type:** Evaluative Study

**Submission Category:** Informatics/Technology/Automation

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**Purpose:** Martin Luther King, Jr. Community Hospital (MLKCH), a safety-net community hospital, developed a digital inventory reporting system in 2018 to optimize inventory turns. While this process improved house wide inventory turns, a systematic method to establish inventory levels within the pharmacy remained undefined, leading to inventory bloat on slow moving and lower cost medications. The original inventory control analysis was expanded to include automated dispensing cabinet (ADC) utilization and package size data to create a days-supply-on-hand (DSOH) metric. This DSOH metric defined par levels for all pharmacy items, informed purchasing decisions, and further reduced inventory carrying costs.

**Methods:** An inventory reporting system was developed by integrating data from automated dispensing systems (BD Pyxis ES), pharmacy inventory application (BD Pharmogistics), and hospital electronic health record (Cerner Millennium) to evaluate inventory on hand. The reporting system tabulated monthly inventory value to produce an inventory turns evaluation within end of month business processes, but additional analysis was needed to further improve inventory performance. As an extension of this methodology, annual and high-usage monthly utilization data from the inventory management system and ADC cabinets, package size, and ADC load level data were integrated to develop an algorithm establishing a days-supply-on-hand (DSOH) metric for every formulary item. This algorithm was designed to be automated and easily applied to 100% of inventory lines. As compared to using only historical purchasing

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data, this DSOH-based par level system was applied to reduce inventory carrying costs while being cognizant of the risk of inventory depletions and service failures.

**Results:** Previous efforts to improve inventory turns were effective but plateaued at the 8 turns mark. The integration of the DSOH-based algorithm identified additional candidates for par level optimization. Algorithm development and initiation resulted in alignment of par levels with DSOH-adjusted utilization patterns and reduced pharmacy inventory by 14%. Incorporation of utilization metrics into the DSOH metric also improved staff confidence to return inventory and comfortably reduce par levels without concern for stock outs and service failures. The full effect of establishing DSOH-based par levels will not be observed until sufficient time has elapsed to utilize current non-returnable inventory. Once the pharmacy staff establish a timeframe for the adjustments to take effect, DSOH-based par levels will be re-evaluated on a quarterly basis.

**Conclusion:** MLKCH developed a DSOH-based par level system to establish pharmacy inventory levels, adjust current stock on hand, and reduce carrying cost by right-sizing par levels in the Pharmacy. The initial adjustment allowed the department to achieve significant and measurable reductions in pharmacy inventory cost with the full effect to be quantified on a quarterly basis. Coupled with the electronic end-of-month inventory turns valuation, this new DSOH-based par level process adds a quarterly double check to the digital inventory management suite to further improve inventory management and reduce carrying costs through integrated pharmacy automation and informatics.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-097

**Poster Title:** The integration of IV robotics for compounding chemotherapy at a large academic medical center

**Poster Type:** Descriptive Report

**Submission Category:** Informatics/Technology/Automation

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**Purpose:** Automation technology has been integrated into the sterile products operations at Yale-New Haven Hospital since the mid-2000s. Most recently, an IV robotic system used in chemotherapy compounding was implemented and integrated into the oncology pharmacy workflow. This poster evaluates the impact of the productivity, accuracy, and safety of sterile IV chemotherapy compounding by implementing robotic technology at a large academic medical center.

**Methods:** An IV robotic system was implemented into the oncology pharmacy operations including integration with the existing IV workflow and electronic medical record systems. The robotic system has the capability to produce both patient-specific and batched compounds. Chemotherapy sterile compounding data was analyzed over an eight month period and comparisons were drawn between the two primary IV automation technologies utilized: IV workflow systems and IV robotics. The analysis included differences in accuracy and compounding turnaround time. Through an initial analysis, process-improvement strategies were identified and implemented resulting in improved productivity of IV robot and cleanroom workflow. In addition, regular air and surface environmental sampling were conducted and monitored to evaluate the self-cleaning feature of the specific IV robotic technology. Implementation also included training and education for pharmacists, pharmacy technicians, and nursing staff throughout the process.

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**Results:** Over an eight month period, a total of 52, 858 IV chemotherapy doses were compounded within the oncology pharmacy. On average the IV robotic system was capable of compounding 5-6 doses per hour. Through data analysis, workflow and staffing changes, the robot was able to compound up to 22.4% of the daily volume with a daily record of 80 doses. The average compounding error rate of the IV robotic and workflow systems was 1.11% and 2.98%, respectively. In comparison, a study by Flynn et al (1997) found a mean error rate of 9% for manual compounding.

The specific robot product features an automatic cleaning cycle supplemented with targeted manual cleaning. During this time period there was no growth found inside the robot during scheduled 6 month re-certifications.

**Conclusion:** Utilization of an IV robotic system increases patient safety through enhanced accuracy and productivity. Robotic compounding significantly reduces compounding error rates when compared to IV workflow systems and manual IV compounding. Data analysis, workflow and staffing changes are important considerations in maximizing the productivity of the IV robotic system. Additional benefits of the robot include reduced chemotherapy waste and reduction in hazardous drug exposure which is consistent with the goals of USP 800.

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**Session-Board #** - 8-098

**Poster Title:** Implementation of the first automated dispensing cabinets at a tertiary academic medical center

in Lebanon; challenges and compliance with the ISMP standards

**Poster Type:**

**Submission Category:** Informatics/Technology/Automation

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**Purpose:** The Institute of Medicine (IOM) in its report “Crossing the Quality Chasm”, called for Information Technology to take a central role in the redesign of the health care system to improve quality, increase efficiency, and reduce errors The American University of Beirut Medical Center (AUBMC) leadership launched the “2020 vision” to transform the healthcare in Lebanon. In 2017, the Pharmacy Department took the lead role in the implementation of Automated Dispensing Cabinets (ADC) to decentralize the medication distribution before the launch of the AUBHealth System (Epic) in November 2018 to meet the strategic goal of Integrated, closed-loop solution for medication management. The objectives are to describe the challenges and compliance with the Institute for Safe Medication Practices (ISMP) guidelines. Methods: AUBMC is a 380 beds hospital with 24/7 pharmacy services that dispenses around 3300 unit dose items per day with Parenteral Admixture Service. The ADC implementation represents a major change for both professional and technical staff. A Coordinating

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Committee composed of executive management, pharmacy director, and leads of the various working groups was appointed to oversee and manage the overall project by eliminating all the barriers, and ensuring meeting the project milestones were achieved. The multidisciplinary working groups were in charge of mapping the current processes, deciding on the optimal model, developing the implementation plan and timeline to meet the 12 core processes of the ISMP guidelines on the Interdisciplinary Safe Use of Automated Dispensing Cabinets, and reporting to the coordinating committee. ADCs rolled out in three phases. Profiled for inpatients, non-profiled for the Emergency Department and Anesthesia (kits) before Epic and profiled for the ambulatory areas post Epic.

Results -

The major challenges were the installation, configuration and training, but the adaptation of the software to the hospital procedures, and integrating it with the home grown systems (patient profile, inventory management, Admission/Discharge/Transfer, labeling and bar-coding) - The compliance scores with the ISMP guidelines at implementation using the self-assessment tool was 90% (402/445).

Despite the success to provide “real-time” medication profile based on Pharmacy order entry system, the major deficiency was the inability to link the administration of medications to their scheduled time. -

Reducing waiting time for first dose delivery. The goal to have  $\geq 75\%$  of non compounded items dispensed from the ADCs was reached in the second month after optimization of the types of medications stocked in the ADCs (75% vs 58%) - Major concerns with the cart- fill distribution system included accumulation of drugs at units’ level because of 24 h dispatch as opposed to a need basis. With the implementation of the ADCs, the optimization of the inventory was reflected by a 300% decrease in the number of items sent to the pharmacy for refund (7000 compared to 25000) - The results of the pre



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and post implementation surveys for the nurses' perceptions of and levels of satisfaction with the ADC

in relation to the efficiency and availability were significantly higher 3 months after complete implementation. The mean scale score for the safety was not statistically significant ( $p=.168$ )

### Conclusion

The process of switching into an automated system may have multiple challenges, which can be circumvented through a carefully developed strategic plan. ADS technology increases nurse's satisfaction.

### Methods:

### Results:

### Conclusion:

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-099

**Poster Title:** Effect of a smart pill lid on medication persistency, adherence, and pharmacist intervention for patients receiving ibrutinib therapy

**Poster Type:** Evaluative Study

**Submission Category:** Informatics/Technology/Automation

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**Purpose:** Ibrutinib is an oral tyrosine kinase inhibitor indicated as front line therapy for multiple different blood cancers. The goal of therapy with ibrutinib is unique, as patients continue with therapy long term in order to remain in remission. A study evaluating ibrutinib treatment discontinuation demonstrated that continuous treatment with ibrutinib improves quality and frequency of responses over time, including that for rates of complete response. The purpose of this study is to evaluate the effect of a smart pill lid (SPL) on medication persistence, adherence, and increased number of pharmacist interventions in patients who are treated with ibrutinib.

**Methods:** Patients new to ibrutinib therapy were offered enrollment into the study during pharmacist counsel or mid-therapy calls. Eligible patients included those who were 18 years of age or older, new to treatment within at least 30 days and prescribed ibrutinib 140 mg capsules. Patients were randomized in a 1:1 fashion to receive an SPL with full notifications turned on (intervention) or an SPL with notifications turned off (control). All SPLs were connected to a real time dashboard which records and tracks time of bottle opening. Patients in the intervention group were monitored and subject to pharmacist adherence follow up calls if weekly adherence measures fell below goal ( $\geq 2$  missed doses,  $< 85\%$  adherence). A historical cohort from January 2018 was also compared to the intervention group. Chi square analysis was used to compare persistence rates at fills 2, 4 and 6 utilizing pharmacy prescription refill records. Adherence rates were compared utilizing the proportion of SPL opens and analyzed using a students t-test. Descriptive statistics were used to evaluate pharmacist interventions and patient satisfaction surveys. For all tests, a p value  $< 0.05$  was considered significant.

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**Results:** A total of 67 patients were included in the study, with 31 in the intervention group and 36 in the control group. Results showed increased persistence to therapy at fill four in the intervention group compared to the control group (74% vs 44%,  $\chi^2 = 8.56$ ,  $p = 0.01$ ) and to the historical cohort (74% vs 22%,  $\chi^2 = 35.42$ ,  $p < 0.01$ ). Patients in the intervention group had higher mean adherence rates based on proportion of SPL opens (93% vs 65%,  $p < 0.01$ ). The intervention group recorded a significantly higher percentage of on time doses (93% vs 62%,  $p < 0.01$ ) and significantly few late doses (1.2% vs 6.7%,  $p < 0.01$ ). Of the patients in the intervention group, 11 of 31 were flagged for adherence follow up calls and 24 pharmacist interventions were completed.

**Conclusion:** The SPL significantly increased adherence and persistence to therapy in the intervention group. Based on the increased percentage of on time doses recorded, the intervention group appears more likely to take their medication at the same time each day. Pharmacist monitoring and targeted adherence outreach may contribute to increased adherence and persistence to ibrutinib therapy. Long term follow up is necessary to appropriately evaluate the continued effect of smart pill lid use.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-100

**Poster Title:** Development and evaluation of an automated robotic system for preparing antineoplastic drugs

**Poster Type:** Evaluative Study

**Submission Category:** Informatics/Technology/Automation

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**Purpose:** Pharmacists who handle antineoplastic drugs are at high risk of occupational hazards. Therefore, we developed an automated robotic system, DARWIN-Chemo<sup>®</sup>, with Yaskawa Electric Corporation and Nikka Micron Co., Ltd. After drug preparation, DARWIN-Chemo<sup>®</sup> could wash off drug residues from infusion bag surfaces with ozonated water. DARWIN-Chemo<sup>®</sup> could prepare up to 20 prescriptions of drugs continuously for several hours, without being monitored by an operator. In this study, we evaluated the accuracy, site contamination, and washing performance of DARWIN-Chemo<sup>®</sup>. We also assessed the overnight preparation of drugs by DARWIN-Chemo<sup>®</sup> in our hospital.

**Methods:** The accuracy of drug preparation by DARWIN-Chemo<sup>®</sup> and a pharmacist were compared. Both DARWIN-Chemo<sup>®</sup> and the pharmacist prepared five formulations of 5-fluorouracil (5-FU) in 100 mL of saline. The weight of the mixed drugs prepared using DARWIN-Chemo<sup>®</sup> was compared with that of the drugs prepared by the pharmacist. The accuracy of each drug preparation was calculated in terms of percentage relative error. For site contamination test, cyclophosphamide (CPA) was continuously added to 50 bags of 100 mL saline solution and then identified in 25 locations inside an isolator. The remaining CPA was collected using the sampling sheet method. The washing performance was tested by washing off 5-FU from the surface of the infusion bag. Twenty specimens of 5-FU that showed adherence to the surface of the infusion bag were removed with ozonated water. Any residual

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5-FU was removed by wiping. We also evaluated the usefulness of overnight preparation of antineoplastic drugs using DARWIN-Chemo<sup>®</sup> and collected data between April 2018 and March 2019. The average number and operation time of antineoplastic drug preparations during the day (8 am–4 pm) and overnight (0 am–8 am) were compared between the 1st and 12th month of the operational year.

**Results:** The average weight error ratios for DARWIN-Chemo<sup>®</sup> and the pharmacist were –0.62% and 2.69%, respectively. CPA contamination was confirmed at the syringe drive unit of the main body; the floor surface, right-arm claw, and stirrer showed contamination  $\geq 1$  ng/cm<sup>2</sup>. Pollution was confirmed for two 5-FU specimens, with a removal rate of  $\geq 99.9\%$ . DARWIN-Chemo<sup>®</sup> was used for 312 days in a 12-month period. The total number of antineoplastic drug preparations was 17,567, of which 5,743 (32.7%) were prepared by DARWIN-Chemo<sup>®</sup>. Of the 5,743 preparations, 1,994 (34.7%) were overnight preparations. Between the 1st and 12th month of the operational year, the average percentage of antineoplastic drugs prepared by DARWIN-Chemo<sup>®</sup> increased from 19.1% to 38.1%, and the average number of overnight preparations increased from 3.2 to 7.2.

**Conclusion:** Our study showed that the preparation accuracy and cleaning performance of DARWIN-Chemo<sup>®</sup> were acceptable. Overnight preparation of antineoplastic drugs by DARWIN-Chemo<sup>®</sup> substantially increased the number of preparations. Thus, DARWIN-Chemo<sup>®</sup> is suggested for practical use to reduce the burden on pharmacists and their exposure to antineoplastic drugs.

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**Session-Board #** - 8-101

**Poster Title:** Time matters: assessing duration of time required for wireless updates to infusion pump drug library

**Poster Type:** Evaluative Study

**Submission Category:** IV Therapy/Infusion Devices

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**Purpose:** Smart pump technology provides safe intravenous medication delivery by utilizing a dose error reduction system, and robust drug libraries. Such drug libraries offer evidence based clinician limitations to ensure safe medication delivery is maintained. On occasion, protocols and dose changes are required within the drug library to comply with regulatory mandates, or align with best practices. The timeliness of updating the infusion device drug library across an organization's pumps is essential to ensure a seamless transition, and reduce the risk of negative patient outcomes which can occur when multiple drug library versions are available.

**Methods:** The pharmacy department at one hospital organization develops and updates the infusion device library as required. Once approved, the new drug library is pushed wirelessly to 1625 Spectrum large volume infusion devices across 3 different hospital sites. During a recent drug library deployment, the progress of uploading to the pumps was monitored to ensure pump connectivity, and successful download of the new library. A continuous quality improvement report was generated specifying the date and time the new drug library was uploaded to each pump. Data analysis examined the length of time required to update the pump fleet and quantified the percentage of pumps remaining with an outdated drug library version.

**Results:** A total of 1467 pumps (90.3 percent of all pumps) received the drug library update within 24 hours of deployment. An additional 66 pumps received the drug library update in the following 5 days, for a total of 1533 pumps (94.3 percent of all pumps). The remaining 92 pumps were reported as "not connected" to the wireless network at the time of analysis. Pumps not connecting to the wireless network were either offsite for repair or were easily

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located using GPS technology, and returned to the biomedical engineering team for review. Additionally, pumps unable to connect could be observed using pump serial numbers and DERS software to monitor for clinician attempts to access the old drug library.

**Conclusion:** Delayed deployment of drug library updates has been shown to increase frequency of false alerts during intravenous infusions, as well as missed alerts for high alert infusions. Capability to deliver timely drug library updates to infusion devices is mandatory to maintain patient safety. Using an infusion device with proven ability to deliver timely updates allows for multidisciplinary confidence. Additionally, preceding any drug library push with appropriate and time sensitive education is key to maintain DERS compliance, and confirm appropriate background knowledge of any protocol changes.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-102

**Poster Title:** Unintended primary infusion from incomplete closure of administration set back-check valves at various head-height differentials and secondary flow rates

**Poster Type:** Evaluative Study

**Submission Category:** IV Therapy/Infusion Devices

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**Purpose:** Intravenous fluid administration set back-check valves are designed to close in response to the pressure differential between the primary and secondary tubing segments to ensure complete, uninterrupted delivery from the secondary container. The pressure differential is affected by the primary and secondary container head-height differential and the secondary infusion flow rate. Incomplete back-check valve closure may lead to “sympathetic flow” of primary fluid infusing concurrently with the secondary fluid. This study evaluates whether clinically relevant head-height differentials and secondary flow rates result in incomplete back-check valve closure and sympathetic flow with infusion pump administration sets.

**Methods:** This study was conducted in a laboratory setting. Two identical commercially available infusion pumps (Pump A and Pump B) were selected for use with two identical dedicated primary administration sets containing back-check valves upstream of the pump. The pumps were configured to deliver secondary infusions at head-height differentials of 20, 16, 8, 4, and 0 inches (the head-height scenarios). At each head-height differential, the secondary infusion was programmed to be infused at 100, 200, 300, 400, and 500 ml/hour (the flow rate scenarios). Fluid flow rates and volumes were assessed continuously by weighing the primary and secondary bags as well as the collection reservoir. The primary outcome measure was the total volume of sympathetic flow delivered in each infusion scenario. The secondary outcomes were the flow rates from primary and secondary containers over time.



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**Results:** At a head-height differential of 20 inches, Pump A delivered negligible sympathetic flow until reaching a secondary flow rate of 500ml/hour which resulted in sympathetic flow of 3.2%. At a head-height differential of 16 inches, Pump A delivered sympathetic flows of 0.1%, 0.7%, 4.6%, 10.7%, and 22.4% with the increasing flow rate scenarios. At head-height differentials of 20 and 16 inches, Pump B delivered negligible sympathetic flow. At head-height differentials of 8, 4, and 0 inches, sympathetic flow was present with both Pumps A and B. The sympathetic flow data is presented here as Pump A%/Pump B%. In one instance, data is not available which is noted as NA. At a head-height differential of 8 inches, Pump A and B sympathetic flows were 0.4/0.1%, 3.8/3.5%, 11.5/9.7%, 20.7/15.2%, and 30.1/24.5% with the increasing infusion rates. At a head-height differential of 4 inches, Pump A and B sympathetic flow rates increased to 4.9/1.3%, 15.7/9.0%, 28.4/18.3%, 41.2/28.4%, and 45.2/NA% with the increasing infusion rates. At a head-height differential of 0 inches, sympathetic flows were 21.6/17.4%, 37.1/29.0%, 50.8/38.9%, 59.7/46.3%, and 68.3/52.8% with the increasing infusion rates.

**Conclusion:** Sympathetic flow from the primary container during a secondary infusion was observed with two infusion pumps with decreasing head-height differentials and increasing secondary flow rates. These results suggest that administration set back-check valve closure may be incomplete, and that secondary infusion delivery may be inconsistent across devices in clinically representative circumstances. The potential patient impacts from sympathetic flow are delayed secondary medication administration and delivery of the primary fluid at the programmed secondary rate. Further studies are required to confirm and evaluate the clinical significance of these results.

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**Session-Board #** - 8-103

**Poster Title:** Smart pump drug library compliance improvement over one year in a community hospital system

**Poster Type:** Descriptive Report

**Submission Category:** IV Therapy/Infusion Devices

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**Purpose:** Smart pump drug library use is associated with improved medication safety and lower potential for infusion errors. The safe guards will not be realized unless the drug library is used during infusion administration which is measured through the library compliance metric. Attaining and maintaining high library compliance requires education, training, and continuous monitoring efforts. ISMP has recommended that drug library compliance meet or exceed 95%. This report describes the results of a community hospital system's actions to improve overall drug library compliance by decreasing the use of "No Drug Selected" with both manual programming and auto programming.

**Methods:** In 2018, a medical system initiative was launched to increase smart pump programming compliance in preparation for expansion of electronic health record (EHR) capabilities to include capture of infusion delivery detail. Historic analytic data demonstrated that the hospital system had less than 50% drug library compliance with manual programming and during the initial stages of interoperability. After an infusion pump update in 2017, smart pump programming compliance increased to approximately 70%. However smart pump safety features continued to be bypassed through utilization of a drug library entry called "No Drug Selected". "No Drug Selected" lacks safety limits and exists to enable manual pump programming when interoperability is not available for a scheduled infusion. Medical center resources were dedicated to initiate infusion system performance improvement. The infusion pump vendor was included in the process to bring data analytic resources and visibility to infusion pump utilization over time. Initiatives included making the

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“No Drug Selected” entry accessible through a search rather than at the top drug library location, refinement and alignment of the drug library to practice, and a system wide campaign to promote smart pump programming with interoperability and utilization of the drug library when manually programming. Analysis of infusion pump data from two study periods, May 2018 and April 2019, was undertaken and shared with health system leadership for evaluation.

**Results:** The initiative included 8 hospitals which share a common drug library with 15 clinical care areas. In May 2018, overall smart pump drug library compliance was 69.2% of 411,966 infusions. In April of 2019, the compliance had increased to 93.5% of 455,396 infusions. The compliance increase correlates to 140,462 additional infusions delivered within the protective limits of the drug library. In the 2018 study period, “No Drug Selected” was utilized in 30.8% of programs or 127,067 infusions. In 2019, the use of “No Drug Selected” decreased to 6.5% of programs or 29,541 infusions. In the 2019 study period, the range of compliance across the hospitals was 91.8% to 96.8%.

The largest gains in compliance from 2018 to 2019 were observed in Oncology (39.5% to 78.0%, +38.5%), MedSurg (63.0% to 96.3%, +33.3%), ED Adult (60.8% to 92.9%, +32.1%), and PCU (65.1% to 95.7%, +30.6%). The highest compliance rate in 2019 was in Anesthesia at 97.5%. The greatest increase in the number of compliant infusions was in the ICU which showed a 16.5% increase in compliance, from 79.3% to 95.8%, correlating to 28,368 additional infusions delivered within the protective limits of the drug library.

**Conclusion:** Drug library compliance during manual pump programming and smart pump programming with interoperability requires ongoing education, training, and accountability for success. This descriptive report presents the successful outcome associated with an effort across a health system to increase drug library compliance. The overall compliance gains seen in a one-year time frame demonstrate that broad improvements are possible across multiple facilities and care areas. These results also suggest that the ISMP recommended compliance targets of 95% during manual programming and smart pump programming with interoperability are attainable. Further studies are required to confirm and evaluate the clinical significance of these results.

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**Session-Board #** - 8-104

**Poster Title:** Communication of alarms through smart pump alarm forwarding technology enables task and care prioritization while reducing clinical staff alarm fatigue

**Poster Type:** Descriptive Report

**Submission Category:** IV Therapy/Infusion Devices

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**Purpose:** An excessive number of medical device alarms may result in alarm fatigue and patient risk. Smart infusion pumps are used widely in healthcare and issue alarms with varying levels of urgency. Response to smart pump alarms may be improved by forwarding alarm details directly to the responsible clinician through the electronic health record (EHR) and/or a mobile device, for prompt awareness, assessment, prioritization, and management. This clinical project was undertaken to improve clinician response to alarms and reduce alarm fatigue through implementation of smart pump alarm forwarding technology.

**Methods:** A hospital design team of nurses and a pharmacist was created to oversee and ensure success of the implementation of alarm-forwarding technology. The team members were experienced with the medical center's integrated smart pump – EHR infusion system and associated clinical workflows. The alarm forwarding initiative began when the team judged that the hospital's integrated infusion system technology was ready to expand capability to include smart pump alarm forwarding. In addition to ensuring proper technology readiness, the team was tasked to identify which alarms would be forwarded to the clinicians, which devices would display the alarms, and the associated level of alarm detail and importance. All caregivers utilizing integrated smart infusion pumps are required to utilize alarm forwarding. Quality improvement efforts are led by the team to optimize alarm management and reduce alarm fatigue by ongoing program monitoring and infusion pump alarm data analytics.

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**Results:** Forwarded alarm details include the name of the alarm and the level of importance. The level of importance is color coded as high (red), medium (yellow), and low (blue). Examples of forwarded alarms include: Air-in-Line (high), Depleted Battery (high), Distal Occlusion (high), and Infusion Completed (medium). To facilitate early awareness, alarms are forwarded to the individual patient computer workstation and the unit dashboard. Alarm forwarding to the clinical staff's hand-held devices is under consideration. Clinicians report that awareness of infusion pump alarms enables task prioritization and reduces interruptions from low priority alarms. It is also reported that knowledge of alarm details enables preparation for efficient alarm management. For example, a forwarded "Infusion Complete" alarm enables the clinician to enter the room with a new container when indicated.

To support the management of forwarded alarms, the team regularly reviews alarm scorecards generated from data held on the hospital's safety software server. Alarms are analyzed and categorized to highlight opportunities for improvement. Alarm data analysis has provided evidence to drive practice changes such as the selection of intravenous catheter sites to reduce distal occlusion alarms. Statistical analysis of the clinical impacts of alarm forwarding has not yet been undertaken.

**Conclusion:** This descriptive report demonstrates the method and results of implementing smart pump alarm forwarding technology. The forwarding of smart pump alarms to the EHR may result in earlier awareness of alarms, reduced response times, and improved effectiveness of interventions. Alarm forwarding may serve to reduce alarm fatigue by enabling task prioritization and reduced interruptions in care. Analysis of alarm data provides the hospital with actionable information that may support initiatives to further reduce alarm burden. Additional study is required to confirm and evaluate the implications of these results.

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**Session-Board #** - 8-105

**Poster Title:** Standardized approach to implementation of infusion pump interoperability

**Poster Type:** Descriptive Report

**Submission Category:** IV Therapy/Infusion Devices

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**Purpose:** Describe the process to implement smart pump–electronic health record (EHR) interoperability technology throughout a multi-facility community health system to improve intravenous (IV) medication safety and efficiency from its original 17 step manual process to seven steps with auto-programming.

**Methods:** It is critical to first identify stakeholders and develop a project plan. We identified the stakeholders to be EHR and pump vendors, nursing, pharmacy, information services, biomedical, facilities, cardiopulmonary, finance, and leadership. Next, we evaluated our current state – wireless network, technology usage and barcode compliance, nursing workflows, computerized provider order entry (CPOE), and pump drug library settings. Then, an extensive review of every IV medication build with all corresponding dosing options occurred followed by testing across the interface from the EHR order to the pump library. Areas and patient situations that will not use interoperability were labeled as out of scope and defined.

Nursing workflows and drug library clinical care areas were explored by stakeholders from nursing, an EHR Clinical Documentation Analyst, and the Pharmacy Integration Nurse. After build was complete and standard workflows defined, extensive testing was conducted throughout the EHR and the pump drug library in a distinct test environment. Testing was conducted by EHR analysts and pharmacists and repeated by bedside nurses. Testers reviewed auto-programming, EHR and intake flowsheet documentation, and popup alerts or error messages prior to go-live. Problems were corrected in real time or tracked to be included as points for end user education.

The final step was to complete a thorough Failure Modes Effects Analysis with key stakeholders where follow up was assigned to address identified concerns.

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**Results:** An IV Pump Steering Committee was formed and met weekly with subgroup meetings, tasks, and assignments occurring in between. Unique patient care drug libraries were reduced from 22 to 9. Three rounds of testing were completed on 1400+ medication orders ensuring the order auto-programs the pump, closes without alerts, and documents rate, dose, and volumes correctly to the EHR. Seven key nursing units were identified to guide standard workflows. Seven out of scope units and six out of scope patient care situations were defined. Eighteen nursing workflows were standardized across eight facilities and more than 50 departments. Over 5500 nurses were trained over 10-weeks using a multimodal training approach, including a terminology e-learning and instructor led classes. The 2-hour class sessions included an interoperability overview, 1-2-minute demonstrations workflow videos created by our team, followed by hands on exercises. Individualized educations were also created for out-of-scope areas, pharmacy, and providers. The project was completed in 18-months from kick-off to successful go-live.

**Conclusion:** Assessment of current state technology should start early. A multidisciplinary approach is critical to ensure all aspects of the project are aligned. A dedicated resource to serve as a liaison among the stakeholders with existing knowledge of pharmacy and nursing is invaluable. Collaborating with the EHR, facilities, and biomedical will minimize delays. Implementation will not be without challenges and delays and is achievable within a reasonable timeframe. Following up with ongoing communications that are identified by end users, event review analysis, and proactive assessment of data allows the system and end user experience to continuously improve.

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**Session-Board #** - 8-106

**Poster Title:** Evaluation of key performance indicators between facilities with and without smart pump–electronic medical record (EMR) interoperability: a multisite retrospective data analysis

**Poster Type:** Evaluative Study

**Submission Category:** IV Therapy/Infusion Devices

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**Purpose:** Medication errors are broadly considered to be a significant source of preventable patient harm. Intravenous infusion safety, in particular, is a key area of focus as intravenous medication administrations often involve high-risk medications. Previous studies have identified smart pump–EMR interoperability as a tool to improve infusion safety. This multisite study aims to describe and benchmark key performance indicators (KPIs) between facilities that have smart pump-EMR interoperability and without interoperability.

**Methods:** We conducted a retrospective data analysis to evaluate key performance indicators in two distinct cohorts: healthcare facilities with smart pump-EMR interoperability and healthcare facilities without smart pump-EMR interoperability. De-identified records were queried from a Hadoop data ecosystem for infusion from 2015-2018 in facilities with interoperability and 2017-2018 in facilities without interoperability. Researchers were blinded to any information related to hospital name, location, number of beds, and any transactional information at a single infusion level. Key performance indicators including reprogrammed infusions and cancelled infusions were aggregated and analyzed from the queried data. Descriptive statistics on these performance metrics were calculated using Microsoft Excel.

