ACCP 2018 Virtual Poster Symposium

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VPS Original Research

ADR/Drug Interaction

1. Evaluation of adverse drug events leading to hospitalizations at VA greater Los Angeles healthcare system. *Joseph Wang, Pharm.D.*[1], Sunita Dergalust, Pharm.D., BCPS[1], Keith Yuge, BS[2], Hyo-Jin Chae, Pharm.D.[1], Leah Loewenstein, Pharm.D.[1], Frank Bertone, Pharm.D., BCPS[1]; [1]Pharmacy, Veterans Affairs Greater Los Angeles Healthcare System, Los Angeles, CA [2]Veterans Affairs Greater Los Angeles Healthcare System, Los Angeles, CA

INTRODUCTION: Adverse drug events (ADEs) represent 5–7% of all hospitalizations, with over half deemed preventable. In addition, they also account for 5–9% of total hospitalization costs per annum. ADEs are more prevalent in the elderly population due to age-related changes in pharmacokinetics and pharmacodynamics, polypharmacy, and multiple comorbidities. This increase in susceptibility to ADEs in the elderly leads to an increase in the amount of hospitalizations due to ADEs.

RESEARCH QUESTION OR HYPOTHESIS: Is there a trend in ADEs leading to hospitalizations at VA Greater Los Angeles Healthcare System (VAGLAHS)?

STUDY DESIGN: Retrospective chart review.

METHODS: Patients who were hospitalized at VAGLAHS due to an ADE between January 1, 2003 and March 31, 2017 were identified. Patient demographics, number of comorbidities and regularly scheduled medications, drug class causing ADE, ADE description, baseline renal and hepatic function, length of hospital stay, and interventions were collected.

RESULTS: Approximately 4,000 ADEs were reported during the data collection period with 10% of the ADEs leading to hospitalizations. Approximately 30% of the patients were hospitalized for angioedema related to angiotensin converting enzyme inhibitors (ACE-I), with 76% of the cases occurring in African-Americans. Cardiovascular drugs and antibiotics were identified as causative agents in 47.4% and 24.3% of the ADEs that have led to hospitalizations, respectively. The average age of patients admitted was 65 years old and 54.6% of the patients presented with more than eight comorbidities while 49.3% of the patients were on more than nine chronic medications. The average length of hospital stay was 7 days.

CONCLUSION: ACE-I induced angioedema was the most prevalent reported ADE leading to hospitalizations at VAGLAHS. This ADE occurs in 0.2% of the general population and 3 to 4 times higher in African-Americans. Further investigation into this reaction is warranted in the veteran population for future prevention of hospitalizations related to this ADE.

2E. Evaluation of tolerability of beta-lactams in patients with reported penicillin allergy. *Garrett Messmer, Pharm.D., MBA*, Kristan Vollman, Pharm.D., BCPS, Lance Smith, Pharm.D., Heath Blandford, Pharm.D., BCGP, Shannon Allcron, Pharm.D., BCCCP, BCPS; Owensboro Health Regional Hospital, Owensboro, KY

Presented at the American Society of Health-System Pharmacists Midyear Clinical Meeting, Orlando, FL, December 6, 2017.

Adult Medicine

3. Evaluation of opioid utilization in patients receiving naloxone stratified by impairment in renal function. *Alexander Kantorovich, Pharm.D., BCPS*[1], Festus Durugo, Pharm.D.[2], Jennifer Lim, Pharm.D.[3], Meghan Soso, Pharm.D., BCPS[4]; [1]Department of Pharmacy Practice, Chicago State University College of Pharmacy, Chicago, IL [2]CVS OMNICARE, waco, TX [3]Walmart Pharmacy, Chicago, IL [4]Department of Pharmacy, Advocate Christ Medical Center, Oak Lawn, IL

INTRODUCTION: Several opioids and their metabolites are known to accumulate in renal dysfunction, particularly morphine. A number of studies have discussed risk factors associated with opioid-related adverse drug events (ADEs), but studies have yet to establish an association between specific opioids to ADEs requiring naloxone in patients with impaired renal function.

RESEARCH QUESTION OR HYPOTHESIS: The purpose of this study is to identify which opioid was last utilized and assess time from opioid administration to naloxone utilization among patients with varying degrees of renal impairment.

STUDY DESIGN: Single center, retrospective, cross-sectional, medical record review.

METHODS: The primary outcome was evaluation of which opioid was last administered to patients prior to the need for naloxone administration. Secondary outcomes included assessment of time from last opioid administration to naloxone administration, change in level of care, intubation, and other risk factors which may confound opioid toxicity. Patients who received opioids for analgesia and had a diagnosis of renal impairment while hospitalized were stratified as follows and included in the study: on dialysis, estimated glomerular filtration rate (eGFR) <30 mL/min (severe impairment), and eGFR 30–59 mL/min (moderate impairment). Patients on patient-controlled analgesia or with opioid overdose prior to admission were excluded.

RESULTS: Of the 340 patients screened, 88 patients met study eligibility. Between the three study groups, there was no difference in the last opioid given (morphine: p=0.50; hydromorphone: p=0.929) and time from last opioid administered to naloxone administration (p=0.140). Change in level of care occurred more frequently in patients on dialysis or with severe renal impairment compared to moderate renal impairment [42% and 10.9% (p=0.018)].

CONCLUSION: No association was found between the last opioid given and time to naloxone administration in patients with differing levels of renal impairment. The premise that specific opioids accumulate in renal impairment and cause more ADEs requiring naloxone was not demonstrated in this study.

5. Assessment of a pharmacy discharge transitions of care pilot on an adult medicine unit. *Ann Fugit, Pharm.D.*, Erin Collard, Pharm.D.; Department of Pharmacy, Vidant Medical Center, Greenville, NC

INTRODUCTION: Transitions of care (TOC) represent points in healthcare where patients are at high risk for safety and medication-related problems. Pharmacists are underutilized in TOC. A pilot was developed to implement discharge TOC services, including reconciliation and counseling for high-risk patients, within a decentralized pharmacist position.

RESEARCH QUESTION OR HYPOTHESIS: To quantify involvement and describe the impact of pharmacists' involvement in the discharge TOC service pilot.

STUDY DESIGN: Retrospective cohort study.

METHODS: Adult patients admitted to the designated medicine unit (June 12 – July 21, 2017) were included in this study. Patients who died or transferred to another unit were excluded from analysis. Patients eligible for TOC services were included in the TOC intervention group; all others patients were assigned to the control group. Primary endpoints included number of patients with TOC services provided by a pharmacist, level of TOC service provided, and counseling duration. Secondary endpoints included incidence of 30-day hospital readmissions and emergency department (ED) visits. Descriptive and inferential statistics (Chi-squared or Fisher exact for categorical data, ANOVA or student t-test for continuous data) were used to assess the data. A p-value less than 0.05 was considered statistically significant.

RESULTS: Fifty-nine patients were eligible for TOC services (59/285; 20.7%), and of those 35 were eligible for counseling (35/59;

59.3%). Most TOC patients had reconciliation fully or partially completed by a pharmacist (48/49; 81.4%). Counseling was provided to 23 eligible patients (23/35; 65.7%), primarily on the entire discharge medication list (19/23, 82.6%). The mean time for counseling was 21.7 minutes. There was no difference in 30-days hospital readmissions (23.7% vs. 23%, p=0.907) or ED encounters (13.6% vs. 15%, p=0.774) between the TOC and non-TOC patients.
CONCLUSION: Pharmacists were highly engaged in discharge reconciliation for eligible patients and were able to provide discharge counseling in under 25 minutes per patient. Further evaluation powered to assess 30-day hospital utilization is needed.

Ambulatory Care

6E. Short and long term effects of clinical pharmacy management on type 2 diabetes treatment outcomes in an ambulatory care setting. *Stephanie Knecht, Pharm.D.*[1], Courtney Pawula, Pharm.D.[2], Brandon Ladd, Pharm.D.[3], Michelle Wilhardt, Pharm.D.[3], Todd Rowland, Pharm.D.[3]; [1]Primary Care, Phoenix VA, Phoenix, AZ [2]Phoenix VA Health Care System, Phoenix, AZ [3]Phoenix VA, Phoenix, AZ
Presented at the Arizona Pharmacy Association Southwestern Region Residency Conference, Tucson, AZ, June 8, 2017.

Cardiovascular

8E. Comparing anti-factor Xa and activated partial thromboplastin levels for monitoring unfractionated heparin. *Rebekah A. Wahking, Pharm.D., MBA Candidate 2018*[1], Rachel H. Hargreaves, Pharm.D.[2], Sean M. Lockwood, MD[3], Sabrina K. Haskell, Pharm.D.[2], Kelly Davis, Pharm.D., BCPS, BCCCP[2]; [1]College of Pharmacy, University of Kentucky, Lexington, KY [2]Department of Pharmacy, Lexington VA Medical Center, Lexington, KY [3]Department of Medicine, Lexington VA Medical Center, Lexington, KY
Presented at American Society of Health-System Pharmacists Midyear Clinical Meeting and Exhibition, Orlando, FL, December 3–7, 2017.

9. Evaluation of the effect of prior anti-arrhythmic drug use on the success of atrial fibrillation catheter ablation. Michelle Wang, Pharm.D., BCPS[1], Katie B. Tellor, Pharm.D., BCPS[2], *Anastasia L. Armbruster, Pharm.D., BCPS*[2], Karthik Ramaswamy, MD, FAHS[3], Andrew Krainik, MD, MPH, FHRS[3]; [1]Missouri Baptist Medical Center, Saint Louis, MO [2]St. Louis College of Pharmacy, St. Louis, MO [3]The Arrhythmia Center, Missouri Baptist Medical Center, Saint Louis, MO
INTRODUCTION: Current guidelines recommend catheter ablation (CA) for atrial fibrillation (AF) refractory to at least one anti-arrhythmic drug (AAD), but do not specify an adequate number of AADs to be trialed prior to considering ablation.
RESEARCH QUESTION OR HYPOTHESIS: Does the number of failed AAD impact CA success?
STUDY DESIGN: Retrospective chart review.
METHODS: This is a single-center, retrospective cohort study that evaluated patients at least 18 years of age with paroxysmal or persistent AF who underwent an initial CA between June 1, 2015 and December 1, 2016 at a community hospital. Patients with unknown AAD histories, those who did not achieve acute procedural success, or who were lost to follow-up or death unrelated to thromboembolic stroke within six months post-ablation were excluded. Catheter ablation success was defined as freedom from AF. The primary outcome was the presence or absence of AF or atrial flutter captured on an electrocardiogram or other recording device at 3, 6, 9, and 12 months after the procedure.
RESULTS: Overall, 99 out of 103 patients completed 1 year of follow-up. Of those patients, 34 of 99 (34.3%) experienced AF recurrence within 1 year post-ablation. There was no significant difference among the categories of number of failed AADs and the recurrence of AF within 12 months post-ablation for zero AADS, 1–2 AADs, and ≥3 AADs (41.7%, 31.7%, and 60% respectively; p=0.368).
CONCLUSION: The results of this study do not support preferentially performing CA on patients who have failed a certain number of AADs. Conclusive results would best be addressed by a prospective randomized trial.

10. Impact of alterations in furosemide doses in heart failure patients with impaired renal function. *Sabrina Co, Candidate Pharm.D.*, Helen Rhee, Candidate Pharm.D., Bert Matsuo, Pharm.D., Huyentran Tran, Pharm.D., BCPS, Lee Nguyen, Pharm.D.; School of Pharmacy, Loma Linda University, Loma Linda, CA
INTRODUCTION: Intravenous (IV) loop diuretics are the foundation of treatment for patients admitted to the hospital for acute decompensated heart failure (ADHF). Although administration of IV loop diuretics results in prompt diuresis and relief of symptoms, it has also been shown to activate the renin-angiotensin-aldosterone system and sympathetic nervous system. The activation of these systems results in decreased renal blood flow and glomerular filtration pressure.
RESEARCH QUESTION OR HYPOTHESIS: We hypothesize that maintaining or increasing furosemide doses despite worsening serum creatinine and blood urine nitrogen laboratory values may impact total days of hospitalization.
STUDY DESIGN: This retrospective study will include hospitalized patients over the age of 17 with ADHF during 01/01/2016-10/01/2017.
METHODS: The groups were divided based on maintaining or increasing (M-INC) versus decreasing (DEC) furosemide dose in association with elevations of blood urine nitrogen (BUN) and serum creatinine (SCr) ratios >20/1. Patients were excluded from the study if their duration hospitalization was <48-hours or expired within 48-hours after receiving furosemide. The outcomes of interest include total days of hospitalization and all-cause in-hospital mortality.
RESULTS: One hundred seventy-eight patients were included in the study (M-INC, N=137; DEC, N=41). Overall, the patient ages were 64 ± 16 years (mean ± SD) with 59% (N=105) of the population being male. Baseline SCr and BUN (mg/dL, mean ± SD) were similar between the groups (SCr, M-INC: 1.8 ± 1.9; DEC: 1.4 ± 0.7, p=0.068), (BUN, M-INC: 30.3 ± 21.6; DEC: 32.6 ± 17.6, p=0.50). The total days of hospitalization (days, mean ± SD) was shorter in the M-INC group (8.2 ± 6) than the DEC group (10.4 ± 6.1), p=0.048. The mortality rate was higher in the DEC group (N=15, 37%) compared to the M-INC group (N=13, 9.5%), p<0.001.
CONCLUSION: In this retrospective study, we found that patients with no adjustment or increases in furosemide dosing based on elevated BUN/SCr ratios had lower total days hospitalized and mortality. Further evaluation is required to determine the impact.

11. Differences in blood pressure reading assessments based on JNC8 and new 2017 blood pressure guideline among community-dwelling adults in Fargo, North Dakota. *Marketa Marvanova, Pharm.D., Ph.D., BCGP, BCPP*[1], Paul Henkel, B.S., M.Soc.Sc[2]; [1]Department of Pharmacy Practice, North Dakota State University School of Pharmacy, Fargo, ND [2]Department of Geographical and Historical Studies, University of Eastern Finland, Joensuu, Finland, Finland
INTRODUCTION: High blood pressure (HBP) is the most important modifiable stroke risk factor (SRF). Previous guidelines defined HBP as ≥140/90 mm Hg, however the newly-published guideline defined HBP as ≥130/80 mm Hg with treatment goal of <130/80.

RESEARCH QUESTION OR HYPOTHESIS: What is the current blood pressure status among North Dakota community-dwelling residents and how does the new guideline influence status?
STUDY DESIGN: Cross-sectional study of community-dwelling adults ≥18 years conducted in four faith-based institutions during April-June 2017.
METHODS: The program consisted of a single blood pressure (BP) reading (seated and resting). BP reading ≥160/95 mm Hg precipitated repeat measure on the other arm. Each participant completed a two-page questionnaire containing demographic and stroke-related medical information. All voluntary participants signed a consent form. Descriptive and chi-square analyses were performed using Stata 10.1.
RESULTS: Subjects (n=97) were screened (Caucasian = 100.0%; female = 71.1%; age = 75.0 ± 13.7 years; BP = 127.7 ± 16.8/74.9 ± 9.1 mm Hg; BMI = 26.3 ± 5.4 kg/m^2; SRFs = 4.0 ± 1.6). Among participants with self-reported hypertension (n=50): 10 did not have BP at JNC8-goal compared to 29 based on newly-revised criteria ($p<0.01$). Among those without self-reported hypertension (n=47): 23 had possible hypertension using revised criteria with only 11 using JNC8 ($p<0.01$); Twelve (60.0%) with prehypertension (JNC8) were classified as stage 1 hypertension using revised criteria, and 8 (88.9%) classified as having stage 1 hypertension (JNC8) were classified as stage 2 hypertension using revised criteria ($p<0.01$). Three individuals (50%) with self-reported hypertension and history of stroke, coronary heart disease and/or heart failure, were identified to have BP>130/80 mm Hg and need improved BP control, none of whom JNC8 identified.
CONCLUSION: There were significant differences in the number of individuals with potentially uncontrolled hypertension or new hypertension based on the new BP criteria. Education of community-dwelling individuals is needed regarding changes in BP goals and to identify those needing life-style modification(s), and/or therapy modification or initiation.

12. Evaluation of thromboembolic and bleeding outcomes in patients with severe renal impairment with atrial fibrillation treated with direct oral anticoagulants (DOACs) from a multi-disciplinary clinic. *Melissa Gage, Pharm.D.*[1], Carina Deck, Bachelors[1], Huyentran Tran, Pharm.D., BCPS[2]; [1]Loma Linda University School of Pharmacy, Loma Linda, CA [2]School of Pharmacy, Loma Linda University, Loma Linda, CA
INTRODUCTION: Apixaban (Eliquis), dabigatran (Pradaxa), edoxaban (Savaysa), and rivaroxaban (Xarelto), are FDA-approved for use in patients with nonvalvular atrial fibrillation. These medications are partially excreted renally and require adjustment in renal impairment. There is limited data about the safety and efficacy of these medications in patients with severe renal impairment.
RESEARCH QUESTION OR HYPOTHESIS: The purpose of this study is to evaluate thromboembolic and bleeding outcomes in patients with atrial fibrillation and renal impairment who are being managed with direct oral anticoagulants (DOACs).
STUDY DESIGN: This study is a retrospective chart review of patients over the age of 17 who received a DOAC and were seen at the Loma Linda University International Heart Institute from October 1, 2010 – July 31, 2017. Patients were included if they had a diagnosis of atrial fibrillation, and were treated with DOACs for > 3 months. A patient was considered to be renally impaired if they required renal dose adjustment for their respective DOAC therapy.
METHODS: The primary outcomes were a major bleed (safety) and thromboembolism (efficacy) while on DOAC therapy. The outcomes were analyzed using a chi-squared analysis with 95% confidence intervals.
RESULTS: Of the 432 patients identified to be included in this study, 372 patients did not require renal dose adjustment whereas 60 patients required renal dose adjustments. For the primary safety outcome, 13 renally impaired patients had bleeding events versus 51 patients with normal renal function (p=0.1074). For the primary efficacy endpoint, 9 renally impaired patients had thromboembolic events versus 36 patients with normal renal function (p=0.21).
CONCLUSION: There was no significant difference in both bleeding and thromboembolic events for patients with renal impairment versus normal renal function. This study looked retrospectively at a small sample size. Further evaluation is required to determine impact.

13. Impact of loop diuretic dosing on congestive heart failure readmission rates. *Krista Riche, Pharm.D.*[1], Soomin Kim, Pharm.D.[2]; [1]Department of Pharmacy, St. Dominic Hospital, Jackson, MS [2]Department of Pharmacy, Yuma Regional Medical Center, Yuma, AZ
INTRODUCTION: Acute Congestive Heart Failure (CHF) exacerbations typically require hospital admission for treatment, and guidelines recommend administration of intravenous loop diuretics as first-line therapy to manage fluid overload symptoms. However, guidelines do not address diuretic dose management including transitioning to a home dose after discharge.
RESEARCH QUESTION OR HYPOTHESIS: To evaluate the relationship between home, inpatient and discharge diuretic doses and 30-day-readmission rates in patients admitted for a CHF exacerbations at St. Dominic Hospital.
STUDY DESIGN: Retrospective chart review.
METHODS: Inclusion criteria are patients ≥18 years-old admitted to St. Dominic Hospital between 8/15/16-10/15/16 with admission ICD10 codes for CHF, and diagnosed with CHF exacerbation. Exclusion criteria are any PRN diuretic doses at home, never received a diuretic dose inpatient, or expired during admission. Primary outcomes were percent of patients with discharge doses > home doses, percent of patients with discharge doses ≥ inpatient doses, and percent of patients with inpatient doses > than home doses. 30-day readmission rates were also evaluated based on diuretic dose groups. Descriptive statistics were utilized for the primary outcome, t-test was used for parametric data and Fisher's exact test was used for dichotomous data.
RESULTS: There were 74 patients included. Only 35% of patients were prescribed a discharge dose that was greater than their home dose. Half of the patients were prescribed a discharge dose equal to or greater than their inpatient dose, even though 69% of patients were prescribed an inpatient dose greater than their home dose. Patients who were not readmitted within 30 days had a significantly higher discharge dose than their home dose ($p<0.01$). Patients who were re-admitted within 30 days did not have a significant difference between discharge and home doses (p=ns).
CONCLUSION: Higher diuretic doses on discharge compared to previous home dose after an admission for CHF exacerbation was associated with a decreased rate of 30-day-readmission.

14. Torsemide versus furosemide after acute decompensated heart failure: a retrospective observational study. *Alaa Rahhal, BSc Pharm, PGY1 Pharmacy Resident*[1], Mohamed Saad, Pharm.D., BCPS[2], Kawthar Tawengi, Pharm.D.[1], Abed Al Raouf Assi, Pharm.D.[1], Masa Habra, BSc Pharm[1], Dalia Ahmed, BSc Pharm[1]; [1]Hamad Medical Corporation, Doha, Qatar, Doha, Qatar [2]Clinical Pharmacy Department, Al-Wakrah Hospital, Hamad Medical Corporation, Doha, Qatar
INTRODUCTION: Loop diuretics are recommended by clinical practice guidelines to treat volume overload in Acute Decompensated Heart Failure (ADHF). The effectiveness of switching furosemide to torsemide versus optimizing furosemide dose following ADHF has not yet been evaluated.
RESEARCH QUESTION OR HYPOTHESIS: Does torsemide reduce HF-related hospitalization compared to optimized furosemide dose?
STUDY DESIGN: A retrospective observational study aims to assess the hospitalization benefit of switching furosemide to torsemide versus optimizing furosemide in ADHF within 6 months of discharge.
METHODS: The study included patients previously on furosemide admitted with ADHF to the Heart Hospital in Qatar

between January 1, 2016 and June 30, 2017. The study included 2 groups: (1) patients discharged on torsemide; (2) patients discharged on optimized furosemide. Chi square was used to determine the association between diuretic use and re-hospitalization.
RESULTS: Of the 232 patients included, 45 received torsemide and 187 received optimized furosemide upon discharge. The majority of patients included were Arabs (83%), males (54%) with a mean age of 67 years, and presented with HF with reduced ejection fraction (57%) and had a history of coronary artery disease (68%). The 6-month HF-related hospitalization rate did not differ between the torsemide and optimized furosemide groups (48.9% vs. 46%; p-value = 0.73).
CONCLUSION: The use of torsemide after ADHF was not associated with reduced HF-related hospitalization compared to optimized furosemide dose. Larger prospective clinical trials are needed to confirm the findings of this study.

Clinical Administration

15. The impact of practice changes in a family medicine residency clinic on provider and staff engagement and perception of job responsibilities. *Megan Fleischman, Pharm.D., BCACP*[1], Alesia Jones, Ph.D.[2]; [1]Department of Pharmacy, Froedtert and the Medical College of Wisconsin, Milewaukee, WI [2]Department of Family and Community Medicine, University of Illinois College of Medicine at Rockford, Rockford, IL
INTRODUCTION: Clinician engagement has been linked to quality of patient care. Studies examining large health systems suggest system wide changes can impact clinicians' perceptions of patient care. It is unclear what impact system changes have on smaller health institutions. Findings subsequent to system-wide changes may be of interest to pharmacists as their services continue to expand in primary care and may influence other workflows to varying degrees.
RESEARCH QUESTION OR HYPOTHESIS: Do provider and staff engagement and perceptions of patient care quality differ after implementation of clinic wide changes?
STUDY DESIGN: Cross sectional.
METHODS: System changes implemented at a midwestern family medicine clinic included centralizing reception tasks, expanding physician providers' clinic hours and lengthening appointment times. All eighty-employees (providers, clinical staff, and support staff) were sent an online survey one month later. Items had been used in previous research on employee engagement. Additional items were developed by the PI to assess perceived patient care quality specific to clinic changes. Fisher's Exact Test using SAS was ran to accommodate the small sample size.
RESULTS: Thirty-eight employees completed the survey. There were no differences by job position on provider and staff engagement ($p>0.05$). Providers and staff were similar in ranking their ability to provide quality of patient care in general and as a result of clinic changes ($p>0.05$). Providers and staff had similar rankings for their perception of efficiency in daily tasks ($p>0.05$), but providers were more likely to disagree that clinic changes helped their efficiency in daily tasks ($p=0.03$).
CONCLUSION: This project suggests services that change workflow may not increase perceived efficiency of clinic operations when assessed after the first month. Pharmacists implementing new services should be mindful of how providers' perceptions of efficiency are impacted. Further studies specific to a pharmacist service could be conducted with questions to specifically understand perception of patient care under these services.

Community Pharmacy Practice

16. Evaluation of patient-related factors in control of asthma and chronic obstructive pulmonary disease. *Milena Kovacevic, M.Pharm.*, Milica Culafic, MSc Clin Pharm, Marija Jovanovic, Ph.D., Katarina Vucicevic, Ph.D., Sandra Vezmar Kovacevic, Ph.D., Branislava Miljkovic, Ph.D.; Department of Pharmacokinetics and Clinical Pharmacy, University of Belgrade-Faculty of Pharmacy, Belgrade, Serbia
INTRODUCTION: Chronic respiratory diseases are still associated with suboptimal outcomes and reduced quality of life. Patients' negative traits/beliefs are common in chronic diseases, influencing the adherence and thus outcomes.
RESEARCH QUESTION OR HYPOTHESIS: The aim was to assess the predictors of disease control, investigating patients' beliefs about the medicines.
STUDY DESIGN: A prospective observational study was conducted in 14 community pharmacies. Adult patients using asthma/chronic obstructive pulmonary disease (COPD) medications were enrolled in the study.
METHODS: Data were collected during the interview, using questionnaires: Asthma Control Test, Modified Medical Research Council Dyspnea Scale; Beliefs about Medicines Questionnaire-general (harm, overuse) and specific (necessity, concerns); Morisky 8-item for adherence. Statistical analysis was performed using SPSS.
RESULTS: Total of 54 asthma and 54 COPD patients were included in the analysis. Low adherence level was determined in 51% asthma and 59% COPD patients ($p>0.05$). Asthma was controlled in 37%, and COPD in 18% of patients ($p<0.05$). The highest proportion of asthma patients expressed: strong beliefs about therapy harm (40%) and necessity (92%); indifferent attitude towards overuse (48%) and concerns (48%). COPD patients usually reported: indifferent attitude towards harm (51%), but strong beliefs about therapy overuse (62%), necessity (90%), and concerns (44%). Difference in median beliefs scores between diseases was not significant. Asthma control was negatively influenced with high concerns about long-term therapy use (7 times more likely to have uncontrolled asthma); but positively influenced by high adherence and non-smoking, 12 and 6 times more likely to have controlled asthma, respectively. COPD control was associated only with the disease duration: each additional year increases the chance of uncontrolled disease by 16%.
CONCLUSION: Patients reported a highly positive perception of the therapy benefit in both asthma and COPD, but estimated adherence level was low. The strategy to improve adherence should be focused on explaining the minimal risk of adverse reactions due to inhalation route of administration.

Critical Care

17E. Missing doses in intensive care units (ICUs) in King Fahad Medical City, Saudi Arabia: a descriptive study. Mukhtar AlOmar, Pharm D, Diploma in Clinical Pharmacy Practice[1], Sohail Ahmad, Pharm D, MSc Clinical Pharmacy[2], Lafi Alharbi, Pharm D[1], Yahya Moustafa, Pharm D, MSc Clinical Pharmacy[1]; [1]Department of Clinical Pharmacy, King Fahad Medical City, Riyadh, Saudi Arabia [2]Faculty of Pharmacy, MAHSA University, Kuala Langat, Malaysia
Presented at 17th Asian Conference on Clinical Pharmacy, Indonesia.

18. A comparison of two methods of argatroban monitoring: dosing requirements in obese patients and incidence of bleeding events. *Evan Mueller, Pharm.D. Candidate*[1], Cesar Alaniz, Pharm.D.[2]; [1]University of Michigan College of Pharmacy, Ann Arbor, MI [2]Department of Pharmacy, University of Michigan, Ann Arbor, MI
INTRODUCTION: A recent study demonstrated that monitoring argatroban with a chromogenic anti-IIa assay resulted in decreased dosing requirements compared to aPTT monitoring. The study did not examine the dosing requirements in obese patients and had limited data on bleeding events.
RESEARCH QUESTION OR HYPOTHESIS: There will be no difference in argatroban dosing requirements between obese

patients monitored via anti-IIa chromogenic assay versus aPTT. Also, there will be no difference in bleeding events for all patients when comparing the two monitoring methods.
STUDY DESIGN: This is a single-centered, retrospective chart review of patients receiving an argatroban infusion for the management of heparin-induced thrombocytopenia.
METHODS: A chart review was conducted for all adult patients, age > 18, who were started on argatroban therapy within a large academic hospital from April 2012 to September 2016. Monitoring of argatroban was done using aPTT until April, 2013 at which point anti-IIa monitoring was instituted. The primary endpoint was to comparing dosing requirements in obese patients via the two methods of monitoring. Also, for all treated patients, the number of new bleeding events were determined for both pre- and post-conversion to anti-IIa monitoring.
RESULTS: The median dose of argatroban was significantly less in the anti-IIa cohort of obese patients (n=124) compared to the aPTT obese cohort (n=37), (1mcg/kg/min [IQR 0.5–1.75] versus 2.25mcg/kg/min [IQR 0.73–2.9], $p < 0.001$). For all patients monitored via the anti-IIa assay (n=338); there were fewer bleeding events (n=10) compared to the aPTT cohort (n=68, bleeds = 8) ((p=0.0013).
CONCLUSION: Monitoring argatroban infusions via anti-IIa chromogenic assay led to decreased dosing requirements in obese patients. Also, for all patients receiving argatroban; the incidence of bleeding events was reduced.

19. Single dose aminoglycoside for the treatment of septic shock: worth the addition?. *Jennifer Kang, Pharm.D.*[1], Franky Yan, Pharm.D. Candidate[2], Thao Nguyen, Pharm.D. Candidate[1], Justin Kinney, Pharm.D., M.A., BCCCP[3]; [1]School of Pharmacy, Loma Linda University, Loma Linda, CA [2]School of Pharmacy, Loma Linda University, Loma LInda, CA [3]School of Pharmacy, Loma Linda University & Loma Linda University Medical Center, Loma Linda, CA
INTRODUCTION: Prompt initiation and appropriate empiric antibiotic therapy in septic shock is critical; commonly vancomycin and piperacillin/tazobactam. However, most broad spectrum antibiotics do not demonstrate the same rapid, bactericidal, concentration dependent effect as aminoglycosides that can be seen as early as a few hours post infusion. Plus, aminoglycosides reduce the likelihood of therapeutic failure due to resistance.
RESEARCH QUESTION OR HYPOTHESIS: The purpose of this study is to evaluate the impact of single dose aminoglycosides, in addition to empiric antibiotics, in patients with septic shock.
STUDY DESIGN: This is a single-center, retrospective chart review of septic shock patients admitted between September 2016 and July 2017.
METHODS: Adult patients diagnosed with septic shock between September 15, 2016 and July 27, 2017 treated with a single dose of aminoglycoside in addition to empiric antibiotic therapy or those who received standard empiric therapy.
RESULTS: Sixty patients each in the study group and control group were analyzed. Study group participants were younger (60 versus 66.3 years, p=0.04), and was more altered at baseline (53.3% versus 35%, p=0.04). Amikacin was utilized most frequently (98.3%) and was mostly dosed within six hours of empiric antibiotics (66.7%). The bacteria in both groups showed similar sensitivities, with both being about 85% susceptible to empiric coverage. Further, the microbiology reports demonstrated 93% susceptibility to the additional aminoglycoside. The mean hospital/ICU length of stay of study versus control groups were 13.6 versus 12.4 days (p=0.66), and 9.3 versus 6.7 days (p=0.13), respectively. The mean hospital/ICU survival rates were 62.7 versus 61.7% (p=0.91) and 66.1 versus 70% (p=0.65), respectively. Additionally, the aminoglycoside showed no difference in kidney function at baseline or three days into therapy.
CONCLUSION: The addition of single dose aminoglycosides to empiric antibiotics in septic shock patients did not significantly reduce length of ICU/hospital stay or mortality.