**Results:** This retrospective data analysis included infusion data from 61 healthcare facilities with smart pump-EMR interoperability and 2,133 healthcare facilities without smart pump-EMR interoperability. Across the entire dataset, healthcare facilities with smart pump-EMR



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interoperability had an average of 130 reprogrammed infusions per month while facilities without interoperability had an average of 153 reprogrammed infusions per month. Reprogrammed infusions included infusions in which infusion parameters were reentered following a dose error reduction software (DERS) alert. Further evaluation showed that healthcare facilities with smart pump-EMR interoperability had an average of 156 cancelled infusions per month while facilities without interoperability had an average of 185 cancelled infusions per month. The differences in these key infusion parameters are potentially attributable to smart pump-EMR interoperability, by which there may be fewer infusion programming errors due to prepopulation of infusion parameters.

**Conclusion:** Overall, this analysis highlights that smart pump-EMR interoperability can have an important role in reducing infusion programming errors. Similar to other studies, we find that smart pump-EMR interoperability may have the potential to reduce reprogrammed and cancelled infusions. These findings may help healthcare systems evaluate new technology as a tool for continuous quality improvement and medication safety stewardship. Future research should focus on additional performance indicator analysis along with stratification by care area, drug, and shift time as well as explore appropriate study designs to compare same facility indicators pre- and post-interoperability implementation.

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**Session-Board #** - 8-107

**Poster Title:** Model-predicted netupitant plasma concentrations following intravenous (IV) NEPA, fosnetupitant-palonosetron, administration: safety considerations for the administration timing of IV NEPA antiemetic prophylaxis

**Poster Type:** Evaluative Study

**Submission Category:** IV Therapy/Infusion Devices

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**Purpose:** NEPA, fixed combination of the neurokinin-1 receptor antagonist netupitant and the 5-hydroxytryptamine-3 receptor antagonist palonosetron, plus dexamethasone is recommended by guidelines for antiemetic prophylaxis following highly (HEC) and some moderately emetogenic chemotherapy. The IV NEPA (fosnetupitant 235 mg-palonosetron 0.25 mg) formulation was developed to improve its administration convenience. While palonosetron as single agent is administered as a 30-second bolus, IV NEPA is administered as a 30-minute infusion before chemotherapy. This study was performed to predict fosnetupitant (prodrug) and netupitant maximum plasma concentrations (C<sub>max</sub>) after single-dose IV NEPA at various infusion rates, and to develop safety considerations for shorter infusion durations.

**Methods:** Experimental pharmacokinetic (PK) data used for model predictions were obtained from a phase 1 study, Study 1 (EudraCT 2015-004750-18), in 24 HEC-treated patients receiving a single IV NEPA 30-minute infusion. Two- and three-compartment PK models for IV infusion were fitted to experimental fosnetupitant and netupitant plasma concentration-time data, respectively. Model-predicted fosnetupitant and netupitant PK curves were generated for 2-, 5-, 10-, 15-, and 30-minute fosnetupitant IV infusions. For safety considerations, simulated fosnetupitant and netupitant C<sub>max</sub> values were compared with experimental C<sub>max</sub> results from a phase 1 study, Study 2 (EudraCT 2012-003407-35), in 148 healthy volunteers receiving a single 30-minute infusion of IV fosnetupitant at doses ranging from 17.6 to 353 mg; safety and tolerability results from healthy volunteers in the fosnetupitant 353-mg dose (n=9) cohort were used.

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**Results:** Two- and three-compartment PK models were suitable for best-fitting, respectively, experimental fosnetupitant and netupitant plasma concentration-time data after 30-minute IV fosnetupitant infusion, as shown by goodness-of-fit parameters. Model-predicted C<sub>max</sub> of netupitant following single-dose IV NEPA administration at 2-, 5-, 10-, 15-, and 30-minute infusion times was 898.5 ng/mL for 2-minute, 814.6 ng/mL for 5-minute, 717.9 ng/mL for 10-minute, 656.6 ng/mL for 15-minute, and 564.5 ng/mL for 30-minute infusions. Predicted C<sub>max</sub> for the 30-minute infusion duration matched the experimental mean (standard deviation [SD]) netupitant C<sub>max</sub> of 562.1 (181) ng/mL reached in Study 1 with IV NEPA 30-minute infusion in patients. For all modeled IV NEPA infusion times, netupitant C<sub>max</sub> was lower than the mean (SD) C<sub>max</sub> reached in Study 2 after 30-minute infusion of fosnetupitant 353 mg in healthy volunteers (1310 [255] ng/mL), a dose at which no local or systemic drug-related adverse events of grade >1 occurred (grade 1 feeling hot, dyspnea, and orthostatic hypotension in 2 volunteers). Model-predicted fosnetupitant C<sub>max</sub> after 2- and 5-minute infusions was 15660 ng/mL and 12212 ng/mL, respectively; both exceeded the mean (SD) fosnetupitant C<sub>max</sub> observed in healthy volunteers following 353 mg fosnetupitant given over 30 minutes (9562 [1007] ng/mL).

**Conclusion:** Netupitant C<sub>max</sub> for all simulated infusion times was substantially lower than the experimental mean C<sub>max</sub> reached with the 353-mg dose of fosnetupitant 30-minute infusion, which was shown to be safe and well tolerated. Administration of IV NEPA over a shorter infusion duration may be feasible and could increase its convenience of administration. Validation of the data in a clinical trial is required.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-108

**Poster Title:** Implementation of a chemotherapy compounding robot in a community ambulatory oncology infusion center and evaluation of its impact on turnaround time

**Poster Type:** Descriptive Report

**Submission Category:** Oncology /Hematology

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**Purpose:** Compounding of sterile products is one of the few pharmacy processes not performed routinely by automation, leaving preparation of high risk medications, such as chemotherapy, open to human error. Automation can be used to reduce repetitive use injuries and limit employee exposure to hazardous medications during compounding. The purpose of our project was to evaluate the impact of implementing a chemotherapy compounding robot on chemotherapy turnaround time.

**Methods:** Available compounding robots were researched, and APOTECACHemo compounding robot was selected. A ten year return on investment calculation was performed, and cost savings from decreased closed system transfer devices, no additional cost for staffing, and minimal additional costs for supplies justified the cost of a robot.

Prior to robot installation, extensive planning occurred to create an appropriate space for the robot within our new facility. Oncology pharmacists decided which medications to compound with the robot through investigation of current chemotherapy medication databases available through APOTECACHemo and local practices. Our information technology team created a suitable communication interface within our electronic medical record (EMR) to allow for robot chemotherapy dispensing upon order verification. In addition, baseline chemotherapy turnaround time, defined as total time from the release of a chemotherapy order in the EMR to pharmacist verification of the product, was measured.

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During robot installation, engineers were onsite for set-up and programming. Pharmacy technicians procured robot-specific supplies, such as syringes, needles, and intravenous bags. Hands-on training with the engineers occurred for both pharmacy technicians and pharmacists. After implementation, engineers remained onsite for two weeks to teach pharmacy technicians troubleshooting techniques, manage any programming concerns, and ensure pharmacist comfort using the robot software for product verification. Following implementation, customer service was available via telephone to promptly assist with additional issues. Chemotherapy turnaround times were again measured.

**Results:** The robot was used to compound 57.9% of our chemotherapy products (2217 of 3830 total chemotherapy products) during the first eight months. Prior to robot implementation, average chemotherapy turnaround time was 33 minutes, with 17 minutes from release of orders to technician compounding preparation and 16 minutes from technician compounding preparation to pharmacist verification of the product. After robot implementation, average turnaround time was 41 minutes, with 17 minutes from release of orders to technician compounding preparation and 24 minutes from technician compounding preparation to pharmacist verification of the product.

**Conclusion:** After extensive planning and troubleshooting, numerous chemotherapy drugs were compounded using a robot in our infusion center. Implementation of the robot did not considerably change chemotherapy turnaround times. During the same time period of robot implementation, several process changes were put into place for compliance with United States Pharmacopeia 797 and 800 at our facility, so further analysis of the change in chemotherapy turnaround time may be warranted. Overall, a chemotherapy compounding robot was successfully integrated into our community ambulatory infusion center with minimal impact on chemotherapy turnaround time.

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**Session-Board #** - 8-109

**Poster Title:** Real-world prevalence of potential drug-drug interactions involving oral antineoplastic agents in Korea: a population based study

**Poster Type:** Evaluative Study

**Submission Category:** Oncology /Hematology

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**Purpose:** Patients that receive anticancer drugs are at risk of drug-drug interactions (DDIs). DDIs involving oral anticancer drugs can decrease their anticancer effectiveness or increase the risk of toxicities. The use of oral anticancer drugs has become widespread over the last decade and they present potential DDI risk owing to their chronic use. Many of them are associated with CYP metabolism and QT prolongation. However, limited information is available on the prevalence of DDIs involving oral anticancer drugs. We aimed to gain further insight into the real-world prevalence of clinically significant DDIs in patients treated with oral anticancer drugs in Korea.

**Methods:** Data from 2016 Health Insurance Review and Assessment Service-National Patients Sample (HIRA-NPS) of South Korea were searched for potential DDIs involving oral anticancer drugs. The drugs prescribed concomitantly with oral anticancer drugs were screened by using two international drug interaction databases: Lexicomp® Interactions module and Micromedex® solution database. Clinically significant DDIs were defined as DDIs with a severity rating of “major” or “higher”. DDIs were classified into category 1 (concordant severity rating) or category 2, based on the concordance of severity ratings between reference databases.

**Results:** Of the 14,352 patients prescribed anticancer drugs, 5,332 patients received oral anticancer drugs; with patients of  $\geq 65$  years of age and  $< 18$  years of age accounting for 36.9%

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and 0.7%, respectively, of the total number of patients. Overall 2,861 cases of DDIs in 1,516 patients (26.7%) and 807 cases of category 1 DDIs in 509 patients (9.0%) were identified. The DDIs involving targeted agents comprised 42.6% and 70.4% of the overall and category 1 DDIs, respectively. The majority of DDIs concerns QT prolongation (34.6% of DDI cases), reduced exposure of antineoplastic agents (27.6%: 23.0% via absorption and 4.6% via metabolism), CNS toxicities (9.1%), bleeding risk (8.2%), and toxicities of antineoplastic agents due to inhibition of metabolism or excretion (7.9%). Pazopanib, methotrexate, gefitinib, dasatinib, and enzalutamide were the most frequently involved antineoplastic agents and H2 receptor antagonists, proton pump inhibitors and antacids were the most common counterpart drug classes in the category 1 DDIs.

**Conclusion:** This study showed that clinically significant potential DDIs with oral antineoplastic agents were prevalent in real-world practice. The recognition of this high prevalence of DDIs in patients taking oral antineoplastic agents is a necessary step to improve the clinical outcome.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-110

**Poster Title:** A retrospective review of an oxaliplatin desensitization protocol

**Poster Type:** Evaluative Study

**Submission Category:** Oncology /Hematology

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**Purpose:** Hypersensitivity reactions prove a significant obstacle in the utilization of oxaliplatin chemotherapy. These interruptions may interfere with treatment goals and effective prevention of cancer recurrence in the adjuvant setting. A common tactic for confronting oxaliplatin-provoked hypersensitivity is desensitization, a gradual presentation of the suspected agent, with the sum dose matching the objective dose. The goal is to drastically limit the symptoms of potential subsequent hypersensitivities. Research was performed at Northwell Health, which utilizes oxaliplatin for the treatment of cancers, primarily colon cancer. The objective is to identify patients imposed by oxaliplatin induced anaphylaxis and examine their response to rechallenge.

**Methods:** This study is an institutional review board approved retrospective chart review of a standardized oxaliplatin desensitization protocol after encountered hypersensitivity. Patients treated at Northwell Health who had been rechallenged with oxaliplatin were identified from the institution's electronic medical records database. Patients were included if they received the oxaliplatin desensitization protocol between January 1st, 2015 to December 31st, 2018. Patient demographic and clinical information such as age, ethnicity, gender, diagnosis, cancer staging according to the American Joint Committee on Cancer, body mass index, height, weight, and body surface area were recorded. Oxaliplatin regimen was broken down into parameters concerning cumulative dose before reaction, cumulative rechallenge dose and dose at anaphylactic reaction. When applicable, progression free survival and ultimate outcome of desensitization, whether patient completed the protocol or withdrew, were documented. The



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primary endpoint is to determine the frequency of patients who successfully underwent Northwell Health's oxaliplatin desensitization protocol. The secondary endpoint is to evaluate the outcomes of these patients.

**Results:** Twelve patients were identified as eligible for inclusion. 75% were male with a median age of 56 years at initiation of oxaliplatin chemotherapy and median BMI of 28 kg/m<sup>2</sup>. Patient breakdown for each cancer are: 10 patients had colorectal cancer and 2 patients had pancreatic cancer. Premedication before rechallenge of successful patients included cetirizine, famotidine, dexamethasone, and montelukast. The median number of treatment cycles until encountering hypersensitivity was 2 cycles. The median dose of oxaliplatin during the cycle of reaction was 85 mg/m<sup>2</sup>, which approximately half received (n=5). The median cumulative oxaliplatin dose was 191 mg/m<sup>2</sup>. Five (45%) patients reported allergic reactions to oxaliplatin rechallenge while 6 (55%) were able to successfully complete rechallenge and ensuing therapy.

**Conclusion:** Standardization of oxaliplatin chemotherapy desensitization for oncology patients threatened by hypersensitivity has improved patient safety and clinical response quality. We demonstrate successful desensitization in approximately half of the patients that underwent our the oxaliplatin hypersensitivity protocol.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 8-111**

**Poster Title:** Why are we waiting? lead times for parenteral systemic anti-cancer therapy

**Poster Type:** Descriptive Report

**Submission Category:** Oncology /Hematology

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**Purpose:** Waiting time on the day of parenteral systemic anti-cancer therapy has a high impact on the patient's overall experience of care. It is also one of the best measures of oncology-haematology day unit process efficiency<sup>1</sup>. Performance and reliability of the aseptic compounding unit can affect waiting times<sup>1</sup>. The pharmacy department demonstrated a reduction in lead times (time from chemotherapy order, to delivery) in 2017 following the appointment of a technician. With anecdotal trends of late (after 16:00) ordering of chemotherapy, a review of lead times was identified to establish if lead times had been maintained following staff changes in 2017.

**Methods:** In order to:

re-evaluate parenteral systemic anti-cancer therapy lead times and compare them to 2017 baseline measurements and to identify factors which result in lead times > 60 minutes, this methodology was followed:

1. Data collection for five consecutive days in December 2018
2. Measure time from chemotherapy order, to departure of chemotherapy dose from aseptic compounding unit
3. Inclusion criteria: all haematology/oncology outpatients for parenteral systemic anti-cancer therapy
4. Exclusion criteria: inpatients & non-haematology/oncology patients for parenteral systemic anti-cancer therapy
5. Data analysed using Microsoft Excel 2010

Data collection for five consecutive days in December 2018

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2. Measure time from chemotherapy order, to departure of chemotherapy dose from aseptic compounding unit
3. Inclusion criteria: all haematology/oncology outpatients for parenteral systemic anti-cancer therapy
4. Exclusion criteria: inpatients & non-haematology/oncology patients for parenteral systemic anti-cancer therapy
5. Data analysed using Microsoft Excel 2010

**Results:** The mean lead times for all parenteral systemic anti-cancer therapy reduced from 28 to 14 minutes ( $p < 0.03$ ) in December 2018 compared to baseline. This includes items made preemptively and those made to order on the day of treatment. Lead times for parenteral systemic anti-cancer therapy manufactured on demand improved, reducing from 49 minutes (2017) to 33 minutes (2018)  $p < 0.01$ .

The range of lead times for all items in 2018 was 0 to 156 minutes with 60% delivered at zero minutes. High cost drugs and the absence of pre-chemotherapy bloods were the reasons why parenteral systemic anti-cancer therapy was not made in advance. Factors for parenteral systemic anti-cancer therapy ( $n = 30$ ) having lead times  $> 60$  minutes were:

1. chemotherapy ordered at break / lunch time (43%)
2. delays due to aseptic compounding unit processes (23%)
3. chemotherapy not prescribed but ordered by nursing staff (14%)
4. unknown (20%)

**Conclusion:** The aseptic compounding unit have decreased the lead time for the manufacture of parenteral systemic anti-cancer therapy since 2017 and increased the proportion manufactured preemptively.

The aseptic compounding unit does not close for lunch, however, turnaround times greater than 60 minutes are associated with orders placed at lunch times. The aseptic compounding unit will continue to review processes to improve the turnaround time for chemotherapy, including continued increase of preemptive manufacturing when feasible.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-112

**Poster Title:** Oxaliplatin induced thrombotic microangiopathy: a case report

**Poster Type:** Case Report

**Submission Category:** Oncology /Hematology

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**Purpose:** This case report describes an event of oxaliplatin-induced thrombotic microangiopathy (TMA), clinically suggestive of hemolytic uremic syndrome (HUS), occurring in a 73 year-old female with a prolonged history of exposure to oxaliplatin for the treatment of metastatic colon cancer. A 73 year-old female with a treatment history including several lines of chemotherapy over the past 11 years for the management of metastatic colon cancer was reinitiated on chemotherapy with oxaliplatin, fluorouracil, leucovorin (mFOLFOX6) with bevacizumab for a disease progression. After receiving her second cycle of chemotherapy, she presented a day and a half later to the emergency department with fatigue, malaise, orbital headache, nausea and vomiting, mild abdominal pain, and chills. She stated her symptoms started hours after the chemotherapy infusion and reported a decrease in urine output and a darkening of urine. On physical examination, the patient had jaundice with icteric sclera since a day ago. A cardiac workup ruled out an acute myocardial infarction. The initial blood workup was significant for thrombocytopenia (platelet count 30.103 cells/mm<sup>3</sup>) and anemia (hemoglobin 8.1 mg/dL). The anemia was defined as hemolytic by a markedly increased bilirubin (total bilirubin 6.4 mg/dL, indirect bilirubin 3.3 mg/dL), a high AST (1725 IU/L), a high LDH (4866 IU/L), and a low haptoglobin (< 0.1 g/L). The patient also showed signs of acute renal failure (serum creatinine had markedly increased from 0.9 mg/dL to 5.5 mg/dL within a week, BUN 78 mg/dL, and uric acid 10.6 mg/dL). The blood film inspection showed signs of hemolysis with a slight anisopoikilocytosis, slight hypochromia, some ovalocytes and echinocytes, few schistocytes and helmet cells, rare teardrop red blood cells and rare

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stomatocytes. There were also occasional reticulocytes. Antibody screening was negative, confirming the microangiopathic hemolytic anemia diagnosis. The coagulation panel was normal. The clinical symptoms and laboratory findings were suggestive of TMA, with a triad of microangiopathic hemolytic anemia, thrombocytopenia, and acute renal failure. The predominance of the severe renal failure was evocative of the hemolytic uremic syndrome, rather than thrombotic thrombocytopenic purpura (TTP). This was confirmed by a normal activity of ADAMTS13. The development of TMA was linked to the exposure to oxaliplatin rather than bevacizumab, due to a clinical presentation that seemed more consistent with the case reports of oxaliplatin-induced TMAs, with a rapid onset of symptoms, severe thrombocytopenia, hemolytic anemia, and renal failure occurring hours after the chemotherapy administration. Another characteristic of oxaliplatin-induced TMAs reported in the literature appeared its development in patients with a long history of exposure to oxaliplatin. Treatment was started promptly with daily plasma exchange and immunosuppression with methylprednisolone (1 mg per Kg per day) for a suspected TTP, then tapered later on. She also received packed red blood cells transfusion, platelets transfusions, and underwent daily intermittent hemodialysis. Electrolyte imbalances were also managed. Her platelet count normalized on day 6. Daily plasma exchange was continued for eight consecutive days. Oxaliplatin-based chemotherapy represents a standard of care in the treatment of metastatic colorectal cancer. Our case confirms the risk of hemolytic uremic syndrome as a rare complication of oxaliplatin-based chemotherapy. We suggest that the etiology of this case of TMA was a dose-dependent, toxicity mediated, drug-induced TMA due to direct cellular damage, although immune memory, tumor histology and other unknown factors could also be responsible for HUS, whose development has to be taken into account in the decision-making process. Physicians need to maintain a high level of clinical suspicion to diagnose and treat this acute life-threatening disorder.

**Methods:**

**Results:**

**Conclusion:**

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 8-113**

**Poster Title:** Prevalence of polypharmacy and potentially inappropriate medication use in older patients with cancer: a population-based study

**Poster Type:** Evaluative Study

**Submission Category:** Oncology /Hematology

**Primary Author:** yewon Suh, Seoul National University Bundang Hospital; **Email:** restim@hanmail.net

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**Purpose:** As older patients are frequently subjected to polypharmacy (PP), adverse events caused by potentially inappropriate medications (PIMs) and drug-drug interactions (DDIs) have been frequently reported in the literature. PP, PIMs, and DDIs may cause increased risk of falls, frailty, adverse events, and reduced efficacy of certain chemotherapy. Despite these issues, studies on the prevalence of PP, PIMs, and DDIs in older patients with cancer receiving chemotherapy have been conducted in relatively small samples, and nationwide population-based studies are limited. Therefore, we aimed to investigate the prevalence of PP and PIMs during chemotherapy in older Korean patients with cancer.

**Methods:** We used the 2016 National Adult Patient Sample database obtained from the Korean Health Insurance Review and Assessment Service (HIRA) database, comprising 1,327,455 patients. From this database, we selected patients diagnosed with cancer, who were prescribed an anticancer drug during 2016. Anticancer drugs were defined as antineoplastic agents (Anatomical Therapeutic Chemical code (ATC code) L01) and endocrine therapy (ATC code L02). PP was defined as the concurrent use of five or more chronic medications. PIMs were assessed according to the 2019 American Geriatrics Society (AGS) Beers Criteria® for potentially inappropriate medication use in older adults. PIMs that were dependent on their diagnosis or condition were excluded. We only counted once when the same type of PIM was repeated.

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Prevalence of potentially clinically important DDIs that should be avoided in older adults as described in the 2019 AGS Beers Criteria® was also evaluated.

**Results:** In total, 21,956 patients (1.7%) were diagnosed with cancer and prescribed anticancer drugs. The mean age was 74.2 years, and 62.6% of the patients were men. Among them, prevalence of PP was 69.1% and 26.8% of patients were prescribed more than 10 medications. A total of 51,531 cases in 18,860 subjects (85.9%) were prescribed at least one PIM independent of their diagnosis or condition, and 2,681 patients (12.2%) had five or more types of PIMs. PIMs associated with strong anticholinergic effects were prescribed in 64.8% of patients, with first-generation antihistamines being the most commonly used (59.1%), followed by antispasmodics (9.2%), anticholinergic antidepressants (7.8%), and muscle relaxants (3.3%). The most commonly prescribed medication class other than strong anticholinergics was megestrol (26.2%); these were followed by benzodiazepines (25.4%), meperidine (20.3%), metoclopramide (19.8%), and zolpidem (13.2%).

A total of 3,806 (17.3%) subjects experienced at least one DDI according to the 2019 AGS Beers Criteria®. DDIs mostly involved three or more CNS-active drugs (8.3%), two or more strong anticholinergics (7.5%), opioids with pregabalin or gabapentin (5.2%), opioids with benzodiazepines (3.6%), and corticosteroids with NSAIDs (1.4%).

**Conclusion:** This nationwide study showed that there was a high prevalence of PP and PIMs in older patients with cancer in Korea. Recognizing the high prevalence of PP and PIMs might be useful for triggering efforts to implement deprescribing interventions in cancer patients on chemotherapy.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-114

**Poster Title:** Safety of 90Y-ibritumomab tiuxetan treatment in Japanese patients in clinical practice

**Poster Type:** Evaluative Study

**Submission Category:** Oncology /Hematology

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**Purpose:** When undergoing 90Y-ibritumomab tiuxetan (90Y-IT) treatment, patients are discharged from hospital soon after initiation of treatment and followed up as outpatients. Thus it is important to apprise patients of the safety information regarding 90Y-IT treatment. However, studies investigating the safety of 90Y-IT in clinical practice are lacking. We sought to clarify the adverse events arising from 90Y-IT administration to patients in our hospital.

**Methods:** Patients who received 90Y-IT treatment at Hiroshima University Hospital from April 2010 to December 2014 were enrolled in this study. We excluded cases for which we could not collect patient information because of transfer to another hospital after 90Y-IT treatment. We evaluated adverse events retrospectively through medical record. Lowest values of leukocytes, neutrophils, hemoglobin and platelets, in addition to days after administration were used to investigate the grade of hematotoxicity. For non-hematotoxic effects, the grade of adverse events was determined by the symptoms described in the medical records using the Common Terminology Criteria for Adverse Events (CTCAE) version 5.0. We also investigated the relationship between age, sex, the number of prior regimens and hematotoxicity.

**Results:** Eleven patients (median age, 65 years) were enrolled. Patients were classified into 3 groups according to the number of prior regimens: 1, 2–3, or >3, consisting of 5, 4 and 2 patients, respectively. The number of patients with induced grade 3 and 4 hematotoxicity, was 5 and 0 for leukocytopenia, 3 and 2 for neutropenia, and 3 and 2 for thrombocytopenia,



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respectively. The median nadir time was 37 days for leukocytopenia, 37 days for neutropenia, 36 days for thrombocytopenia, and 43 days for anemia. Febrile neutropenia was found in only one case. Granulocyte-colony stimulating factor (G-CSF) administration and platelet transfusion were conducted in 7 and 2 cases, respectively. Four patients had Grade 1 non-hematologic toxicity and the symptoms for each patient were nausea, malaise, dyspepsia and epigastric pain, respectively. Marginal elevation of LDH was found in one case. Hypoalbuminemia and elevation of serum bilirubin, AST, and ALT were not observed. Patients conducted with 2 or more prior regimens tended to experience grade 3 or 4 hematotoxicity more frequently than those with 1 prior regimen.

**Conclusion:** We showed that hematotoxicity is a major adverse event of 90Y-IT treatment and that the nadir time is later than that with conventional anticancer agents. Moreover, in patients with more than 2 prior regimens there is a possibility of more severe hematotoxicity. Medical staff, including pharmacists, should direct attention to the initial symptoms of hematotoxicity, especially in those patients who have received several prior regimens.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-115

**Poster Title:** Part-filled opioid prescriptions reduced opioids dispensed from community pharmacies after orthopedic surgery

**Poster Type:** Descriptive Report

**Submission Category:** Pain Management/Palliative Care

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**Purpose:** Opioid prescription is a common phenomenon for surgical patients on hospital discharge. Rates of unused opioids after surgical procedures range from 34% to 71%. The consequences of these unused opioids is unknown and may result in their misuse and abuse, which is a concern amidst the current opioid crisis. Our study aims to reduce the average oral morphine equivalents (OME) dispensed by community pharmacies between hospital discharge and 4-6 weeks post-total hip arthroplasty (THA) and total knee arthroplasty (TKA).

**Methods:** A quality improvement (QI) study was conducted at a university-affiliated hospital using a before and after study design. A multidisciplinary team including an orthopedic surgeon and resident, pharmacists, an anesthesiologist, an acute pain service nurse practitioner, a nurse-in-charge, a nurse educator, and physiotherapists, evaluated the overprescribing problem and developed the QI intervention. The intervention included part-fill opioid prescriptions along with a pain management pamphlet for patients, which started on December 11, 2018. The amount of OME dispensed from hospital discharge to 4-6 weeks after THA or TKA, when patients stopped using opioids after surgery, the number of opioids left in the first opioid pill bottle, request for additional opioid prescriptions and overall patient satisfaction with opioid management were assessed pre- and post-intervention. These measures were collected from the initial prescription provided at discharge and patient surveys at the first follow-up clinic visit 4-6 weeks after TKA or THA surgery. Data from November 1st to December 10th, 2018 was compared to data from December 11th, 2018 to February 15th, 2019.

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**Results:** From November 1st, 2018 to February 15th, 2019, 276 patients had THA or TKA. The mean survey response rate was 61% (58% before vs. 62% after intervention). Characteristics pre- and post-intervention including mean age (65 years vs. 64 years), gender (42% vs. 45% male ) and type of surgery (60% vs. 58% THA) were similar. After the intervention, the mean OME dispensed from discharge to 4-6 weeks after surgery reduced from 530 to 400mg OME ( $p < 0.00001$ ) and no change in duration of opioid use ( $p=0.3749$ ), number of opioids left ( $p=0.704$ ), additional opioid prescription requests ( $p=0.4335$ ), and overall patient satisfaction with opioid management ( $p=0.1086$ ).

**Conclusion:** The part-filled opioid prescriptions and patient education pamphlets intervention reduced the mean total opioids dispensed from 530 to 400mg OME, which indicates a 25% reduction in number of opioids dispensed from the community pharmacy. Patient satisfaction with overall opioid prescription treatment was not affected suggesting that part-fill opioid prescriptions were not too inconvenient. Since the duration of opioid use, the number of leftover opioids and request for additional opioids did not change, patients were using opioids more sparingly when opioids were prescribed in a part-fill format.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-116

**Poster Title:** Effect of a 24-hour intravenous acetaminophen restriction on opioid consumption in post-operative patients

**Poster Type:** Descriptive Report

**Submission Category:** Pain Management/Palliative Care

**Primary Author:** Kevin Maeda, Cardinal Health; **Email:** kevin.maeda@cardinalhealth.com

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**Purpose:** Multimodal pain management has led to interest in using non-opioid analgesics, including intravenous acetaminophen (IV APAP, Ofirmev®). One potential benefit for its use is its opioid sparing properties. Clinical trials found 46% less morphine consumption over 24 hours in total hip and knee replacement patients that received IV APAP vs. those that did not. This study aims to identify the effects of opioid use following the implementation of a 24 hour IV APAP restriction.

**Methods:** This is a retrospective, single center study evaluating opioid utilization pre- (Jan to Aug 2017) and post- implementation (Sep 2017 to Dec 2018) of an IV APAP restriction. Pre-implementation, there was no restriction on the use of IV APAP and durations greater than 24 hrs were allowed. A restriction was implemented in September 2017 which limited use of IV APAP to 24 hours post-operatively. To measure the effect of the restriction, opioid consumption was compared between groups. Opioid consumption was collected for the entire length of stay for patients who received IV APAP within the study timeframe. Consumption was measured by morphine milligram equivalents (MME) received for opioids on the post-operative order sets. These opioids included injectable hydromorphone and morphine as well as oral oxycodone, hydrocodone/acetaminophen and oxycodone/acetaminophen.

**Results:** 233 patients were identified in the pre-implementation group and 701 in the post-implementation group. The average opioid consumption (MME) was similar between groups (238 pre-implementation vs. 193 post-implementation). The mean±SD MME per opioid before and after implementation were as follows: oxycodone (83.3±115 vs 56.6±118),

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oxycodone/acetaminophen ( $17.3 \pm 71.9$  vs  $32.9 \pm 93.3$ ), hydrocodone/acetaminophen ( $41.3 \pm 142$  vs  $38.5 \pm 91.2$ ), injectable morphine ( $27.4 \pm 75.7$  vs  $28.2 \pm 90.6$ ) and injectable hydromorphone injectable ( $68.5 \pm 419$  vs  $38.2 \pm 134$ ).

**Conclusion:** At this facility, IV APAP was often used for greater than 24 hrs in an attempt to reduce opioid consumption. As a result, it was feared that restriction to 24 hrs may increase opioid consumption. However, implementation of a 24-hour IV APAP restriction program did not increase total opioid consumption in post-operative patients receiving IV APAP.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-117

**Poster Title:** Analysis of the clinical effectiveness of IV acetaminophen within Catholic Health initiatives

**Poster Type:** Evaluative Study

**Submission Category:** Pain Management/Palliative Care

**Primary Author:** Henry Mattern, Catholic Health Initiatives; **Email:** HenryMattern@catholichealth.net

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**Purpose:** To evaluate the impact of intravenous acetaminophen on patient outcomes.

**Methods:** In this retrospective observational analysis, 54,742 patients were identified from 19 hospitals over a 12 month period. The treatment population for this project was defined as patients who received IV acetaminophen, and the control group were those patients who did not. Propensity score matching was used to identify sets of matched pairs for each outcome. Matching was intended to address the underlying biases in our populations due to patient characteristics. These characteristics included basic patient demographics; structural factors such as facility and provider; and comorbidities, expected length of stay, and average income by zip code. There were 5 outcomes analyzed: total length of stay, ICU length of stay, total narcotic use during admission (measured in morphine milligram equivalents [MME]), whether a patient was discharged with a narcotic prescription, and 30-day readmission rate. Tests were run against balanced populations for 5 procedures: Total Knee Replacement, Total Hip Replacement, Caesarean Section, Coronary Artery Bypass Graft (CABG) surgery, and Gallbladder Resection. A combined population with all procedures balanced between groups was also tested for each outcome. With 5 outcomes and 6 populations, there was a total of 30 possible tests. Due to the limited number of observations with ICU length of stay, only the combined population was tested for that outcome. Therefore, matched populations for 25 tests were created.

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**Results:** After matching, there was no significant difference found between the treatment and control groups for the aforementioned patient characteristics. Six of the 25 tests on the clinical effect of IV acetaminophen showed a significant negative treatment effect. Length of stay was shorter for the control group in the combined population (-0.18 day [4 hours],  $p < 0.001$ ). Total narcotic use was lower for the control group in the Caesarean Section (-10 MME,  $p < 0.001$ ), CABG (-26 MME,  $p < 0.001$ ), and combined (-13 MME,  $p < 0.001$ ) populations. The control group was less likely to be discharged with a narcotic prescription for the Caesarean Section (-5%,  $p = 0.01$ ) and combined (-4%,  $p < 0.001$ ) populations. Three additional tests showed no significant effect on total length of stay, but had power greater than 80%. These tests were on the Total Knee Replacement, Total Hip Replacement, and Caesarean Section populations.

**Conclusion:** Patients in the control group had a shorter length of stay, lower total narcotic use, and fewer narcotic prescriptions at discharge. No tests showed a significant difference favoring the IV acetaminophen group.

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**Session-Board #** - 8-118

**Poster Title:** Examine the impact of intravenous acetaminophen on opioid use for postoperative cesarean section patients in a community hospital

**Poster Type:** Evaluative Study

**Submission Category:** Pain Management/Palliative Care

**Primary Author:** Lorenzo Porras, Baptist Health South Florida; **Email:** lorenzop@baptisthealth.net

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**Purpose:** The South Miami Hospital (SMH) pain management study focused on what benefits intravenous (IV) acetaminophen may propose for patients that underwent a cesarean section.

**Methods:** This retrospective study analyzed electronic medical administration records (eMARs) at South Miami Hospital. The patients that were analyzed were those patients that underwent a cesarean section procedure. The included patients' data was collected and summarized for comparison.

**Results:** Overall, morphine equivalence (ME) utilized in the IV acetaminophen group postoperatively was 30.60 mg versus 22.01 mg for the oral acetaminophen group. The average length of stay for the patients treated with IV acetaminophen was 3.65 days, and 3.91 days for oral acetaminophen. The average pain reported for patients treated with IV acetaminophen was 4.57 within the first 24 hours and 4.83 within the first 48 hours. The average pain reported for patients treated with oral acetaminophen was 4.77 in the first 24 hours and 4.55 within the first 48 hours.

**Conclusion:** The study demonstrated that there was not a considerable benefit when IV acetaminophen was administered versus oral acetaminophen postoperatively for patients that underwent a cesarean section.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-119

**Poster Title:** Implementation of a multimodal pain order set and use of therapeutic activity goal as an inpatient opioid reduction strategy: from pilot to national initiative

**Poster Type:** Descriptive Report

**Submission Category:** Pain Management/Palliative Care

**Primary Author:** Kati Shell, Ascension; **Email:** kati.shell@ascension.org

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**Purpose:** Opioid dependence and abuse is a well-known national crisis. CDC Guidelines for prescribing indicate opioid use should be aimed at improving function and quality of life. The purpose of this performance improvement project was to validate results from another site of care to determine if a multimodal pain medication regimen with a Therapeutic Activity Goal dosing strategy for opioids could be implemented to reduce opioid use and keep patient's pain controlled. A Therapeutic Activity Goal is a functional goal, specific to the patient, developed by the care team and patient to advance healing and rehabilitation necessary for discharge.

**Methods:** The multi-disciplinary orthopedic team collaborated to implement a novel pain strategy in a 311 bed community hospital. The intervention included the use of a multimodal pain order set with acetaminophen 975mg every 6 hours and celecoxib 200mg daily, and an as needed opioid. Therapeutic Activity Goals were assigned to each patient and used to determine opioid dosing and administration. If the patient was unable to accomplish this activity without a predetermined, acceptable level of pain, the patient would be administered an opioid from the multimodal order set. Orthopedic patients receiving total hip and total knee arthroplasties, aged greater than 18 were included and excluded were those that were admitted longer than 7 days. Primary outcomes were opioid administration across the length of stay and average pain score during hospitalization. Data was collected from August to December 2017 and compared to baseline data from January to December 2016.

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**Results:** The opioid administration in oxycodone equivalents decreased from an average over the inpatient stay of 164mg at baseline to 39 mg, which represented a 76% decrease in opioid usage ( $p<0.05$ .) Pain scores showed a reduction of 4.5 at baseline to 4 during the pain pilot ( $p<0.05$ .)

**Conclusion:** Use of the multimodal order set with associated Therapeutic Activity Goals for as needed pain medication reduced the amounts of opioid the post-surgical patients received, and improved pain scores. The success of this pilot along with another pilot site has facilitated the expansion of the multimodal order set and Therapeutic Activity Goal across a large healthcare organization.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-120

**Poster Title:** Use of lidocaine for renal colic in a community hospital

**Poster Type:** Evaluative Study

**Submission Category:** Pain Management/Palliative Care

**Primary Author:** Jean Stoerger, Hackensack Meridian Health; **Email:**  
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**Purpose:** Renal colic presents as acute radiating pain from the flanks to the groin, accompanied by microscopic hematuria, nausea and vomiting. Pain occurs due to the passage of a stone from the ureter due to obstruction of the urinary flow, increased pressure on the urinary tract wall, inflammation and edema. In light of the opioid crisis, the emergency department providers are committed to consider alternative pain management approaches.

**Methods:** Historically, non-steroidal anti-inflammatories and opioid are used for these patients. Research has demonstrated that IV lidocaine can be effective to treat patients suffering from acute renal colic but no guidelines existed to safely administer IV lidocaine for acute renal colic in a community hospital. A literature search was conducted to identify studies utilizing IV lidocaine for pain management both in the emergency department and post-surgical pain. Studies looking at the effectiveness of lidocaine IV for the treatment of pain, and more specifically acute renal colic, studies whose primary endpoint included an evaluation of the safety of administration in an emergency room setting were also evaluated. At this time a decision was made to limit our implementation to the treatment of renal colic as the literature for other pain management indications did not demonstrate the same efficacy. Once the studies were identified, an analysis of dosing, frequency and monitoring parameters were reviewed and a dosing strategy was determined with consultation with the emergency room physician champion. IV infusion rates, contraindications and maximum doses were all determined by literature review. The emergency room nurse educator was consulted for nursing care parameters. These instructions included the recommendation of a 12 lead EKG prior to infusion, and observation and monitoring parameters. Education was developed for the nursing staff to safely administer IV lidocaine to patients with renal colic.

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**Results:** As a result, 88 patients presented to the emergency department with the diagnosis of renal colic, only 7 had documented contraindications to IV lidocaine. 81 patients who were eligible for IV lidocaine received treatment with non-steroidal anti-inflammatory agents, and 2 of those patients were treated with IV lidocaine after failing ketorolac and morphine administration. No cardiac or other toxicity related adverse effects were identified, and patient's pain was satisfactorily controlled.

**Conclusion:** In conclusion, it has been demonstrated that a safe and effective program can be developed to administer IV lidocaine to patients in a community hospital emergency room. Increased physician education should be utilized to increase the awareness of IV lidocaine as a treatment alternative to patients who present with a diagnosis of renal colic.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-121

**Poster Title:** Pain range order analgesic protocol improves post-operative pain management in laparoscopic appendectomy patients

**Poster Type:** Evaluative Study

**Submission Category:** Pain Management/Palliative Care

**Primary Author:** Tzong-Kwei Yau, Department of Pharmacy, Beijing United Family Hospital;

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**Purpose:** As a Joint Commission International certificated healthcare agency, Beijing United Family Hospital adopts particularly serious attitude towards pain management. From June 2018, Beijing United Family Hospital initiated a pain-range order analgesic protocol regarding to World Health Organization analgesic ladder in general surgical post-operative patients. However, adoption of stepwise approach of World Health Organization analgesic ladder to post-operative pain management has been questioned by various healthcare professionals. The goal of this research was to evaluate the effectiveness of a range order analgesic approach for patients after laparoscopic appendectomy, a minor to intermediate minimally invasive procedure.

**Methods:** This is a retrospective study of patients who were hospitalized more than 24 hours after laparoscopic appendectomy at Beijing United Family Hospital, where a pre-intervention group (54 consecutive patients) from June 2017 to May 2018 is compared to a post-intervention group (42 consecutive patients) from June 2018 to May 2019 after implementation of pain range order analgesic protocol on pro re nata analgesics orders. Population who were under 12 years old or older than 65 years old, either underwent per-operative pain or chronic pain were excluded from this study. Data collected included patient demographics, operation length, post-operatively hospitalization length and pain score and so on. Patient pain assessments were performed every 0.5 hours to 2 hours. The primary outcomes are the times of moderate-to-severe pain within post-operative 24 hours, average time of moderate-to-severe pain in each patient. A survey of attitude and practice of analgesic use in post-operative patients among medical staffs in general surgical ward was conducted.

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**Results:** The proportion of patients who experienced moderate- to-severe pain (Visual Analog Scale 4-10) post-operatively decreased after implementation of range order analgesic protocol: 63 percent versus 48 percent. The average times of undergoing moderate-to-severe post-operative pain within 24 hours was decreased from 1.46 (n equals 34) to 1.14 (n equals 20). Average post-operatively hospitalized length decreased from 47 hours to 42 hours. Nursing staff attitude surveys of pre-/post- intervention revealed standardized pain range order reduced burden of decision making and standardized interpretation of pro re nata analgesic orders.

**Conclusion:** These findings illustrate pain-range order analgesic protocol improves post-operative pain management of laparoscopic appendectomy patients. Study such as patient satisfaction survey on post operative pain management will be done in the future.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-122

**Poster Title:** Assessment of the knowledge and perception of probiotics use in acute infectious diarrhea in children among Lebanese pediatricians

**Poster Type:** Descriptive Report

**Submission Category:** Pediatrics

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**Purpose:** Probiotics use has increased drastically over the past couple of years, and has accompanied the ascent of antibiotics resistance. With the large diverse availability of probiotics strains and brands in the Lebanese market, a major concern has emerged, which is the prescribers' extent of the awareness and knowledge of probiotics and their use. This study was conducted to assess the Lebanese pediatricians' knowledge, attitude and practice of probiotics in acute infectious diarrhea in children.

**Methods:** A cross sectional multi-center observational study was performed. It included Lebanese pediatricians who are a member of the Lebanese Order of Physicians as well as the Lebanese Pediatric Society, and provided us with an informed consent to participate in the study. The participants were selected by convenience; they were required to fill a comprehensive questionnaire made up of five parts including demographics, knowledge about probiotics, attitude, practice, and knowledge about acute infectious diarrhea in children. A total knowledge score of 32 points (12 points for probiotics' knowledge and 20 points for their proper use in acute infectious diarrhea) was computed. The primary outcome was to assess the knowledge of pediatricians about probiotics and its use in acute infectious diarrhea in children. As for the secondary outcome, it included the association of different variables on the knowledge score.

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**Results:** Out of 138 eligible pediatricians, 126 completed the questionnaire. Ninety one point one percent of pediatricians were familiar with the proper definition of probiotics whereas 39.8% acknowledged the correct definition of acute infectious diarrhea. Eighty three point one percent of participants believed that probiotics are beneficial and 98.6% prescribed probiotics. The reported median knowledge score was 22 [18-25] points. Linear regression showed that females had a higher knowledge score than males (B coefficient=2.16, P value=0.013), and those prescribing probiotics had a higher knowledge score when compared to those who don't (B coefficient=2.93, P value=0.045). As for the consultations number per day, those examining 10-20 patients per day had a higher knowledge score than those examining more than 20 patients, and less than 10 patients per day (B coefficient=1.46, P value=0.017).

**Conclusion:** The data showed a good pattern of prescription of probiotics along with an acceptable knowledge of probiotics and their use, precisely in acute infectious diarrhea, yet it could be further improved. This study emphasizes the importance of continuous education for pediatricians via conferences, lectures, or workshops in order to provide the optimal health care for their patients.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 8-123**

**Poster Title:** Knowledge and awareness of mothers regarding reconstitution, administration, and storage of antibiotic suspensions for pediatrics: a cross-sectional study in Lebanon

**Poster Type:** Descriptive Report

**Submission Category:** Pediatrics

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**Purpose:** In Lebanon, most of the antibiotics prescribed for pediatrics are usually dispensed as oral suspensions together with measuring devices. For appropriate use of antibiotic suspensions, parents should be aware of the correct reconstitution, concentration, dose administration, duration of treatment, and storage conditions.

Among these factors, confusion and errors in terms of dosing may result from the wide range of measuring devices types and styles that vary in terms of increments and units of measurements.

The objective of this study was to evaluate the appropriate knowledge and awareness regarding antibiotic suspensions reconstitution, dose administration, duration, and storage conditions among Lebanese mothers.

**Methods:** This study is a questionnaire based cross-sectional descriptive study conducted among the Lebanese population, where a sample of 300 mother was met and asked to answer a face to face questionnaire.

This study was conducted at several community pharmacies between October 2018 and June 2019.

**Results:** Preliminary results showed that 75.6% of mothers noted that they read instructions, among which only 66 % could understand these instructions. 80% of mothers asked

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pharmacists advice regarding reconstitution and among which 90% asked to reconstitute the antibiotic at the community pharmacy.

seventy-five percent of mothers used accompanied measuring device while remaining preferred changing to other available devices.

Ninety percent of mothers claimed that they usually shake the suspension bottle before use while 88% claimed that they usually store the reconstituted antibiotic in the refrigerator.

**Conclusion:** The preliminary results reflect a good level of knowledge and awareness regarding studied variables. However, there is a need to emphasize more importance of usage of accompanied measuring devices and avoidance of switching. Also, pharmacists are recommended to explain more the correct directions for dose administration, and to counsel parents about storage condition and to refrigerate only when it is recommended by the manufacturer.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-124

**Poster Title:** Comparative analysis of acute bronchitis medicines application in pediatric outpatient between public and private hospitals

**Poster Type:** Evaluative Study

**Submission Category:** Pediatrics

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**Purpose:** The study aims to compare the application of pediatric acute bronchitis in public and private hospitals, and further to find out their differences and the reasons of irrational drug use, so that to provide important supports for rational acute bronchitis use in children.

**Methods:** Two hundred electronic prescriptions from August to December 2018 at public and private hospitals were randomly collected. Retrospectively analysis was carried out on these pediatric prescriptions, the drug use and unreasonable prescriptions were reviewed.

**Results:** Proprietary Chinese medicines, especially combination proprietary Chinese medicine with chemical medicines, are used more widely in public hospital than in private hospitals. There are more types of drugs used in public hospitals than in private hospitals. The use of antimicrobial and expectorant drugs were similar in public and private hospitals. The types of antiasthmatic drugs used in public hospitals were different from those in private hospitals. In public hospitals, montelukast sodium chewable tablet was most commonly used. While in private hospitals, inhalation of salbutamol sulfate solution was most commonly used. Public hospitals and private hospitals have different tendency to use antiallergic drugs. Loratadine syrup was most commonly used in public hospitals, while cetirizine hydrochloride drops are mostly used in private hospitals. The reasons for unreasonable drug use including repeated medications, improper drug choice and computer input errors are usually appeared in public

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hospitals, while unreasonable dosage and over-prescription are usually appeared in private hospitals.

**Conclusion:** The medications for acute bronchitis in pediatric outpatients of public and private hospitals have their own characteristics, and the rationality of medication still both needs to be strengthened, but the direction and degree of improvement are different.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-125

**Poster Title:** Assessing effects of neonatal hypoglycemia protocol change to oral glucose gel administration

**Poster Type:** Evaluative Study

**Submission Category:** Pediatrics

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**Purpose:** Neonatal hypoglycemia may require interventions which interfere with mother-baby bonding and breastfeeding, including formula feeding, intravenous dextrose, and neonatal intensive care. Oral glucose gel is a non-invasive, inexpensive intervention, to quickly correct hypoglycemia. The neonatal hypoglycemia protocol at a community-based hospital was updated to include primary treatment with oral glucose gel. Goals included decreasing other interventions and increasing likelihood of breastfeeding in hospital and per discharge feeding plan. Threshold for treatment was changed from glucose less than 36 mg/dL to less than 41 mg/dL. The purpose of this study was to evaluate the effects of the protocol change.

**Methods:** The institutional review board approved this retrospective chart review study. Glucose results for newborns admitted prior to (8/1/17 through 1/31/2018, Timeframe I) and after protocol change (8/1/2018 through 1/31/2019, Timeframe II) were reviewed. Neonates under well newborn care with initial glucose less than 36 mg/dL and less than 41 mg/dL were included based on the respective hypoglycemia protocol. Patients were excluded if they were delivered outside of the hospital's labor and delivery unit or admitted to neonatal intensive care at the time of glucose check. Mean initial glucose result, time to first glucose, qualifiers for glucose screening, first feeding within one hour of birth, type of first feeding, exposure to any formula or donor milk during admission, and discharge feeding plan were evaluated. Additionally, adherence to the corresponding neonatal hypoglycemia protocol was reviewed, including time to primary treatment (feeding in Timeframe I and glucose gel in Timeframe II)

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and time to glucose recheck. Subsequent admission to neonatal intensive care and administration of intravenous dextrose were evaluated. Study results were not evaluated for statistical significance, but were descriptive in nature.

**Results:** A total of 868 charts were reviewed. Fourteen patients met criteria for hypoglycemia treatment in each group. Average initial glucose result, time to first glucose, qualifiers for glucose screening, first feeding within one hour of birth, type of first feeding, and admission to neonatal intensive care were similar between the two groups. Thirteen neonates in Timeframe I were exposed to formula or donor milk during admission, while 8 patients were in Timeframe II. The number of patients with discharge feeding plan of breastmilk increased from 2 patients in Timeframe I to 7 patients in Timeframe II. Discharge feeding plan of formula was similar between groups, with 3 patients in Timeframe I and 2 patients in Timeframe II. Combination feeding plan decreased from 9 patients to 5 patients. Intravenous dextrose was administered to 4 patients in Timeframe I and 1 patient in Timeframe II. Mean time to primary treatment, as well as mean time to recheck glucose decreased from 66 to 22 minutes and 106 to 83 minutes, respectively.

**Conclusion:** Change in neonatal hypoglycemia protocol to include oral glucose gel as the primary treatment demonstrated a decrease in mean time to primary treatment and glucose recheck. Fewer neonates were exposed to formula or donor milk during their hospital admission and an increase was seen in the number of neonates discharged with breastmilk as the feeding plan. Use of intravenous dextrose was lower in the oral glucose gel group as well. Further study involving a larger patient group would be necessary to determine statistical significance.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-126

**Poster Title:** Assessment of outpatient palivizumab compliance rates after discharge following a pharmacist reminder call to primary care providers

**Poster Type:** Evaluative Study

**Submission Category:** Pediatrics

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**Purpose:** Palivizumab is a monoclonal antibody used to prevent serious lower respiratory tract infections caused by respiratory syncytial virus (RSV) in high-risk infants and children. Per American Academy of Pediatrics (AAP) recommendations, at our institution palivizumab is provided at discharge for high-risk patients to prevent community-associated RSV transmission. Monthly follow-up doses are to be provided by primary care providers for the duration of RSV season. As low compliance increase morbidity and mortality, this project was designed to assess outpatient compliance rates and to determine if a reminder call by a pharmacist increased compliance for the first dose after discharge.

**Methods:** All patients that received a dose of palivizumab at discharge between November 2017 and March 2018 were included in this analysis. Pharmacists called the primary care provider for each patient one week prior to the first required dose after discharge. If the patient was not scheduled to receive palivizumab at their PCP's office, the office was asked to schedule an appointment with the patient. For those patients where this reminder was necessary, another follow-up call one week after the required dose was made to determine if the reminder call was successful in eliciting a dose. If the dose was still not provided in spite of the reminder, the PCP office was asked to identify barriers to access, including insurance coverage. Patients were excluded from the analysis if the follow-up dose fell outside the RSV season; if the patient was discharged to a step-down facility; if the dose was provided before discharge; if the PCP was unknown; if the patient was readmitted with RSV; or if the patient received multiple inpatient doses.

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**Results:** A total of 86 palivizumab doses were provided for 76 unique patients in the 2017-2018 RSV season, of which 46 patients were ultimately included in the analysis. There were 29 females (63%) and 17 males (37%) with an average age of 4.67 months at the time of the first dose. After discharge, 33 (71.7%) patients had an appropriate follow-up scheduled with their PCP for a follow-up palivizumab dose. After the reminder call, an additional 5 patients received a dose and increased compliance to 82.6%. Of the 8 patients that did not receive a dose, 7 had commercial insurance. Insurance coverage, including the time needed to complete prior authorizations, was reported as the biggest hurdle in the timely administration of follow-up doses. Of the 13 patients that were initially non-compliant, discharge summaries were also found to lack appropriate guidance on the need for follow-up doses, including lack of a specific date for the administration of the initial inpatient dose and/or specific date for the follow-up dose.

**Conclusion:** This analysis of compliance rates of palivizumab showed room for improvement in ensuring outpatient compliance. We found that a significant amount of complex information is transmitted to a PCP office upon discharge, and discrete fields that provide specific instructions on follow-up needs is a necessary component of discharge summaries. Additionally, in contradiction to published data, our study found that patients with commercial insurance had more barriers to access than those with Medicaid. Follow-up reminder calls improved compliance, and calls made soon after discharge may improve compliance further. This data supports the need for dedicated personnel to coordinate outpatient palivizumab.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 8-127**

**Poster Title:** Comparison of mean morphine milligram equivalents in pediatric patients undergoing appendectomy, external ventricular drain placement, and spinal fusion repair that received oral versus intravenous acetaminophen

**Poster Type:** Evaluative Study

**Submission Category:** Pediatrics

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**Purpose:** Intravenous acetaminophen is significantly more expensive than oral or rectal formulations. Numerous studies to date have shown that oral or rectal formulations of acetaminophen are as equally efficacious as the intravenous formulation in reducing opioid requirements in the post-operative period. At our institution, costs associated with the use of intravenous acetaminophen have increased exponentially, yet 76% of doses are being given within 4 hours of another oral medication. In light of this, it was important to quantify the clinical benefit of a more costly alternative by analyzing post-operative opioid requirements in patients who received concomitant intravenous or oral acetaminophen.

**Methods:** This study is a pilot analysis of post-operative opioid requirements in pediatric patients who received concomitant intravenous or oral acetaminophen as part of a multimodal approach to the treatment of pain after a procedure. The analysis included all patients who underwent an appendectomy, external ventricular drain placement, or spinal fusion repair in 2017, and also received at least four (4) doses of intravenous or oral acetaminophen in the first 36 hour post-operative period. Patients who received a combination of both formulations were excluded. The mean intravenous morphine milligram equivalents (MME) of the total opioid requirement per patient was compared between those patients who received intravenous versus oral acetaminophen.

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**Results:** Of 103 total patients, 53 patients were included in the analysis, of which 71.6% received intravenous acetaminophen post-operatively. The majority of the patients were admitted for an appendectomy (67.9%). Patients who received the intravenous formulation had a higher number of acetaminophen doses (5.03 versus 4.13 doses,  $p=0.001$ ) and were not significantly different in age (9.24 years vs. 8.07 years,  $p=0.43$ ). The mean total MME per patient in the first 36 hour post-operative period was higher in patients who received intravenous acetaminophen versus oral acetaminophen (6.16 mg vs. 5.23 mg,  $p=0.65$ ), though this did not reach statistical significance. The majority of the patients received intravenous morphine (90.5%). In a subgroup analysis of appendectomy patients, the mean MME required per patient in the first 36 hour post-operative period was higher in the intravenous group compared to the oral group (8.3 mg vs. 3.60 mg,  $p=0.024$ ).

**Conclusion:** In this pilot analysis of multiple procedures, the data suggests that there are no significant differences in opioid requirements in patients who received intravenous versus oral acetaminophen in the first 36 hour post-operative period. Total mean MME was higher for appendectomy patients who received intravenous acetaminophen. Due to the high cost of intravenous acetaminophen, careful considerations should be made at a formulary level regarding appropriate restriction criteria, and utilization should be analyzed on an on-going basis. This data supports the need for a more robust review in pediatric patients across a larger cross-section of patients and procedures.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-128

**Poster Title:** Parental knowledge and practice on fever and use of antipyretics: a cross-sectional study in Bekaa Valley, Lebanon

**Poster Type:** Evaluative Study

**Submission Category:** Pediatrics

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**Purpose:** Fever is one of the most common reasons for seeking medical care in pediatrics. Many parents consider it to be a disease by itself, while others treat fever as a good sign of an immune response. The proper management and appropriate utilization of antipyretic agents remain a challenge for parents in self-care of their children. The purpose of this study is to assess parental knowledge about fever and antipyretic agents use, and the impact of this knowledge on parental practice towards childhood fever.

**Methods:** This cross-sectional study was approved by the institutional review board, and targeted parents who have a child aged between 3 to 5 years old. 1300 questionnaires were distributed via schools to the parents in Bekaa valley in Lebanon between October and April. The primary objective of the study is to assess parental knowledge, attitude and practice towards fever. The secondary outcomes are to determine the association between parental knowledge and practice, and to establish the practice concerning medical consultation, antipyretics proper use, frequency, and combination, as well as to verify the correct antibiotics indication in treating fever.

**Results:** A total of 808 mothers and fathers participated in the study with a response rate of 62 percent. Among them, 339 parents (42.7 percent) defined fever as body temperature equal to 38.5 degrees Celsius; and 213 parents (28 percent) consider fever as a good sign for immune

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response. Most parents (65.5 percent) were found to use antipyretics in the setting of temperature of less than 38.5 degrees Celsius; however, 520 parents (68.3 percent) don't alternate between 2 antipyretics, and 18.8 percent believe that there is no difference between different dosage forms. moreover, 157 parents (20 percent) believe that there is a need for antibiotics regardless of the fever etiology.

**Conclusion:** Parental awareness regarding fever assessment and management must still be appropriately and carefully addressed by primary care givers and community pharmacists. Hence, further community education for parents about fever will improve the practice outcomes in the pediatric population.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 8-129**

**Poster Title:** Successful implementation of an antibiotic stewardship program in the neonatal intensive care unit of a middle income country

**Poster Type:** Descriptive Report

**Submission Category:** Pediatrics

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**Purpose:** To reduce unnecessary and inadequate antibiotic usage by implementing an antimicrobial stewardship program in level IV NICU at the American University of Beirut Medical Center, an academic tertiary referral medical center in Beirut, Lebanon.

**Methods:** A multidisciplinary team consisting of a neonatologist, an ID physician and a pediatric clinical pharmacist was formed. Unit specific algorithms to guide antibiotic prescribing in neonatal early onset sepsis and late onset sepsis were developed with focus on medical team education, daily and weekly prescriber audits and feedback. An interrupted time-series analysis to evaluate the effect of our ASP was performed. Data on neonatal Antibiotic Usage Rate (AUR) was measured using Length of Therapy (LOT) per 1000 patient days, defined as the number of calendar days during which a patient was on antibiotics regardless of the number of antibiotics used. Data presented in this abstract includes pre-implementation (calendar year 2015) and post-implementation (April 2017 through October 2018) phases obtained through retrospective chart review of patients admitted to our NICU.

**Results:** Antibiotic use among all neonates admitted to NICU decreased by 43% (67% to 38%) post implementation. Similarly, neonates requiring more than one course of antibiotic decreased from 36% to 27%. AUR decreased by 42% from 400.8 per 1000 patient days to 202 per 1000 patient days after 1 year of ASP implementation. Subsequently, average length of stay

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decreased by 29% from 27.37 days in the baseline data to 19.43 days post implementation. The Antibiotic Stewardship program has resulted in 85% reduction in empirical antibiotic treatment.

**Conclusion:** The ASP has been successful in optimizing antibiotic prescribing among neonates. The results have shown improvement in patient care as reflected by shorter antibiotic courses and length of stay without increase in morbidity and mortality. Further refinement of the ASP is underway through optimizing the antimicrobial utilization measures and implementing automatic stop orders interventions provided by our new electronic health record. Other improvement projects include the development of national guidelines adapted to our resistance patterns and prevalent organisms and starting a collaboration network with others NICUs at the national level.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-130

**Poster Title:** Evaluation of pharmacist-driven discharge medication delivery and counseling in a pediatric hospital

**Poster Type:** Descriptive Report

**Submission Category:** Pediatrics

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**Purpose:** The integration and expansion of transitions of care into inpatient care is a key initiative in pharmacy practice. Non-compliance with filling prescriptions was identified as a top cause of readmissions (Rosen, et al). A partnership with an outpatient pharmacy was formed to dispense and transport discharge prescriptions to the hospital for decentralized pharmacists to deliver to patients and families. Patients and families were counseled on proper use, administration, monitoring, and possible side effects. This initiative was designed to safely dispense new medication therapy, deliver medications, and provide medication counseling prior to discharge.