Education/Training

20E. Educational gaming: design of a diabetes themed escape room. *Heidi Eukel, Pharm.D.*[1], Jeanne Frenzel, Pharm.D.[2], Dan Cernusca, Ph.D.[2]; [1]North Dakota State University, Fargo, ND [2]North Dakota State University School of Pharmacy, Fargo, ND
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21E. A simulation to assess students' knowledge of cardiac arrest and perceived readiness for interprofessional learning. *Jeanne Frenzel, Pharm.D.*[1], Margaret Mackowick, MS, RN[2], Gail Gores, MSN, RN[2], Marsha Ramstad, MS, RN, CNE[2]; [1]North Dakota State University School of Pharmacy, Fargo, ND [2]School of Nursing, North Dakota State
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22. Study of healthcare team awareness of statins usage among outpatients with Type 2 diabetes mellitus. Mohamed A. Hammad, MPharm., BCPS, Ph.D. Candidate[1], Syed Azhar Syed Sulaiman, Pharm.D.[1], Dzul Azri Mohamed Noor, MPharm., Ph.D.[1], Muhammad Qamar, Pharm.D., M.Pharm. Clinical Pharmacy, BCPS[2], Faiz Ahmed Shaikh, MPharm[2]; [1]Department of Clinical Pharmacy, School of Pharmaceutical Sciences, University Sains Malaysia, Penang, Malaysia [2]Department of Clinical Pharmacy, Faculty of Pharmacy, MAHSA University, Selangor, Malaysia
INTRODUCTION: Knowledge, attitude, and practice (KAP) surveys are widely used to gather information for planning public health programs in the countries. KAP study assists as an educational diagnosis of the community. This study aimed to evaluate the awareness of healthcare team about statins usage in outpatients with Type 2 diabetes.
RESEARCH QUESTION OR HYPOTHESIS: What are the percent of knowledge, attitude, and practice of healthcare team about statins usage in outpatients with Type 2 diabetes?
STUDY DESIGN: A cross-sectional study was conducted at Hospital Pulau Pinang, in January-July 2017, Malaysia.
METHODS: 200 participants were recruited using a pre-validated and reliable questionnaire (Cronbach's-Alpha: 0.783). It involved four sections: demographic characteristics, knowledge, attitudes towards statins utilization and practice. The survey based on the 2013 American college of cardiology/American heart association (ACC/AHA) dyslipidemia management guidelines. IBM-SPSS 23.0 was used in data analysis.
RESULTS: Physicians represent (78.5%) and Pharmacists (21.5%). Nearly one-quarter of healthcare team had a postgraduate certificate (21%). The mean of subjects' experience was (5.3 ± 5.7) years. Subjects' knowledge about statins was (75.2%). The participants correctly answered the practice questions with (55.8%). Most of the participants (61%) have a positive attitude about statins therapy for outpatients with Type 2 diabetes. While only (19.5%) of subjects have a negative attitude and (19.5%) of participants, have a neutral attitude. Job type (Pharmacist or physician) and practice are significant predictors of knowledge (P-value: 0.032 and p-value: 0.001 respectively). Knowledge is a significant predictor of practice (P-value: 0.001). The KAP mean scores of participants with postgraduate qualifications were significantly higher than healthcare without postgraduate qualifications; [(72.9 ± 18 vs. 64.2 ± 15.6) ($Z: -4.26$, p-value: 0.001)].
CONCLUSION: Healthcare team has a significant level of knowledge and positive attitude about statins usage among diabetic patients. However, there is still a room for improvement of practice. Moreover, improving healthcare knowledge and practice positively reflects on their attitudes.

23E. Use of the acronym "MEDICATION" to aid in the identification of medication-related problems. *Elizabeth Skoy, Pharm.D.*[1], Heidi Eukel, Pharm.D.[1], Jeanne Frenzel, Pharm.D.[2]; [1]North Dakota State University, Fargo, ND [2]North Dakota State University School of Pharmacy, Fargo, ND

Presented at American Association of Colleges of Pharmacy, Nashville TN, July 2018.

24E. Toxicology education needs of emergency department pharmacists. Catherine Dewaal, BScPharm, Pharm.D.[1], Matt Mink, BSP[2]; [1]Pharmacy Services, Alberta Health Services - South Health Campus, Calgary, AB, Canada [2]Poison and Drug Information Service (PADIS), Alberta Health Services, Calgary, AB, Canada
Presented at Canadian Society for Hospital Pharmacists (CSHP) Professional Practice Conference, Toronto ON, February 3–7, 2018.

25. Enhancing success in the pharmacy residency match through implementation of a residency preparatory course. Monica L. Miller, Pharm.D., MS[1], Ashley Crumby, Pharm.D.[2], *Alex Isaacs, Pharm.D.*[3]; [1]Department of Pharmacy Practice, Purdue University College of Pharmacy, West Lafayette, IN [2]Department of Pharmacy Administration, The University of Mississippi School of Pharmacy, Jackson, MS [3]Department of Pharmacy Practice, Purdue University College of Pharmacy//Eskenazi Health, Indianapolis, IN
INTRODUCTION: By 2020, all pharmacists participating in direct patient care will be expected to have completed residency training. Expanding interest in residency training has resulted in increased competition for the limited positions. Evaluation of methods to prepare students for successful pursuit of residency positions is needed.
RESEARCH QUESTION OR HYPOTHESIS: Engagement in a residency preparatory course results in an increased match rate for enrolled students compared to students not in the course.
STUDY DESIGN: Retrospective review of the American Society of Health-System Pharmacy (ASHP) residency match results.
METHODS: Match rates from 2007 through 2017 were evaluated. National pharmacy match data was compiled from the ASHP National Matching website and institution-specific data was collected from annual reports provided by ASHP. Data was separated into students graduating prior to (2007–2014) and after the course (2015–2017). The primary endpoint was the evaluation of residency match rates for students in the course compared to other students at the institution not enrolled in the course. Secondary endpoints included match rates within the course and institution compared to the national match rates. Data was analyzed using a Chi-square test in SPPS version 24.
RESULTS: For 2015–2017, the match rate was significantly higher at the institution with students who completed the course compared to those not enrolled (88.7% vs. 70.7%, $p<0.01$). For the students enrolled in the course (2015–2017), the match rate was higher than the national average (88.7% vs. 66.4%, $p<0.01$). The institution's match rate was similar to the national match rate prior to the course (71.2% vs. 65.3%, $p=0.78$), but was significantly higher after implementation (78% vs. 66.4%, $p<0.01$).
CONCLUSION: The residency preparatory course increased the rate of successful attainment of a pharmacy residency for students in the course compared to students not in the course and increased the match rate compared to the national average.

26. Value of post-graduate pharmacy resident involvement in an investigational drug service. *Jamie Brown, Pharm.D., BCPS, BCACP*, Sherin Jacob, Pharm.D., BCPS, Frank Tillman, III, Pharm.D. Candidate, Sara Britnell, Pharm.D., BCPS; Pharmacy Service, Durham VA Health Care System, Durham, NC
INTRODUCTION: Participation in an investigational drug service (IDS) provides a robust learning experience for post-graduate pharmacy residents, while also creating an opportunity to contribute clinical and economic benefits to the health care system. However, there is a currently paucity of data establishing the financial impact of residents within an IDS.
RESEARCH QUESTION OR HYPOTHESIS: The primary objective of this assessment is to determine the cost avoidance associated with resident involvement in an IDS. Secondary objectives include assessing resident contribution to revenue charges and investigator cost savings for fee-waived studies.
STUDY DESIGN: Retrospective record review.
METHODS: Study protocols and dispensing records for all investigational drug studies conducted at the institution were reviewed from January 1, 2016 to December 31, 2017. Only dispensations completed by residents were included in the analysis. For the study, cost avoidance was defined as the cost of medications the institution would have incurred if not sponsor-provided free of charge. Medical center contract acquisition costs were used to calculate cost avoidance. Revenue was determined by totaling fees charged by the IDS for resident dispensations. Investigator cost savings was calculated by totaling revenue not collected due to waived fees. Descriptive statistics were utilized for all assessments.
RESULTS: A total of 23 unique protocols and 1370 dispensations were recorded by the IDS during the study period. Of these, resident participation in the IDS contributed 444 (32.4%) dispensations on 15 (65.2%) protocols resulting in a total cost avoidance of $144,898.59. Total revenue for these dispensations was determined to be $1,661.47 and waived revenue fees totaled $17,812.33. Oncology protocols resulted in the highest totals for cost avoidance; cardiovascular protocols led to the highest totals for revenue.
CONCLUSION: Pharmacy resident involvement in the IDS provides both an educational experience and economic value to the institution through substantial cost avoidance, revenue generation, and investigator cost savings.

27. Impact of an electronic exam on student pharmacist performance in a required therapeutics course. *Rebecca Stauffer, Pharm.D., BCPS*[1], Laura Challen, Pharm.D., MBA, BCPS, BCACP[2], Jamie Pitlick, Pharm.D., BCPS[3]; [1]Pharmacy Practice, St. Louis College of Pharmacy, St. Louis, MO [2]St. Louis College of Pharmacy / Mercy Hospital St. Louis, St. Louis, MO [3]Pharmacy Practice, Drake University, Des Moines, IA
INTRODUCTION: The use of technology in the classroom and the opportunity to administer exams electronically has continued to grow with the advancement of classroom management systems. As assessments are shifted towards electronic submission, it is imperative to ensure that student knowledge is being assessed accurately and that exam scores are not reflective of technology proficiency.
RESEARCH QUESTION OR HYPOTHESIS: What is the impact of an electronic exam on exam scores in a required therapeutics course?
STUDY DESIGN: Retrospective, single-centered, quasi-experimental.
METHODS: This study included second year pharmacy students enrolled in a required one semester therapeutics course over the past four years. Four exams were administered each semester. Lecture content and exam format, a mixture of multiple choice questions and free response written cases, did not differ significantly between years. Exams administered during the first two years were printed on paper, while exams administered during the third and fourth years were all electronic, submitted through a classroom management system. Following IRB approval, the change in mean overall examination scores between paper and electronic exams were analyzed.
RESULTS: Of the 900 students enrolled in this study, there was no difference in overall mean examination score between paper and electronic exams (74.8%, 73.8%, $p=0.50$). In addition, there was no difference in mean examination scores between overall individual paper and electronic exam 1 through 4 scores ($p=0.11$, 0.20, 0.95, 0.22, respectively) or overall multiple choice or free response scores between paper and electronic exams ($p=0.85$, 0.38, respectively).
CONCLUSION: Examination scores did not differ between paper and electronic based exams. From this study, test method does not appear to impact examination results.

28. Student perception of utilizing gamification during an advanced pharmacy practice experience capstone course. *Jason Bandy, Pharm.D.*[1], Veronica T. Bandy, Pharm.D., MS[2], Hooria Iqbal, B.S.[2], Stephanie Kwan, B.S.[2], Morgan Sato, B.S.[2]; [1]School of Pharmacy, University of the Pacific, Stockton, CA [2]University of the Pacific, Stockton, CA

INTRODUCTION: During the final year of pharmacy school at the University of the Pacific, students participate in an Advanced Pharmacy Practice Experience (APPE) capstone course. The course is designed to prepare students for practice as a pharmacist and build upon didactic knowledge. There is little gamification research during APPE coursework. This study aims to engage students during an APPE capstone course through application of gamification strategies to encourage participation and active learning.

RESEARCH QUESTION OR HYPOTHESIS: Implementation of gamification strategies in an APPE capstone course will improve student perception of utilizing learning games in the classroom.

STUDY DESIGN: This was a survey-based longitudinal study.

METHODS: Students participated in six different games throughout the course which served to help reinforce topics covered during rotations. Each student was given an anonymous eleven-question likert-scale survey before and after the course was completed. The two sets of surveys were compared to evaluate any changes in students' perception of utilizing games in a classroom setting and were analyzed with the wilcoxon rank sum test using SPSS.

RESULTS: The response rate was 100% (33/33). Of the eleven questions asked in the initial and final surveys, the responses to five questions demonstrated a statistically significant improvement in students' perceptions of classroom games while the remaining questions showed a trend toward improvement. Where 1 = Agree and 5 = Disagree, students agreed that classroom games will help or help improve their quiz scores (pre-intervention mean: 1.7, post-intervention mean: 1.3, p=0.002), will help or help improve clinical skills at practice site (1.9, 1.36, p=0.009), and will help or help me self-assess areas of weakness (1.5, 1.18, p=0.005).

CONCLUSION: Based on the questions asked in the survey, students perceived that games helped improve quiz scores, improve clinical skills, and self-assess weak areas after utilizing gamification strategies throughout the course.

29. Continuing professional education selection criteria for hospital and clinic-based pharmacists practicing in the upper Midwest. *Paul Henkel, B.S., M.Soc.Sc*[1], Marketa Marvanova, Pharm.D., Ph.D., BCGP, BCPP[2]; [1]Department of Geographical and Historical Studies, University of Eastern Finland, Joensuu, Finland, Finland [2]Department of Pharmacy Practice, North Dakota State University School of Pharmacy, Fargo, ND

INTRODUCTION: Pharmacists are responsible to populations and organizations they serve to provide high-quality care. Continuing professional education (CPE) is important for pharmacists in hospitals and clinics to maintain and build knowledge and skills and ensure they remain able, over time, to continue to provide high-quality patient-centered care to the populations served.

RESEARCH QUESTION OR HYPOTHESIS: What are the variations in relative importance of selection criteria utilized when selecting CPE by pharmacists?

STUDY DESIGN: Cross-sectional survey of licensed pharmacists in Iowa, Minnesota, Nebraska, North Dakota, and South Dakota.

METHODS: During 2017, pharmacists working in hospitals and clinics in five states were contacted via surface mail and e-mail. Voluntary participants (n=448) completed a paper or web-based questionnaire which included demographic information and CPE-selection criteria importance. Descriptive and T-test analyses were performed using Stata 10.1.

RESULTS: Respondents (n=448) were working in hospitals (78.6%) or clinics (21.4%). The majority of participants were female (67.2%), had >10 years experience (61.0%), had a Pharm.D. (73.6%), and worked in urban areas (67.6%). 37.3% completed a residency and 23.2% were BPS-certified. The CPE-selection criteria rated most important were: maintaining licensure (3.68 ± 0.66), maintaining BPS-certification (3.63 ± 0.69), personal interest (3.64 ± 0.57), self-improvement (3.48 ± 0.64), and free-of-charge (3.08 ± 0.90). Population need ranked 6th in importance for pharmacists in clinics and 9th by pharmacists in hospitals out of 14 surveyed CPE-selection criteria. Selecting CPE from which one was a member of the sponsoring organization (1.96 ± 1.01) was 13th ranked. Pharmacists with a Pharm.D. and/or who completed residency placed greater importance on population need ($p<0.05$).

CONCLUSION: Licensure, personal interest, personal interest, self-improvement, and free were the most important CPE-selection criteria for the pharmacists surveyed. Needs of populations served was not ranked in the top five criteria. Patient-centered care is at the core of the Pharmacists' Patient Care Process, and understanding current and changing needs is central to quality care.

30. Continuing professional education practices related to older adults among community and hospital/clinic-based pharmacists in the upper Midwest. *Paul Henkel, B.S., M.Soc.Sc*[1], Marketa Marvanova, Pharm.D., Ph.D., BCGP, BCPP[2]; [1]Department of Geographical and Historical Studies, University of Eastern Finland, Joensuu, Finland, Finland [2]Department of Pharmacy Practice, North Dakota State University School of Pharmacy, Fargo, ND

INTRODUCTION: With a rapidly aging population in the United States, providing high-quality, patient-centered care for older adults is paramount. Continuing professional education (CPE) is a key tool for pharmacists in maintaining and updating knowledge and skills for providing patient-centered care to changing populations.

RESEARCH QUESTION OR HYPOTHESIS: What CPE hours are pharmacists selecting, primarily related to older adults, what CPE providers are they utilizing, and how do hours differ based on workplace?

STUDY DESIGN: Cross-sectional survey of licensed pharmacists in Iowa, Minnesota, Nebraska, North Dakota, and South Dakota.

METHODS: Pharmacists completed a questionnaire (hardcopy or online) on demographics, CPE hours completed in select topics (primarily in age-related chronic diseases and health issues), and utilization of CPE providers in the past 12 months. County-level population data were obtained from American Community Survey 5-Year Estimates, 2011–2015. Descriptive, t-test, chi-square analyses were performed using Stata 10.1.

RESULTS: Community (55.6%) and hospital/clinic (44.4%) pharmacists (n=1,010) were 66.3% female and 11.9% board-certified. Of 21 CPE topics surveyed, ≥30% of participants completed hours in diabetes, hypertension, asthma, heart failure, and/or COPD. Hours in Alzheimer's disease were completed by 27.1%, but <18% completed hours in other dementia/aging-related topics (e.g. physiological issues of aging, geriatric syndrome, dementia with Lewy bodies), with <5% completing CPE in more than one related topic. Area population aged ≥65 years was not associated with selection. Pharmacist's Letter (57.1%), Power-Pak (42.2%), and professional conferences (32.6%) were by far the most utilized CPE providers. Most other providers were used by <10% of pharmacists.

CONCLUSION: There does not appear to be significant CPE differentiation based on practice site or area population. A large percent of pharmacists completed CPE from only a few of the available providers. Given current findings and existing research, current CPE utilization/habit(s) seem inadequate for ensuring high-quality patient-centered care for a growing aging population.

31. Benefits of structured interactive workshop in Alzheimer's and Parkinson disease as an add-on to didactic lectures for pharmacy third-year students. *Marketa Marvanova, Pharm.D., Ph.D., BCGP, BCPP*[1], Paul Henkel, B.S., M.Soc.Sc[2]; [1]Department of Pharmacy Practice, North Dakota State University School of Pharmacy, Fargo, ND [2]Department of Geographical and Historical Studies, University of Eastern Finland, Joensuu, Finland, Finland

INTRODUCTION: There is a growing aging population in the United States. Alzheimer's disease (AD) and Parkinson's disease (PD) increase with advanced age and individuals affected by these disorders require competent pharmaceutical care.

RESEARCH QUESTION OR HYPOTHESIS: What are the effects of a newly-developed workshop integrating pharmacology and therapeutics in management of PD and AD on third-year pharmacy students' high-cognitive thinking, and self-rated knowledge improvement, confidence, and interest in the subjects?

STUDY DESIGN: Prospective interventional study of a single workshop comprises a foundational knowledge quiz from pathophysiology, pharmacology and therapeutics, performance on high-cognitive thinking in three clinical scenarios, and structured hands-on activity using active learning exercises in pharmacology and therapeutics related to AD and PD care administered in a single classroom/institution.

METHODS: Performance from baseline quiz, pre-and post-education intervention performance on high-cognitive thinking, and pre- and post- Likert-type questions on students' self-rated confidence, interest and knowledge improvement were administered and collected. Descriptive statistics, paired t-test, Pearson correlation, and chi-square analyses were performed using Stata 10.1.

RESULTS: 84/93 students (90.3%) completed all workshop activities. Students' ability to apply knowledge in complex case mediation problems in three case scenarios was not associated with performance on baseline quiz questions linked to knowledge needed to solve the therapeutic problems (Pearson r: 0.03–0.17). Completion of structured, hands-on activity using active learning exercises had measurable immediate benefit for high-order cognitive ability ($p<0.05$) and increased student self-rated confidence from 2.35 ± 0.65 to 3.08 ± 0.64 ($p<0.01$). 85.6% of students reported that knowledge improved "somewhat" or "very much" after the activity. Interestingly, mean scores before and after hands-on activity were not associated with interest in the topic.

CONCLUSION: Structured, interactive hands-on workshops as an add-on to didactic lectures improved students' high-cognitive thinking and self-reported confidence. Students also self-reported knowledge improvement.

Emergency Medicine

32E. Evaluation of post-intubation sedation following rocuronium administration in the emergency department. *Sarah Schuman, B.A., Pharm.D. Candidate 2019*[1], Hannah Hewgley, Pharm.D.[2], Megan Van Berkel, Pharm.D., BCPS, BCCCP[3], W. Preston Hewgley, B.S.[4], Rachel Wilkinson, Pharm.D., BCCCP[2]; [1]Department of Clinical Pharmacy, University of Tennessee Health Science Center, Memphis, TN [2]Department of Pharmacy, Methodist University Hosptial, Memphis, TN [3]Department of Pharmacy, Erlanger Health Systems, Chattanooga, TN [4]College of Medicine, University of Tennessee, College of Medicine, Memphis, TN

Presented at the Midyear Clinical Meeting of the American Society of Health-System Pharmacist, Orlando, FL, December 3–7, 2017.

33E. Haloperidol in the Treatment of Diabetic Related Gastroparesis in the Emergency Department. *Michelle Komlo, Pharm.D. Candidate*[1], William Heuser, Pharm.D., MS[2], Deep Patel, Pharm.D.[2], Michael Harrington, Pharm.D.[2]; [1]School of Pharmacy and Health Sciences, Northwell Health/ St. John's University, Jamaica, NY [2]Northwell Health, Queens, NY

Presented at the American Society of Hospital Pharmacists Midyear Clinical Meeting, Orlando, Florida, December 4, 2017.

34. Improving antibiotic dispensing and administration efficiency to patients in the emergency department. *Jacob Marler, Pharm.D., BCCCP*[1], Adam Wiss, Pharm.D.[2], Stephen Turner, BS[3], Brian Wheeler, MD[4], Justin Usery, Pharm.D., BCPS[1], Ana Negrete, Pharm.D., BCPS[1]; [1]Department of Pharmacy, Methodist University Hospital, Memphis, TN [2]Department of Pharmacy, Ohio State University Wexner Medical Center, Columbus, OH [3]School of Pharmacy, University of Tennessee Health Science Center, Memphis, TN [4]Department of Medicine, Methodist University Hospital, Memphis, TN

INTRODUCTION: For septic patients, each 1 hour delay in antimicrobial administration is associated with a decrease in survival of 7.6%. At our institution, the majority of antibiotics are dispensed from the main hospital pharmacy, and an internal investigation revealed significant delays in first-dose antibiotic administration in the emergency department (ED). From this investigation, an institutional practice change was implemented to stock additional intravenous antibiotics in automated dispensing cabinets (ADC) in the ED.

RESEARCH QUESTION OR HYPOTHESIS: Does antibiotic dispensing from ADC in the ED improve antibiotic administration efficiency?

STUDY DESIGN: Single-center, retrospective cohort study.

METHODS: We included adult patients administered antibiotics in the ED for sepsis. Patients in 2013 (pre-ADC stocked antibiotics) were compared to patients in 2015 (post-ADC stocked antibiotics) for the primary outcome of first-dose administration time.

RESULTS: A total of 113 (84 patients) and 110 (88 patients) antibiotics were administered in the pre-ADC and post-ADC groups, respectively. The primary outcome of antibiotic administration time was significantly reduced in the post-ADC group (33 minutes vs 60 minutes; $p<0.01$). Rates of severe sepsis (46.4% vs 28.4%; $p=0.01$), septic shock (11.9% vs 3.4%; $p=0.04$), and APACHE II scores (14.3 vs 10.5; $p<0.01$) were higher in the pre-ADC group. However, hospital survival (96.5% vs 86.9%; $p=0.02$), length of stay (2 vs 5 days; $p<0.01$), and antibiotic administration within 1 hour (74.5% vs 49.6%; $p<0.01$) were significantly better in the post-ADC group. When only patients with severe sepsis were compared, there was a trend towards improved survival benefiting the post-ADC group (92% vs 76.9%; $p=0.17$).

CONCLUSION: Antibiotic administration efficiency and patient outcomes were improved in the post-ADC group. Hospital emergency departments should consider optimizing the stocking of intravenous antibiotics to reduce administration delays and improve sepsis treatment.

35. Defining the correlation between heroin overdose and length of hospital admissions. *Justin Reinert, Pharm.D.*, Rachel Leis, Pharm.D., BCPS, Alison Paplaskas, Pharm.D., BCCCP, Deborah Bakle-Carn, Pharm.D.; Department of Pharmaceutical Care, Mercy Health St. Vincent Medical Center, Toledo, OH

INTRODUCTION: Heroin has had an overwhelming impact on public welfare and health resources within the state of Ohio. National surveillance data indicate a 21.5% increase in drug overdose deaths in Ohio between 2014–2015. State and local resources have been devoted to curbing the heroin abuse epidemic in the Toledo region, including community education, the distribution of naloxone, and a division of the sheriff's department targeted at rehabilitation of non-violent drug offenders.

RESEARCH QUESTION OR HYPOTHESIS: What is the length of hospital stay in suspected or confirmed heroin overdose?

STUDY DESIGN: Retrospective chart analysis.

METHODS: This retrospective chart analysis evaluated patients aged 18–89 years presenting to the Emergency Department (ED) with confirmed or suspected heroin overdose between Jan-

uary 1st, 2017 – June 30th, 2017. The primary objective of this evaluation was to determine the length of hospital stay in suspected or confirmed heroin overdose. Descriptive statistics were utilized.
RESULTS: twb = .44w? > One-hundred and one patients were included in this study: 49 presented to the ED and were subsequently admitted, while 52 were evaluated in the ED and discharged. No statistically significant differences in demographic data were identified. The average length of stay for admitted patients was 4.39 days (range, 0–12 days) with an average of 1.91 days in the ICU and 2.48 days on a general medicine floor. Higher average amounts of naloxone administered prior to presentation to the ED was found to predict an admission to the ICU (6.48 mg vs. 2.43 mg, p=0.0208). The most frequent necessary interventions were central line placement (16/49, 32.7%) and mechanical ventilation (15/49, 30.6%). Seven patients (14.3%) experienced a cardiac arrest.
CONCLUSION: Heroin overdoses continue require emergent interventions and demand extensive healthcare resources. Investment in strategies for prevention of overdose and the subsequent utilization of resources is paramount controlling the heroin epidemic in Ohio.

36. Changes of blood glucose after insulin plus dextrose with and without albuterol in patients with hyperkalemia. *Mohannad Alshibani, Pharm.D., BCPS*[1], Ahmed Aljabri, Pharm.D., BCPS[2], Stephen Perona, Pharm.D., BCPS[3], Moteb Khobrani, Pharm.D., BCPS[4], Daniel Jarrell, Pharm.D.[5], Asad E. Patanwala, Pharm.D.[6]; [1]College of Pharmacy- Center for Health Outcomes & PharmacoEconomic Research: The HOPE Center, University of Arizona, Tucson, AZ [2]department of Clinical Pharmacy, King Abdulaziz University Faculty of Pharmacy, Jeddah, Saudi Arabia [3]Pharmacy Department, Northwest Medical Center, Tucson, AZ [4]Department of Pharmacy Practice & Science, College of Pharmacy, University of Arizona, Tucson, AZ [5]Department of Pharmacy, Banner University Medical Center Tucson, Tucson, AZ [6]university of Arizona- College of Pharmacy, Tucson, AZ
INTRODUCTION: The regimen of intravenous (IV) insulin with dextrose is commonly used for treatment of hyperkalemia. However, this regimen can be associated with the risk of developing hypoglycemia. Albuterol is often used concurrently with this regimen for the management of hyperkalemia, and has the potential to raise the blood glucose (BG), mitigating the risk of hypoglycemia.
RESEARCH QUESTION OR HYPOTHESIS: The goal of this study was to examine the BG changes after the addition of albuterol to the standard therapy of insulin plus dextrose.
STUDY DESIGN: A multicenter retrospective cohort study conducted at two tertiary hospitals and one community hospital in the United States.
METHODS: Consecutive adult patients in the emergency department who received a regimen of 10 units of IV regular insulin with 25 grams of IV dextrose for the management of hyperkalemia were included. Patients who received nebulized albuterol were compared to patients who did not receive albuterol. The primary outcome was the extent of BG reduction (mg/dL) over 6 hours. The secondary outcomes were the incidence of hypoglycemia (BG < 70 mg/dL) and severe hypoglycemia (BG < 40 mg/dL).
RESULTS: There were a total of 132 patients included in this study. Of these, 66 were in the albuterol group and 66 in no albuterol group. The mean BG reduction was 22.6 ± 51.6 mg/dl in the albuterol group and 31.2 ± 54.1 mg/dl in no albuterol group (p=0.354). Hypoglycemia occurred in 21 patients (31.8%) in the albuterol group and 17 patients (25.8%) in the no albuterol group (p=0.564). Severe hypoglycemia occurred in 0 patients (0%) and 3 patients (4.6%) in albuterol and no albuterol groups, respectively (p = 0.244).
CONCLUSION: The addition of albuterol to the standard regimen of insulin plus dextrose in patients with hyperkalemia does not appear to affect BG levels or the risk of hypoglycemia.

37. Effect of initial intravenous antihypertensive agent on the management of blood pressure during hypertensive emergencies. *Priya Shah, Pharm.D.*, Luigi Brunetti, Pharm.D., MPH, BCPS, BCGP, Christopher Adams, Pharm.D., BCPS, BCCCP; Department of Pharmacy, Robert Wood Johnson University Hospital Somerset, Somerville, NJ
INTRODUCTION: Hypertensive crisis is a systolic blood pressure greater than 180 mmHg and/or a diastolic blood pressure greater than 120 mmHg. Hypertensive emergency is a hypertensive crisis with end organ damage that requires titratable intravenous antihypertensives. There are only a few studies that compare intravenous antihypertensive agents and determine optimal therapy.
RESEARCH QUESTION OR HYPOTHESIS: The objective of this study was to evaluate the influence of initial antihypertensive on patient outcomes.
STUDY DESIGN: Patients 18 years or older presenting to the emergency department with hypertensive emergency who were given at least one dose of an intravenous antihypertensive were eligible for inclusion in this retrospective cohort study. Pregnant patients and individuals presenting with ischemic or hemorrhagic stroke were excluded.
METHODS: The primary outcome, attainment of goal mean arterial pressure within the first hour of initial antihypertensive, was a reduction of 25 percent from initial measurement. Secondary outcomes included time to initial goal mean arterial pressure, proportion of mean arterial pressures at goal within 24 hours of hospitalization, duration of intravenous antihypertensive treatment, and number of intravenous antihypertensives. Patients were split into two groups, receipt of labetalol or an alternative agent. All data were summarized using descriptive statistics.
RESULTS: Fifty patients were included; 27 in the labetalol group and 23 in the alternative group. There was no significant difference in the proportion of patients achieving goal mean arterial pressure within the first hour of presentation, time to initial goal mean arterial pressure, and proportion of mean arterial pressures at goal within the first 24 hours of hospitalization. 48.1% in the labetalol group required further intervention to remain at target mean arterial pressure versus 82.6% in the alternative group (p=0.014).
CONCLUSION: There was no significant difference in the attainment of goal mean arterial pressure within one hour. However, the alternative group required more changes in therapy and a longer duration of intravenous therapy.

38. Retrospective analysis of the effectiveness of modified dosing of four-factor prothrombin complex concentrate in patients requiring rapid reversal of anticoagulation. *Katie Schipper, Pharm.D., BCCCP*[1], Carlen Johnson, Pharm.D. Candidate[2]; [1]Pharmacy Department, St. Dominic Hospital, Jackson, MS [2]The University of Mississippi School of Pharmacy, Jackson, MS
INTRODUCTION: Four-factor prothrombin complex concentrate (4F-PCC) is preferred over fresh frozen plasma and vitamin K therapy for the emergent reversal of anticoagulation. 4F-PCC is indicated for the urgent reversal vitamin k antagonist therapy and has also been used for the emergent reversal of novel oral anticoagulants (NOACs). The dose of 4F-PCC is individualized based on a patient's weight. Recent data suggests that use ideal body weight over actual body weight may be equally as efficacious and provide significant cost savings.
RESEARCH QUESTION OR HYPOTHESIS: There is no difference between dosing strategies of 4F-PCC for emergent reversal of anticoagulation
STUDY DESIGN: Retrospective chart review.
METHODS: Patients who received 4F-PCC and were at least 18 years of age were included. Patients who received 4F-PCC for an indication other than for urgent reversal of anticoagulation were excluded. Coagulation laboratory data was collected pre and post 4F-PCC dosing. Dosing strategies (ideal versus actual body weight, 15 units/kg versus 25 units/kg) were also collected.

RESULTS: A total of 31 patients were included in this study. There was no significant difference in the percent reduction in INR when comparing 15 units/kg and 25 units/kg dosing strategies. There was no significant difference in the percent reduction in INR when 4F-PCC was dosed using ideal body weight versus actual body weight. There was no statistical difference in the number of patients who were able to achieve an INR of less than 1.5 between dosing strategies.
CONCLUSION: Use of alternative dosing strategies such 15 units/kg instead of 25 units/kg or using ideal body weight over actual body weight provide adequate reversal of warfarin. Alternative dosing strategies provide significant cost savings. 4F-PCC seems to be efficacious in reversal of NOACs. Further prospective studies are needed to validate these dosing strategies as well as to evaluate the safety of these strategies.