**Methods:** By working in close collaboration with care-coordinated hospital teams, a new process was created that allowed patients to receive all discharge medications and bedside counseling prior to leaving the hospital. Providers, nurses, social workers, case managers, and pharmacy staff were educated about the Meds to Beds (M2B) program prior to the start. Fliers, power point presentations, and personal conversations were used for staff education. The M2B program went live on January 2019. Initially, a limited number of patient care units were piloted; after showing success, the M2B program was expanded to a majority of the pediatric inpatient departments. Medications were filled at University Hospital Outpatient Rainbow Pharmacy, located off site from the inpatient hospital. A final comprehensive review, bedside medication delivery, and counseling was provided by an inpatient pediatric pharmacist. Medication education including indication, administration, possible side effects and proper storage was provided to the patient and family. The family was given opportunities to ask

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additional questions. Documentation of medication counseling and additional interventions was completed prior to patient discharge.

**Results:** The M2B program started January 2019. Number of patients who participated in M2B were 180. Number of prescriptions filled during this time period 659. The amount of prior authorizations completed by pharmacy staff was 37 and patient experience, Consumer Assessment of Healthcare Providers and Systems (CAHPS), medication domain scores for the period were: January 76.61%, February 78.95%, March 83.94%, April 81.67%, and May 100%. The target CAHPS goals for 2019 were 79.59% with a benchmark of 81.19%.

121 patients using M2B services were tracked and monitored for readmission. Only 8 patients were re-admitted to the hospital 30 days after discharge. 95% of patients did not get hospitalized after 1 month. We did not include 58 patients that received M2B services in May since we would not be able to check their readmission rate after 30 days.

**Conclusion:** The M2B program and medication discharge counseling was helpful in addressing patients' needs and concerns prior to discharge. Significant interventions were made that addressed appropriate dose, frequency, and cost of medication. The feedback from providers, nurses, care coordinators, and families about M2B service was positive. Suggestions for improvement were addressed to improve the program in the future.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-131

**Poster Title:** Standardization of antifungal prophylaxis in pediatric patients with cancer

**Poster Type:** Descriptive Report

**Submission Category:** Pediatrics

**Primary Author:** Paige Shapiro, American Family Children's Hospital, University of Wisconsin Hospitals and Clinics; **Email:** pshapiro3@wisc.edu

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**Purpose:** Many pediatric cancer patients require fungal infection prophylaxis depending on their risk for developing an invasive fungal infection. While several national guidelines exist recommending fungal infection prophylaxis in cancer patients, no consensus recommendation for fungal infection prophylaxis in pediatric cancer patients exists. We attempt to use primary literature, current guidelines, and interdisciplinary coordination to establish an institutional standard for the use of antifungal agents to prevent invasive fungal infections in pediatric cancer practice.

**Methods:** Pharmacists and student pharmacists evaluated randomized controlled trials using Pubmed and Cochrane Cancer Network Register of Trials to assess primary literature. We also searched disease-specific Children's Oncology Group cancer treatment protocols well as National Comprehensive Cancer Center (NCCN) guidelines and Infectious Disease Society of America (IDSA) guidelines, despite these guidelines lacking specific pediatric recommendations. Providers in the hematology/oncology unit of a children's hospital were surveyed about antifungal prescribing preferences for standard and high risk acute lymphoblastic leukemia, acute myelogenous leukemia and high risk neuroblastoma before and after presentation of current literature recommendations.

**Results:** Eight providers completed the pre- and post-antifungal practice surveys. Based on their responses, consensus fungal prophylaxis was achieved in the pediatric cancer clinician group. Standardized orders for antifungal therapy were incorporated into electronic chemotherapy treatment plans for diseases as developed by consensus.

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**Conclusion:** Fungal prophylaxis recommendations, while well-defined for adults with cancer, are lacking in pediatric cancer patients, leading institutions to create unique guidelines to prevent fungal infections. In addition to achieving a consensus for antifungal prescribing, it was also deemed a best practice to incorporate standardized orders into existing electronic chemotherapy treatment plans to aid in practice standardization. By incorporating our consensus into treatment plans we are using ISMP's highest level of effectiveness to create forcing functions at the level of prescribing. This will reduce errors in prescribing and ensure our antifungal guidelines are upheld.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-132

**Poster Title:** Using reflective accounts to identify the psychosocial effects of placebo-based medication adherence simulation

**Poster Type:** Descriptive Report

**Submission Category:** Precepting/Preceptor Skills/Education and Training

**Primary Author:** Uea Matala, University of East Anglia; **Email:** r.matala@uea.ac.uk

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**Purpose:** Fifty percent of patients do not take their medications as prescribed. Persistent medication non-adherence is associated with high mortality rates. Evidence suggests that pharmacists are less likely to attempt to identify non adherence compared to nurses and doctors. However patient counselling on medicines and how to use them is frequently central to their role.

Simulations have been shown to improve assessment performance in pharmacy students, however they have not shown an improvement in the psychosocial aspects of adherence. The purpose of this evaluation was to identify the benefits of locating a medication adherence simulation exercise within the pre-registration training year.

**Methods:** Trainees (n=76) were invited to participate in the simulation which involved taking pre-dispensed medicines (sweets) for seven days.

Trainees reported on their adherence in real time using an online reporting form. This involved stating whether each dose was taken and reasons for omitting doses. At the end of the simulation they wrote a reflective account on their experience of the process, impact of regular medication taking on their daily life and how this has changed their practice (n=20). A focus group (n=7) was conducted to gather perspectives and identify improvements for the training simulation.

Quantitative analysis was conducted on data collected from self-reported adherence in order to identify rates and reasons for non-adherence. Content analysis of the reflective accounts and focus group discussion was used for qualitative evaluation in order to identify the psychosocial

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impact and ascertain the benefit of conducting the simulation on pre-registration trainees as opposed to undergraduate students.

Ethics committee approval was not required as this was an evaluation of an educational exercise.

**Results:** Of 52 volunteers, 28 completed the simulation fully. Adherence to 42 doses in each regime over seven days ranged from 31-95% with an average of 71% adherence. Of a total of 1176 possible doses, 24% were missed (n=283). Reasons include: forgetting (12.24% n=144), medication unavailable (6.63% n=78), intentional omission (2.47% n=29), alternate dosage timing (1.19% n=14), poor taste (0.6% n=7), embarrassment (0.34% n=4) and packaging issues (0.09% n=1). In 0.51% n=6 of cases no reason was stated.

On completion trainees reported a greater understanding of the barriers patients face, putting into context their undergraduate teaching. They found taking the complex regime more difficult than anticipated and acknowledged that many patients take far more medications. Trainees valued new level of empathy they felt toward patients taking regular medications.

Trainees acknowledged that undertaking this experience whilst in practice has provided a more realistic experience than if it were located within the undergraduate degree. Trainees reported changing their practice regarding asking questions about non-adherence as a result.

Suggestions of future improvements to the exercise include provision of placebo tablets rather than sweets, printed patient information leaflets, paper self-reporting forms and extended simulation period to three weeks.

**Conclusion:** The simulations provided similar outcomes to previous reported studies; increased empathy and understanding of the reasons for non-adherence. However, in addition, trainees reported that they were more likely to attempt to identify and explore non-adherence with patients in their practice.

Consensus was that all trainees should experience this type of simulation in the pre-registration training year as undergraduates do not have a fixed routine or regular contact with patients to put their learning into context.

This service evaluation has informed some direct changes to the simulation exercise, which include extending the time period and multiple methods of recording adherence.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-133

**Poster Title:** Evaluating the effectiveness of using a web based video and audio conferencing cloud platform to conduct an interactive lecture remotely to pharmacy students in Japan

**Poster Type:** Descriptive Report

**Submission Category:** Precepting/Preceptor Skills/Education and Training

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**Purpose:** According to Gallup's polls, American pharmacists have been ranked as one of the most trusted professionals. American pharmacy practice model is highly regarded in Japan. To help Japanese future pharmacists develop an international perspective, understanding the training and practice of pharmacists in the United States would be beneficial. However, it is not easy to connect with American pharmacists. Using a web-based video and audio conferencing cloud platform, Japanese pharmacy students were able to interact and communicate with American pharmacists. This project will assess and report the effectiveness of using this video conference in providing lecture remotely.

**Methods:** American pharmacists provided interactive lecture to Japanese pharmacy students via a web-based video and audio conferencing cloud platform. The objective of the lecture was to introduce Japanese pharmacy students to the roles, education and training of pharmacists in various practice settings in United States. The lecture time including questions and answers section was 30 minutes. Students were allowed to submit questions post lecture for questions that were not able to answer during lecture and question and answer section. At the end of the lecture, a web-based questionnaire survey was conducted. The questionnaire was designed to assess the students' level of understanding of the lecture's content materials, and the students' opinion on the lecture's format including the video's image and sound quality. Refer to the questionnaire survey for more details.

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**Results:** The answers to the questionnaire survey were collected from 146 people. More than 90% of people surveyed were able to understand the lecture content. Regarding the lecture's video format, 40% of opinions suggested the video's image quality need improvement, but there was no problem reported with video's sound quality. 88% of the survey's participants were positive about the web-based video conference lecture format compared to the traditional in-person lectures where the lecturer is present in the classroom. These results suggested that the location of the professor or lecturer (i.e. the lecturer is present in the classroom or lecture remotely from offsite) has little effect or impact on the students' learning.

**Conclusion:** Web-based video and audio conferencing cloud platform is a useful and effective method to provide lecture or presentation remotely. The same educational interactive learning effects can be achieved as in traditional face-to-face lecture environment where the lecturer stands in front of the classroom.

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**Session-Board #** - 8-134

**Poster Title:** Simulated inter-professional clinical decision making during the pre-registration training year to enhance multi-professional working; a service evaluation

**Poster Type:** Descriptive Report

**Submission Category:** Precepting/Preceptor Skills/Education and Training

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**Purpose:** Hospital trainee pharmacists in the UK normally develop their clinical decision making skills via accompanied ward visits. Their learning is mainly shaped by pharmacy-led activities on wards. Ongoing education reform led by Health Education England requires work based educators to promote a multi-professional approach to education where appropriate. Within this education development project we have used clinical case-based scenarios to allow for simulated clinical decision making with different healthcare professionals working together. The aim was to identify the potential benefits of this approach to the different healthcare professionals.

**Methods:** Trainee pharmacists from East of England hospitals were allocated to small inter-professional learning groups (2-3 members). The groups consisted of medical students (year 5), foundation year 1 doctors (FY1), foundation year 2 doctors (FY2), trainee Advanced Clinical Practitioners (tACP), trainee nurses and trainee pharmacists. Groups were asked to discuss case-based scenarios, prior to making a clinical decision on appropriate treatment choices. The scenarios were written by clinical educators and piloted to ensure validity. Each case was followed by group discussion with a clinical educator, who facilitated discussion and addressed questions raised.

Individual participants were asked to complete a questionnaire at the start of the session (utilising rating of statements on a 1-5 Likert scale) to ascertain the learner groups' perceptions

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on the extent of their involvement in clinical decision-making and ability to contribute to evidence-based, safe prescribing.

A post-session questionnaire (utilising rating of statements on a 1-5 Likert scale and several open questions) was used to evaluate perceived benefits for all participants. Trainee pharmacists were invited to a follow-up focus group discussion where they expressed their views regarding the inter-professional learning experience and perceived benefits to their learning. Data analysis was largely descriptive with thematic analysis for responses to open questions and focus group discussions.

Ethical approval was obtained from the UEA Faculty of Medicine and Health Ethics Committee under "Service evaluation".

**Results:** Inter-professional learning sessions were conducted at three different hospital sites. Learner groups included; trainee pharmacists [n=28], medical students [n=15], FY1s [n=4], FY2s [n=2], tACPs [n=8] and trainee nurses [n=5]. Clinical educators assigned participants into groups (2-3 members) at the start of each session.

Data from pre-session questionnaires highlighted differences in perceptions between learner groups with regards to the extent of their involvement in clinical decision making. Trainee pharmacists had a higher median rating than medical students, but lower than nurses, tACPs, FY1s and FY2s.

The participants' perceptions captured in the post session questionnaires indicated that all healthcare disciplines found the session useful and would recommend the learning session to fellow trainees or colleagues. There was variability as to the extent to which the session enhanced clinical decision making skills. Trainee pharmacists reported the maximum benefit. Focus group discussions with trainee pharmacists identified the following perceived benefits of the sessions: development of inter-professional relationships, making clinical decisions in a secure environment and promoting the strengths of the pharmacy profession.

Suggestions for future improvements included not having FY2s as part of the sessions due to their seniority, having more sessions throughout the training year and on a wider range of topics.

**Conclusion:** Simulated case-based sessions with multi-professional groups provide a platform for trainee pharmacists to enhance their clinical decision making skills in a secure environment. This learning instils confidence and prepares them better for expanding prescribing and patient-facing roles. Furthermore the opportunity to learn with and from other professions enhances the potential for better integration of trainee pharmacists with multi-professional healthcare



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teams. This study provides evidence that use of simulated inter-professional learning approaches has multiple benefits for trainee pharmacists. Findings will be used to embed simulated sessions on a wider scale across the East of England.

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**Session-Board #** - 8-135

**Poster Title:** Reaping the rewards of a health-system pharmacy observership program

**Poster Type:** Descriptive Report

**Submission Category:** Precepting/Preceptor Skills/Education and Training

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**Purpose:** In 2010, Houston Methodist Hospital established an unpaid pharmacy student observership program offered to students after completion of their first or second year. Information about the program is available on the hospital website and Deans of Colleges of pharmacy in Texas help promote the program by informing students of the opportunity to apply. The 6-week program is designed to expose students to various areas of hospital pharmacy practice. The students benefit by expanding their professional network connections and the department benefits by forming valuable relationships with talented and motivated individuals.

**Methods:** Students apply by submitting a curriculum vitae and letter of intent to the coordinator of the observership program. Interviews are granted to the first 25 applicants that successfully submit their application. The committee members consisting of clinical specialists and administrative specialists select the summer observers based on a 15-20 minute telephone interview that contains standardized interview questions. These questions are designed to ascertain the student's interest and understanding of the observership program, determine if the student would be a good fit for the institution, and identify qualities that would make them a successful candidate for the program. The top two candidates are then selected based on overall scores from the interview. Once selected, the summer observers are asked to complete a hospital application in order to facilitate access to electronic health information access and hospital email account. Prior to the start of the program, the committee prepares the daily

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schedule for shadowing experiences, meetings with different managers, administrative specialists, and potential project experiences.

**Results:** The goal of the program is to provide the observers with access to pharmacists in operational and clinical roles. Summer observers are able to rotate through various areas of central pharmacy to observe different operations; they also shadow clinical specialists in different specialty practice areas and meet with several administrative specialists and managers in their area of expertise. Typically, the shadowing experiences are scheduled for the morning and project work are in the afternoon. Furthermore, the observers work on multiple quality projects throughout the 6 weeks, gaining hands-on experience with evaluating goals and outcomes, entering and analyzing data, and deriving conclusions. Finally, the committee offers several sessions for professional development to provide tips on curriculum vitae and letter of intent writing, presenting a formal presentation, and participating in a mock interview for residency or job. Most of our past summer observers have pursued PGY-1 and PGY-2 post graduate training. Some of the barriers and challenges to the program include lack of funding for parking and lodging expenses for students from out of town, limited resources for only two positions per summer despite high number of applicants, unexpected changes in preceptors' schedule, and competing priorities within the pharmacy department.

**Conclusion:** Continuing to maintain the observership program allows for pharmacy students to gain early exposure to health-system pharmacy, encourages pursuit of postgraduate training in a variety of pharmacy practice settings, and gives the students an opportunity to see pharmacy practice in the renowned Texas Medical Center. The institution benefits through the assistance with quality projects and recruitment of future pharmacists and residents.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-136

**Poster Title:** Using SBAR to improve clinical communication skills in fourth year pharmacy students

**Poster Type:** Descriptive Report

**Submission Category:** Precepting/Preceptor Skills/Education and Training

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**Purpose:** Interprofessional communication is a basic principle in healthcare. Situation, Background, Assessment, Recommendation (SBAR) is a well-recognized tool for communication between healthcare professionals in nursing and medicine. Communication courses within pharmacy curricula tend to focus on pharmacist-patient communication, with the major emphasis on counseling points and methods of delivery for patients, such as in the Pharmacists' Patient Care Process. There are inconsistent formats for pharmacists to use for interprofessional communication with other medical professionals. This project aimed to determine if the SBAR technique would improve fourth-year pharmacy student communication skills with other healthcare professionals when making clinical recommendations.

**Methods:** Six faculty preceptors were recruited to participate in this project, which consisted of providing an SBAR toolkit to their fourth-year students and evaluating the student's communication of a clinical recommendation, during a 6-week APPE experience. Faculty were chosen due to the extent of interprofessional communication that occurs within their practice experience. The toolkit included an educational SBAR document from the Institute for Healthcare Improvement, pre- and post-surveys, and two communication scenarios. Students were instructed to utilize a real patient case for the third scenario. The SBAR document detailed how to utilize SBAR technique and also provided illustrations of use. The pre- and post-surveys ascertained communication comfort and confidence level from the student's perspective. The three scenarios allowed students to practice their communication skills in making clinical recommendations, which were assessed utilizing the VALUE rubric for communication. The VALUE rubric assesses domains of organization, language, delivery, supporting material, and

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central message. The first scenario (pre-defined) was administered without any preparation, while the second scenario (pre-defined) and third scenario (live scenario, chosen by the student) occurred after the SBAR toolkit was provided.

**Results:** Results from the VALUE rubric were analyzed using a Wilcoxon Signed Rank test. Data from 21 students who completed scenario one and scenario two are included. All five individual rubric items evaluated showed statistically significant improvement from baseline scores (p-value < 0.05). The aggregate score increased for total points along with each individual rubric item. On a standard letter grade scale, average student scenario letter grades improved by two letter grades. Out of the 20 points possible, the average total score for scenario one was 14 points while the average total score for scenario two increased to 18 points. Looking at the pre- and post-survey data, the student's self-assessed comfort level and confidence level increased after utilizing SBAR technique to communicate a clinical recommendation.

**Conclusion:** Results from this project suggest that pharmacy students in their fourth professional year benefit from having a structured interprofessional communication tool like the SBAR to frame their clinical recommendations. More research is needed to evaluate whether this technique could be incorporated into the earlier years of the curriculum and whether or not this formal communication technique helps pharmacists communicate more clearly once they enter practice.

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**Session-Board #** - 8-137

**Poster Title:** Prescription renewal request review as a learning tool for APPE ambulatory care pharmacy students

**Poster Type:** Descriptive Report

**Submission Category:** Precepting/Preceptor Skills/Education and Training

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**Purpose:** Primary Care Providers (PCP's) are tasked with many responsibilities, including reviewing prescription renewal requests for patients needing chronic prescription medications. A primary responsibility of pharmacists in any setting is to ensure medication therapy is safe and effective for patients. As a patient care activity and learning activity, fourth-year pharmacy students on Advanced Practice Pharmacy Experiential (APPE) ambulatory care rotations reviewed prescription renewal requests received from community pharmacies. The primary objective of this study is to assess whether this activity was an effective learning process for students. A secondary objective is to assess if student recommendations were well-received by PCP's.

**Methods:** This retrospective review was approved by the University of Hawaii Institutional Review Board. As part of an ambulatory care APPE rotation, pharmacy students were tasked with reviewing all prescription renewal requests that the clinic received from community pharmacies. While reviewing these requests, students reviewed the patient's electronic medical record (EMR) to decide whether this prescription should be renewed. Students were trained to assess each prescription for safety, efficacy, and convenience, a process that is similar to verify medication orders in a dispensing pharmacy. If everything is appropriate with the prescription, students forward the request to the PCP for final review. When students identified a potential intervention, they presented the case to their preceptor. If approved, the student forwarded the recommendation to the PCP for consideration. At the end of the academic year, participating students were surveyed on how this activity impacted their overall learning experience. The survey included likert-scale based questions inquiring whether the experience

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helped students learn monitoring parameters, effects on confidence in verifying prescription orders, and improving written interprofessional communication skills. Additionally, the EMR was retrospectively reviewed to identify what types of recommendations were made and if they were accepted by PCP's. Recommendations were categorized into the following six categories: (1) patient appointment scheduling, (2) dosage change, (3) discontinue medication, (4) labs, (5) new medication, and (6) quantity change.

**Results:** A total of 8 fourth-year pharmacy students participated in this study over the course of three separate six-week APPE rotation blocks from May-August 2018 and January-February 2019. Of the 7 survey respondents, all (100%) reported agreeing or strongly agreeing that this activity helped students learn monitoring parameters of drugs, improved written interprofessional communication skills, and improved self-confidence in the ability to verify prescription orders. A total of 879 unique requests that were reviewed during this period, averaging roughly 18 requests per clinic day. Pharmacy students made a total of 131 recommendations from the 879 requests that were reviewed. Of the 131 recommendations, 104 were accepted by the PCP (79.4%). The most common type of intervention accepted was to adjust the quantity of the prescription, including increasing the number of refills or the quantity of medication per fill (29.8%). The second most common type of intervention made was to recommend ordering of lab tests that related to either medication safety or efficacy (26%). The remaining recommendations were to schedule the patient for a follow-up appointment (20.2%), change the drug dose or dosage form (16.3%), discontinue the drug (5.8%), or prescribe a new medication (1.9%).

**Conclusion:** The findings from this study demonstrate that this prescription renewal review process was helpful to pharmacy students as a learning activity. The benefits of this activity was multifaceted, increasing students confidence in order verification, improving knowledge of drug monitoring parameters, and providing experience for written interprofessional communication. Additionally, many recommendations made through this process were accepted by the PCP's. This activity will be continued due to the dual benefit as a learning tool for pharmacy students and positive impact on patient care. Further studies will assess if this service has a long-term effect on prescribing patterns.

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**Session-Board #** - 8-138

**Poster Title:** The role of a medical mission trip on student perceptions of interprofessional collaboration

**Poster Type:** Descriptive Report

**Submission Category:** Precepting/Preceptor Skills/Education and Training

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**Purpose:** According to the World Health Organization (WHO), interprofessional education (IPE) “occurs when two or more professions learn with, about, from each other to enable effective collaboration and improve health outcomes.” Accreditation bodies require the integration of IPE into many health profession programs. Medical mission trips serve as opportunities to involve various health professions and enhance IPE competencies. In this study, optometry and pharmacy students participated in a medical mission, providing eye exams and health screenings to underserved patients. The objective was to identify the role of an international medical mission trip (intervention) on students’ perceptions of interprofessional collaboration.

**Methods:** As part of an extra-curricular activity sponsored by the Lion’s Club International, six optometry and two pharmacy students (n equals 8) participated in an eight-day medical mission trip to the rural, mountainous regions of Chihuahua, Mexico. Under the supervision of licensed clinicians, the trip consisted of four clinic days in which optometry students conducted eye exams and dispensed eyeglasses, while pharmacy students performed health screenings for hypertension, diabetes, and dyslipidemia—disease states that are all associated with increased risks for ocular disorders. In addition, the optometry and pharmacy students rotated through each others’ respective services. Upon arrival and at the conclusion of the medical mission trip, the twenty-question Interprofessional Collaborative Competency Attainment Survey (ICCAS) was administered to students. Although the published ICCAS should be completed at one point of time, the authors decided to give the survey before and after the medical mission (two



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points of time). The ICCAS is composed of seven-point Likert scale questions, with responses ranging from strongly agree (7 points) to strongly disagree (1 point) and “not applicable.” The survey assesses competencies in the following domains: communication, collaboration, roles and responsibilities, patient and family engagement, conflict management and resolution, and team management. The pre- and post-intervention surveys were analyzed using the Mann-Whitney U tests.

**Results:** Over 1,800 patients received eye exams and health screenings during the medical mission. All eight students completed the pre- and post-intervention surveys. The data analysis of the pre- and post-intervention ICCAS indicates a positive trend toward an enhancement of competency for all domains. Specifically, statistical significance was reached in the following areas: accountability for contributions in the interprofessional team (z equals -2.87, P equals 0.004), understanding the abilities and contributions of the interprofessional team members (z equals -2.19, P equals 0.03), inclusion of family and patient in decision-making (z equals -2.06, P equals 0.04), and negotiation of responsibilities in overlapping scope of practices (z equals -2.17, P equals 0.03).

**Conclusion:** This medical mission trip provided a meaningful opportunity to connect two seemingly unrelated professions: optometry and pharmacy. At the conclusion of the medical mission, students reported an enhancement of interprofessional collaboration skills. To validate this study’s findings, the ICCAS will be used to evaluate students’ perceptions of interprofessional collaboration in future medical mission trips.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-139

**Poster Title:** Developing foundation residencies

**Poster Type:**

**Submission Category:** Precepting/Preceptor Skills/Education and Training

**Primary Author:** Diane Sandulache, Alfred Health; **Email:** d.sandulache@alfred.org.au

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**Purpose:** Pharmacists form an integral part of the multidisciplinary team that works together to achieve

best patient outcomes. As complexity in healthcare continues to increase, so have the requirements of

pharmacists working in a clinical setting. As a profession, we need to make sure our pharmacists have

appropriate training and support in this environment. Residencies have been available across the world

for many years, including in the United Kingdom, Canada, Singapore and the United States of America

(USA). In the United States. In Australia, the Society of Hospital Pharmacists Australia (SHPA) has had a

strong focus on post-registration training, and implemented a foundation Residency Program In 2017.

The Australian Residency program is a structured, formalised, supported and accredited two year

program, which facilitates the development of general level pharmacists. This program is inspired by the

PGY1 Residencies in the USA, but has some significant differences. Currently in its third year, there are

now over 30 accredited sites across Australia and over 150 Residents. The SHPA Residency supports

pharmacist practitioner development towards competence and performance aligned with Stage 1

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(Transition Level) of the Australian Advanced Pharmacy Practice Framework and provides an important springboard to other professional development pathways, such as advanced practice recognition. This presentation would describe the implementation of Foundation Residencies at the Alfred Hospital in Melbourne and contrast it with the Residencies in the USA.

**Methods:**

**Results:**

**Conclusion:**

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-140

**Poster Title:** East of England pre-registration trainee pharmacist programme: an evaluation of online teaching modules

**Poster Type:** Descriptive Report

**Submission Category:** Precepting/Preceptor Skills/Education and Training

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**Purpose:** Hospital pre-registration pharmacy training in the UK involves primarily experiential learning complemented by academic study to achieve registration requirements. Time allocated to supportive training programmes is limited. Therefore this cohort of learners is potentially suited to blended learning approaches. Effectiveness of online teaching strategies in pharmacy education has been demonstrated. However, there is a lack of research investigating learners' perceptions of online learning and the extent to which it could replace face-to-face teaching.

The purpose of this evaluation was to address this paucity of qualitative data and define potential utilisation of online learning as part of a multi-modal training programme.

**Methods:** Two clinical topics from the registration assessment framework were selected for development into online teaching modules namely: Musculoskeletal and Genito-urinary medicine. The selection was on the basis that these key therapeutic areas were not included in the current curriculum of the training programme. Trainee pharmacists enrolled on the programme were invited to complete the interactive online teaching modules and online assessments. They were also asked to provide feedback via an online evaluation form. A focus group was conducted to explore learners' experiences of completing the modules and their views on the role of online teaching as part of their pre-registration training and preparedness for the registration assessment. Data analysis was largely descriptive with thematic analysis for responses to open questions and focus group discussion.

UEA Faculty of Medicine and Health Ethics committee deemed the project to be a service evaluation of a teaching enhancement.

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**Results:** Trainees who completed one or both modules provided positive feedback regarding the online learning experience. Specifically, learners valued the structure that the online modules provided and appreciated the interactive elements of the online modules and the patient-based scenarios. However, trainees described the learning they acquired as ‘baseline’.

Trainee 2: “it’s really structured so it’s quite nice just to go through them”

Trainee 2: “I liked the case studies in the module”

Focus group participants unanimously agreed that online modules could not replace face-to-face teaching but could ‘enhance’ it. Learners suggested that online teaching is best suited for ‘niche’ topics with specified content or as preparatory work for face-to-face teaching sessions.

Trainee 1: “I wouldn’t say it would replace it but I think it’s a good way of doing face-to-face teaching so you could do the online module before... and then they do teaching around that”

Trainee 4: “online modules would be quite good for the sort of niche topics that probably don’t need a two hour session at a residential to go through it”

Suggestions for improvement to the modules was restricted to improving the usability of the online learning platform. They also requested an increased quantity of assessment activities.

**Conclusion:** Online teaching is well received by hospital trainee pharmacists. It was viewed that the online teaching materials must be interactive and patient-centred to engage learners. The learning achieved was described as useful ‘baseline’ learning and not perceived as an acceptable replacement for face-to-face teaching. It could however be a useful tool as preparation for face-to-face teaching sessions and to provide knowledge requirements in specific areas. This study adds to the qualitative evidence on how learners perceive online teaching. Findings will be used to inform the development of future online teaching materials and their place within a multi-modal training programme.

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**Session-Board #** - 8-141

**Poster Title:** Quality of life of Lebanese post-stroke patients

**Poster Type:** Descriptive Report

**Submission Category:** Psychiatry/Neurology

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**Purpose:** Stroke is increasingly recognized as being a major cause of loss of autonomy and achievement of quality of life. The impact of stroke on health-related quality of life may be significant. It can affect multiple domains in life and lead to disastrous consequences- neurological disorders such as physical limitations including long-term disability or fatigue, and/or cognitive and psychological issues such depression or anxiety. The objective of the study was to assess these consequences in the Lebanese community, hence evaluate the participants' quality of life post-stroke using various validated scales.

**Methods:** A descriptive study was conducted from January to May 2019 among 100 Lebanese surviving stroke patients previously diagnosed in Beirut and Mount Lebanon hospitals. Telephone interviews were made using a well-structured questionnaire written in Arabic. The questions were answered by the patients themselves or by their relatives or caregivers. They addressed the socio-demographic and socio-economic characteristics as well as drug therapy. Functional status was determined using the Modified Rankin Scale (MRS), while fatigue was assessed using the Fatigue Severity Scale (FSS). The Hamilton Anxiety Scale (HAM-A) and The Hamilton Depression Scale (HAM-D) were used to determine the presence of anxiety and depression respectively. Health related quality of life was assessed using the Short Form Health survey (SF-12).