Endocrinology

39. Lead (Pb) inhibits insulin-activated AKT signaling and reduces glycogen in rat liver. *Victoria Tutag Lehr, Pharm D*[1], Merene Mathew, M.D.[2], Nicholas Mastrandrea, Ph.D.[3], Kyle Burghardt, Pharm.D.[4], Todd Leff, Ph.D.[5]; [1]Department of Pharmacy Practice, Wayne State University, Detroit, MI [2]Department of Pharmacy, Wayne State University, Detroit, MI [3]Department of Pharmaceutical Sciences, Wayne State University Eugene Applebaum College of Pharmacy & Health Sciences, Detroit, MI [4]Eugene Applebaum College of Pharmacy and Health Sciences Department of Pharmacy Practice, Wayne State University, Detroit, MI [5]Integrative Biosciences Bldg., Wayne State University, Detroit, MI
INTRODUCTION: Lead (Pb) exposure disrupts insulin signaling which may contribute to insulin resistance and diabetes in humans. As human Pb exposures increase from aging water infrastructure, it is imperative to investigate specific disruptive mechanisms of Pb to develop interventions for exposed populations.
RESEARCH QUESTION OR HYPOTHESIS: To determine whether Pb exposure affects hepatic insulin signaling pathways and gene expression in cultured rat hepatocytes, and glycogen content in liver from Pb-exposed rats.
STUDY DESIGN: Prospective cohort, quantitative study using isolated primary cultured rat hepatocytes (PCH) from Sprague Dawley rats and liver from Pb-exposed Zucker diabetic fatty (ZDF) rats.
METHODS: PCH were exposed to various concentrations of Pb-acetate. Changes in insulin-mediated AKT phosphorylation (pAKT) were determined by immunoblot. Gene expression changes were identified via microarray, followed by Ingenuity Pathway Analysis. One-way analysis of variance, followed by Tukey-Kramer multiple comparison analysis compared differences between groups. Significance was $p<0.05$. ZDF rats were provided Pb-acetate in drinking water for 24 weeks. Postmortem liver glycogen content was examined by histological analysis.
RESULTS: Glycogen levels were significantly reduced in ZDF rat liver and PCH following Pb exposure ($p<0.05$). In addition, dose-dependent decreases in insulin-mediated pAKT, and glycogen synthase kinase (pGSK), and increases in glycogen synthase (pGS), were found ($p<0.05$). Finally, microarray and gene pathway analyses identified significant changes in expression of genes involved in glycogen synthesis. Exposure of PCH to Pb caused enrichment of genes related to canonical pathways of pregnane X receptor (PXR)/retinoid X receptor (RXR) activation, caveolin-mediated endocytosis signaling, and hepatic fibrosis/hepatic stellate cell activation ($p<0.01$).
CONCLUSION: Pb exposure promotes insulin resistance in rat liver, partly via inhibition of insulin-mediated AKT signaling and changes in gene expression. Together these changes contribute to an observed Pb-mediated reduction in hepatic glycogen levels in ZDF rats. These data represent possible mechanisms behind Pb and insulin resistance. Human hepatocyte validation may support diabetic screening of Pb-exposed populations.

40. Assessment of medication use and self-efficacy (MUSE) and perceived diabetes self-management (PDSM) among adult diabetic patients in Kuala Lumpur, Malaysia. Sohail Ahmad, Pharm D, MSc (Clinical Pharmacy)[1], Safaa Ahmed Al Abboud, BPharm Hons, MSc (Clinical Pharmacy)[2], Nahlah Elkudssiah Ismail, BPharm Hons, Ph.D. Clinical Pharmaceutics[1]; [1]Faculty of Pharmacy, MAHSA University, Kuala Langat, Malaysia [2]Faculty of Pharmacy, Universiti Teknologi MARA, Puncak Alam, Malaysia
INTRODUCTION: Self-care is an essential component of diabetes management to survive with the complex nature of the diabetes mellitus (DM). Despite the recent great strides that have been made in the management of DM, many patients do not achieve optimal glycemic control.
RESEARCH QUESTION OR HYPOTHESIS: This study was conducted to determine the levels and predictors of medication use and self-efficacy (MUSE) and perceived diabetes self-management (PDSM) among Malaysian diabetic patients.
STUDY DESIGN: A cross-sectional study.
METHODS: This study recruited a total of 252 adult diabetic patients from Hospital Kuala Lumpur using a convenience sampling method. The study instrument consisted of three parts: socio-demographic and medical data; PDSM (8 items); and MUSE (8 items). The data were extracted from completed questionnaires and analyzed by Statistical Package for Social Sciences (SPSS), version 21 for Pearson correlation test, and multiple linear regression (MLR).
RESULTS: The enrolled DM patients possessed high level of MUSE (27.3/40, $\pm$ 4.5) and intermediate level of PDSM (27.29/50, $\pm$ 5.43). There was moderate statistically positive correlation between the scores of PDSM and MUSE ($r = 0.307$, $p<0.001$). Among all the selected socio-demographic and medical variables, the education level ($\beta = 0.16$, $p=0.03$), diabetes medication (oral, insulin, and oral and insulin) ($\beta = -0.23$, $p=0.01$), HbA1c ($\beta = -0.23$, $p<0.001$), and frequency of diabetes education/counselling ($\beta = -0.16$, $p=0.045$) made the statistically significant contributions to self-management model by explaining 18.3% of the variation in the self-management score. For MUSE, diabetes education/counselling ($\beta = 0.21$, $p=0.02$) and HbA1c level ($\beta = -0.21$, $p=0.001$) were the main predictors explaining 11.6% of variation in MUSE score.
CONCLUSION: The impact of MUSE and PDSM score on HbA1c suggested that the future policy efforts should be focused on promoting self-management and self-care practices through a multi-pronged and an integrated approach.

Gastroenterology

41E. Retrospectively assessment of acid suppression therapy in internal medicine service. Ilknur Ince, B.S.[1], *Beyza Torun, B.S.*[1], Ayse Leblebici, B.S.[1], Berkay Ozdemir, B.S.[1], Aysenur Belentepe, B.S.[1], Oznur Ozkan,[1], Refik Demirtunc,[2], Efe Serkan Boz,[2], Mesut Sancar,[1], Betül Okuyan,[1]; [1]Clinical Pharmacy Department, Marmara University- Faculty of Pharmacy, Istanbul, Turkey [2]University of Health Sciences, Haydarpasa Numune Training and Research Hospital, Istanbul, Turkey
Presented at the International Meeting on Education & Research in Health Sciences, Istanbul, Turkey, Nov 3–5, 2017.

Geriatrics

42. Correlation between initiation or dose increase of central nervous system medications and inpatient falls. *Marilyn Schoenle, Pharmacy Student*[1], Lindsay Saum, Pharm.D., BCPS, BCGP[2], Brian Skinner, Pharm.D., BCPS[3]; [1]Butler University College of Pharmacy and Health Sciences, Indianapolis, IN [2]Butler University College of Pharmacy and Health Sciences & St.

Vincent Health, Indianapolis, IN [3]St. Vincent Health, Indianapolis, IN
INTRODUCTION: While several studies have examined the association between central nervous system (CNS) medications and falls, none have analyzed whether initiating or intensifying CNS medications in an inpatient setting impacts patient fall risk. The aim of this study is to identify potential risk factors for inpatient falls.
RESEARCH QUESTION OR HYPOTHESIS: Initiating or increasing the dose of CNS medications increases the risk of falling in hospitalized patients.
STUDY DESIGN: Case-cohort, retrospective chart review over two years.
METHODS: Inclusion criteria were: age greater than 40 years, length of stay greater than 48 hours, and receipt of at least one of the studied CNS medications. Exclusion criteria were: admission for a fall, usage of depot medications, or fall occurring prior to the index date (median time to fall) for the control group. Studied CNS medication classes were antipsychotics, tricyclic antidepressants (TCAs), non-TCA antidepressants, gabapentinoids, and sedative hypnotics. The study compared home and inpatient medications and categorized them according to the presence or absence of dose escalation or initiation. The primary outcome was to measure the relationship between initiation or increase of CNS medications and the occurrence of falls. Secondary outcomes measured the same relationship based on the number of concomitant CNS medications. Statistics performed were Chi-square analysis for nominal variables and Mann-Whitney U for continuous data with an alpha of 0.05.
RESULTS: 179 falls patients and 614 non-falls patients were included. The escalation or initiation of individual CNS medication classes were not found to significantly increase the risk of inpatient falls. However, the use of 3 or more CNS medications ($p=0.01$) and the intensification of 2 or more CNS medications ($p=<0.001$) significantly increased fall risk.
CONCLUSION: This study did not correlate starting or increasing a CNS medication with inpatient falls, although changes in multiple medication classes significantly increased the risk of falling.

Health Services Research

43. Applying lean management to reduce patient waiting time and improve satisfaction at a hospital outpatient pharmacy. *Suzan Hammoudeh, Phc MCIPS*, Abdullah Amireh, Pharm.D., BCPS, Saad Jaddoua, RPH, Lama Nazer, Pharm.D., BCPS, Enas Jazairy, Information & Communication Technology, Ronza Dewiri, CPHQ; King Hussein Cancer Center, Amman, Jordan
INTRODUCTION: Patient satisfaction with the outpatient pharmacy services at our institution was below the target level, mainly due to long waiting times. A lean management strategy to reduce patient waiting time and increase the satisfaction of both patients and staff was developed and implemented.
RESEARCH QUESTION OR HYPOTHESIS: Does applying lean management improve patient waiting time and improve satisfaction at a hospital outpatient pharmacy?
STUDY DESIGN: Prospective observational study.
METHODS: The project was conducted in the outpatient pharmacy of a comprehensive cancer center in Amman, Jordan. The process started with formation of a multidisciplinary team and A3 problem-solving, which is a 10-step scientific lean management method with measurable patient-centered outcomes. Average patient waiting time and level of patient satisfaction were compared before and after full implementation of the process. In addition, a survey was conducted among the pharmacy staff who worked in the outpatient pharmacy during the process to determine its impact on staff satisfaction.
RESULTS: After full implementation of the lean process, patient waiting time for prescriptions of fewer than three medications and of three medications or more decreased significantly (22.3 min vs 8.1 min, $p<0.001$, and 31.8 min vs 16.1 min, $p<0.002$, respectively), and patient satisfaction increased (62% vs 69%; $p=0.005$). The majority of the pharmacy staff reported that the process motivated them in their work and that both their jobs and their relationships with their managers and colleagues had improved .
CONCLUSION: Application of lean management in an outpatient pharmacy was effective in reducing patient waiting time and improving the satisfaction of both patients and employees.

Hematology/Anticoagulation

44. Validation of enoxaparin dosing in morbidly obese patients. *Charlotte Fielding, Pharm.D.*, Kellie Fortier, Pharm.D., BCPS; Banner Desert Medical Center, Mesa, AZ
INTRODUCTION: Obesity increases a patients risk for venous thromboembolism (VTE). Current recommendations for enoxaparin prophylaxis dosing are not weight based. Pharmacokinetics of enoxaparin can be altered in obesity leading to under dosing.
RESEARCH QUESTION OR HYPOTHESIS: Does enoxaparin 60 mg every 12 hours (q12 h) achieve recommended AFXa levels (0.2–0.5 IU/ml) for VTE prophylaxis in patients with a body mass index (BMI) ≥ 60 kg/m^2.
STUDY DESIGN: Retrospective-chart review.
METHODS: The primary endpoint was achievement of therapeutic AFXa levels. Secondary endpoints included incidence of thrombotic and bleeding events. Patients ≥ 18 years, admitted between 8/1/2015 and 8/31/16 on enoxaparin, weight >140 kg, and creatinine clearance (CrCl) >30 ml/min were identified. Patients on enoxaparin 60 mg q12 h with a BMI ≥ 60 kg/m^2, non-pregnant, received ≥ 3 doses of enoxaparin, and had an AFXa level drawn 3–6 hours post dose were included. Patients with CrCl ≤ 30 ml/min at baseline or at time of AFXa level draw, thrombocytopenia, age ≥ 90 years, or active bleeding were excluded. Data collected included age, gender, actual body weight, ideal body weight, BMI, serum creatinine and CrCl at baseline and time of AFXa level draw, VTE risk score, AFXa levels, timing of AFXa levels, processing time of levels, major and minor bleeding, and suspected or confirmed thrombotic events. Descriptive statistics were used to report categorical variables as percentages.
RESULTS: Forty-four patients were included in the final analysis. Thirty-eight patients (86.4%) obtained AFXa level within range. There were 3 patients (6.8%) who were supratherapeutic, and 3 patients (6.8%) who were subtherapeutic. Secondary safety endpoints showed no bleeding, deep vein thrombosis or pulmonary embolisms. There were two superficial clots both associated with PICC lines.
CONCLUSION: Enoxaparin 60 mg q12 h is an effective dosing strategy for maintaining AFXa levels within goal range for prophylaxis in patients with a BMI ≥ 60 kg/m^2.

45. Real-world adherence and outcomes with direct oral anticoagulants in a medically underserved community. *Brady Brown, Pharm.D. Candidate*, Charlotte Ricchetti, Pharm.D.; Regis University School of Pharmacy, Denver, CO
INTRODUCTION: Adherence to direct oral anticoagulants (DOACs) is extremely important, and existing studies demonstrate long-term adherence rates decline over time. Little information is known about adherence to DOACs in a medically underserved population.
RESEARCH QUESTION OR HYPOTHESIS: This study examined adherence rates and rates of adverse events for patients prescribed DOACs in a Federally Qualified Health Center (FQHC).
STUDY DESIGN: Retrospective chart review.
METHODS: Adult patients who received care at Clinica Family Health taking a DOAC between August 1, 2016 and August 31, 2017 for at least 6 months were included. Patients who were

institutionalized for more than 2 weeks, prescribed DOAC therapy outside of the system or with a contraindication to DOAC therapy were excluded. The primary outcome was DOAC adherence defined as percent days covered (PDC) for the most recent 6 months, and a PDC greater than 80% was considered a high level of adherence. Secondary outcomes included the occurrence of a thromboembolic event, bleeding, monitoring of blood counts (CBC) and renal function, and dose adjustments for renal impairment.
RESULTS: Forty-nine patients, average age of 58 years (range 30–90), met study criteria of which 53% were female. Only 24 (49%) had a >80% PDC. Minor bleeding occurred in two patients, both with an identifiable cause (i.e. hemorrhoids and urinary infection). One patient with a low PDC (16%) was found to have a chronic deep vein thrombosis, but it was uncertain if this was persistent from the initial event. Only 67% and 61% of patients received an assessment of CBC or renal function within a year, respectively.
CONCLUSION: This study demonstrated that less than half of patients were adherent with DOAC therapy, which is lower than recent post-market studies.

46. Characterization of oral factor Xa inhibitor exposures reported to US poison centers. Ryan Feldman, Pharm.D.[1], *Kaitlin Ewert, Pharm.D.*[2], Amy Zosel, MD[3]; [1]Froedtert Hospital Emergency Department, Froedtert and the Medical College of Wisconsin, Milwaukee, WI [2]Department of Pharmacy, Froedtert & The Medical College of Wisconsin, Milwaukee, WI [3]Department of Emergency Medicine, Medical College of Wisconsin, Milwaukee, WI
INTRODUCTION: The oral factor Xa inhibitor class has gained widespread use for many indications. Due to their lack of a reversal agent and inability to reliably monitor anticoagulation, toxicity from overdose or incidental exposure is difficult to monitor and outcomes from exposure are not well defined.
RESEARCH QUESTION OR HYPOTHESIS: To characterize the incidence of major adverse clinical effects in intentional adult exposures and unintentional pediatric exposures reported to U.S. poison centers.
STUDY DESIGN: Retrospective chart review of medical outcomes catalogued in the National Poison Data System (NPDS) for cases involving oral factor Xa inhibitors.
METHODS: This retrospective study utilized data from the NPDS comprised of calls to U.S. poison centers. Inclusion criteria were all human patients with exposure to the oral factor Xa inhibitor class from 7/1/2011 to 12/31/2016. As medical outcome of exposure was a primary outcome in this study, only those cases within NPDS that were followed to known outcome were included.
RESULTS: There were 1486 total oral factor Xa inhibitor exposures followed to known outcome. Of the 1486 patients, 1181 (79.5%) were adult, and 297 (20.0%) were pediatric (age < 6 y). Intentional exposures were 210 (14.1%) of the population. Only 9 (4.3%) of the intentional exposures developed major effects. Of the 297 pediatric exposures, 1 (0.3%) had a major effect, 10 (3.4%) had moderate effects and 285 (95.6%) had minor or no effects. Thirteen (0.8%) fatalities were reported all. Fatality reports suggest these occurred while patients were taking the medication as prescribed.
CONCLUSION: The majority of oral factor Xa inhibitor exposures resulted in minor or no effects in pediatrics patients and intentional adults overdose. Reported major effects included bleeding, PT prolongation, coagulopathy and death. This study is limited by its retrospective nature, passive reporting and reliance on caller information. Additional research is needed to quantify what effects occurs during exposure and characterize toxicity.