**Results:** Among participants, 48.8% of questionnaires were answered by the patients themselves and 51.2% by caregivers. The mean age at stroke was  $71 \pm 11.2$ . The majority of

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patients were men (57%), married (55.2%), with primary/complementary education level (34.7%); 44.7% were without any professional activity. Moreover, 59.2% of patients working before the occurrence of stroke didn't stop practicing afterwards. In addition, 55.3% of the caregivers who filled the questionnaire were aged between 40 and 60 years old with 47.2% having completed university education. The medications taken post-stroke by patients were anti-hypertensives (93%), anti-diabetics (51%), statins (70%) with the majority (50.8%) on atorvastatin, antiplatelets (81.8%) with 70.1% on aspirin and 46.5% were taking anticoagulants with 52.3% on rivaroxaban. Furthermore, regarding physical limitations, 27.3% of patients showed moderately severe disability as assessed by the MRS and 67.3% suffered from fatigue. As for mental health, according to HAM-A, 84.8% of patients had mild anxiety; 28.2%, 20% and 15.3% of participants showed mild, mild to moderate and moderate to severe depression respectively as assessed by the HAM-D scale. In addition, both Mental and Physical Health Composite Scales were below the national norm- $32.0 \pm 11.9$  and  $46.3 \pm 11.5$  respectively- indicating poor overall health related quality of life.

**Conclusion:** The present study showed an important impact of stroke on health related quality of life among Lebanese stroke survivors. Early identification of the above mentioned contributing factors could promote better interventions for individuals with ischemic stroke, minimizing disabilities and improving quality of life.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 8-142**

**Poster Title:** The use of long-acting injectable (LAI) antipsychotics for maintenance treatment of schizophrenia

**Poster Type:** Evaluative Study

**Submission Category:** Psychiatry/Neurology

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**Purpose:** Long-acting injectable (LAI) antipsychotics are frequently used for the maintenance treatment of schizophrenia and other psychotic disorders. Saint Elizabeths Hospital (SEH) Pharmacy conducted medication use evaluations (MUEs) on LAI antipsychotics, then collaborated with hospital committees and Psychiatry team to improve the quality and cost-effectiveness of their use. The Psychiatry team developed and implemented new guidelines for using LAIs. The purpose of this study is to evaluate the LAI use, adverse drug events and cost savings after implementing the new guidance.

**Methods:** Two pharmacists reviewed all the patients' chart retrospectively who were treated with LAI antipsychotics during the period of January 1, 2018 – May 31, 2018. The study summary was presented to the P&T Committee and the Medical Staff Leadership Committee in June 2018. Then the Psychiatry team developed the new guidance recommended by the hospital committees and implemented it within June 2018. This was then used to evaluate the impact of guideline implementation, the pharmacy conducted another MUE on LAI antipsychotics during the intervention period of June 1, 2018 – December 31, 2018. LAI antipsychotics use, adverse drug events, LAI cost per patient day and monthly LAI costs were analyzed.

**Results:** After implementing the new guidelines, the prescribing rate of Risperdal Consta increased while the prescribing rates of Invega Trinza and Sustenna decreased. This change



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yielded that monthly spending on second generation LAIs decreased from \$118,017 to \$70,597 during the intervention period.

ADE rates which was calculated as number of reported ADEs that occurred for every 1,000 patient days were 0.33, 0.47, 0.53 and 0.97 in 1Q, 2Q, 3Q and 4Q, respectively. Among them, LAI antipsychotics related ADE rates were 0.12, 0.04 and 0 in 1Q, 2Q, 3Q and 4Q. It implied the new guidance implementation didn't affect the ADE rates. Psychiatrists did not report significant clinical changes in patients undertaking medicine changes.

**Conclusion:** Interdisciplinary effort in developing and implementation of new LAI guidance resulted in a 23% reeducation in LAI spending during the seven month study period, with a total cost savings of \$331, 932. ADE rates didn't increase and clinical outcomes were not affected by the shift. This shows that pharmacists play a vital role in taking initiative in improving patient care and saving medication cost. Further studies on LAI antipsychotics and cost effectiveness are needed to assess the long-term outcome.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-143

**Poster Title:** Initiation of methadone maintenance treatment

**Poster Type:** Case Report

**Submission Category:** Psychiatry/Neurology

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**Purpose:** The purpose of this patient case is to describe the management of a patient who is being initiated on methadone for maintenance treatment. The patient was identified on interdisciplinary rounds, and the patient information was gathered from the electronic medical record. The patient is 32-year-old male with a past medical history of infective endocarditis, methamphetamine and heroin abuse (1 g daily), who presented with pain and redness of left gluteal area at the injection site. The abscess was drained and treated with antibiotics. During admission, the patient's pain was not controlled with acetaminophen-oxycodone 325-10 mg every four hours as needed due to the pain at the site of incision and drainage. The medical team decided to initiate methadone for maintenance treatment (MMT) and consulted pharmacy to help with the initiation.

Literature suggests that methadone is an effective and safe option for maintenance treatment as well as chronic pain management. Methadone is a potent synthetic opioid targeting primarily  $\mu$ -opioid receptor in the brain, which then blocks heroin from binding to the receptor. Per American Pain Society Guidelines, the patient was initiated on methadone 30 mg daily.

Literature also recommends a maximum daily initiation dose of 40 mg. Dosing titration is based on objective signs of patient's tolerance of the medication. The team was advised to increase the dose by 30% of total daily dose and no more frequently than every three to four days.

Methadone is a lipophilic drug which is extensively stored in the liver and secondarily in the body tissues (e.g. fatty tissue, spleen, kidneys). With ongoing dosing and the slow release from the body tissues, the serum methadone level can rise progressively every day leading to the risk of overdose if titration is too frequent.

When initiating methadone, the pharmacist monitored the patient closely in multiple ways. Because methadone is associated with QTc prolongation, a baseline ECG assessment was done

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prior to initiating methadone treatment. Additionally, an ECG was repeated after one week of methadone initiation and at any time the dose was increased. Other adverse effects of methadone such as sedation, respiratory depression, and endocrinologic effects were monitored daily to ensure the dose of methadone was not too high. Alternatively, if the therapy is abrupt or the dose is too low, withdrawal symptoms may occur. Cardinal signs are dilated pupils, nausea/vomiting, restlessness, and diarrhea. The serious complication can be life-threatening changes in breathing and heartbeat which can lead to death. The patient was counseled by the pharmacist on these important points.

Georgia regulations require that methadone maintenance treatment has to be provided from a certified psychiatrist from a methadone clinic that is licensed by Substance Abuse and Mental Health Services Administration (SAMHSA). Thus, the pharmacist also ensured that the patient had appropriate follow up at the methadone clinic after discharge prior to initiation of methadone.

In addition to methadone maintenance treatment, this agent also has the ability to treat patient's pain at the incision and drainage site. The pharmacist recommended to discontinue acetaminophen-oxycodone and initiate ketorolac 30 mg every six hours as needed for pain along with the methadone while admitted. The patient's pain was better controlled after these interventions. The patient tolerated the methadone well and was discharged with close follow-up at the methadone clinic. Thus, pharmacist plays a vital role in dosing and monitoring parameters upon methadone initiation, recommending appropriate pain management, establishing methadone clinic follow-up, as well as counseling the patient on methadone.

**Methods:**

**Results:**

**Conclusion:**

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**Session-Board #** - 8-144

**Poster Title:** Assessing the mental health wellness of pharmacy residents in a university-affiliated residency program

**Poster Type:** Evaluative Study

**Submission Category:** Psychiatry/Neurology

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**Purpose:** There is a considerable amount of published literature on mental health and its impact on health care costs and productivity. Many studies have examined the mental health wellness of pharmacy students or medical residents whereas few studies have focused on pharmacy residents. The purpose of this Institutional Review Board (IRB) approved study was to determine the perceived stress and presence of depressive symptoms in postgraduate year 1 (PGY1) and postgraduate year 2 (PGY2) pharmacy residents participating in a teaching certificate program and identify a need for pharmacy resident tailored wellness services on campus.

**Methods:** A one-time anonymous electronic survey using Qualtrics software was administered in April 2019 via email to 36 pharmacy residents completing a University affiliated residency program. The primary endpoints of this study were scores on the 10-item Perceived Stress Scale (PSS-10) and the 9-item Patient Health Questionnaire (PHQ-9). Question 9 on the PHQ-9 (thoughts that you would be better off dead, or of hurting yourself) was omitted from the survey due to the inability of the investigators to intervene if suicidal ideation was endorsed as the survey was anonymous. The secondary endpoints were perceived overall mental health, duration and negative effects of reported emotional problems, presence of household or social stressors, and durations of different emotional states felt during the residency year. Descriptive statistics were used to analyze the data.

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**Results:** Overall, 52 percent (n equals 19) of residents responded to the survey. Of those, the majority were female (n equals 14). Seventeen responses were from PGY1 residents and two were from PGY2 residents. Eighteen residents were included in the PSS-10 analysis due to one incomplete survey response. The mean score on the PSS-10 was 18.1 (SD plus or minus 5.68) with 72 percent of residents scoring within the perceived moderate stress range. The majority of residents (74 percent) had a PHQ-9 score of less than 10 with a mean score of 6.7 (SD plus or minus 5.38). Most (79 percent) pharmacy residents rated their overall mental health as “good” or higher. Two-thirds (68 percent) of the residents said they felt they accomplished less than they would have liked due to emotional problems. About half said that these emotional problems started sometime during the residency year. The most common household stressor was “financial burden” as reported by 19 percent of residents. Of the five emotional states, residents felt stressed on average 62 percent of the time, followed by happy (57 percent), calm (48 percent), anxious (43 percent) and depressed (17 percent) during residency.

**Conclusion:** Although the majority of pharmacy residents appeared to be handling stress in a manner that did not affect their mental health, it is notable that 26 percent of the subjects in this study endorsed symptomatology that could be indicative of a depressive disorder. These results support the need for wellness programs or quarterly evaluations to be implemented to assess the residents’ wellness during their training program.

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**Session-Board #** - 8-145

**Poster Title:** Exercising restraint in prescribing pharmacologic restraints

**Poster Type:** Descriptive Report

**Submission Category:** Psychiatry/Neurology

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**Purpose:** Pharmacologic restraints are administered to sedate patients with aggressive behavior that could endanger themselves, staff, or other patients. An antipsychotic agent such as haloperidol is often used as a pharmacologic restraint. Haloperidol can cause extrapyramidal symptoms and/or dystonia with increasing severity at higher doses. During an annual review of adverse drug reactions (ADRs), four patients experienced an ADR after receiving multiple doses of intramuscular (IM) haloperidol. The investigator sought to implement strategies to safely optimize dosing within recommended and maximum dosing ranges to prevent ADRs associated with IM haloperidol and to potentially decrease the incidence of patients requiring multiple restraints.

**Methods:** This single center, retrospective cohort study within a 55-bed rural pediatric and adolescent behavioral health facility included patients admitted to the hospital for treatment of serious emotional, behavioral, or psychological difficulties. Patients aged 5 to 17 years old who received pharmacologic restraints were included. A dosing chart including recommended and maximum doses based on age and/or weight was implemented for the restraint medications historically prescribed at the facility including haloperidol, LORazepam, and diphenhydrAMINE. Prescribers were provided copies of the restraint dosing chart for reference at the beginning of the evaluation period. The investigator provided concurrent review and recommendations once a patient received two pharmacologic restraints. Haloperidol ADRs were documented through the pharmacy's ADR monitoring program for the pre-and post-implementation periods. Primary endpoints included the incidence of patients who received

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two or more doses of haloperidol IM and experienced an ADR, as well as incidence of patients receiving two or more total restraints, in the one year pre- and post-implementation periods. Secondary endpoints included the percentage of patients prescribed doses of haloperidol, LORazepam, and/or diphenhydrAMINE within the recommended and maximum dosing ranges to determine if doses were being optimized and safely prescribed. Primary endpoint analyses were conducted using a Fisher's exact test with an alpha level equal to 0.05.

**Results:** The incidence of patients experiencing ADRs associated with two or more doses of haloperidol IM significantly decreased post-implementation [4 of 15 patients (26.7 percent) versus 0 of 18 patients (0 percent),  $p$  equals 0.0334]. The incidence of patients receiving two or more restraints increased significantly post-implementation [16 of 56 patients (28.6 percent) versus 20 of 38 patients (52.6 percent),  $p$  equals 0.0299]. In the post-implementation period, there were a total of 94 pharmacologic restraints prescribed with varying combinations of haloperidol, LORazepam, and/or diphenhydrAMINE. Haloperidol was used most frequently in 87 restraints (93 percent), followed by LORazepam in 83 restraints (88 percent), and diphenhydrAMINE in 18 restraints (19 percent). Haloperidol was prescribed within the recommended dosage range for 72 percent of the orders and was under the established maximum dose for 97 percent of the orders. Of the LORazepam orders, 93 percent were within the recommended dosage range and all orders were below the maximum recommended dose. All diphenhydrAMINE orders were within the recommended and maximum dosage ranges.

**Conclusion:** Implementation of strategies to provide dosing recommendations and proper monitoring of patients receiving multiple pharmacologic restraints prevented haloperidol IM-related ADRs. With improvement potential on orders being prescribed within the recommended and maximum dosing ranges for haloperidol and LORazepam, the pharmacy has expanded pharmacologic restraint options and incorporated a patient-specific dosing recommendation chart upon admission for all patients to provide prescribers with quick access to appropriate dosing during these emergent situations. The pharmacy will continue to investigate and implement further methods to decrease the incidence of patients requiring multiple restraints.

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**Session-Board #** - 8-146

**Poster Title:** Comparison of long-acting injectable antipsychotics in preventing 30-day hospital readmission in an acute care psychiatric hospital

**Poster Type:** Evaluative Study

**Submission Category:** Psychiatry/Neurology

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**Purpose:** Long-acting injectable antipsychotics (LAIs) have been established since the 1960s. They were developed to improve medication adherence and reduce relapse. However, there is limited information when comparing LAIs in terms of their effectiveness to reduce hospital readmission. This retrospective study compared different LAIs in preventing hospital readmission in < 30 days in an acute care psychiatric hospital.

**Methods:** Retrospective study of 607 patients  $\geq 18$  years old with DSM-V criteria for bipolar I (n = 28), bipolar II (n = 26), bipolar mixed (n = 56), major depressive disorder (MDD) with psychosis (n = 41), MDD without psychosis (n = 10), psychosis (n = 165), schizoaffective disorder (n = 113), and schizophrenia (n = 168). Treatment outcomes of 4 LAIs, Abilify Maintena (AM), Aristada (A), Haldol Decanoate (HD), and Invega Sustenna (IS), were compared using data from the Pharmacy dispensing LAIs tracking log from July 2016 to September 2018. Exclusion criteria included patient refusal for LAI and missed second loading dose of IS injection. The primary objective of the study was to compare the efficacy of LAIs at preventing hospital readmission in < 30 days after discharge. Additionally, we examined whether patient diagnosis impacted hospital readmission.

**Results:** A total of 607 patients who used AM (n=198), A (n=68), HD (n=106), and IS (n=235) during the index hospitalization were analyzed. The IS group had the lowest rate of readmission within 30 days (6.8%, p = 0.028). Logistic regression showed the likelihood of being readmitted to the hospital within 30 days was 2.1 and 3.2 times higher for patients on AM and A, respectively, compared to patients on IS (OR=2.11, 95% CI=1.07-4.17, p=0.031, and OR=3.16,



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95% CI=1.36-7.33,  $p=0.007$ ). HD group had a lower likelihood of readmission compared to IS, however, there was no significant difference (OR=0.70, 95% CI = 0.232-2.099,  $p=0.522$ ). There was no statistical difference in 30-day diagnosis.

**Conclusion:** Among the 4 LAIs compared, IS was the most effective at reducing 30-day psychiatric hospital readmission.

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**Session-Board # - 8-147**

**Poster Title:** Incidence, nature and causes of medication errors reported at the largest academic healthcare setting in Qatar: data from 13 hospitals

**Poster Type:** Descriptive Report

**Submission Category:** Safety/Quality

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**Purpose:** Medication errors are major global issue, adversely impacting health outcomes and patient safety. Previous studies have reported difficulties in determining the prevalence and rates of medication errors, widely due the heterogeneity in definitions, data collection, choice of denominator etc. Incident reporting systems (IRSs) are commonly used tool for medication error reporting and monitoring. The aim of this research is to analyze how medication errors/incidents are reported and detected at different stages of medication use process, to characterize the medication errors reported in terms of types of errors, severity, medication class involved etc. and to identify the causes of errors.

**Methods:** This is a retrospective, cross-sectional review of all medication errors reported to the incident reporting system (RL6) over a period of three years (January 2015 to December 2017). The incidence and/or rate of medication errors was calculated by dividing the number of medication errors reported to the total medication orders. The causes were classified based on the James Reason's Accident Causation Model. According to this model, a system has a 'sharp end' (active failures) and a 'blunt end' (latent conditions). Whilst active failures are unsafe acts (e.g. slips, lapses, mistakes and violations) that originate as a part of the front-line workers, the latent failures arise mostly due to 'error-producing conditions' at different levels within the system (such as lack of knowledge, poor administrative support, lack of resource etc.). Medication errors were classified based types of errors such as prescribing errors, dispensing

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errors, administration errors or monitoring errors, further subtypes were also categorized. Medication errors reported per each hospital and the severity levels were analysed using NCCMERP severity index. Types of medication based on their pharmacological action were segregated using The Anatomical Therapeutic Chemical (ATC) Classification System that categorizes the active chemical entity based on the organ or system on which they act and their therapeutic, pharmacological and chemical properties. The study further analysed the profession of the reporter.

**Results:** A total of 18390 incidents were reported over 36 months with a mean monthly reporting rate of 510 reports ( $SD \pm 260.5$ ). Incidence of medication errors reported was found to be 0.6 medication errors/1000 medication orders. However, only 5104 reports were included in the final analysis after excluding the incomplete reports, or the reports that did not possibly allow the analysis. Prescribing errors ( $n = 4485$ , 88%) being the most common and monitoring errors (less than 1%) being reported the lowest. Most common types of prescribing errors reported were prescribing wrong dose (36%) followed by wrong frequency (15%). Of all the reports, majority was reported by pharmacists (90%) followed by nurses (8%), while only < 1% were reported by the doctors. Anti-infectives for systemic use (22%) were involved in almost one fourth of the errors followed by medications used to treat neurological disorders (17%). In terms of severity, gross majority 77% were classified as “near miss” events, no errors resulted in permanent patient harm, or patient death. Based on James Reason's accident causality model majority of the incidents reported were classified as Active Failures (90%) that includes Mistakes (59%), Slips (15%), Lapse (12%), Violations (4%).

**Conclusion:** Medication errors are common, with prescribing errors being the most common type of error reported. Therefore, preventive strategies to minimize medication errors should aim at improving prescribing competency. Low contribution to reporting from non pharmacy profession requires an in depth investigation, an inquiry using qualitative research design underpinning theoretic framework will be most appropriate at this stage. Furthermore, to compare the data with international data, a standardized approach to quantifying medication errors is warranted.

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**Session-Board #** - 8-148

**Poster Title:** Comparison and evaluation of the improvement in decreasing dispensing errors at King Abdulaziz Medical City (KAMC) - Riyadh (2017 versus 2018) through safety reporting system

**Poster Type:** Descriptive Report

**Submission Category:** Safety/Quality

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**Purpose:** Medication errors are considered one of the most preventable causes of patient's harm. It could happen at any stage of the medication use process including prescribing, preparation, dispensing, and administration. Dispensing is complex process involves multiple stages and the occurrence of any error in this process could threaten a patient's life. The objective of this study was to identify the prevalence and the severity level of dispensing errors reported in King Abdulaziz Medical City –Central Region (KAMC-CR) and King Abdullah Specialized Children's Hospital (KASCH).

**Methods:** Dispensing Error Data were collected from King Abdulaziz Medical City (KAMC) reporting system- Safety Reporting System (SRS). In order to analyze Dispensing Errors, the cause of error was reviewed and classified them according to the cause. Also, categorization of errors is used which is developed by the ISMP and the ASHP. Wrong Practice Medication Errors class; any error by the pharmacist who is not following the hospital policy and procedure. For evaluating and categorizing medication error in the data, the NCC MERP Index is utilized.

**Results:** A total of 3017 safety reports were submitted to the safety reporting system during 2017and the dispensing errors reported was 448 (14.84%). While in 2018 nearly 2381 safety

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reports and a slightly higher percentage of dispensing errors were noted about 18%. Generally, KAMC and KASCH pharmacies have consistently low percentage of dispensing error not exceeding 0.01% of the total orders received. In 2017, the number of dispensing errors involving high alert medications was about 14.06% of total error reported in KASCH and 20% in KAMC and a similar percentage in 2018. The monthly reporting rate fluctuated by several factors such as holidays. After further analysis of 2017 reports, medication delay was the highest reason for dispensing errors accounts for 28% and 27.4% in both KASCH and KAMC respectively. Followed by reasons was incorrect medication accounts for 23% in KAMC, and 20.17% in KASCH for packaging issues of reports. In addition, a sub-analysis by the severity level was done. In 2017, 97.4% of the reports in KASCH and 97% in KAMC did not reach the patients while in 2018; about 98% in KAMC and 99% in KASCH. Only a minority about 1.1% in 2017 and 3.2% in 2018 did reach the patient.

**Conclusion:** The safety report system used as a tool for improvement in pharmaceutical care services and provide staff education to be more vigilant before dispensing medications. Overall low rate of dispensing error was observed in this study. Moreover, dispensing error increase during 2018 due to implementing Automated Dispensing Cabinet (ADC) in the hospital. Doing an annual analysis of the dispensing error helps to identify the frequency and predisposing factors to the occurrence of such errors and working accordingly to reduce these errors. We encourage staff to report medication error to have safe practice and just culture environment.

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**Session-Board #** - 8-149

**Poster Title:** Descriptive of pharmacists therapeutic intervention in King Abdulaziz Medical City (KAMC) and King Abdullah Specialized Children Hospital (KASCH) In Riyadh, Saudi Arabia

**Poster Type:** Descriptive Report

**Submission Category:** Safety/Quality

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**Purpose:** Pharmacist intervention have always been considered a valuable input to other health care providers during the patient care process. It can contribute significantly to the reduction of medication error, and cost of Therapy. These interventions have developed over time and their forms vary from the simple handwritten form to the computerized databases. The objectives of this study was to analyze therapeutic intervention documentation (TID) report made by the pharmacists when reviewing the prescription in both King Abdulaziz Medical city (KAMC) and King Abdullah Specialized Children Hospital (KASCH). To identify the highest reasons, highest departments and to eliminate future medication error

**Methods:** A retrospective review of therapeutic intervention documentation (TID) data have been extracted from the organization's HIS-CPR in King Abdul-Aziz Medical City (KAMC) and King Abdullah Specialized Children Hospital (KASCH) – Central Region (Riyadh) in the year 2018. We analysis 13 TID reasons which are allergy , incorrect dosage form, incorrect dose , incorrect drug, incorrect duration, incorrect frequency, incorrect patient, incorrect protocol/stage of treatment, incorrect route ,lab/diagnostic test indicated not ordered, nomenclature-sound-alike and renal/ hepatic dose adjustment

**Results:** During 2018, 2179695 prescriptions were dispensed from KAMC and 888920 prescriptions from KASCH. The total numbers of documented TID were 162055 (7.4%) from

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KAMC and 108341 (11%) from KASCH. Most of TID reports documented about the Emergency department prescriptions for both KAMC and KASCH with 15824 and 15884 respectively. Excluding the pharmacy workload reasons, the top 5 TID reasons were incorrect dose, followed by incorrect drug, incorrect duration, incorrect frequency, and incorrect dosage form. When analyzing the TID reports of KAMC, the most common reason associated with incorrect dose was found to be related to inappropriate history taking (57%) and the most causative agent was acetaminophen. Moreover, 88% of the incorrect drug TID reports were related to therapy duplication. Regarding incorrect duration TID reports, were most of the time associated with Pregabalin the reason behind that believed to be related to the recent classification of this drug as controlled substance by the SFDA that limited the maximum dispensed duration of this drug except in certain conditions. Furthermore, Acetaminophen followed by Piperacillin/Tazobactam were the most common agents associated with incorrect frequency TID reports. For incorrect dosage form TID reports, intravenous heparin was found to be the mostly associated agent.

**Conclusion:** This study highlights the importance of intervention documentation system to prescriptions. Based on various criteria such as patient care area, physician department, medical services, specific drug and intervention type. Pharmacist intervention and documentation provide optimum safety toward patients in our health institution. Furthermore, implementing action to solve these prescribing error from pharmacists intervention and documentation. The hospital demonstrate good utilized of TID to prevent medications error. Therapeutic intervention documentation (TID) by pharmacists are essential to improve the patient safety and reduce the likelihood of medication errors caused by prescribing medications to implement recommendation

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**Session-Board #** - 8-150

**Poster Title:** Development of an environmental monitoring plan for hazardous drugs using a rapid point-of-care lateral flow technology to detect surface contamination in a community hospital

**Poster Type:** Descriptive Report

**Submission Category:** Safety/Quality

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**Purpose:** Handling of hazardous drugs (HD) comes with inherent risk and USP discusses practices and standards to promote safety and protection for both patients and workers. The chapter states that environmental monitoring (EM) should be conducted to detect HD residue initially as a baseline and at least every 6 months. The pharmacy department at NewYork-Presbyterian/Queens developed an environmental monitoring plan using a point-of-care lateral flow technology hand-held device that delivers qualitative results for select marker HD (methotrexate and doxorubicin).

**Methods:** An EM plan was developed by examining the life of an HD drug throughout the pharmacy. An assessment was conducted to determine every point an HD may come in contact with the environment. The overall risk of each site was stratified according to three categories: likelihood of occurrence (dependent on volume and manipulation of HDs), severity of occurrence (accessibility and exposure to others), and mitigation controls (engineering controls, administrative controls, and personal protective equipment in place). Each category was scored from one to three and collectively tallied to determine if a site was low (3-4), medium (5-6), or high (7-9). The risk level was then used to determine a frequency of testing where low would be tested semiannually, medium would be tested quarterly, and high would be tested monthly. This technology allows for rapid detection with actionable results, so a procedure for mitigation, remediation and further investigation of positive HD surface contamination results was created. When a site was positive testing was expanded to evaluate if HD contamination had spread. After sample collection, the positive site was deactivated, decontamination, cleaned and re-tested. An analysis of the site was used to determine if the HD contamination



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was due to work practices, personnel practices, or environmental controls. In addition to the routine monitoring, random testing was then conducted as a follow up to the plan of correction.

**Results:** After evaluating potential sites in the pharmacy department, it was determined that 30 sites would compose the baseline. Out of the baseline sample, 2 out of 30 sites were positive for methotrexate: a tote from the distributor and the edge of a containment primary engineering control (CPEC). Adjacent sites were further tested both before and after deactivation, decontamination, and cleaning which showed no positive results.

The corrective action plan for the distributor tote was to re-educate staff to unpack totes with chemotherapy rated gloves and to decontaminate and deactivate the receiving table at the end of every workday. The distributor was notified that the tote had been received with trace HD residue on the inside. The correction action plan for the edge of the CPEC was to re-educate and re-train staff about proper manipulation of HDs and deactivation, decontamination, and cleaning.

**Conclusion:** Although the point-of-care lateral flow technology is currently limited in the number of HD marker drugs for contamination detection, the cost-effective and rapid testing allowed for the development of a robust EM plan for the pharmacy department. This technology enables routine and random surface contamination testing to take place. In addition, the technology can be used as a tracer for when a marker drug is compounded. Even though the results are qualitative, the fact that the results are obtained within 10 minutes permits immediate mitigation and remediation that cannot be obtained with other current wipe-sampling analysis.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-151

**Poster Title:** An evaluation of student pharmacist admission medication histories at a level 1 trauma, academic medical center

**Poster Type:** Evaluative Study

**Submission Category:** Safety/Quality

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**Purpose:** The purpose of this study is to demonstrate the impact of using advanced pharmacy practice experience (APPE) students in the collection of admission medication histories at an academic teaching hospital prior to pharmacist medication reconciliation.

**Methods:** This study is a retrospective, descriptive study. Using electronic medical records, the study looked at patients admitted to 9 different units during a two-month period. The primary objective of this study was to assess the clinical impact of utilizing APPE students in the collection of admission medication histories. The secondary objective was to evaluate the time and potential cost savings by utilizing APPE students to complete medication histories.

**Results:** Over eight weeks, the APPE students identified 2,666 discrepancies, which equates to approximately  $4.71 \pm 4.76$  discrepancies per patient. The majority of these discrepancies were identified as omissions of therapy (39.1%), followed by medications the patients were no longer taking that had remained on the medication list (29.8%), and wrong dosing frequencies (18.1%). The total average time spent on medication histories was 240.38 hours with a potential cost savings of \$14,067.04.

**Conclusion:** APPE students assist in the medication reconciliation process by identifying numerous medication discrepancies which may have prevented patient harm. APPE students can be used as pharmacy extenders to provide valuable services at little cost to the health entity.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-152

**Poster Title:** Safety of intravenous push ertapenem compared to intravenous piggyback at a tertiary academic medical center

**Poster Type:** Evaluative Study

**Submission Category:** Safety/Quality

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**Purpose:** Ertapenem is a broad spectrum carbapenem antibiotic used in the setting of aerobic gram-negative infections. Recent shortages of intravenous (IV) fluids have resulted in healthcare systems converting administration of many medications from IV piggyback to IV push. Recently our institution transitioned ertapenem IV piggyback to IV push. Administering medications via IV push presents numerous advantages such as reduced material cost, improved workflow, and shorter time to first dose; however, increases in adverse drug reactions (ADRs) may occur. The purpose of this analysis was to evaluate the safety profile of ertapenem when administered as IV piggyback compared to IV push.

**Methods:** This IRB approved, single-center, retrospective study was performed at Brigham and Women's Hospital in Boston, Massachusetts. The electronic health record was used to identify all patients receiving IV ertapenem therapy from April 1, 2017 through September 30, 2018. Patients ages 18 or older were included in the study if there was a documented administration of IV ertapenem. The major endpoints analyzed were IV site reactions including phlebitis and infiltration. For the presence of each ADR, the Naranjo Nomogram was utilized to assess the causality of the reactions to determine the likelihood of whether the event was caused by the medication itself or other factors, such as concomitant medications. Data is presented as means and standard deviations as well as percentages. Student's t-test was used to compare means while the chi-squared test was used to compare nominal and categorical variables.

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**Results:** To date, 602 administrations from 174 patients have been analyzed: 283 administrations (92 patients) in the IV push group and 319 administrations (82 patients) in the IV piggyback group. In the IV push cohort there were 255 1000 milligram doses as compared to 262 in the IV piggyback cohort (90.11% vs 82.13%; p-value 0.005). The remaining doses were all 500 mg. The number of IV site reactions was 14 compared to 8 in the IV push versus IV piggyback group, respectively (4.95% vs. 2.51%; p-value 0.11). Nine patients in the IV push cohort experienced infusion site reactions compared to 7 patients in the IV piggyback cohort (3.18% vs 2.19%; p-value 0.45). Eleven (78.57%) of the events in the IV push group were deemed “possible”, 2 (14.29%) deemed “doubtful” while the remaining event was considered “probable” per the Naranjo Nomogram. Of the events in the IV piggyback group, all 8 (100%) were found to be “possible” per the Naranjo Nomogram.

**Conclusion:** The administration of IV push ertapenem showed similar rates of infusion site reactions compared to IV piggyback on a per administration basis and the infusion site reaction event rate per patient was comparable. Therefore, IV push appears to be a safe and viable method of ertapenem administration as compared to IV piggyback.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-153

**Poster Title:** Compounding of an oral suspension of clonidine hydrochloride 20 µg/mL for neonatal patients using tablets and a self-contained wet-milling technology

**Poster Type:** Evaluative Study

**Submission Category:** Safety/Quality

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**Purpose:** Compounding of oral liquids from tablets and capsules is commonly conducted using a mortar and pestle. A novel automated wet-milling technology was developed to enable compounding to be performed within a single-use multipurpose specialized plastic container. The container allows for self-contained compounding, storage and administration of the compounded product. Oral liquid suspensions of clonidine hydrochloride 20 µg/mL were compounded from tablets, purified water and simple syrup. Stability studies were conducted to establish the dose uniformity and a BUD for the compounded preparation.

**Methods:** The requisite number of tablets and specified quantity of purified water for the desired volume to be compounded were placed into the specialized plastic containers, the containers capped and processed employing an unattended 10 minute wet-milling cycle. The specially textured surface of the container combined with a high RPM planetary motion from the milling machine results in the conversion of the contents into a fine uniform suspension. The required amount of simple syrup was then added to the suspension. Dose uniformity and stability of the compounded preparations were conducted using a validated HPLC method.

**Results:** The compounded formulas were found to have a smooth texture and the required characteristics for proper dose withdrawal. A beyond use date (BUD) of 1 month at room temperature was assigned to the compounded product. The dose uniformity results were within 2% of the label claim. The stability study results were within 10% of the label claim.

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**Conclusion:** The data demonstrate the effectiveness of the novel automated wet-milling compounding technology. The automated method allows for simultaneous compounding of up to four different products with consistent quality. The study demonstrates compounding of extremely low concentration suspensions can be achieved. The self-contained compounding system prevents transfer losses and eliminates variability introduced by manual procedures. The employment of a single-use disposable container for compounding, storage, and administration eliminates the need for cleaning and the risk of cross contamination. The resultant formulas are especially beneficial for dosing neonatal patients and also make conversion to nationally accepted standard concentrations more feasible.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-154

**Poster Title:** Compounding of oral liquid formulas of two hazardous drugs, tacrolimus 1 mg/mL and hydroxyurea 100 mg/mL, using unopened capsules and a safe self-contained technology

**Poster Type:** Evaluative Study

**Submission Category:** Safety/Quality

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**Purpose:** Oral liquid formulas of tacrolimus 1 mg/mL and hydroxyurea 100 mg/mL were compounded from whole unopened capsules in the liquid diluent, Ora-Blend®. The compounding was undertaken using a novel self-contained automated wet-milling technology. The technology compounds, stores and dispenses from a single-use specialized plastic container. The technology has been proven to eliminate aerosolization of powders during compounding. Thus unlike compounding undertaken with a mortar and pestle, the technology eliminates exposure of personnel to aerosolized powders during the process. Stability studies were employed to establish a BUD for the formulas.

**Methods:** Whole unopened capsules of tacrolimus and hydroxyurea were compounded into 1 and 100 mg/ml oral liquid preparations respectively. The requisite number of capsules and specified quantity of the liquid diluent, Ora Blend, were placed into the specialized plastic containers, the containers capped and processed employing an unattended specially developed cycle. The specifically textured surface of the container combined with a high RPM planetary motion from a milling machine results in the conversion of the contents into a fine uniform suspension. Stability studies employing HPLC were conducted on the compounded formulas.

**Results:** The compounded formulas were found to have a smooth texture and the required characteristics for proper dose withdrawal. A beyond use date (BUD) of 90 days at room

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temperature was assigned to both compounded products. The stability study results were within 10% of the label claim.

**Conclusion:** The data demonstrates that the automated wet milling technology safely compounds high quality oral liquid formulas of hazardous drugs using whole capsules. The lack of need to open capsules for compounding coupled with the self-containing features eliminates powder aerosolization and provides personnel with a safe procedure. The variability introduced by manual procedures is eliminated. The employment of a single-use disposable container for compounding, storage, and administration eliminates the need for cleaning and the risk of cross contamination. The collective features provide a benefit for patients. The technology provides an environmental benefit by eliminating hazardous waste streams emanating from cleaning procedures.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-155

**Poster Title:** Medication errors reported among home healthcare patients in Qatar

**Poster Type:** Descriptive Report

**Submission Category:** Safety/Quality

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**Purpose:** Medication errors (ME) are inevitable, recognised one of the major cause of morbidity and mortality among hospitalised patients. Previous research around medication management has focussed on either hospitalised patients, long-term care facilities or in community, however little is known about medication management process in home healthcare services (HHC). HHCs in Qatar is relatively new, to stimulate development of interventions to improve medication use among such vulnerable population, information is needed regarding the frequency, and causes of ME occurring in these facilities. The current study aims to determine the frequency, type, and causes of ME reported among home healthcare patients in Qatar.

**Methods:** This was a retrospective, cross-sectional study of all ME reported to the HMC reporting system over a period of three years (January 2015 to December 2017). Medication safety officer collected and extracted the data and further assessed it for appropriateness and quality. A standardised tool to assess the quality was developed by the research team and piloted. Incidence of medication errors were calculated as, the number of medication errors reported for HHC patients as numerator divided by the total number of medication errors reported to the incident monitoring system as denominator. To compare the findings with international data we have standardised the results to 1000 patients. ME were further classified to The National Coordinating Council for Medication Error Reporting and Prevention for severity and classification. James Reason Model of Accident Causation a theoretical model was used to describe the contributory factors associated with errors in these patients. A data

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collection tool was developed from previously published literature around medication errors. Data analysis was descriptive in nature. Microsoft Excel, SPSS® version 20 was used for data management and data analysis

**Results:** A total of 512/18200 (2.81%) ME were reported from home Hamad Medical Corporations healthcare services. However, after excluding the duplicates, records not related to ME, incomplete entries and ME errors without proper justifications, only 181 unique entries were selected to the final review and analysis. Majority of the errors were administration errors (70.2%) that occurred while administration of the medication either by the patient, caregiver or other healthcare professional. Most common cause of administration errors reported were due to non compliance to the physicians order (29.2%) followed by administering a wrong drug or dose (20.8%). Medication errors commonly happened in adult population (95%), while just below 5% were reported among pediatric patients. Medication class most commonly involved in medication errors were anti-thrombotic agents (20%) followed by systemic hormones (13.3%), drugs acting on cardiovascular system (7.7%). We classified causes into Active failure (80%), Error Provoking conditions (19.3%) and Latent failures (0.6%). Of active failures, mistakes (37%) and violations (22.1%) were more frequently occurring than slips (9.4%) or lapses (11.6%). Majority of the incidents were categorized as those cause harm or caused minor harm that just required monitoring (53%).

**Conclusion:** The current study targeting vulnerable population such as home healthcare care is first of its kind in the region. Medication error reporting at home healthcare center is relatively low, and the existing ones are of poor quality. Future interventions in terms of education or training targeting healthcare professionals and caregivers at home healthcare services in Qatar is warranted. Considering the diverse, culture and educational background of healthcare professions in Qatar, studies should also focus on exploring the reporting of severe medication errors that actually caused harm.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-156

**Poster Title:** Implementation of an automated naloxone co-prescribing program within a large rural health care network

**Poster Type:** Descriptive Report

**Submission Category:** Safety/Quality

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**Purpose:** With the number of deaths due to opioid overdose increasing exponentially, there is urgency to expand naloxone access for at-risk patients and their communities. Regulatory, guideline, and evidence-based stakeholders all recommend co-prescribing naloxone to patients at increased risk for opioid overdose.<sup>1</sup> A pharmacist's role can be multifaceted in developing pathways to implement this broadly supported recommendation to improve the quality and safety of patient care. This pharmacist-led initiative to expand community access to naloxone in a rural healthcare network aimed to standardize naloxone co-prescribing for at-risk patients and streamline corresponding clinical workflow for providers, all within the electronic medical record.

**Methods:** This was a wide-reaching quality and safety improvement project conducted within the 5,000 square mile rural healthcare network. The scope of this automated naloxone co-prescribing program was initially targeted at ambulatory care centers, but has also been adapted for acute care facilities to use on discharge. The Quality Improvement (QI) project team consisted of Clinical Pharmacy Specialists (CPS), the Medical Director of Quality and Clinical Effectiveness, and the Information Technology/electronic medical record (EMR) build team. The QI team secured buy-in from key stakeholders including the interdisciplinary pain committee, and clinical and executive leadership.

A network-wide standardized naloxone co-prescribing guideline was developed based upon national best practice recommendations and evidence based guidelines. The guideline was then integrated into the EMR as an order set as well as a best practice advisory (BPA). The BPA

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automatically fires on a patient-specific basis when moderate to high risk opioid misuse criteria are met. The automated BPA and order panel link providers to the naloxone prescribing guideline, medication orders for naloxone in each available formulation, a progress note template, the Opioid Risk Tool (ORT) for risk stratification,<sup>2</sup> a urine drug screen, associated pertinent laboratory values, and billing codes. Finally, automatically printed patient education facilitates the provider-patient discussion regarding the risk of opioid overdose and appropriate use of naloxone.

**Results:** Network-wide usage of this interprofessional safety and quality improvement program was implemented on February 2017. Co-prescribing of naloxone was measured by the number of patients prescribed naloxone since the BPA and order set went live. Use of the ORT was measured by the number of patients evaluated for future opioid misuse since the ORT went live in the EMR.

At baseline, prior to EMR implementation, 36 naloxone prescriptions had been ordered. There were no documented risk assessments using the ORT, as it did not yet exist in the EMR. At 24 months after BPA and order set integration, there were 768 co-prescriptions for naloxone. Of the 768 prescriptions for naloxone, 646 were for intranasal, 2 for intramuscular, and 120 acted as place holders in patients' medication histories showing they were referred to receive a free naloxone kit through a state-wide program for underserved and uninsured patients. Within 24 months after the ORT was integrated, 6614 patients were assessed for risk of opioid misuse, of which 1029 were determined to be at moderate or high risk and qualified for a naloxone co-prescription per network guidelines.

**Conclusion:** This automated naloxone co-prescribing program, consisting of an automated EMR integrated platform, has substantially improved the network-wide co-prescribing and accessibility of naloxone for at-risk patients. An effective clinical workflow was key to establishing a rapid and sustained increase in naloxone prescriptions across a large geographic region. Pharmacists are well positioned to take a lead role in quality improvement and safety initiatives focusing on opioid safety and harm reduction.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-157

**Poster Title:** Can selective serotonin reuptake inhibitors make you bleed?

**Poster Type:** Case Report

**Submission Category:** Safety/Quality

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**Purpose:** Purpose: Antidepressants are one of the most commonly prescribed therapeutic drug classes. Selective serotonin reuptake inhibitors (SSRI) are frequently used as first-line antidepressants due to their efficacy, tolerability and safety. Reports of their antiplatelet effects emerged soon after commercialization, associated with the essential role played by serotonin in platelet function. In the clinical setting, a frequent and important issue is the management of medications that are known to increase bleeding, such as antiplatelet agents, non-steroidal anti-inflammatory drugs or anticoagulants, prior to an invasive procedure. In this paper we will evaluate if SSRI should be included in this discussion, presenting a case of a bleeding event probably related to the use of a SSRI and reviewing the literature regarding this subject.

**Methods:** We describe a case of a 51-year-old woman who presented for an ultrasound-guided vacuum-assisted breast biopsy and developed unexpected bleeding that forced the cancellation of the procedure taking into account the risk of developing hematoma or severe rebleeding. When questioned about concomitant illnesses or medications, she mentioned that she was followed in psychiatry for a major depressive disorder and that she was on sertraline. To assist the radiology team regarding the cause of this event and the reschedule of the biopsy, a search of the scientific literature has been conducted to access a possible connection between this drug and the bleeding event, using PubMed, Google Scholar, MEDLINE and UpToDate, and the following keywords: SSRI, selective serotonin reuptake inhibitors, bleeding, hemorrhage, biopsy, surgery, invasive procedure.

**Results:** Bleeding complications related to SSRI use have been identified in several observational studies and include a wide range of events with different severity. The majority of information available is related to the management of SSRI therapy prior to surgery and the

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results differ regarding risk and type of surgery. In the context of less invasive procedures we found little information. In one study the frequency of bleeding complications after invasive dental procedures in patients taking SSRI was low to negligible and another study evaluated bleeding events in patients undergoing breast biopsies and concluded that SSRI were associated with elevated bleeding risk. The critical question is to evaluate the potential benefit of stopping SSRI therapy when compared to the risk of developing a discontinuation syndrome, symptom recrudescence or relapse of depression caused by the withdrawal of the drug.

Conclusion: Considering the scarce information available we suggest that clinicians be aware of the potential for bleeding associated with SSRI but not routinely discontinue them prior to invasive procedures and prior to the consultation of a psychiatrist. Further studies should be conducted to evaluate the necessity of stopping SSRI therapy and, if this is the case, how to manage the risk of discontinuation syndrome related to the suspension of these drugs.

**Methods:**

**Results:**

**Conclusion:**

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**Session-Board #** - 8-158

**Poster Title:** Assessment of perioperative vancomycin use in orthopedic surgical patients with a history of penicillin allergy: a retrospective review of penicillin skin testing

**Poster Type:** Evaluative Study

**Submission Category:** Safety/Quality

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**Purpose:** Approximately 10% of the United States population has a history of allergy to penicillin (HOAP) documented in their electronic medical record. True penicillin allergy is estimated to be 0.01%. Overdiagnosis of penicillin allergy has the potential to lead to inappropriate treatment with vancomycin, clindamycin, and fluoroquinolones. The purpose of this study is to evaluate the outcomes of penicillin skin testing on perioperative vancomycin use in total joint replacement orthopedic procedures.

**Methods:** This retrospective analysis included adult patients who had a total joint replacement surgery performed by a Marshfield Clinic Health System orthopedic surgeon. The implementation of penicillin skin testing and a flowchart to guide perioperative antibiotic use in patients with documented penicillin allergies was implemented on January 1, 2018 through December 1, 2018. Results were compared to a historical cohort. Data was gathered and analyzed to assess how many Marshfield Clinic Health System patients had a penicillin allergy recorded in their electronic medical record, including information on the type of documented reaction. The number of patients with a documented penicillin allergy who went on to receive penicillin skin testing was also assessed. The incidence of perioperative vancomycin use in total joint replacement orthopedic surgical patients was gathered as well as the frequency of updated penicillin allergy information in the electronic medical record in patients who had a negative penicillin skin test.

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**Results:** In Marshfield Clinic Health System patients, 13.6% had a history of penicillin allergy documented in their electronic medical record. The most common documented reaction to penicillin was rash (40%) and hives (29%). Between January 1, 2018 and December 1, 2018, 15 patients with a documented penicillin allergy were referred to the allergy clinic for penicillin skin testing. Thirteen patients (87%) had a negative penicillin skin test and were candidates to receive cefazolin preoperatively instead of vancomycin. Perioperative vancomycin use was reduced after the implementation of a preoperative assessment and penicillin skin testing (4.2% vs 9.5%). In the thirteen patients who had a negative penicillin skin test, 10 patients had the penicillin allergy removed from their electronic medical record.

**Conclusion:** The incidence of medical health record documented penicillin allergies at our health care system was similar to the national average of 10-20%. The implementation of penicillin skin testing and a guidance flowchart helped to aid provider prescribing of perioperative antibiotics in patients with documented penicillin allergies and reduced vancomycin use in total joint orthopedic procedures. Future directions will include evaluating the feasibility of extending penicillin skin testing to all patients scheduled to receive an orthopedic procedure.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-159

**Poster Title:** Driving safety and compliance through implementation of the infusion super panel

**Poster Type:** Descriptive Report

**Submission Category:** Safety/Quality

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**Purpose:** A 2018 Joint Commission medication management update indicated over 49% of hospitals surveyed were non-compliant with titratable infusion orders. Essential components of such orders include a starting dose, titration increment, frequency, goal, and maximum dose. A multidisciplinary team identified the opportunity to standardize titratable infusion orders to reduce the risk for conflicting or incomplete orders. The purpose of this project is to outline the development and implementation of the “infusion super panel” and its impact on driving standardized, safe and regulatory-compliant prescribing and administration practices of frequently used medication infusions in a multi-hospital health system.

**Methods:** Engaging senior leadership for support and strategic alignment was foundational in the early planning and resource allocation phases of this patient safety initiative. A multidisciplinary team was formed to ensure frontline input and appropriate subject matter expert representation including physicians, nurses, and pharmacists across various specialties such as emergency medicine, critical care, neurology, cardiology, and pediatrics. A structured meeting series was held to identify areas of opportunity and to develop the clinical build content based on most current evidence-based and best practice recommendations. During the multidisciplinary team meetings, every medication record for titratable infusions was reviewed to ensure all regulatory requirements were met. The essential elements of titratable orders were built as required fields and defaulted to content that was most frequently used by bedside practitioners while still allowing the flexibility for customization when necessary. Rigorous user acceptance testing was completed by clinical and informatics

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subject matter experts for final approval and sign-off. The Organizational Learning Department developed and coordinated education for roll-out across all 11 hospitals.

**Results:** The infusion super panel combines a variety of innovative safeguards and clinical decision support tools such as interactive, cascading order questions, age-appropriate context, linked orders, as well as dose warning alerts and hard stops. A total of 160 medication records and 55 order sets were affected by the electronic medical record (EMR) build. This is estimated to impact approximately 11,800 patients and 34,800 medication orders yearly across the system. The successful implementation of the infusion super panel highlights the importance of a robust change control process and coordinated multidisciplinary team efforts with end-user involvement in identifying process gaps and finding solutions to help leverage innovative EMR functionality and clinical decision support in the safe and regulatory-compliant delivery of patient care.

**Conclusion:** Building complete, concise orders for titratable infusions in the EMR that meet regulatory requirements is a challenging task. Essential components of such orders include a starting dose, titration increment, frequency, goal, maximum dose, and/or instructions on when to notify the provider as applicable. During this project, we sought to reduce the risk for conflicting or incomplete orders and the need for re-work to ensure clear and complete content. Through implementation of the “infusion super panel”, we were able to address this challenge with the expertise of a multidisciplinary team.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-160

**Poster Title:** Impact of a therapeutic interchange program on discharge medication reconciliation

**Poster Type:** Descriptive Report

**Submission Category:** Safety/Quality

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**Purpose:** Therapeutic interchange programs authorize pharmacists to exchange medications with therapeutic alternatives in accordance with a guideline, protocol or policy. The process is employed by healthcare systems as a mechanism to maintain a sound formulary while providing cost-efficient care. It is a practice supported by ASHP and ACCP. Monitoring the impact these programs have on outcomes of care is important. Concerns were recently expressed regarding the potential impact therapeutic interchange has on discharge medication reconciliation in terms of discharging the patient home on incorrect medications. We theorized that safeguards are in place within our CPOE system that minimize this risk.

**Methods:** An assessment of the therapeutic interchange workflow in the COPE system was planned. Orders for medications with a therapeutic interchange should trigger an alternative alert to display that directs the provider to order the therapeutic interchange medication. This in turn should allow the discharge medication reconciliation process to show that a home medication has been interchanged to a different inpatient medication thereby allowing the provider to clearly see the interchange and make appropriate discharge decisions. A review of medications ordered via an alternative alert was planned in order to identify the original home medication ordered and the corresponding therapeutic interchange medication ordered. The patients' after-visit summary was reviewed to identify if the patient was discharged home on the original home medication or the therapeutic interchange medication.

**Results:** The CPOE system workflow assessment confirmed that functionality was present to support a successful therapeutic interchange program. Alternative alerts were working as expected for the commonly utilized therapeutic interchanges and identified gaps were

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submitted for corrective action. The CPOE discharge medication reconciliation process displays the home medication list and the current inpatient medication list. Home medications therapeutically interchanged via an alternative alert are displayed side by side with the therapeutic interchange medication such that the interchange is visible to the provider. Ordering the home medication for continuation at discharge results in discontinuation of the therapeutic interchange medication. A total of 103 therapeutic interchanges that occurred within the system were reviewed. Ninety seven percent of the time the patient was discharged home on their original home medication. Of the 3% that were not discharged on their original home medication 66% had a valid reason: one patient had their home medication discontinued at the time of discharge and one patient had their home medication purposefully changed due to a change in medical status. Only one patient (< 1%) was discharged on the therapeutically interchanged medication with no documented reason for the change resulting in a conclusion that this was done inadvertently.

**Conclusion:** Therapeutic interchange programs can be successfully implemented without negatively impacting clinical care during discharge medication reconciliation when safeguards are in place within the CPOE system to avoid inadvertently discharging patients on the therapeutically interchanged medication.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-161

**Poster Title:** Parenteral nutrition standardization for adult patients at a large health system

**Poster Type:** Descriptive Report

**Submission Category:** Safety/Quality

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**Purpose:** Parenteral nutrition provides critical intravenous (IV) nutrition for patients who cannot tolerate enteral nutrition, but prescribing and compounding complexities make the process vulnerable to medication errors. Standardizing electronic parenteral nutrition ordering has been shown to decrease ordering errors, resulting in a safer, more uniform provision of parenteral nutrition. A large health system historically utilized multiple parenteral nutrition order sets, a variety of parenteral nutrition products, and some outsourcing services for compounding parenteral nutrition. A change in manufacturer-provided premix product availability prompted a time-critical standardization of parenteral nutrition products and ordering processes at the health system for adult patients.

**Methods:** Standardization of parenteral nutrition orders and products had been attempted in the past and sensitized the organization to be successful. An interdisciplinary workgroup of pharmacists and dietitians was developed and met for four months. Discussions centered on evaluation of products, comparison of preparations and order sets used between hospitals in the health system, evaluation of ordering elements, and education development. Examples of recommendations included creating an order cut off time, standard administration hang time, standard lipid volume, and standard multivitamins. The recommendations developed from this workgroup were presented to the relevant formulary and order set committees for approval. Once the standardized recommendations were implemented into the electronic medication record, a nursing survey was planned and executed to evaluate the success of the initiative. The

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workgroup met for an additional post-go-live review over three months to address any additional issues. The project was then completed after seven months of work effort.

**Results:** Parenteral nutrition products were standardized from over 20 product preparations to three preparations and from eleven order sets to two order sets. Items standardized included lipid volume and infusion time, minimum hours for cycling, hang time, order cut off time, maximum administration rate, trace elements, multi-dose vitamin, and recommended/optional laboratory orders. Minor modifications were addressed to improve wording in the order sets and address nursing survey feedback.

**Conclusion:** Creation of two order sets has introduced efficiencies in maintaining parenteral nutrition ordering in the electronic medication record. The focus on process improvement and engagement from stakeholders was key to successful implementation and standardization of parenteral nutrition ordering and parenteral nutrition products for adult patients at a large health system.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-162

**Poster Title:** Adherence to a procalcitonin guided algorithm for antibiotic management in lower respiratory tract infections and sepsis

**Poster Type:** Evaluative Study

**Submission Category:** Safety/Quality

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**Purpose:** Procalcitonin is a serum biomarker of bacterial infection that is approved by the Federal Drug Administration to guide initiation and cessation of antibiotics in lower respiratory tract infections and cessation of antibiotics in sepsis. Appropriate and timely antibiotic administration is crucial in improving healthcare outcomes in patients with infections, but inappropriate antibiotic prescribing can contribute to antimicrobial resistance, adverse medication side effects, and Clostridium difficile infections. This purpose of this study was to evaluate the implementation of hospital-developed guidelines for the use of procalcitonin by assessing the utilization of procalcitonin diagnostic testing by clinicians and adherence to hospital-developed guidelines.

**Methods:** The institutional review board approved this retrospective quality improvement study. All patients enrolled in the study were admitted, had a procalcitonin serum test collected during the month of June 2018, and a suspected lower respiratory tract infection or sepsis. A retrospective review of Cerner electronic medical record data was performed to compile a list of patients with a serum procalcitonin lab value in June 2018. An electronic medical record review was then conducted for the compiled list of patients to assess for adherence to hospital guidelines for utilization of procalcitonin in antibiotic initiation and de-escalation. For all instances of deviation from the algorithm, investigators attempted to clarify clinical decision-making involved.

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**Results:** The electronic medical record review was conducted for 50 patients admitted with serum procalcitonin values in June 2018. Of the patients with a known or suspected lower respiratory tract infection, 67% were initiated on antibiotics if the procalcitonin level was  $>0.25$  as recommended by hospital guidelines. Of the 33% who were not initiated on antibiotics, 89% had clinical documentation on why antibiotics were deferred, such as not meeting quick sequential organ failure assessment (QSOFA) and systemic inflammatory response syndrome criteria (SIRS). 26% of patients were initiated on antibiotics despite having a procalcitonin value less than or equal to 0.25. Some documented reasons for this deviation from the guidelines include positive microbiology studies and meeting QSOFA and SIRS criteria. A follow up procalcitonin level was not collected in 41% of patients with a suspected lower respiratory tract infection. Of patients with known or suspected sepsis, 23% of patients that had a procalcitonin less than or equal to 0.5 had antibiotics discontinued. Follow up procalcitonin levels were not collected in 38.46% of patients.

**Conclusion:** Overall, providers are following the evidence based algorithms when deciding on whether to initiate antibiotics in suspected lower respiratory tract infections and when to discontinue antibiotics in suspected sepsis. When the algorithms are not adhered to, clinicians often provided documentation of the patient-specific clinical factors that led to the deviations. However, serial procalcitonin levels were not consistently drawn. By understanding how the procalcitonin diagnostic test is currently being utilized, investigators hope to create targeted educational interventions for clinicians to address knowledge gaps and encourage evidence-based patient care.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-163

**Poster Title:** Peri-operative redesign to increase patient access and medication safety: pharmacy driven telehealth medication reconciliation support

**Poster Type:** Descriptive Report

**Submission Category:** Safety/Quality

**Primary Author:** EunJi Ko, Brigham and Women's Hospital; **Email:** ejko@bwh.harvard.edu

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Fatema Alrashed

Twilight Cofield

Kate Ulbricht

**Purpose:** Brigham and Women's Hospital (BWH) pre-operative evaluation clinic (The Weiner Center) serves ~450 patients weekly, including 72 orthopedic surgery patients. There are not enough Nurse Practitioner (NP) office visits available to adequately serve ortho patients in a timely manner contributing to rescheduled surgeries and patient dissatisfaction. Orthopedic surgery patients have a low medication reconciliation rate of 20%. NPs spend ~35 hours/week completing medication reconciliation by phone for ~90 patients prior to clinic visits.

Unfortunately, not all patients are reached prior to clinic visits contributing to increased visit time, risk of medication related adverse events, and increased admission rates.

**Methods:** In February, we began a six-month peri-operative pharmacy-led telehealth medication reconciliation support redesign pilot for pre-operative orthopedic surgery patients. A team of pharmacists and pharmacy interns identified patients in the electronic medical record system to call 12 days prior to their clinic visit. Multiple resources were utilized to collect accurate medication lists. Best possible medication histories were performed over the phone and medication lists were updated accordingly in the electronic medical record. Pharmacies were called if there were discrepancies, patients were unsure of their correct medication regimens, or there seemed to be potential adherence issues. Our aim is to increase clinic visit throughput to decrease lead time for patient appointments by significantly reducing NP medication review time and decrease 85-minute visit length by 10% so the clinic can serve ~5 more patients/day by the end of July.

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**Results:** Four months into the pilot, the pharmacy-led team has completed 455 medication reconciliation support calls, correcting numerous medication errors. The most common types of discrepancies were deletions, followed by omissions, then duplications. The majority of discrepancies were found with over the counter products/herbal supplements. Average length of clinic visit time has decreased by 11% (~89 min to 79 min) since the start of the intervention, freeing up NPs to do other work. Preliminary data supports this intervention can increase patient access, satisfaction, and workforce efficiency leading to reduced risk of delayed surgeries and medication errors.

**Conclusion:** Pharmacy-led telehealth medication reconciliation support services offer a high impact, low barrier to entry, cost effective method of optimizing medication management. This model proves that collaborative interdisciplinary redesign processes can foster sustainable solutions to common healthcare challenges promoting patient safety and mitigating risk.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-164

**Poster Title:** Medication-use evaluation regarding the current intravenous immunoglobulin (IVIG) administration practices within Michigan Medicine

**Poster Type:** Evaluative Study

**Submission Category:** Safety/Quality

**Primary Author:** Paul Ko, Michigan Medicine/University of Michigan College of Pharmacy;

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**Purpose:** When administering IVIG, the rate of infusion must be slowly titrated up to the maximum rate due to the risk of infusion-related adverse events increasing with a faster infusion rate. Thus, it is important to start the patient on the correct initial rate of infusion using the appropriate weight. The purpose of this medication use evaluation was to determine if nurses at Michigan Medicine were using the correct weight (ideal, actual, or adjusted) for calculating initial IVIG infusion rates for patients in the outpatient setting, according to hospital guidelines, and if incorrect initial rates were associated with infusion-related adverse events.