HIV/AIDS

47. Outcomes of switching patients with HIV infection from tenofovoir disoproxil fumarate (TDF) to non-TDF containing regimens. *Kaitlin Sassa, Pharm.D. Candidate*[1], Jason Schafer, Pharm.D.[2]; [1]College of Pharmacy, Thomas Jefferson University, Philadelphia, PA [2]Thomas Jefferson University, Philadelphia, PA
INTRODUCTION: In clinical trials, switching patients from *tenofovir disoproxil fumarate* (TDF) to non-TDF containing antiretroviral regimens can prevent osteopenia and preserve kidney function while maintaining virologic suppression. However, limited data are available outside of clinical trials assessing virologic efficacy following a TDF to non-TDF switch in addition to patient preferences, tolerability, and ease of new medication use.
RESEARCH QUESTION OR HYPOTHESIS: Following a TDF to non-TDF regimen switch, there will be no change in virologic efficacy and no change in patient preferences, tolerability, and ease of medication use.
STUDY DESIGN: This study was a retrospective chart review of 100 consecutive patients who switched from TDF to a non-TDF containing antiretroviral regimen.
METHODS: Patients included were HIV positive, on antiretroviral therapy, virally suppressed, and switched from TDF to a non-TDF containing regimen between January 2016 and August 2017. Information collected included demographics, laboratory data, medications, and answers to standardized questions regarding preference, tolerability, and ease of medication use. Virologic efficacy was achieved when patients maintained their new regimen and had virologic suppression 6 months after the switch.
RESULTS: The mean age of patients was 49 years and their average time with HIV infection was 12.4 years. All patients maintained viral suppression after switching medications but five patients required another regimen switch due to poor tolerability. Three of these five patients reported preferring their previous medications on the standardized questionnaire. Most patients expressed either no preference between regimens (45%) or preference toward their new regimen (51%). The majority of patients (95%), reported either an improvement or no change in ease of medication use.
CONCLUSION: This study demonstrates that TDF to non-TDF HIV regimen changes do not alter virologic efficacy. The switches are well tolerated and lead to improvements in regimen preference and ease of use.

Infectious Diseases

48. Low rates of antibacterial discontinuation after the results of a positive respiratory virus panel. *Jacalyn Gualtieri, Pharm.D.*[1], Samantha LaRocque, Pharm.D.[2], Pramodini Kale-Pradhan, Pharm.D., FCCP[3], Leonard Johnson, M.D.[2]; [1]Pharmacy, St. John Hospital and Medical Center, Detroit, MI [2]St. John Hospital and Medical Center, Detroit, MI [3]Department of Pharmacy Practice, Wayne State University, Eugene Applebaum College of Pharmacy & Health Sciences and St. John Hospital and Medical Center, Detroit, MI
INTRODUCTION: Respiratory virus panel (RVP) polymerase chain reaction (PCR) is increasingly used to help reduce unnecessary antibacterial therapy.
RESEARCH QUESTION OR HYPOTHESIS: What is the rate of antibiotic discontinuation following results of a positive RVP.
STUDY DESIGN: A single-center retrospective quality improvement project.
METHODS: We evaluated antibacterial discontinuation rates after a positive RVP from January-December 2015. Patients with a negative RVP or expired within 24 hours of the RVP were excluded. Data collection included: demographics, location (ICU/non-ICU), day of antibiotic discontinuation following RVP, and results of microbiology (blood/sputum cultures, *Legionella* antigen).

RESULTS: 220 patients met the inclusion criteria, 118 (54%) were males, median age was 3 years (interquartile range, 15). 167 (76%) <18 years, 35 (16%) 18–64 years, and 18 (8%) >64 years. The median length of stay was 1 day (IQR, 2). 190 (86%) non-ICU and 30 (14%) were ICU patients. The most common viruses detected by PCR were 106 (48.2%) rhinovirus, 24 (10.9%) adenovirus, 16 (7.3%) parainfluenza virus-3, 15 (6.8%) parainfluenza virus-1 and 14 (6.4%) RSV. 110/220 of the patients received antibiotics prior to the positive RVP. Of the 50% of patients who received antibiotics, discontinuations rates were as follows: 40 (36.7%) within 24 hours, 11 (10.1%) after 2 days, 19 (17.4%) after 3–4 days, 35 (32.1%) after 5–10 days, and 4 (3.7%) were more than 10 days from positive RVP. Sixty-four patients (29%) had respiratory cultures and 109 (49.5%) had blood cultures. Only one patient had a positive blood culture for *Staphylococcus aureus*. No difference was found in antibiotic discontinuation rates within 24 hours between those patients <18 and ≥18 years of age (35.4% vs. 38.6% p=0.73), or in ICU versus non-ICU patients (46.2% vs. 35.4% p=0.45)
CONCLUSION: Results of positive RVP were underutilized in discontinuing antibacterials and need to be coupled with antimicrobial stewardship team to reduce inappropriate antibacterial use.

49. Implementation and initial outcomes of the procalcitonin assay in a rural hospital. *Jennifer Cole, Pharm.D., BCPS, BCCCP*; Department of Pharmacy, Veterans Health Care System of the Ozarks, Fayetteville, AR
INTRODUCTION: Procalcitonin (PCT) is a biomarker for bacterial infection that is employed in antimicrobial stewardship programs to decrease overall antibiotic utilization. There is a paucity of data to guide the implementation process at the facility level. Furthermore, most positive studies in PCT utilization were done in large, tertiary medical centers. Commonly reported outcomes like antibiotic free days generally require randomization, detailed chart review, and approval from an Institutional Review Board.
RESEARCH QUESTION OR HYPOTHESIS: Can the PCT assay be feasibly implemented in a rural, 65-bed primary care hospital with successful non-study, real-world outcomes?
STUDY DESIGN: The implementation process is described via observational methods while the impact is described using a before and after quasi-experimental study design comparing two identical six month periods; May – October 2016 and May – October 2017.
METHODS: Antibiotic consumption is compared with days of therapy (DOT) per 1000 patient days (PD). Antimicrobial purchasing costs, admission rates, and length of stay (LOS) are also compared. Antibiotic consumption was compared with a chi squared test for proportions while continuous variables were compared with a Student's T test.
RESULTS: PCT orders decreased gradually over six months, total expenditure of PCT procurement during the study period was $40,560. Antimicrobial consumption was variable during the study period with the greatest reduction at six months: 856 DOT/1000 PD before versus 576 DOT/1000 PD after (p<0.0001). Admission rates were not affected: 18.5% before versus 17.5% after (p=0.23). Average LOS was not shortened: 3.6 days before versus 4.0 days after (p=0.02). There was no associated savings in antibiotic purchasing costs: $114,189.79 before versus $139,829.26 after (difference +$25,639.47).
CONCLUSION: Although implementation of PCT testing is feasible in a rural healthcare facility, this was not associated with a decrease in admission rates, LOS, or substantial cost savings in antibiotic purchasing in the first six months. Interim analysis showed a marginal decrease in antibiotic consumption.

50E. Impact of including indication and stop date in antibiotic ordering in intensive care units: a retrospective review. *Phuong Tran, Pharm.D. Candidate*; MCPHS University, Boston, MA
Presented at the Midyear Clinical Meeting of the American Society of Health-System Pharmacist, Orlando, FL, December 3–7, 2017.

51. Duration of antibiotic therapy unaffected with the introduction of procalcitonin in a rural facility. *Clarice Montgomery, Pharm.D.*[1], Jennifer Cole, Pharm.D., BCPS, BCCCP[2], Bradley Hodge, Pharm.D.[3]; [1]Veterans Hospital, Fayetteville, AR [2]Department of Pharmacy, Veterans Health Care System of the Ozarks, Fayetteville, AR [3]Department of Pharmacy, Veterans Healthcare System of the Ozarks, Fayetteville, AR
INTRODUCTION: The procalcitonin (PCT) assay is a biomarker for bacterial infection that has been shown to decrease antibiotic exposure in lower respiratory tract infections (LRTI). Most positive outcomes stem from randomized controlled trials in large, tertiary medical centers. Real world data for PCT impact is lacking, especially in small, rural hospitals.
RESEARCH QUESTION OR HYPOTHESIS: Can the positive results seen with LRTI in clinical trials be replicated with the implementation of PCT testing in a non-study setting at a 65-bed rural facility?
STUDY DESIGN: This was a quasi-experimental before and after study comprised of chart review of patients presenting to the emergency department for COPD exacerbation or community acquired pneumonia.
METHODS: The before group consisted of 156 patients meeting inclusion criteria from May to September 2016, the after group consisted of 184 patients meeting inclusion criteria from May to September 2017. The primary outcome was total duration of antibiotic therapy. Secondary outcomes included antibiotic initiation rate, days of hospitalization, rate of *Clostridium difficile* infection within 14 days of discharge, and readmission rate within 28 days of discharge. Median antibiotic durations were compared using a Mann Whitney U test while secondary outcomes were compared using a Student's T test or Chi square where appropriate in R Foundation for Statistical Computing version 3.4.1.
RESULTS: Median days of antibiotic therapy was unaffected by the intervention: median 8 days before (IQR 5–10 days) versus 8 days after 8 (IQR 5–10 days), (p=0.50). Antibiotic initiation rates were not statistically different: 94% versus 85% (p=0.52). Duration of hospitalization was similar: mean 5.09 days versus 5.30 days (p=0.90). There was no significant difference in readmission rates or *Clostridium difficile* infection.
CONCLUSION: Implementation of the PCT assay did not translate into shortened antibiotic durations in LRTIs in a non-study setting at a rural facility.

52. Knowledge, attitude and practice (KAP) of hand, foot and mouth disease (HFMD) among childcare workforces in childcare centers and preschools in Klang Valley, Malaysia. Sohail Ahmad, Pharm D, MSc (Clinical Pharmacy), Yeap Boon Jing, BPharm (Hons), Faiz Ahmed Shaikh, BPharm, MPharm (Clinical Pharmacy), Muhammad Qamar, Pharm D, MPharm Clinical Pharmacy, BCPS, Nahlah Elkudssiah Ismail, BPharm Hons, Ph.D. (Clinical Pharmaceutics); Faculty of Pharmacy, MAHSA University, Kuala Langat, Malaysia
INTRODUCTION: Hand, foot and mouth disease (HFMD) has reached outbreak proportions in Malaysia. Despite increasing cases of HFMD and the boom of early childhood care and education industry, limited literature is available on knowledge, attitude and practice (KAP) of childcare workforce toward HFMD.
RESEARCH QUESTION OR HYPOTHESIS: The aim of the study was to determine KAP of workforces regarding HFMD in early childhood settings in Klang Valley, Malaysia.
STUDY DESIGN: A cross-sectional study design.
METHODS: Post ethics approval, a total of 212 child caregivers and teachers from childcare centers and preschools were enrolled. A self-administered questionnaire attached with subject information sheet and consent form was distributed using convenience sampling method. The study instrument consisted of four sections: socio-demographic data (n=9), knowledge (n=14), attitude (n=12), and practice (n=10) regarding HFMD. The descriptive and inferential statistics (Cronbach's alpha (α), Spearman's rank-order correlation, and Chi square test) were applied using SPSS, version 21.

RESULTS: The respondents showed poor knowledge (11.34, ± 4.06), moderate attitude (44.25, ± 4.83), and good practice level (36.67, ± 5.46) of HFMD. Cronbach's alpha (α) values of knowledge (0.847), attitude (0.600), and practice (0.910) proved the reliability of the study instrument. There were positive statistically significant correlations between KAP (r = 0.273 (KA), 0.390 (AP), 0.375 (KP); p<0.05). No statistically significant associations were found between socio-demographic data and KAP score except between knowledge level of HFMD and past HFMD outbreak experience in the community (p=0.025) and between level of practice of HFMD with age (p=0.003), educational level (p=0.002), past experience of encountering HFMD children (p=0.007) and number of children they were taking care of in their premise (p=0.000).
CONCLUSION: The findings of this study emphasized the need to improve the knowledge of childcare workforce. The moderate attitude and good level of practice toward HFMD can be considered encouraging to prevent the spread of HFMD by taking the preventive measures.

Medication Safety

53. Evaluation of safety and monitoring of quetiapine in critically ill patients. *Tiffany Chiu, Pharm.D.*, Livia Allen, Pharm.D., BCCP, Chelsea Landgraf, Pharm.D., BCPS, BCACP, Karrie Derenski, Pharm.D., BCNSP, BCCCP, CNSC, Jason Pelletier, Pharm.D., BCPS; Pharmacy Department, CoxHealth South Medical Center, Springfield, MO
INTRODUCTION: Antipsychotics have been associated with corrected QT (QTc) prolongation, a risk factor for developing Torsade de Pointes (TdP). Quetiapine, an atypical antipsychotic, has been used off-label for treating intensive care unit (ICU) delirium. In 2010, the American Heart Association (AHA) published a statement with recommendations for "Prevention of Torsade de Pointes in Hospital Settings."
RESEARCH QUESTION OR HYPOTHESIS: Assess safety and monitoring of quetiapine in critically ill patients at a community hospital.
STUDY DESIGN: Single-center, retrospective chart review assessed patients with quetiapine initiated during admission over six months using descriptive evaluation.
METHODS: Patients included were admitted to an ICU, 18 years or older, and received two or more doses of quetiapine. Patients not critically ill, less than 18 years, or with quetiapine as a home medication were excluded. Primary objectives evaluated patients with a baseline electrocardiogram (ECG) performed, patients with an ECG performed 8 to 12 hours after quetiapine initiation or dose increase, incidence of QTc prolongation, and patients with a baseline QTc >500 milliseconds (ms) still started on quetiapine.
RESULTS: 169 ICU patients had quetiapine initiated during admission with 84 patients excluded.

Primary Objective	Included Patients (n=85)
Baseline ECG performed	64 (75.3)*
Repeat ECG 8 to 12 hours after initiation or dose increase	3 (3.5)*
QTc prolongation >60 ms above baseline	0
Baseline QTc >500 ms still started on quetiapine	1 (1.2)*

*Percentage
CONCLUSION: The primary objectives aimed to evaluate safety and monitoring of quetiapine used in treating ICU delirium based on AHA's recommendations for preventing TdP; however, a lack of baseline ECGs and repeat ECGs, hindered further evaluation of QTc prolongation. Scheduled ECG could be one method to improve monitoring, and possibly increasing identification of adverse drug reactions.

54. Evaluate the safety of the co-administration of repaglinide and clopidogrel. *Chu-Yun Huang, M.S.*[1], Hsiu-Chen Chan, MS[2], Yen-Ying Lee, Pharm.D.[1]; [1]Department of Pharmacy, Shuang Ho Hospital, Taipei Medical University, New Taipei City, Taiwan [2]Department of Pharmacy, Taipei Medical University - Shuang Ho Hospital, New Taipei City, Taiwan
INTRODUCTION: In 2014, Tornio et al. has found that co-administration of clopidogrel and repaglinide can increase the AUC level and the half-life of repaglinide. However, whether the concomitant use of these two drugs increases the risk of hypoglycemia in the clinical setting among type 2 diabetic mellitus (T2DM) patients is still unclear.
RESEARCH QUESTION OR HYPOTHESIS: To compare the proportion of hypoglycemia among DM patients who were concurrently treated with repaglinide plus clopidogrel and with repaglinide alone.
STUDY DESIGN: This is a retrospective cohort study conducted in a 1000-bed hospital in Taiwan.
METHODS: T2DM patients who aged ≥18y/o, hospitalized during January 2015- February 2016 were included. Patients concurrently taking repaglinide and clopidogrel during hospitalization were defined as the exposure group; those who took repaglinide only were defined as the control group. The primary endpoint was the proportion of hypoglycemic events among each group. The difference of mean blood glucose levels between groups and the change in mean blood glucose before and after clopidogrel administration in the exposure group were also analyzed.
RESULTS: A total of 134 patients were included. The baseline characteristics between groups were balanced except a higher rate of sulfonylurea use in the control group. The overall proportions of patients experienced hypoglycemia were comparable between groups, but higher hypoglycemic events within 72 hrs from the co-administration of clopidogrel and repaglinide were found in the exposure group (25% vs. 18%). The mean blood glucose was lower but not statistically significant in the exposure group (190 mg/dL vs. 196 mg/dL), and the mean blood glucose before and after clopidogrel administration were 203 mg/dL vs. 196 mg/dL, respectively. Similar results were found when excluding patients taking sulfonylureas at baseline.
CONCLUSION: Clinicians should be aware of the potentially increased risk of hypoglycemia among patients concurrently receiving clopidogrel and repaglinide, especially within the first 72 hours of co-administration.

55. Simvastatin dose adjustment: a cross-sectional study. *Mohamed A. Hammad, MPharm., BCPS, Ph.D. Candidate*, Syed Azhar Syed Sulaiman, Pharm.D., Dzul Azri Mohamed Noor, MPharm., Ph.D.; Department of Clinical Pharmacy, School of Pharmaceutical Sciences, Universiti Sains Malaysia, Penang, Malaysia
INTRODUCTION: Rapid accumulation and toxicity of metabolites can be developed if drugs dosages are not adjusted in patients with chronic kidney diseases (CKD). This study was considered to estimate the prevalence of optimal simvastatin dosing in chronic kidney diseases, elderly, or/and concomitant amlodipine.
RESEARCH QUESTION OR HYPOTHESIS: Null hypothesis; patient was given an accurately adjusted dose of simvastatin.
STUDY DESIGN: A cross-sectional study established at Hospital Pulau Pinang, Malaysia, in October- December 2017.
METHODS: Demographic criteria and laboratory tests of patients were collected from patients' records. Dosage adjustment depends on the patient's kidney function, most often estimated by the patient's glomerular filtration rate (eGFR) calculated by the CKD-EPI (Chronic Kidney Disease Epidemiology Collaboration) and a computerized system was used to determine the adjusted renal dose. Simvastatin dose of a patient with CrCl < 30 mL/min must be from 5 mg to 10 mg/daily. Simvastatin need dose adjustment in case concomitant amlodipine and patient' age >75 years

(dose: 20 and 40 mg). Data was managed by IBM-SPSS 23.0. The finding was presented as descriptive statistics.
RESULTS: About 450 patients given simvastatin (10 mg to 80 mg/daily) with age (57.8 ± 14.9) years, were 243 (54%) females and 207 (46%) males. Patients with CrCl < 30 ml/min were 51 (11.3%), and they need simvastatin dose adjustment. However, only 6 (11.8%) subjects were given adjusted simvastatin dosage, and 45 (88.2%) patients were given unadjusted simvastatin dose. From 104 (23.1%) patients using amlodipine, 40 (38.5%) cases were prescribed adjusted dose. However, 40 (8.9%) patients were >75 years, only 2 (0.05%) were given adjusted dosage.
CONCLUSION: The dosing of the majority of simvastatin that needs dosing adjustment were not adjusted which can increase the side effects and toxicity of simvastatin for patients with CKD, elderly or/and given amlodipine. It is the pharmacist duty by cooperation with the healthcare team to ensure the prescribing of optimal dose.

Oncology

56E. Efficacy and updated safety of ceritinib (450 mg or 600 mg) with low-fat meal vs 750 mg fasted in ALK+ metastatic NSCLC. Byoung Chul Cho, MD, Ph.D.[1], Radka Obermannova, MD, Ph.D.[2], Alessandra Bearz, M.D[3], Dong-Wan Kim, MD, Ph.D.[4], Sergey Orlov, M.D[5], Gloria Borra, M.D.[6], Sang-We Kim, M.D.[7], Pieter E Postmus, M.D.[8], Scott Laurie, M.D.[9], Keunchil Park, M.D.[10], Sarayut L Geater, M.D.[11], Anna Cecilia Bettini, M.D.[12], Karen Osborne, M.S.[13], Vanessa Q Passos, M.D.[14], Zhe Chen, Ph.D.[14], Rafal Dziadziuszko, MD, Ph.D.[15]; [1]Yonsei Cancer Center, Yonsei University College of Medicine, Seoul, Korea [2]Masaryk Memorial Cancer Institute, Brno, Czech Republic [3]Centro Di Riferimento Oncologico-Ircc, Aviano, Italy [4]Seoul National University Hospital, Seoul, Korea [5]Department of Medicine, State Pavlov Medical University, St. Petersburg, Russian Federation [6]Az. Osp. Univ.Maggiore Della Carità, Novara, Italy [7]Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea [8]The Clatterbridge Center NHS Foundation Trust, Liverpool, United Kingdom [9]The Ottawa Hospital Cancer Center, Ottawa, ON, Canada [10]Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea [11]Prince of Songkla University, Songkhla, Thailand [12]A.S.S.T. Papa Giovanni XXIII, Bergamo, Italy [13]Novartis Pharma AG, Basel, Switzerland [14]Novartis Pharmaceuticals Corporation, East Hanover, NJ [15]Medical University of Gdansk, Gdansk, Poland
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57. Pre-treatment counseling sessions for newly diagnosed cancer patients. *Daryl Schiller, Pharm.D.*; Pharmacy Department, Nyack Hospital, Nyack, NY
INTRODUCTION: A patient with a new diagnosis of cancer may experience numerous challenges but helping them understand their treatments and the resources that are available may improve their satisfaction with care and their quality of life.
RESEARCH QUESTION OR HYPOTHESIS: A pre-treatment, multidisciplinary counseling session can improve patient's satisfaction, anxiety, and understanding of the care they will receive.
STUDY DESIGN: Prospective, cohort, survey.
METHODS: Patients who were newly diagnosed with cancer were offered the opportunity to participate in a multidisciplinary orientation that provided an overview to treatment and the Infusion Center. Testing the effectiveness of this orientation was done using a psychometrically valid survey that focused on patient's knowledge of medications, tests, emotional support, patient self-management, and communication with staff. Surveys were given to all newly diagnosed patients treated at our Infusion Center within 1 month of starting treatment. Responses were sorted into those that were from patients who did versus did not participate in an orientation. Additionally, lorazepam use was identified as a surrogate marker for anxiety. Questions were grouped based on the category they focused on and were analyzed using a chi-square test, logistic regression, or odds ratio with a 95% confidence interval.
RESULTS: There were 98 surveys collected; 20 were excluded leaving 45 surveys from patients who participated in orientation and 33 from patients who did not participate. Overall satisfaction and pre-treatment anxiety were similar between groups. The orientation sessions identified several significant benefits but the biggest impact was on subject's understanding of self-management issues (23% difference, $p = 0.0001$).
CONCLUSION: The overall anxiety level or perception of care was not influenced by whether or not a patient participated in a pre-treatment orientation but the counseling session significantly helped patients understand how to stay healthy, identify support services that are available, and know who to contact with questions about treatment.

Pediatrics

58. Initial antimicrobial therapy in pediatric patients with cat scratch disease. *Loujain Shorbatli, Pharm.D.*[1], Katalin Koranyi, M.D.[2], Milap C. Nahata, Pharm.D., MS[3]; [1]School of Pharmacy, Ohio State University, Columbus, OH [2]Columbus, OH [3]Ohio State University College of Pharmacy, Columbus, OH
INTRODUCTION: Appropriate antimicrobial treatment of typical cat scratch disease (CSD) is not well established.
RESEARCH QUESTION OR HYPOTHESIS: What is the most effective initial antimicrobial therapy in pediatric patients with typical CSD?
STUDY DESIGN: A retrospective cohort study.
METHODS: Electronic medical records of pediatric patients diagnosed with typical CSD between 2006 and 2016 were reviewed. In addition to patient demographics, clinical and laboratory data at presentation, antimicrobial treatment and follow up evaluations including radiologic and clinical assessment of lymph node size were reviewed. The antibiotic effectiveness was based on clinical resolution and improvement of signs and symptoms, lymph node size, and clinician assessment. Antibiotic failure was defined by the lack of resolution or improvement, changes in the antibiotic therapy or need for surgical intervention after receiving initial antimicrobial therapy.
RESULTS: Two hundred and fifteen patients (age 7.3 ± 4.4 years) were diagnosed with CSD. Azithromycin (75 patients), amoxicillin/clavulanate (32) and trimethoprim/sulfamethoxazole (TMP/SMX) (20) were the most frequently used initial antibiotics. Resolution and improvement of CSD was observed in 28%, 3.1% and 25% of patients with azithromycin, amoxicillin/clavulanate, and TMP/SMX, respectively. Statistically significant differences in the effectiveness was found between azithromycin versus amoxicillin/clavulanate ($p<0.001$) and TMP/SMX versus amoxicillin/clavulanate ($p=0.005$). The effectiveness of azithromycin and TMP/SMX was comparable ($p=0.69$).
CONCLUSION: Azithromycin may be an appropriate initial treatment for CSD. TMP/SMX may be alternative treatment for patients intolerant or allergic to azithromycin.

59. Antimicrobial treatment in children with disseminated cat scratch disease. *Loujain Shorbatli, Pharm.D.*[1], Katalin Koranyi, M.D.[2], Milap C. Nahata, Pharm.D., MS[3]; [1]School of Pharmacy, Ohio State University, Columbus, OH [2]Columbus, OH [3]Ohio State University College of Pharmacy, Columbus, OH
INTRODUCTION: Cat scratch disease (CSD) may be systemically disseminated and lead to complications and hospitalizations. Limited data exist for optimal antibiotic regimen for children with disseminated CSD.
RESEARCH QUESTION OR HYPOTHESIS: Is combination antimicrobial therapy more effective than single antimicrobial therapy in pediatric patients with disseminated CSD?

STUDY DESIGN: A retrospective cohort study.
METHODS: Electronic medical records (EMRs) of pediatric patients diagnosed with disseminated CSD between 2006 and 2016 were reviewed. The EMRs were reviewed for demographics, clinical and laboratory data at presentation, antimicrobial treatment and follow-up evaluations. The effectiveness of antimicrobial therapy was determined based on clinical resolution and improvement of signs and symptoms, lymph node size, imaging studies, inflammatory markers and clinician assessment.
RESULTS: Thirty-seven patients (age 8.5 ± 4.7 years) were diagnosed with disseminated CSD. Approximately 54.0% of patients were male and 78.4% Caucasians. Of 37 patients, 16 received single antimicrobial therapy, 17 received combination antimicrobial therapy, and four were excluded due to lack of follow-up for assessment of antimicrobial effectiveness. Azithromycin was used as single antimicrobial therapy in 13 of 16 patients after disseminated CSD diagnosis; one had resolution and five had improvement but seven failed azithromycin therapy. These seven patients and remaining three patients who had received doxycycline or ciprofloxacin required combination antimicrobial and/or surgical intervention. Seventeen patients were started on combination antimicrobial therapy after diagnosis of disseminated CSD. Thirteen of 17 patients had resolution or improvement of CSD and four required modification of combination antimicrobial therapy and/or surgical intervention. Initial combination antimicrobial therapy was more effective than single antimicrobial therapy in resolving or improving clinical outcomes in pediatric patients with disseminated CSD (p=0.037). Rifampin and azithromycin were the most commonly used antibiotics among antimicrobial combinations which included trimethoprim/sulfamethoxazole, ciprofloxacin, and doxycycline.
CONCLUSION: Combination antimicrobial therapy may be more effective than single antimicrobial therapy in pediatric patients with disseminated CSD.

Pharmacoeconomics/Outcomes

60. A comparison of the economic impact of the hospital's participation in clinical trials for patients with multiple mieloma in 2014 and 2016. *Eva María Sáez, Pharmacy*[1], María Del Pilar García, Pharmacy[1], Silvia Jiménez, Pharmacy[1], Beatriz Castaño, Pharmacy[1], María Victoria Mateos, Medicine[2], María José Otero, Pharmacy[1]; [1]Pharmacy Service, University Hospital of Salamanca, Salamanca, Spain [2]Haematology Service, University Hospital of Salamanca, Salamanca, Spain
INTRODUCTION: Multiple myeloma accounts for approximately 10% of all hematologic tumors. Treating it has a growing economic impact on the pharmaceutical expenses of a hospital, due to the availability of new high-cost treatment. Participating in clinical trials may lead to a reduction in costs associated with this pathology.
RESEARCH QUESTION OR HYPOTHESIS: To evaluate and compare the economic savings for the hospital from its participation in clinical trials for patients with multiple myeloma in 2014 and 2016.
STUDY DESIGN: Retrospective study of clinical trials carried out at a tertiary hospital for multiple myeloma in 2014 and 2016.
METHODS: Pk-ensayos® management software was used to collect next data: number of clinical trials, number of participants recruited, and research medications used. The direct cost of all approved drugs provided by the sponsors was calculated according to the acquisition price in 2014 and 2016. Medications from previous phases of the research, which had no price assigned to them, could not be evaluated.
RESULTS: In 2014, 80 patients were included in 27 clinical trials with 11 drugs of quantifiable cost provided by the sponsors: total cost 1,496,159.22 €; average savings per year/patient: 18.702 €. In 2016, 106 patients (32.5% more than in 2014) were included in 41 clinical trials (52% more than in 2014). Total cost for the 14 drugs evaluated provided by the sponsors, including the high costly new drugs carfilzomib, daratumumab and pembrolizumab: 3,754,506.27 €. Average savings per year/patient: 35,419.87 €. Additional savings in 2016 compared to 2014: 2,258,347.05 €.
CONCLUSION: The large number of clinical trials for multiple myeloma carried out at our hospital in recent years represents a significant and constant increase in savings for pharmaceutical expenses. Participating in clinical trials not only brings great benefits to patients, improving patient access to new alternative therapies, but also offering great economic advantages for the hospital.

61. The influence of depression and anxiety upon clinical outcomes for type II diabetes. *Elham Heidari, Pharm.D., MS candidate*, Vincent Giannetti, Ph.D., Khalid Kamal, MPharm, Ph.D., Jordan R Covvey, Pharm.D., Ph.D., BCPS; Division of Pharmaceutical, Administrative and Social Sciences, Duquesne University School of Pharmacy, Pittsburgh, PA
INTRODUCTION: Patients with type II diabetes have an increased risk of comorbid mental illness, including depression and anxiety. However, there is a paucity in data about the impact of these diagnoses upon glycemic control.
RESEARCH QUESTION OR HYPOTHESIS: To determine the prevalence of depression and/or anxiety and to evaluate changes in clinical outcomes over the first year following diagnosis of type II diabetes.
STUDY DESIGN: Retrospective cohort utilizing electronic medical record (EMR) data from a primary care physician (PCP) group practice
METHODS: Adult patients treated by PCPs in Western Pennsylvania with at least 12 months of EMR data post-diagnosis of type II diabetes (ICD-9 CM 250.00, 250.02) were identified. Incident cases had at least 6 months of EMR data prior to the first coding for diabetes. The presence of comorbid depression and/or anxiety was identified by ICD-9 CM coding 311 and 300.0x, respectively. Data extracted included patient demographics, laboratory/clinical markers, medication utilization and clinical outcomes. Change in hemoglobin A1c (HgbA1c) from baseline at diagnosis through one-year post-diagnosis was compared according to comorbid diagnosis using a repeated measures ANOVA.
RESULTS: A total of 1822 predominantly Caucasian patients (47.1% female) with type II diabetes were evaluated. Of them, 1410 were diagnosed with diabetes only (77.4%), 148 diabetes with depression (8.1%), 215 diabetes with anxiety (11.8%) and 49 diabetes with both depression and anxiety (2.7%). Excluding missing data, a change in HgbA1c was evaluated in 1089 patients (59.8%). Significant reductions in HgbA1c occurred across all four groups (p<0.001), but comorbid diagnosis did not affect HgbA1c changes across patients (p=0.163).
CONCLUSION: Preliminary findings suggest that comorbid diagnoses of depression and/or anxiety have limited singular influence upon HgbA1c among patients with type II diabetes. Further work will examine additional clinical outcomes for diabetes and model the influence of demographic/clinical contributors to these outcomes.

Pharmacogenomics/Pharmacogenetics

62. The association of polymorphism in DPYD 496A>G gene with response to adjuvant chemotherapy of colorectal cancer. *Mohammed Zawiah, Master in Clinical Pharmacy*[1], Al-Motassem Y. Fahmi, Ph.D.[2]; [1]School of Pharmacy, University of Jordan, Amman, Jordan, Jordan [2]Department of Biopharmaceutics and Clinical Pharmacy, School of Pharmacy, University of Jordan, Amman, Jordan
INTRODUCTION: Colorectal cancer (CRC) is one of the major health issues worldwide. 5-Fluorouracil (5-FU) is a cornerstone of chemotherapy for CRC and the major targets of 5-FU are folate metabolizing enzymes. Dihydropyrimidine dehydrogenase (DPD) enzyme is a rate-limiting enzyme encoded by DPD gene

(DPYD). It responsible for the catabolism and elimination of up to 85% of a given dose of 5-fluorouracil.
RESEARCH QUESTION OR HYPOTHESIS: We hypothesized that polymorphisms in the *DPYD* 496A>G would be associated with CRC patient' disease-free survival (DFS).
STUDY DESIGN: A prospective cohort study.
METHODS: A total of 103 CRC patients with complete clinical data were included in this prospective cohort study. Genotyping was performed using polymerase chain reaction followed by sequencing. Using Kaplan-Meier curves, log-rank tests, and Cox proportional hazard models, we evaluated associations between this polymorphisms and (DFS)
RESULTS: CRC patients carrying the homozygote GG genotype in *DPYD* 496A>G are 4.36 times more susceptible to poor prognosis than wild-type AA carriers, [($DFS_{GG\ vs\ AA}$: 8.0 ± 4 vs 69.0 ± 10 months; HR = 4.36, 95% CI = 1.04–18; p = 0.04).
CONCLUSION: Genetic polymorphism in *DPYD* 496A>G seems to be associated with DFS in CRC patients receiving an adjuvant regimen of 5-FU/capecitabine based chemotherapy. Further studies are needed to verify these findings.