**Methods:** A retrospective analysis was done for a dataset that included all adult outpatient encounters from 09/04/2018 to 10/11/2018 at the Taubman Infusion Center where Gamunex-C or Gammagard (both IVIG) was administered. All included encounters received an initial infusion rate of 0.5 mL/kg/hr. Encounters with initial infusion rates of 0.25 mL/kg/hr and deceased patients were excluded. Electronic medical records (MiChart) were used to collect the following data: indication, treatment date, first infusion (Yes/No), weight on treatment day, height, initial rate of IVIG, and infusion-related adverse events. From the initial rate of IVIG, the weight used by nurses in kilograms (WKG) was derived. From the height and weight on treatment day (actual body weight), the ideal and adjusted body weights were calculated. WKG was categorized as actual, ideal, or adjusted body weight. An additional category of "other" was added for WKGs that did not match with any of the three weight categories. Encounters were

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further excluded from analysis if WKG belonged in two or more weight categories. After the matching process, it was determined whether the nurses were using the “correct” or “incorrect” weight based on the current IVIG guidelines at Michigan Medicine. Frequency of infusion-related adverse events were then compared between patients receiving “correct” and “incorrect” initial IVIG infusion rate.

**Results:** 52 out of the 62 encounters were analyzed. We excluded ten encounters in total: four encounters for using 0.25 ml/kg/hr as the starting infusion rate, one patient encounter with a deceased patient, and five encounters with WKG that belonged in two or more weight categories. Eight of the encounters were categorized as “other,” two of which used double the actual weight and resulted in adverse events. Seven encounters were a first-time IVIG infusion, all seven of which used the wrong weight to calculate the initial infusion rate. One of these seven encounters experienced an adverse event. 90.4% (n=47) of the encounters used the incorrect weight for calculating initial infusion rate. The most common error in 63.8% (n=30) of the encounters was using the actual weight when ideal or adjusted should have been used. There were 36.2% (n=17) adverse events among the 57 encounters. Four of these were from the five encounters that used the correct weight and 13 from encounters that used the wrong weight. The most common adverse event was increased blood pressure. Some other adverse events were increased respiration, increased pulse, and headache.

**Conclusion:** The evaluation found that nurses used the wrong weight to calculate the initial infusion IVIG rate and many patients received faster infusions than indicated by the “Guidelines for IVIG Dosing and Administration” from Michigan Medicine. Necessary steps should be taken to properly train nurses and improve the EMR to provide the “correct” weight before initiating infusions. This evaluation did not show an association between using the wrong weight and the frequency of infusion-related adverse events. Future studies that analyze more encounters over a longer time period are needed.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-165

**Poster Title:** Comparative analysis of Lenalidomide versus Thalidomide in multiple myeloma ; drug-induced peripheral neuropathy

**Poster Type:** Evaluative Study

**Submission Category:** Safety/Quality

**Primary Author:** So Hee Lee, Seoul St. Mary's Hospital; **Email:** sohee.zzzz@gmail.com

**Additional Authors:**

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**Purpose:** Lenalidomide(LD) inhibits angiogenesis and shows immunosuppressive effects. LD was introduced to treat multiple myeloma and is known to show positive differences in side effects compared to Thalidomide(TD). In particular, peripheral neuropathy, one of the most common complications of TD in treating the patients with multiple myeloma, was reported less frequent when treating with LD. However, no local study has been conducted to compare the effects of TD and LD in peripheral neuropathy. Therefore, this study was conducted to investigate the appearance, aggravation or improvement of peripheral neuropathy and relevant risk factors in the patients treated with LD and TD.

**Methods:** The electronic medical records of 169 patients with multiple myeloma who had treated with LD and TD in a tertiary hospital between March 2014 and March 2015 were retrospectively reviewed. The basic characteristics of the patients, the incidence of peripheral neuropathy, and other adverse events were evaluated with the use of a Chi-square test. Logistic regression analysis was used to analyze the risk factors of peripheral neuropathy.

**Results:** There were 85 patients in the LD group and 84 patients in the TD group for final analysis. The mean age of patients was 62 and 75 years old in the LD and TD group, respectively. There was no significant difference in the presence of diabetes, renal or hepatic functions of patients between the groups. The percentage of patients who showed increased severity of peripheral neuropathy after the treatment was 2.35% in the LD group and 19.05% in the TD group ( $p < 0.001$ ). Six patients in the TD group showed two or greater increase in the

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grade. A 51.76% in the LD group and 11.90% in the TD group ( $p < 0.001$ ) continued chemotherapy without showing any aggravation of present peripheral neuropathy.

**Conclusion:** The patients treated with LD showed less increase in the severity of peripheral neuropathy compared to those treated with TD. Significant difference also was observed between the drugs in the percentage of patients who continued the treatment without aggravation of peripheral neuropathy. However, other risk factors suggested in previous studies such as diabetes, decreased renal function or previous neurotoxic drug use did not show significant correlation with the aggravation of peripheral neuropathy.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-166

**Poster Title:** USP 797: environmental monitoring excursions, investigations, action plans, and taking a “mulligan”

**Poster Type:** Descriptive Report

**Submission Category:** Safety/Quality

**Primary Author:** John Lubkowski, Cardinal Health/Augusta Health; **Email:** johnlubkowski@yahoo.com

**Additional Authors:**

**Purpose:** An ongoing pattern of environmental monitoring excursions related to organism growth from surface and air sampling in a sterile compounding suite was identified in a mid-size community hospital over a multi-year period. This case presents the methodology utilized to trend culture results, investigate potential sources of contamination, create remediation action plans, and provide follow up on the identified issues and culture results.

**Methods:** A spreadsheet was used to track growth on environmental culture plates over time, by location, within the sterile compounding suite. A pattern of growth appeared to be present related to the time of year for sampling, and proximity to entrance points. An investigation into potential contamination sources was conducted by a multidisciplinary team for each excursion. The depth of the investigations escalated after each sampling failure. Investigations sequentially included; evaluating environmental conditions, staff observations, evaluating cleaning processes, verification of airflow and pressure isolation, inspection of air filtration equipment, wall and floor inspections, evaluation of areas adjacent to the compounding suite, assessment of equipment placement, and evaluation of air handlers. Sequential action plans included; terminal cleaning and resampling, staff education, establishing twelve hour beyond use dating, shifting compounding to a satellite pharmacy, reapplication of epoxy paint on clean room walls, removal of carpet in the pharmacy, relocation of air returns outside the clean room, removing refrigerators from the area adjacent to the anteroom, removal of equipment from the anteroom, changes to the cleaning procedure, treatment with aerosolized hydrogen peroxide, and implementation of UV-C disinfection outside of the clean room. Growth continued to be identified which led to the engagement of consultants to identify facility design and process issues, as well as to suggest steps to remedy the ongoing situation.

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**Results:** Contracted subject matter experts identified process issues that led to policy revisions and the development of a re-training program for staff on the new processes. They also determined that the facility design did not maintain a sterile environment. Observations included wooden doors that opened inward, the ante-room opened directly to a receiving area, air exchanges per hour and pressure isolation were at the low end of the acceptable ranges, the epoxy paint on the walls did not meet standards, light covers made cleaning difficult, and air return grates were on the ceiling next to the incoming filtered air.

Construction began to address all identified issues. Automatic sliding glass doors were installed. A controlled, not ISO-classified room was added to separate the ante-room from the receiving area. Fan-assisted HEPA filters were installed to increase the pressure differentials and air exchanges. The walls were covered with a seamless, smooth, non-porous, solid-surface system. Light covers were reversed for more effective cleaning. Air return vents were relocated low on the walls to ensure proper airflow. After a terminal cleaning, air and surface cultures showed no growth on all but one plate, which displayed only alert levels.

**Conclusion:** A systematic approach to investigating sterile compounding suite environmental excursions can help to identify sources of contamination and factors negatively impacting the sterile environment. External consultants may be useful in developing additional action plans and securing required resources when common strategies fail to rectify recurrent environmental excursions, creating the need to take a “mulligan” and reconstruct the suite. Continuous training of staff, including education on the rationale for why things must be done a specific way, along with staff observations are imperative to ensure continuing compliance.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-167

**Poster Title:** Coping with medicine shortages: different pathways-one goal

**Poster Type:**

**Submission Category:** Safety/Quality

**Primary Author:** Nenad Miljković, European Association of Hospital

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**Purpose:** The problems created by medicines shortages have been widely reported by healthcare professionals, as well as patients and acknowledged at the European level by the European Medicines Agency (EMA), the European Commission and the Heads of Medicines Agencies (HMA). Healthcare professionals across Europe apply various approaches in order to mitigate shortages including designing reporting systems, where data on duration, causation, and possible alternatives for a medicine in shortage is available. Systems operating in Belgium and the Netherlands seem to fit the purpose and needs of healthcare professionals and patients as for providing timely information needed for a quick response to a shortage at the healthcare settings. However, in some countries reporting systems are not efficient and do not provide up-to-date information on ongoing shortages. This includes the provision of PDF charts with obsolete information instead of interactive shortages catalogues by responsible authorities, linked to healthcare professionals' association databases where it is possible to quickly find a suitable alternative.

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Multi-stakeholder approaches initiated by the authorities as seen in Malta and Finland, help sharing the information among manufacturers, wholesalers, regulatory authorities and healthcare professionals in a way, which helps forecasting future shortages and providing solutions to existing problems with finding alternative treatments. Open, transparent communication among stakeholders involved in managing shortages is lacking and is perceived as the main hurdle to overcome in order to adequately respond to this challenge.

This acknowledgement manifested itself on the one hand in the creation of a dedicated task force on the availability of authorised medicines for human and veterinary use and on the other hand through dedicated research funding in the field of medicines shortages from the European Cooperation in

Science and Technology (eCOST). Despite the efforts of the European Medicines Shortages Research

Network, funded by eCOST, the problem of medicines shortages continues to persist.

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Multi-stakeholder approaches initiated by the authorities as seen in Malta and Finland, help sharing the information among manufacturers, wholesalers, regulatory authorities and healthcare professionals in a way, which helps forecasting future shortages and providing solutions to existing problems with finding alternative treatments. Open, transparent communication among stakeholders involved in managing shortages is lacking and is perceived as the main hurdle to overcome in order to adequately respond to this challenge. This acknowledgement manifested itself on the one hand in the creation of a dedicated task force on the availability of authorised medicines for human and veterinary use and on the other hand through dedicated research funding in the field of medicines shortages from the European Cooperation in Science and Technology (eCOST). Despite the efforts of the European Medicines Shortages Research Network, funded by eCOST, the problem of medicines shortages continues to persist. Since data on the prevalence, nature and impact for patient care of medicines supply shortages is still lacking, European Association of Hospital Pharmacists (EAHP) saw a need to launch a follow-up investigation to its 2014 survey activity. The 2018 Medicines Shortage Survey gathered data on:

- The current nature of medicines shortages problems in Europe, including their prevalence;
- The most

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common types of shortages; • Their impact on patient care and hospital pharmacy services; •

Existing

national mechanisms for dealing with or monitoring shortages; • How hospital pharmacists typically

manage the problems shortages cause; and, • Hospital pharmacist views on proposed policy solutions.

The EMA/HMA joint task force on the availability of authorised medicines for human and veterinary use

has been working on developing strategic support as well as advice for coordination and concerted

approach aiming at promoting good practice by: • Enhancing current communication practices and

ensuring a multidisciplinary approach within regulatory authorities; • Aligning criteria for publication

across the EU network; • Increasing visibility and accessibility of information on availability on medicines; and, • Fostering interaction with stakeholders.

**Methods:**

**Results:**

**Conclusion:**

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**Session-Board #** - 8-168

**Poster Title:** Pharmacist education on oral anticoagulant medication: a patient satisfaction survey

**Poster Type:** Evaluative Study

**Submission Category:** Safety/Quality

**Primary Author:** Dearbhla Murphy, Mater Misericordiae University Hospital; **Email:** demurphy@mater.ie

**Additional Authors:**

Mariosa Kieran

Ciaran Meegan

**Purpose:** Due to their high risk nature, the Mater Misericordiae University Hospital (MMUH) Pharmacy Department provide a medicines education service to all patients newly prescribed an oral anticoagulant (warfarin or a Direct-Acting Oral Anticoagulant (DOAC)). As well as verbal education, a warfarin or DOAC booklet is provided. A MMUH DOAC booklet was introduced in August 2017. The aim of this study was to assess patient satisfaction with oral anticoagulant education provided by pharmacists and to obtain feedback on the new DOAC booklet.

**Methods:** The audit was conducted over a six week period between February and April 2018. All patients who were provided pharmacist education on an oral anticoagulant during this time frame were given a questionnaire for completion after education took place. The questionnaire contained questions on whether the patient found the information useful, the quantity of information discussed and which format of communication was most beneficial.

**Results:** 30 patients were involved in this study. 40% (n=11) of patients were prescribed warfarin, with the remaining 56% (n=17) prescribed a DOAC (apixaban n=12, rivaroxaban n=4, dabigatran n=1). All patients reported that the verbal and written information was useful. When asked which format of communication was most beneficial, the majority (n=16) of respondents answered both verbal and written communication. The majority (n=29) of patients reported that they understood the information discussed. All patients (n=16) who had read the DOAC booklet reported that it was helpful.

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**Conclusion:** The results of this audit demonstrate patient satisfaction with the pharmacist education provided to patients commenced on oral anticoagulants at the MMUH. The results also suggest that patients support the use of written materials in addition to verbal education. Patients reported that they find the DOAC booklet helpful.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-169

**Poster Title:** Pregabalin and gabapentin drug utilization review at the Mater Misericordiae University Hospital

**Poster Type:** Evaluative Study

**Submission Category:** Safety/Quality

**Primary Author:** Dearbhla Murphy, Mater Misericordiae University Hospital; **Email:** demurphy@mater.ie

**Additional Authors:**

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Ciaran Meegan

**Purpose:** Both pregabalin and gabapentin are included in the top 100 products reimbursed by the Primary Care Reimbursement Service in Ireland. The government's Medicines Management Programme have highlighted the need for vigilance when prescribing and dispensing pregabalin/gabapentin as both drugs have a risk of addiction and a potential for misuse. Pregabalin and gabapentin are frequently supplied for Mater Misericordiae University Hospital (MMUH) in-patients. The aim of this study was to assess the current practice of prescribing gabapentin/pregabalin at the MMUH and to determine if intervention is required to ensure their appropriate use.

**Methods:** A one day hospital-wide audit of pregabalin and gabapentin was conducted. The audit took place over 5 days (August 2018). Clinical Pharmacists gathered information on the dose prescribed, indication and documented history of epilepsy and if treatment was started prior to admission.

**Results:** Approximately 588 in-patient drug charts were reviewed. 53 patients were prescribed pregabalin, one of whom had a history of epilepsy. 83% of pregabalin prescriptions were initiated before hospital admission. Pregabalin 75mg twice daily (n=8) was the most commonly prescribed dose.

45 patients were prescribed gabapentin during the audit. Five patients had a history of epilepsy. 47% of these patients were prescribed gabapentin before hospital admission. Gabapentin 300mg three times daily (n=12) was the most commonly prescribed dose.

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**Conclusion:** This study found a significant level of in-patient pregabalin/gabapentin use. The high rate of gabapentin initiation at the MMUH is in accordance with the hospital post-operative pain guidelines. In contrast, most patients commenced Pregabalin prior to hospital admission. This audit provides baseline data for which future audits can be compared against. Results were disseminated to the Drug and Therapeutics Committee and will be discussed with the pain management team to explore potential interventions for appropriate use. Future studies to address if gabapentin prescriptions are appropriately continued on discharge from the MMUH are required.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-170

**Poster Title:** An observational review to evaluate the appropriateness of stress ulcer prophylaxis continuation in cardiothoracic patients post intensive care unit discharge

**Poster Type:** Descriptive Report

**Submission Category:** Safety/Quality

**Primary Author:** Maria Murphy, Mater Misericordiae university Hospital; **Email:** mariamurphy@mater.ie

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**Purpose:** Stress ulcer prophylaxis (SUP) is recommended by international guidelines as a standard of care in critically ill patients with appropriate risk factors for stress ulcers to prevent gastrointestinal bleeding. They state that once risk factors for stress ulcers have resolved SUP can be stopped.

Evidence exists that many risks are associated with the use of acid-suppressants such as increased risks of clostridium difficile and pneumonia.

This study aims to evaluate the appropriateness of current practice in the Mater Misericordiae University Hospital (MMUH) for the continuation of stress ulcer prophylaxis (SUP) in cardiothoracic patients post intensive care unit (ICU) discharge.

**Methods:** This study is a prospective observational review that involved the development of a data collection tool by the researcher following a discussion with the medical director of critical care in the MMUH to include indications for SUP administration in accordance with the American Society of Health System Pharmacists (ASHP) SUP guidelines and the Surviving Sepsis SUP guidelines. The data collection tool was piloted by the researcher and was then used to evaluate the appropriateness of SUP administration in cardiothoracic patients post ICU discharge.

**Results:** SUP was inappropriately continued in 88.8% of patients discharged to CTHDU from ICU.

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**Conclusion:** Many cardiothoracic patients in CTHDU post ICU discharge were inappropriately continued on SUP. This highlights the need for initiatives to be introduced to reduce the unjustified continuation of SUP post ICU discharge such as adaption of evidence-based SUP guidelines at ICU discharge and introduction of educational interventions to educate staff on risk factors for stress ulcers and the importance of reviewing patients for same.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-171

**Poster Title:** Cost savings associated with switching from enteric to film coated prednisolone

**Poster Type:** Descriptive Report

**Submission Category:** Safety/Quality

**Primary Author:** Marie O Halloran, Mater Misericordiae University Hospital; **Email:** mohalloran@mater.ie

**Additional Authors:**

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Maríosa Kieran  
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**Purpose:** Prednisolone is a corticosteroid, commonly prescribed in the hospital setting for a variety of indications, often as a short term treatment. Enteric coated (EC) prednisolone was the preparation routinely stocked and utilised by hospital in-patients, even when EC was not specifically prescribed. Film coated (FC) prednisolone was supplied for in-patients with swallowing difficulties. There is no conclusive evidence that the use of EC prednisolone reduces the risk of peptic ulceration.<sup>1</sup> Furthermore patients on high dose or long term corticosteroids are often prescribed a separate agent for gastro-protection. EC prednisolone is five times more expensive than FC prednisolone.

**Methods:** In February 2019, EC prednisolone was replaced by FC prednisolone on all in-patient ward stock lists. Only patients admitted on EC prednisolone were maintained on the EC preparation, including the heart /lung transplantation patients who are routinely managed with EC prednisolone.

**Results:** In a two month period prior to the changeover (November and December 2018) 24,200 units of EC prednisolone were purchased (Cost=€ 2,388) and 1,600 units of FC prednisolone were purchased (Cost = € 28), resulting in a total spend of € 2,416 in a two month period.

In the two month period directly after the changeover 1,800 units of EC prednisolone (Cost = € 174) and 21,400 units of FC prednisolone were purchased (Cost = € 377), resulting in a total spend of € 551 in a two month period.

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This constitutes savings of €1,865 in a two month period, a 77.2% reduction in total spend on prednisolone.

Although we note slightly more prednisolone (n =2600 units) purchased in the two month period before the changeover versus after, the data is still comparable.

**Conclusion:** The growth in medicines costs is a global challenge. Spending on hospital medicines is increasing at a greater pace than any other type of healthcare expenditure, thus organisational governance of medicines expenditure is crucial. Our hospital has demonstrated a simple change from EC prednisolone to FC prednisolone was possible, with no reported adverse effects. There will be continued significant cost savings associated with the switch.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-172

**Poster Title:** Review of insulin event reports and proposal of risk mitigation strategies across a national healthcare organization

**Poster Type:** Descriptive Report

**Submission Category:** Safety/Quality

**Primary Author:** Elizabeth Papa, Ascension Health; **Email:** elizabeth.papa@ascension.org

**Additional Authors:**

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**Purpose:** Medication event reporting allows for identification, resolution, and prevention of serious safety events as well as tracking and trending to identify opportunities for improvement. High alert medications, such as insulin, bear an increased risk of causing significant patient harm when used in error. The purpose of this project is to complete a robust review of medication event reports related insulin to identify trends and recommend action steps to improve patient safety.

**Methods:** The healthcare organization's National Medication Safety Team reviewed insulin events entered through the electronic event reporting system from January 1, 2019 through March 31, 2019. These events were analyzed and grouped by the medication use process in which the event occurred. Trends were identified and presented to nursing, physician, and pharmacy leaders in addition to frontline staff to aid in identifying potential risk mitigation strategies. In addition to review of insulin events, the National Medication Safety Team completed site assessments throughout the health ministries where the Institute for Safe Medication Practices High-Alert Medication Assessment for Insulin was completed. This assessment also identified opportunities for improvement which were incorporated into the review and recommendations.

**Results:** A total of 220 events were reported, of which 41% were near misses. Analysis of the data revealed that most events originated during the administering and prescribing phases of the medication use process. The most common type of insulin involved in reported events was

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insulin aspart, followed by insulin detemir, and insulin regular. Most of the events reported were classified as low severity errors with no harm to the patient. Reports associated with administering included providing higher doses than prescribed, dose omissions, and duplicate or incomplete orders. Higher severity events were associated with administering a higher dose than prescribed, medication reconciliation, or unpreventable adverse drug reactions. Contributing factors identified in many of the events include human factors such as failure to comply with policy or protocol, lack of attention, distraction, and miscommunication during handoff. Several risk mitigation strategies were identified. These included clinical decision support enhancements to aid in limiting available routes of administration and decreasing duplicate orders, implementation of glucometers with wireless technology or docking stations to decrease handoff miscommunication, ensuring appropriate order sets are available and implemented for rescue agents, basal, correctional insulin, and hyperkalemia treatment, as well as implementation of double checks for intravenous insulin administration.

**Conclusion:** Many risk mitigation strategies were identified through this multidisciplinary review of insulin events. The National Medication Safety Team will work with their respective ministries to ensure successful adoption of these safe practice recommendations. A repeat analysis of medication events in 6-12 months will be completed to monitor for improvements.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-173

**Poster Title:** Enhancing neuromuscular blocker safety: a multi-modal approach

**Poster Type:** Descriptive Report

**Submission Category:** Safety/Quality

**Primary Author:** Erin Pender, Truman Medical Centers; **Email:** erin.pender@tmcmcd.org

**Additional Authors:**

Melissa Gabriel

**Purpose:** A recent fatal medication error occurred when a non-intubated patient was given the neuromuscular blocking agent (NMB), vecuronium. Since this time, there has been an emergence in awareness surrounding the use of these high-risk medications and how hospitals world-wide can elevate to a best-practice standard for patient safety. At Truman Medical Centers (TMC), our aim is to evaluate our current processes and identify additional opportunities to enhance our medication safety awareness surrounding NMB's.

**Methods:** A pharmacy NMB taskforce was assembled to evaluate our institutions management of neuromuscular blocking agents. Taskforce members included, pharmacy IT personnel, clinical pharmacists, pharmacy residents, and pharmacy patient safety leadership. Key areas of focus were as follows:

- NMB located in critical need areas only
- Review of accessibility of NMBs from automated dispensing cabinets (ADC)
- Access to reversal agents in all located where NMBs are stored
- Hospital-wide storage of NMBs in individual, lidded storage containers
- Alert systems in place for both electronic medical record (EMR) and ADCs
- Physician accessibility to all NMB orders via computerized physician order entry (CPOE)
- Availability and utilization of a NMB orderset

**Results:** Review of our institution's current NMB process identified significant opportunities for growth in our surveillance and safeguard of these high risk medications. Such areas for improvement included:

- Insufficient quantities of reversal agents for full NMB reversal in all ADCs

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- NMB were accessible by nursing staff through utilization of the override function on all ADC cabinets
- Storage of NMB in containers without lids was found in the central pharmacy
- Lack of system alerts in place in EMR for new NMB orders or upon removal of medication from ADC
- Ordersets were not available for providers to order NMBs
- Physicians were not able to access all NMB orders via CPOE

**Conclusion:** Key deficits were identified in our storage and dispensing process. Immediate changes were implemented and included removal of NMBs from the institutions override list, increased supply of reversal agents in ADCs, addition of alerts for providers and pharmacists. Addition of an interactive alert on ADCs upon removal of a NMB. Enhanced alert stickers were procured and placed on all NMB storage in addition to any compounded medication dispensed from the pharmacy. Development of a Critical Care Medication Safety Program has been developed for high risk medications to be reviewed annually to ensure patient safety is at the best practice standard.



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**Session-Board #** - 8-174

**Poster Title:** Implementation and evaluation of a medication transfer bag process to improve rate of medication transfer between inpatient units

**Poster Type:** Descriptive Report

**Submission Category:** Safety/Quality

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**Purpose:** Sending patient-specific medications with a patient when the patient transfers between inpatient units presents operational and patient safety challenges. When medications are not transferred with the patient it can lead to increased costs in waste and replacement of these medications, lost time in searching for and replacing these medications, and delays in patient care. This project sought to improve the rates at which patient-specific medications are sent with a patient during transfer through implementation of a medication transfer bag process. This project was performed at an academic medical center with approximately 300 adult admission/discharge/transfer events per day.

**Methods:** A baseline analysis assessed the scope of medications lost during patient transfer. This analysis reviewed medication redispenses for adult inpatients who had an admission/discharge/transfer event within 24 hours preceding the redispense. Chart review confirmed whether the redispense was for a medication that was available prior to transfer or whether the redispense was unrelated to transfer.

An education initiative regarding medication transfer was performed in spring 2018 through nursing unit safety meetings. Based on feedback from these meetings, a pilot medication transfer process with nursing and pharmacy interventions was implemented from Fall 2018 to Spring 2019.

Nursing unit interventions involved the charge nurse or unit secretary bringing the transferring nurse a medication transfer bag as a visual reminder and aid for medication transfer. The

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medication transfer bag pilot was implemented in eight nursing units. Pharmacy interventions were implemented in the Central Pharmacy and the Critical Care and Surgery Pharmacy Division and included confirming patient location when scanning medications prior to delivery. Cartfill technicians were educated regarding patient transfer and asked to also confirm patient location on medication delivery using unit census information. Data analysis with descriptive statistics for one nursing unit was repeated following pilot implementation. Endpoints considered included number of medications lost during transfer, cost of replacing lost medications per year, types of medications most frequently lost, and delay in administration time.

**Results:** Baseline data analysis indicated that 132 medication doses were redispensed over a five day period for medications lost upon patient transfer. When extrapolated to a 365-day time period, the cost of replacing these medications was estimated to be greater than \$100,000/year. Of the medications lost upon patient transfer, 103/132 (78%) of them were available on the nursing unit prior to patient transfer and 29/132 (22.0%) of them were still in the pharmacy cartfill delivery process when the patient transferred. The types of items most likely to be lost upon transfer were oral unit dose medications (63/132, 47.7%) and multi-dose items (21/132, 15.9%). The average delay in administration time for medications that were replaced after being lost during patient transfer was 2 hours 53 minutes, and 4/132 (3.0%) missing medication doses were not administered at all.

Review of redispense data for a five day period in one nursing unit that had implemented the medication transfer bag process (Neurocritical Care Unit) following implementation of the medication transfer bag process indicated a 76% reduction in medications lost during patient transfer.

**Conclusion:** Baseline data analysis confirmed that medications lost during patient transfer had both patient care impact through delay in medication administration time and economic impact through the cost of replacing missing medications. The true cost of replacing medications lost during patient transfer is likely higher, as labor cost in replacing lost medications was not included. Following implementation of the medication transfer bag process, a reduction in missing medications was seen in one nursing unit. Future plans include analyzing the medication transfer bag process in the remaining nursing units and evaluating feasibility of expansion of the medication transfer bag process.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-175

**Poster Title:** An exploration into a pharmacist-led medicines reconciliationservice: a service review in an acute hospital setting

**Poster Type:** Descriptive Report

**Submission Category:** Safety/Quality

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**Purpose:** Accurate medication records are essential in preventing errors, avoiding harm, aiding diagnosis and treatment planning. Medicines Reconciliation “the formal process in which healthcare professionals partner with patients to ensure accurate and complete medication information transfer at interfaces of care” ensures accurate medication record generation. MR is undertaken to varying degrees in many institutions, by a variety of healthcare professionals each with their own focus, priorities and methods.

- To determine views and opinions of doctors towards a pharmacist-led MR service in an acute hospital setting
- To ascertain what doctors identify as barriers and facilitators to MR.

**Methods:** Methods: A self-completion questionnaire used mixed methodology through open and closed question styles to accurately gather prescriber views and opinions on the pharmacist-led MR Service.

**Results:** Results: The positive impact on patient care and safety demonstrated by MR was acknowledged by 98% (n=50) of respondents. Forty-nine respondents, 94%, agreed MR saved them time while 92% (n=48) recognised MR decreased their workload. Participants were satisfied with the MMUH MR Service, 90% (n=46) and 94% (n=49) agreed MR is accurate. Participants called for dedication of pharmacy resources to MR, 88% (n=46), and service expansion to include all patients on admission, care transition and discharge was advocated by participants, 79% (n=41), 86% (n=44) and 79% (n=41) respectively. The most important MR facilitator was verbal communication of MR discrepancies. The most important barrier was

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current service limitations. Thematic analysis of 138 classifiable responses identified four themes, patient safety (n=33), workload implications (n=9), MR usefulness (n=52) and service development (n=56). Some comments overlapped themes.

**Conclusion:** Conclusion: Prescribers view the pharmacist-led MR Service as a positive, useful initiative saving prescribers time and increasing patient care and safety hospital wide.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-176

**Poster Title:** Improving medication safety reporting with event taxonomy changes

**Poster Type:** Descriptive Report

**Submission Category:** Safety/Quality

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**Purpose:** Incident reporting systems are standard for most health systems and can aid in enhancing just culture when use is optimized. Utilizing data from these reporting systems is essential to identify opportunities and trend outcomes of process changes. The Agency for Healthcare Quality and Research reports medications events as one of the highest reported event types within voluntary reporting systems. The purpose of this project is to streamline taxonomy options available during event entry to aid in providing consistent data extraction, tracking, and trending.

**Methods:** The Ascension National Medication Safety Team, comprised of six pharmacists with medication safety training, reviewed the current medication event classifications offered by the subscription service Ascension utilizes for incident reporting. The team compared the taxonomy classification to nationally recognized medication event taxonomy published by the National Coordinating Council for Medication Error Reporting, which has been adopted and implemented in the Institute for Safe Medication Practices error reporting system and the Pennsylvania Patient Safety Reporting System taxonomy. The team identified an opportunity to reduce the current taxonomy structure from 88 unique event classifications to 24 unique event classifications. The recommendations were guided by the reduction of contributory factors that were used as an event type and to align with nationally recognized taxonomy structure to better identify patient safety opportunities. This proposal went through an extensive review process approval process including multidisciplinary clinical, operational, and quality committees. Feedback on the recommendations included from clinical pharmacy leaders, retail pharmacy leaders, other medical clinicians as well as quality leaders within the Ascension

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Healthcare System. Once agreed upon, the proposal was recommended and approved for incorporation into the subscription incident reporting service.

**Results:** The subscription service amended several recommendations and provided a taxonomy classification of 48 unique events. Ascension was provided the opportunity to suppress medication event classifications for the Ascension Healthcare System subscribers. After approval and agreement from the subscription service on final taxonomy structure, the taxonomy structure was implemented in the subscription service to a total of 28 unique events. Education was sent out to users of the incident reporting system to notify of changes and rationale for aligning with nationally recognized taxonomy.

**Conclusion:** Medication event taxonomy can be a complex classification system for safety event reporting. Alignment with nationally recognized taxonomy structures may be beneficial and can be difficult to adopt in external subscription services. More research is needed to determine if aligning taxonomy classification for incident reporting can improve patient outcomes. As data systems migrate and increase bi-directional language it will be necessary for event taxonomy to be consistent from source to source and allow for better sharing of information to increase patient safety.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board # - 8-177**

**Poster Title:** Interventions on drug-related problems identified from prescriptions dispensed in private community pharmacies in Singapore

**Poster Type:** Descriptive Report

**Submission Category:** Safety/Quality

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**Purpose:** Drug-related problems (DRPs) are events or circumstances involving drug therapy that actually or potentially interfere with desired health outcomes. While DRPs have been widely studied overseas and in hospital settings locally, there is no published data on the DRPs identified by community pharmacists in the three major private chains in Singapore. This study aimed to describe the nature and frequency of DRPs identified from prescriptions dispensed in private community pharmacies in Singapore and the interventions made by pharmacists. The study team also hoped to investigate the acceptance rate and perceived clinical significance of pharmacists' interventions.

**Methods:** In this IRB-approved study, the top 30% pharmacy stores in terms of the number of prescriptions dispensed per month were selected and recruited from each of the three community pharmacy chains. Over the two-month study period, the study team collated from the pharmacies dispensed prescriptions with interventions. The DRPs detected and pharmacists' recommendations were analysed and classified accordingly by the study team. An adapted version of the validated DOCUMENT DRP classification system was chosen for this study as the DOCUMENT DRP system also includes the classification of actions taken to resolve the DRPs. The acceptance rate and perceived clinical significance of interventions were also evaluated.

**Results:** A total of 17 259 prescriptions were dispensed, of which 550 were found to contain DRPs. Most of these prescriptions came from private general practitioner (GP) clinics (77.46%), and the median number of prescribed drugs was 1 (IQR: 1 – 2). A total of 627 DRPs were

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identified, of which incorrect strength was most common (n = 246, 39.23%), followed by incorrect dosing instructions (n = 184, 29.53%). The drug classes that were most commonly associated with DRPs were Dermatologicals (n= 119, 18.89%), Respiratory system products (n = 90, 14.35%) and Nervous system products (n = 86, 13.72%). Preparations with multiple strengths, available in several different dosage forms, or had a recent change in strength or formulation were most commonly implicated. Pharmacists often had to clarify the problem (n = 452, 72.09%) or recommend a change to patient's therapy (n = 152, 24.24%). The recommendations made achieved a high acceptance rate of 86.79% from prescribers. Most of the interventions were perceived to be of low level of clinical significance (n = 469, 74.80%).

**Conclusion:** In this first nation-wide study, we saw a DRP occurrence rate of 3.63 DRPs per 100 prescriptions dispensed by community pharmacists in Singapore. This figure differs greatly from other similar studies done elsewhere due to the different classification systems used, different healthcare structures as well as methods of data collection. Nonetheless, through identifying and resolving DRPs, this study illustrates the important role of community pharmacists in ensuring that patients receive safe and effective therapy.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-178

**Poster Title:** Evaluating the ISO 80369-3 (ENFit) enteral connection system for implementation at a large non-profit health system

**Poster Type:** Descriptive Report

**Submission Category:** Safety/Quality

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**Purpose:** The International Organization for Standardization (ISO) has approved design standards to prevent misconnections between medical devices that have different intended uses. In September 2018, the U.S. Food and Drug Administration (FDA) released recommendations for hospitals and clinicians to start utilizing enteral devices with connectors that meet the standards of ISO 80369-3. A large, Catholic health system evaluated the ENFit enteral connection system to determine the feasibility of implementing the enteral connector changes within each of its hospitals in a safe and efficient manner.

**Methods:** A multidisciplinary decision team was formed to evaluate the ENFit enteral connection system. The team included representatives from nursing, pharmacy, supply chain, dietary, quality/safety, case management, and the operating room. Team members with pediatric experience were also present on the decision team. Once established, the committee developed a charter and mission. The objective of the team was to evaluate the ENFit enteral connection system and develop a plan to safely implement the ENFit connector changes throughout the system's hospitals, including the overall care of patients after discharge. To accomplish these goals, the team set out to determine the desired attributes of the ENFit products. The group also created and reviewed current state and future state process maps to evaluate potential risks in the new workflow and identify corresponding mitigation strategies. The team determined the resources it would generate as part of its charter, which would include an SBAR (Situation, Background, Assessment, Recommendation) document, frequently

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asked questions (FAQ) resource, and executive summary slides. The supply chain members of the team created a supplier matrix, displaying which ENFit products were available from vendors contracted with the organization. The committee was also tasked with determining a measurement of compliance with the conversion to ISO 80369-3. The team's recommendations and resources were subsequently advanced through the health system's formal clinical initiative approval process.

**Results:** The desired attributes and supplies agreed upon by the team included characteristics of the ENFit syringes: display metric units only, range in size from 0.5mL to 60mL, and availability in an amber color. To minimize workflow changes, the group recommended that ENFit syringes replace oral syringes for oral administration of liquid medications. Based on the expectation that patients would still be admitted with "legacy" feeding tubes after implementation of the ENFit system, the team agreed that availability of adapters would be necessary to allow use of ENFit syringes with legacy feeding tubes. To assist with safely discharging patients with a newly inserted ENFit feeding tube, the team created a patient discharge instruction sheet. This document contained information for the patient's tube feeding supplies and included recommendations for patient communication with outpatient services. The group also identified resource documents on appropriate cleaning of feeding tubes and on the preparation/administration of liquid medications. The committee established a goal of implementing the ENFit enteral connection system in 50% of all the organization's hospitals by the end of June 2020 and 100% of sites by the end of June 2021, with implementation priority given to pediatric facilities and those needing to meet state/regional mandates.

**Conclusion:** The creation of a multidisciplinary decision team was essential in evaluating implementation of the ENFit enteral connection system. The various disciplines represented were able to help determine important product attributes to be considered when making the transition and to identify potential risks in workflow that would need to be addressed. The team also identified resources that would be helpful in adequately educating the health system's associates prior to implementation of the ENFit connector changes.

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**Session-Board #** - 8-179

**Poster Title:** Audit of oral anticoagulant (OAC) prescribing in the Mater Misericordiae University Hospital (MMUH); what has changed in 4 years?

**Poster Type:** Descriptive Report

**Submission Category:** Safety/Quality

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**Purpose:** The MMUH formulary recommendations for OACs are in line with the Health Service Executive (HSE) Medicines Management Programme (1,2). Warfarin is the OAC of choice. Apixaban is the preferred Direct Oral Anticoagulant (DOAC) if warfarin is unsuitable. Edoxaban, dabigatran and rivaroxaban are third-line options (1,2). In 2014, warfarin was prescribed in 81% of cases in the MMUH. National data indicates DOACs are now prescribed more often than warfarin (2).

**Aims**

To identify current MMUH OAC prescribing practice and compare results with 2014 data.

**Methods:** A point prevalence audit was completed in November 2018 by clinical pharmacists, across thirty wards on all patients on OACs. The OAC, indication, dose, prescribing team speciality and if treatment was commenced on this MMUH admission were recorded. Results were collated, analysed and compared with an identical 2014 audit.

**Results:** More MMUH patients were prescribed OACs in 2018 (n=87) than 2014 (n=53). Apixaban was the most commonly prescribed OAC (48%), followed by rivaroxaban (20%), warfarin (16%), dabigatran (14%) and edoxaban (2%). In 2014, warfarin was the most commonly prescribed OAC (81%), followed by rivaroxaban (15%), apixaban (2%) and dabigatran (2%).

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The Medicines for the Elderly speciality had the most patients on OACs in both 2018 (n=29) and 2014 (n=14). Atrial fibrillation remains the most common indication for oral anticoagulation. The majority of patients prescribed OACs in both 2014 and 2018 were 60 years or over. In 2014, all patients under 60 requiring oral anticoagulation were on warfarin. In 2018, all these patients were on DOACs.

The number of patients starting OACs during MMUH admission was approximately 10% higher in 2018 than 2014.

**Conclusion:** Apixaban is the most commonly prescribed OAC in the MMUH. Use of warfarin has decreased from 81% in 2014 to 16% in 2018 and is now surpassed by DOAC prescribing.

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**Session-Board #** - 8-180

**Poster Title:** Inpatient sedative/hypnotic medication usage in a community hospital

**Poster Type:** Evaluative Study

**Submission Category:** Safety/Quality

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**Purpose:** In light of FDA warnings as well as the recognition of the potential increased risk for falls and other safety concerns in patients receiving sedative/hypnotics as inpatients, the need to evaluate and optimize the use of sleep medications has been recognized. A determination was made to conduct a review and to limit the number of patients who were not on sleepers at home from starting sedative/hypnotic therapy as an inpatient, reduce the dose of those patients' already on sedative/hypnotics to a safe level and reduce falls and falls with injury from sedative/hypnotics.

**Methods:** A retrospective review of 50 patients on sleepers was conducted for 45 days to evaluate if these patients were on a sedative/hypnotic at home, if the patient had fallen at home, if the dose was consistent with the dosage they were on at home, and the assessment of safety and efficacy of medication administration as an inpatient. The results of the retrospective study indicated that 30 patients currently on a sedative/hypnotic were not on a similar medication at home and 63% of these patients did not use the medication during the current inpatient stay. Most concerning, 16.6% patients received a prescription for a sedative/hypnotic when discharged who had not previously been on this therapy and 25% of patients who fell during this time period were on a sedative/hypnotic. Finally, 45% of zolpidem purchases were for 10 mg doses during the retrospective period.

**Results:** In order to change these trends, education was developed for both physicians and nursing staff. A question to the intervention database was added so that data could be collected about patient falls on sedative/hypnotics. Computer physician order entry order sets were developed for physicians and other licensed healthcare professionals to indicate

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appropriate dosing based on age and gender which follow the FDA guidelines. Alternative medications including, trazodone, doxepin and melatonin were introduced to the healthcare providers as safe and effective alternatives. Flowsheets were developed for both nursing and licensed healthcare professionals which provided step by step processes to decrease the number of sedative/hypnotics ordered. As a result, purchases of zolpidem 10 mg decreased by 14% and the purchases of melatonin increased by 100%. Falls declined at all treatment sites as well as falls with injury.

**Conclusion:** This intervention program involved a multidisciplinary approach to the reduction of sedative/hypnotic usage which is imperative for success. Education for patients who are utilizing these medications at home needs to be provided at every opportunity during the inpatient stay. The reduction of new and continuing orders for traditional sedative/hypnotics is essential to reduce at home usage, decrease potential risk of fall and fall with injury, as well as other adverse events related to sedative/hypnotic usage, and potential readmission are all benefits of this intervention program.

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**Session-Board # - 8-181**

**Poster Title:** Decontamination of hazardous drug residues from stainless steel using a sporicidal disinfectant

**Poster Type:** Evaluative Study

**Submission Category:** Safety/Quality

**Primary Author:** Mark Wiencek, Contec Healthcare; **Email:** mwiencek@contecinc.com

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**Purpose:** Decontamination of hazardous drugs from surfaces in compounding areas is essential to reduce the risk of cross-contamination and occupational exposure, and is required by several regulatory guidance documents. Results of previous studies suggest that high concentrations of sodium hypochlorite can decontaminate surfaces such as stainless steel, but there are concerns about corrosion of material surfaces and the lack of disinfectant registration for these formulations. To explore alternatives, studies were conducted to determine the feasibility of a registered sporicidal disinfectant to decontaminate hazardous drugs from stainless steel and to understand the roles of physical removal versus degradation of the parent drugs.

**Methods:** Coupons of 316 stainless steel were spiked with compounding-relevant doses of several hazardous drugs. After allowing the drug solutions to dry or waiting at least 30 minutes, the surfaces were wiped twice with sterile pads or wipers saturated with a formulated mixture of peracetic acid, hydrogen peroxide and surfactants. After allowing the solution to remain wet on the surface for 3 minutes (enough for sporicidal efficacy), the surfaces were wiped with 70% sterile isopropanol. After drying, the coupons were sampled for residual contamination using a swabbing technique, extraction and analysis with chromatography. Residual drugs on the coupons (mass per 100 square centimeters) were compared to initial levels. Additional experiments examined the recovery efficiency of the sampling technique and whether degradation of the parent drugs played a role in the decontamination effect.

**Results:** After conducting the wiping protocol with the peracetic acid/hydrogen peroxide disinfectant solution followed by 70% isopropanol, drug residues on the surface of stainless steel were reduced up to 99.99% compared to initial levels. Most drugs, including common

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antineoplastics, hormones and penicillin were reduced by >99.8%, but somewhat lower efficacy (99%) was observed with two platinum-based drugs, cisplatin and carboplatin. The decontamination effect was similar when the drugs were tested individually or in combinations of up to three drugs on the same coupons. Recovery efficiency of residual drugs from control coupons using a commercial sampling kit ranged from 50-78% for cyclophosphamide, 5-fluorouracil, estradiol and progesterone but was substantially lower with platinum-based drugs. Results of separate studies where penicillin was exposed to the solution of peracetic acid/hydrogen peroxide without the wiping procedure suggested that degradation of the parent compound contributed to the decontamination effect. Degradation may have been caused by the low pH and high oxidation potential of the disinfectant solution, but further research is needed to elucidate what specific chemical reactions are involved.

**Conclusion:** A wiping protocol utilizing a sporicidal disinfectant composed of peracetic acid/hydrogen peroxide followed by 70% isopropanol can effectively decontaminate drug residues from stainless steel. Results of experiments with penicillin indicate that dried residues of concentrated drug may require additional wiping steps with the disinfectant solution to remove visible residues and completely decontaminate the surface. The mixture of oxidizers was shown to degrade the penicillin molecular structure, thereby enhancing the decontamination effect. Further studies are needed to understand if this solution can degrade other hazardous drugs or if removal of residues by wiping is the primary mechanism of decontamination.



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-182

**Poster Title:** Optimizing composite medication event data reporting in a large national non-profit health system

**Poster Type:** Descriptive Report

**Submission Category:** Safety/Quality

**Primary Author:** Neil Wood, Ascension; **Email:** Neil.Wood@ascension.org

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**Purpose:** In an assessment to eliminate clinical variation, it was recognized by Ascension Pharmacy leadership that reporting of composite medication event data was not aligned from market to market. The Ascension National Medication Safety Team was charged with optimizing and standardizing medication event data reporting in 15 ministry markets and 151 hospitals across the United States.

The objective of this project was to plan and develop a secure cloud based interactive dashboard utilizing warehouse data from the voluntary event reporting system. The dashboard should be filterable and support the display of medication event graphics for Ascension, individual markets, and specific hospitals

**Methods:** The National Medication Safety Team utilized data collected from the standardized voluntary event reporting system for Ascension. Data is warehoused securely by the Ascension Healthcare Patient Safety Organization (AHP SO).

The team designed a pilot dashboard using a custom report from event data beginning October 1st to December 31st, 2018. After data optimization, the pilot dashboard was presented to leadership including the director of quality management and senior data analysts at Ascension Healthcare. A proposal to construct a new Medication Event Dashboard to be added to other AHP SO protected dashboards on the Tableau cloud-based system was approved for construction in March 2019.

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In April a review of the data fields needed for the dashboard was completed and a build timeline was outlined with initial deliverables in late April 2019. After the medication safety and build teams closely collaborated to review the dashboard, final changes were made the middle of May and the final version was published to the AHP SO Tableau server on May 28th, 2019. After publication, education to targeted users was completed detailing optimal report utilization and methods for presentation to local therapeutic and medical staff committees.

**Results:** Upon publication of the Medication Events Dashboard, each pharmacy user has the ability to view graphics that illustrate medication related events. Dashboards included are: total medication events by volume; frequently occurring medications and classes; assessment by final severity; root causes of event (nature/subnature); contributing factors; and care process involved in event. Each of these six dashboards can be independently filtered to view and trend all Ascension, market level, and individual hospital level events. Filters are also available to select specific medications or classes for investigation as well as trending causes and/or near miss versus those events reaching patients.

The interactive dashboard uses a standardized data source and graphics to report medication events to committees across Ascension. Medication safety improvements through identification of frequently occurring event types and high-alert medication events have resulted in development of targeted performance improvement at both the national and local level. Work has continued by providing valuable positive feedback to care teams on actions taken toward patient safety as a result of voluntary reporting. The feedback is designed to encourage increases the voluntary event reporting culture in the future.

**Conclusion:** The successful development and publication of the Medication Events Dashboard has yielded an easily retrievable, cloud-based, interactive graphic representation of voluntarily reported medication events. The utilization of these dashboards has supported identification of trends and implementation of performance improvement to promote safe medication use across Ascension.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-183

**Poster Title:** Memes for health: a millennial approach to health literacy using the CDC clear communication guidelines

**Poster Type:** Descriptive Report

**Submission Category:** Safety/Quality

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**Purpose:** Modern health educational materials are mostly composed of large chunks of text that are difficult to understand for patients with basic literacy skills. Without there being alternative educational resources, these patients lack the proper knowledge to take care of themselves and end up with a lower level of health literacy overall. To combat this, research has been done to prove if the inclusion of visuals can provide higher understanding in patients across all literacy levels. Memes for Health (MfH) improves upon the current state by bringing Centers for Disease Control (CDC) guidance to the creation of health care imagery.

**Methods:** Memes for Health utilizes a truncated version of the CDC Clear Communication Guidelines, reducing the CDC Index to three considerations: 'what is the message,' 'what is the call to action,' and 'is the information current, accurate, and/or clinically appropriate.'

Volunteer participants gather at Memes for Health Art Salons to discuss a healthcare topic led by a clinician in the field, in order to develop their thoughts on the subject in the context of what is considered current, scientifically accurate, and clinically appropriate. Volunteers develop a message and a call to action that they will try to illustrate using 10 words or fewer. The truncated CDC Index is utilized to review and validate the submissions. Responses are collected from art salon participants utilizing an anonymous open-ended survey. The illustrations are validated using the same anonymous open-ended survey by the Memes for Health Research Board members who did not attend the Art Salon. Illustrations that satisfy multiple criteria, including high correspondence between the anonymous survey results, and a

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rigorous consideration of the appropriateness of the health messaging, are considered for reproduction and mass distribution as Memes for Health stickers.

**Results:** Memes for Health has held 2 orientations and 6 art salons since October 2018 resulting in 10 validated illustrations. Three of the nine validated illustrations have been mass produced as stickers. One of these nine is a completed “Meme for Health”, which uses novel technology to expand the message of the illustration.

**Conclusion:** Through this alternative method of conveying health information, patients will be better able to understand their treatment plans, resulting in improved patient outcomes and quality of life.

## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-184

**Poster Title:** Potential drug-drug interactions between tacrolimus and direct acting antivirals sofosbuvir / velpatasvir and glecaprevir / pibrentasvir in kidney transplant patients during hepatitis C treatment

**Poster Type:** Case Report

**Submission Category:** Transplant/Immunology

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**Purpose:** This case series represent cases of potential drug-drug interactions between tacrolimus and two pagenotypic direct acting antivirals sofosbuvir/velpatasvir and glecaprevir/pibrentasvir in kidney transplant patients during hepatitis C treatment. Patient 1 was status post Deceased Donor Renal Transplant (DDRT) with stable renal graft function with serum creatinine range 0.8 – 1.1 mg/dL. Immunosuppressive medications included tacrolimus 1.5mg/day (1mg morning and 0.5mg bedtime) with the therapeutic level at goal of 5.6 ng/ml, mycophenolate sodium 360mg three times daily, and prednisone 5mg daily. Patient was treated with sofosbuvir/velpatasvir for 12 weeks for hepatitis C genotype 3 infection. Four days after treatment was initiated, tacrolimus level was elevated to 10.8 ng/ml. Tacrolimus dose was adjusted and reduced to 1mg/day (0.5mg morning and 0.5mg bedtime) and level was lowered to 7.2 ng/ml and then subsequently stabilized at 5.3 ng/ml. Patient tolerated medication well and finished the treatment. After the medication was stopped, it was noticed that tacrolimus level was decreased to 2.9 ng/ml and it required dosage adjustment to increase back to 1.5mg/day (1mg morning and 0.5mg bedtime). The level gradually went up and stabilized at goal with 4.4 ng/ml. Patient 2 was status post DDRT with stable allograft function with serum creatinine range between 1.2 and 1.6 mg/dL. Immunosuppressive medication included tacrolimus 5mg/day (3mg morning and 2mg bedtime) with the therapeutic level at goal of 5.2 ng/ml and mycophenolate sodium 720mg twice daily. Patient was treated with glecaprevir/pibrentasvir for 12 weeks for hepatitis C genotype 3 infection. Four days after treatment was started, tacrolimus level was elevated to 11.4 ng/ml. Tacrolimus dose was reduced to 4mg/day (2mg morning and 2mg bedtime) and level was dropped to 9.2 ng/ml and then later adjusted to 5mg/day (3mg morning and 2mg bedtime) to have the therapeutic level

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stabilized at 4.9 ng/ml. Patient completed the treatment with no side effect. After medication was stopped, tacrolimus level was dropped to 3.7 ng/ml and it required dosage adjustment to 6mg/day (3mg morning and 3mg bedtime). The level went up to 6.3 ng/ml and then stabilized at 6 ng/ml. Patient 3 was status post DDRT with stable graft function with serum creatinine range from 0.8 to 1 mg/dL. Immunosuppressive medications included tacrolimus 5mg/day (3mg morning and 2mg bedtime) with therapeutic level of 4 ng/ml and mycophenolate sodium 720mg twice daily. Patient was treated with glecaprevir/pibrentasvir for 12 weeks for hepatitis C genotype 1b infection. Nine days after treatment was started. Tacrolimus level was elevated to 8.3 ng/ml. Tacrolimus dose was reduced to 4mg/day (2mg morning and 2mg bedtime). The level was lowered to 6.5ng/ml and then stabilized at 5.2 ng/ml. Patient tolerated well and completed the treatment. After medication was stopped, tacrolimus level was decreased to 2.5 ng/ml. Tacrolimus dose was increased back to 5mg/day (3mg morning and 2mg bedtime), the level went up and then stabilized at 5.7 ng/ml. All three cases showed the same pattern of drug-drug interaction. When medication was started, the tacrolimus level was elevated and when medication was finished, the level was lowered. It both required tacrolimus dosage adjustment to maintain the therapeutic level. These 3 cases suggest that there are potential drug-drug interactions between tacrolimus with sofosbuvir/velpatasvir and glecaprevir/pibrentasvir. Although more study is needed to further explain this interaction, the providers treating post-transplant patients who are on immunosuppressive medication tacrolimus should be aware about this potential interaction and monitor patients closely to prevent medication toxicity and to maintain renal graft function during the treatment.

### **Methods:**

### **Results:**

### **Conclusion:**

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**Session-Board #** - 8-185

**Poster Title:** C1 esterase inhibitor-induced pulmonary embolism in a patient with hereditary angioedema

**Poster Type:** Case Report

**Submission Category:** Transplant/Immunology

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**Purpose:** Angioedema is a phenomenon caused physiologically by the sudden onset of vasodilatory response systems, which in turn increases surface area and permeability of the vasculature and results in severe, asymmetrical influx of fluid into the subcutaneous and submucosal space. Beyond this broad definition, several subtypes of angioedema have been identified and studied over the past decades and include angiotensin-converting enzyme-induced angioedema (ACE-IA) and hereditary angioedema (HAE). Whereas in ACE-IA the conversion of angiotensin I to angiotensin II can increase the circulating concentrations of kallikrein and bradykinin as a byproduct of the medication's mechanism of action, the activation of kallikrein and bradykinin in HAE is largely due to the intrinsic complement system. This intrinsic complement system, notably the C1 protein, is primarily responsible for HAE-induced attacks.

HAE is a relatively uncommon disease process, however; the clinical and financial implications of diagnosis are extreme. In recent years, C1 inhibitors such as Cinryze® have been prescribed for the prophylaxis of HAE attacks, though the risks associated with these medications are still being quantified. Despite the incidence of thrombosis being described within the package insert, the true actualized risk to patients remains elusive.

An 81-year-old female with a past history of HAE being managed with Cinryze® was brought to the emergency department after being intubated in her home due to severe hypoxia. Upon arrival, it was discovered that the patient had developed a thrombus in her left common iliac artery 6 months prior, which was being managed with clopidogrel and aspirin. Additional pertinent medical history included GERD which was being managed with esomeprazole. The patient rapidly declined and developed a PEA rhythm, for which ACLS was initiated. Bedside ultrasound demonstrated hypokinesis of the right ventricle, leading the medical team to believe

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a large pulmonary embolus was the precipitating cause of the cardiac arrest. The patient was deemed a non-candidate for fibrinolytics and expired after 28 minutes of active CPR.

In a clinical trial evaluating 146 patients, 5 (3.4%) experienced a significant thrombotic event while on Cinryze® therapy, including: one myocardial infarction, one deep vein thrombosis, one pulmonary embolism, and two cerebrovascular accidents. The hypothesized pathophysiology of clot formation with Cinryze® revolves around the inhibition of fibrinolysis via C1 inhibitor and the subsequent complex formed, which in turn prevents the endogenous antithrombotic tissue plasminogen activator and plasmin from exerting their physiologic function.

While the concomitant therapy of clopidogrel and esomeprazole is a confounding variable in the development of this patient's pulmonary embolism, the formation of the initial distal clot 6 months prior to the fatal incident, combined with the lethal thrombus that occurred while the patient was being managed with Cinryze®, warrants discussion. Furthermore, an evaluation with the Naranjo algorithm yields a score of 4, indicating that this severe adverse drug event was possible.

**Methods:**

**Results:**

**Conclusion:**



## 2019 ASHP Midyear Clinical Meeting Professional Poster Abstracts

**Session-Board #** - 8-186

**Poster Title:** Association between vitamin D level at time of renal transplant and subsequent rejection

**Poster Type:** Evaluative Study

**Submission Category:** Transplant/Immunology

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**Purpose:** Vitamin D has been linked to immunity regulation. Calcitriol, the active form of vitamin D, can inhibit interleukin-2 production and decrease expression of co-stimulatory molecules CD 28 and CD 86 on leukocytes, all implicated in promoting rejection. Adding calcitriol supplementation to standard immunosuppression has decreased acute rejection in rat models. Waitlisted end stage renal disease (ESRD) patients often exhibit vitamin D deficiency due to impaired renal production of calcitriol. The purpose of this study was to investigate if low vitamin D levels at time of transplant associates with an increased risk of rejection post-transplant.

**Methods:** This was a non-interventional, retrospective, cohort study. Included were adult transplant recipients receiving a kidney-only allograft between October 2015 and March 2018 who had an available vitamin D level (calcidiol) at time of transplant and at least six months of follow-up. Exclusion criteria were recipients experiencing rejection or death during index hospital admission, not receiving per-protocol immunosuppression at transplant, or transfer of care within first six months. Collected data included demographics, transplant characteristics, calcidiol levels and supplementation, and both protocol and for-cause biopsies. Vitamin D deficiency was defined as a calcidiol level < 20 ng/mL. Rejection was a composite of biopsy proven acute cellular or antibody-mediated rejection, including borderline/suspicious. The primary outcome was time to first rejection. Data was described using mean (standard deviation, SD) or median (interquartile range, IQR) for continuous variables and counts (percentages) for categorical variables. Group comparisons used student t or Mann-Whitney U test and Pearson's chi-square or Fisher's exact test as appropriate. The primary outcome was

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estimated by Kaplan-Meier survival curves and log-rank test. Cox proportional hazards model was utilized to identify independent risk factors for time to rejection and compare risk of rejection between groups with adjustment of covariates. All p values were two-sided, with 0.05 as level of significance. Analysis was performed using R software version 3.5.0. The study was approved by the Institutional Review Board.

**Results:** 293 subjects were transplanted during the study period; after exclusion of 15 subjects, 278 were included. There were n=110 vitamin D deficient subjects (mean level 13.7 ng/mL) and n=168 vitamin D non-deficient (31.9 ng/mL). There were significantly more non-deficient group subjects on vitamin D supplementation (64.3% vs 43.6%, p=0.001), but more deficient group subjects taking calcitriol (54.2% vs 32.4%, p=0.017). The non-deficient group was older (51.9 vs 48.6 yrs, p=0.033) and had longer cold ischemia time (CIT) (10.5 vs 7.1hrs, p=0.036).

Overall rejection incidence was 25.9%, being lower in the deficient group than non-deficient (18.2% vs. 31.0%). The unadjusted risk of rejection in the deficient group was 43% lower than non-deficient group (HR [95%CI]: 0.57 [0.34;0.95], p=0.032). In multivariable analysis (adjusting for CIT and recipient age), rejection risk in the deficient group remained lower than non-deficient group (HR [95%CI]: 0.53 [0.31;0.89], p=0.017).

In post-hoc analysis, rejection risk no longer had significant association with vitamin D deficiency when using the first calcidiol level measured post-transplant (HR[95%CI]: 1.06 [0.65;1.73], p=0.81). Subgroup analysis revealed no statistically significant difference in rejection survival between calcitriol supplementation use versus non-use at time of transplant in 156 subjects taking vitamin D supplementation (p=0.42).

**Conclusion:** Lower rejection risk in the deficient group was contrary to our hypothesis. While calcitriol is a known immune-regulator, it is not measured due to its short half-life, and calcidiol is measured to assess vitamin D deficiency. We identified significantly higher calcitriol use in the deficient group. Many subjects were not taking vitamin D supplements or intermediate forms that may not convert to calcitriol due to ESRD. This could suggest calcitriol use while awaiting transplant is a more immunologically beneficial supplement choice, and calcidiol levels are not indicative of calcitriol's immunomodulatory benefits peri-transplant. Further studies are necessary to corroborate this suggestion.

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**Purpose:**

**Methods:**

**Results:**

**Conclusion:**

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**Session-Board # -**

**Poster Title:**

**Poster Type:**

**Submission Category:**

**Primary Author: , ; Email:**

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**Purpose:**

**Methods:**

**Results:**

**Conclusion:**