Pharmacokinetics/Pharmacodynamics/Drug

63E. Solubility improvement of poorly-water soluble drug Fenofibrate by solid dispersion in polyethylene glycol-hydroxy propyle methyle cellulose. *Sushanta Sarkar, Pharm.D.*[1], Saiful Islam, Ph.D.[2], Mamoon Rashid, Ph.D.[1]; [1]Appalachian College of Pharmacy, Oakwood, VA [2]Department of Pharmaceutical Technology, University of Dhaka, Dhaka, Bangladesh
Published in Int. Res. J. Phar. 2013;4(11)33–36.

64. Clinical and pharmacokinetic outcomes of peak-trough-based versus trough-only-based vancomycin therapeutic drug monitoring approaches: a pragmatic randomized controlled trial. Fatima Khalifa Al-Sulaiti, BScPharm, MSc (Pharm)[1], Ahmed Mohamed Nader, BSPharm, MSc, Ph.D., BCPS[2], Mohamed Saad, Pharm.D., BCPS[3], Hani Abdelaziz, Pharm.D., BCPS[3], Adila Shaukat, MBBS, CABM, MRCP[4], Rakesh Parakadavathu, MD[5], Ahmed Elzubair, MSc[6], Daoud Al-Badriyeh, Ph.D.[1], Hazem Elewa, Ph.D., RPh, BCPS[1], Ahmed Awaisu, BPharm, MPharm, Ph.D.[1]; [1]Clinical Pharmacy and Practice Section, College of Pharmacy, Qatar University, Doha, Qatar [2]Division of Clinical Pharmacology, Indiana University, Indianapolis, IN [3]Clinical Pharmacy Department, Al-Wakrah Hospital, Hamad Medical Corporation, Doha, Qatar [4]Infectious Diseases Department, Al-Wakrah Hospital, Hamad Medical Corportaion, Doha, Qatar [5]Infectious Diseases Department, Hamad General Hospital, Hamad Medical Corporation, Doha, Qatar [6]Clinical Pharmacy Department, Al-Khor Hospital, Hamad Medical Corporation, Al-Khor, Qatar
INTRODUCTION: Vancomycin therapeutic drug monitoring (TDM) is based on achieving 24-hour-area-under-concentration-time-curve (24-hr-AUC) cure breakpoints. Approaches to vancomycin TDM vary, with no head-to-head randomized controlled trial (RCT) comparisons to date.
RESEARCH QUESTION OR HYPOTHESIS: This study aimed to compare the clinical outcomes between peak-trough-based and trough-only-based vancomycin TDM approaches and; to evaluate the relationship between vancomycin 24-hr-AUC and cure.
STUDY DESIGN: A multicenter pragmatic parallel prospective RCT was conducted in Hamad Medical Corporation in Qatar.
METHODS: Adult non-dialysis patients initiated on vancomycin were randomized to peak-trough-based (n=30) or trough-only-based (n=35) vancomycin TDM approaches. The primary endpoints included therapeutic cure, nephrotoxicity, neutropenia and all-cause mortality. Vancomycin dosing requirement was a secondary endpoint. Descriptive, inferential, and CART statistical analyses were applied using SPSS.v.23 (IBM®, Armonk;NY). NONMEM.v.7.3 and PDx-Pop.v.5.2 (ICON,USA) were used for 24-hr-AUC calculation.
RESULTS: Peak-trough-based TDM was significantly associated with higher therapeutic cure rates compared to trough-only-based TDM [76.7% vs. 48.6%; p-value=0.02]. The trough-only group experienced 2.2-fold more therapeutic failures compared to the peak-trough group [p-value=0.02]. No statistically significant differences were observed for all-cause mortality, neutropenia and nephrotoxicity between the two groups [p-value>0.05]. Compared to trough-only-based-TDM patients, peak-trough-based-TDM patients required less vancomycin single doses and total daily doses by 4.94 mg/kg/dose and 12.05 mg/kg/day, respectively [p-value <0.05]. CART identified creatinine clearance(CrCl), 24-hr-AUC and TDM approach as significant determinants of therapeutic outcomes. All patients with CrCl ≤7.85 L/hr who achieved 24-hr-AUC ≤1255.98 mg.hr/L and received peak-trough-based TDM achieved clinical success [100%, n=19]. In contrast, patients with CrCl ≤7.85 L/hr who maintained 24-hr-AUC ≤1255.98 mg.hr/L but received trough-only-based-TDM experienced 29.4% failure rates. A 24-hr-AUC>564.12 mg.hr/L was identified as the cure breakpoint in trough-only-based-TDM recipients [84.6%, n=11].
CONCLUSION: The maintenance of 24-hr-AUC between 564.12 and 1255.98 mg.hr/L, and the implementation of peak-trough-based vancomycin TDM may potentially improve cure rates and dosing requirements associated with vancomycin treatment. Future larger scale RCTs are warranted to confirm these findings.

65. Vancomycin population pharmacokinetics in adult non-dialysis MENA population. Fatima Khalifa Al-Sulaiti, BScPharm, MSc (Pharm)[1], Ahmed Awaisu, BPharm, MPharm, Ph.D.[1], Mohamed Saad, Pharm.D., BCPS[2], Hani Abdelaziz, Pharm.D., BCPS[2], Hazem Elewa, Ph.D., RPh, BCPS[1], Daoud Al-Badriyeh, Ph.D.[1], Ahmed Mohamed Nader, BSPharm, MSc, Ph.D., BCPS[3]; [1]Clinical Pharmacy and Practice Section, College of Pharmacy, Qatar University, Doha, Qatar [2]Clinical Pharmacy Department, Al-Wakrah Hospital, Hamad Medical Corporation, Doha, Qatar [3]Division of Clinical Pharmacology, Indiana University, Indianapolis, IN
INTRODUCTION: Vancomycin is widely used to treat serious gram-positive bacterial infections, particularly MRSA. Vancomycin clinical pharmacokinetic parameters have not been studied in Middle East and North Africa (MENA) population.
RESEARCH QUESTION OR HYPOTHESIS: This study aimed to: 1) determine vancomycin population pharmacokinetics (PPK) in adult non-dialysis MENA population; 2) assess the need for vancomycin dosing nomograms specific to the MENA population.
STUDY DESIGN: A PPK analysis was conducted.
METHODS: Vancomycin blood concentrations were obtained from adult non-dialysis patients hospitalized in Hamad Medical Corporation hospitals in Qatar. Non-linear mixed effects modeling approach was used for model development. Internal validation of the final model was applied using bootstrap analysis (N=500). The agreement between the final model parameter estimates, and the bootstrap results was assessed. The generated population parameter estimates were compared against literature reported values in other populations. NONMEM.v.7.3 and PDx-Pop.v.5.2 (ICON,USA) were used for PPK analysis.
RESULTS: A total of 769 vancomycin blood concentrations obtained from 156 subjects were analyzed. A two-compartment model with a proportional residual error and between-subject variability modeled on clearance (Cl), central compartment volume of distribution (Vc), and intercompartmental clearance (Q) best described vancomycin disposition. The physiologic parameters Cl and Vc, were estimated with good precision [Cl:87.17 ml/min, 95% CI:78.67–95.67; Vc:0.63 L/kg, 95% CI: 0.54–0.72]. CrCl and age were significant covariates on Cl and Vc, respectively (p-value <0.01). Interindividual variability for Cl, Vc and Q was 38.9%, 42.7%, and 97% in the final model, respectively. Fixed effects parameters were estimated with reasonable precision and lied within 95% CI of bootstrap analysis. The population parameter estimates were similar to literature

reported 2-compartment model estimates in adult non-dialysis patients.
CONCLUSION: Vancomycin population pharmacokinetics was established in the adult non-dialysis MENA population. Vancomycin parameter estimates in the present population were similar to the parameter estimates of other adult non-dialysis populations, implying that specific vancomycin dosing nomograms for the MENA population may not be warranted.

Psychiatry

66. Study of statins impacts on dementia among outpatients with Type 2 diabetes mellitus. *Mohamed A. Hammad, MPharm., BCPS, Ph.D. Candidate*[1], Syed Azhar Syed Sulaiman, Pharm.D.[1], Nor Azizah Aziz, MD, Dip. Int. Med, MRCP[2], Dzul Azri Mohamed Noor, MPharm., Ph.D.[1]; [1]Department of Clinical Pharmacy, School of Pharmaceutical Sciences, Universiti Sains Malaysia, Penang, Malaysia [2]Endocrinology Clinics, Penang General Hospital, Penang, Malaysia
INTRODUCTION: Dementia is the harm of mental capability severe enough to interfere with normal activities of daily living, and not concomitant with a loss or change of consciousness. The impact of statins on dementia progress has not been well investigated in Malaysia. This study aims to determine the effect of statins on dementia development among outpatients with Type 2 diabetes.
RESEARCH QUESTION OR HYPOTHESIS: Does statins therapy associated with a higher or lesser risk of dementia incidence among outpatients with Type 2 diabetes mellitus?
STUDY DESIGN: A cross-sectional study was conducted at Hospital Pulau Pinang, Malaysia, in May – October 2017.
METHODS: Mini-Addenbrooke's Cognitive Examination (M-ACE) developed by Hsieh et al. (2015) was used to evaluate dementia (With permission). M-ACE measures the person' ability to attention, memory, language fluency and visuospatial. M-ACE score is 30, and the cut-off score for dementia is ≤16. Patients with Alzheimer's disease, blindness, paralysis, Parkinsonism, <40 years old, stroke, disability reading, and writing were excluded. IBM-SPSS 23.0 was used in data analysis.
RESULTS: M-ACE was conducted for 280 cases with age (59.6 ± 10.9) years, distributed as 177 statins users and 103 statins non-users. Treatment cohort had 32 (18.1%) cases of dementia, CI: 95% (9.1 – 15.2). Control cohort had 16 (15.5%) cases of dementia, CI: 95% (10.2 – 15.5). The relative risk of dementia associated with statins utilization in diabetic patients is (RR: 1.16, 95% CI: 0.67 – 2.02) and the excess relative risk is 16.4%. The absolute risk is 2.54%, and the number needed to harm is 40. Chi-square test showed the statistically significant difference between the means of dementia incidence of both cohorts (P-value: 0.001). However, Spearman's test indicated a non-significant correlation amongst statins and dementia incidence (P-value: 0.587).
CONCLUSION: This analysis demonstrated that there is no association between statins usage and dementia incidence. Statins therapy does not affect the dementia progress.

67E. Reports of gabapentin and pregabalin abuse, misuse, dependence, or overdose from the Food and Drug Administration Adverse Events Reporting System (FAERS). *Kirk Evoy, Pharm.D.*[1], Thuy Nguyen, Pharm.D. Candidate[2], Chuxi Li, Pharm.D. Candidate[2], Kyle Hultgren, Pharm.D.[3]; [1]The University of Texas at Austin College of Pharmacy and University of Texas Health San Antonio Long School of Medicine, San Antonio, TX [2]University of Texas at Austin, San Antonio, TX [3]Purdue University, West Lafayette, IN
Presented at American Society of Health-System Pharmacists Midyear Clinical Meeting, Orlando, FL, December 3–7, 2017.

68. Public beliefs and attitudes toward depression in Kuala Lumpur: A cross-sectional survey. Muhammad Qamar, Pharm D, MPharm Clinical Pharmacy, BCPS[1], Sohail Ahmad, Pharm D, MSc (Clinical Pharmacy)[1], Faiz Ahmed Shaikh, BPharm, MPharm (Clinical Pharmacy)[1], Nahlah Elkudssiah Ismail, BPharm Hons, Ph.D. (Clinical Pharmaceutics)[1], Mohamed A. Hammad, MPharm., BCPS, Ph.D. Candidate[2]; [1]Faculty of Pharmacy, MAHSA University, Kuala Langat, Malaysia [2]Department of Clinical Pharmacy, School of Pharmaceutical Sciences, Universiti Sains Malaysia, Penang, Malaysia
INTRODUCTION: Major depression is a debilitating illness and has become a leading cause of morbidity worldwide. One in every three adults in Malaysia is grappling with mental health issues, whether they realize it or not.
RESEARCH QUESTION OR HYPOTHESIS: The objective of the study is to determine the beliefs and attitudes toward depression among the general public in Kuala Lumpur, Malaysia.
STUDY DESIGN: A Cross-sectional study.
METHODS: A total of 400 participants were conveniently recruited using a pre-validated questionnaire. It consisted of four sections: demographic characteristics, attitudes towards depression, choice of treatment, and experience of depression.
RESULTS: Majority, 91.3% of respondents were aware of depression, and 62.8% agreed that people suffering from depression tend to withhold their condition. Moreover, 31.3% believed that it is better to avoid visiting people suffering from depression if you do not want to be depressed. Among perceived causes of depression, the most frequent cause endorsed was the death of close friend and relative (87%). In addition, 39.5% agreed that bairn illness might cause depression. Psychologists were often indicated as the best source of professional consultation. Almost three-fourths of the respondents (75.3%) believed that depression should be treated by drugs, but worried about drugs addiction and side effects. Visiting to a primary care physician (PCP) was disappointing; furthermore, many individuals believed that PCPs are too busy to treat persons suffering from depression.
CONCLUSION: The leading causes of depression were tragic life events, family problems, and financial issues. However, people were hesitant to disclose their symptoms to PCPs and concerned about the addictive, harmful effects of antidepressants. In the manifestation of a gap between people's beliefs and what healthcare providers consider suitable for the management of depression, a "shared decision making" approach to treatment selection should be adopted to ensure active compliance with effective therapies.

69. Do state suicide rates differ based upon respective suicide prevention education requirements?. *Kenric Ware, Pharm.D., MBA, AAHIVP*; Department of Pharmacy Practice, South University School of Pharmacy, Columbia, SC
INTRODUCTION: Educational efforts centered on prevention exhibit great diversity. Enforcement varies at the state level for suicide prevention. The purpose of this research was to assess differences among state suicide rates based upon suicide prevention education requirements. Strides have been made in specialty training for pharmacists that explore neurological considerations. These underpinnings bolster pharmacists as ideal health care professionals to champion suicide prevention platforms.
RESEARCH QUESTION OR HYPOTHESIS: Do state suicide rates differ based upon respective suicide prevention education requirements?
STUDY DESIGN: This study employed a quantitative retrospective analysis evaluating data from the American Foundation for Suicide Prevention.
METHODS: Data for study analyses were retrieved from the American Foundation for Suicide Prevention's "State Fact Sheets" and "State Laws: Suicide Prevention Education for Students." For the primary outcome, 50 states were divided into two groups; 1) Encourages and requires student education and 2) No student education law. For the secondary outcome, 25 states were divided into two groups; 1) Encourages student education and 2) Requires student education. Mann – Whitney U tests were conducted for both outcomes, with statistical significance set at $p<0.05$. The investigation tested differences in the reported 2015 rates of suicides per 100,000 population.

RESULTS: Fifty states were divided into "encourages and requires student education" (n=25) and "no student education law" (n=25). Median suicide rates were significantly different (p=0.008), 13.92 and 16.21 per 100,000, respectively. Twenty five states were divided into "encourages" (n=18) and "requires" (n=7) student education. Median suicide rates were not significantly different (p=0.883), 13.47 and 14.77 per 100,000, respectively.
CONCLUSION: The complexities of state suicide rates cannot be comprehensively addressed in isolation. Suicide participants are often confronted with multifaceted concerns prior to life terminating decisions. The results here do not seek to confirm, but rather to compel greater intrigue by pharmacists into suicide prevention education.

Transplant/Immunology

70. Impact of ambulatory transplant pharmacy services on outcomes and readmissions in adult abdominal transplant recipients. *Kayla Joyal, B.S. Pharmacy Studies*, Mariesa Cote, Pharm.D., Christin Rogers, Pharm.D., Katelyn Richards, Pharm.D.; Beth Israel Deaconess Medical Center, Boston, MA
INTRODUCTION: Over the past two decades, the role of transplant pharmacists (Txp Rx) has expanded following revised guidance from UNOS and CMS. There is little data published detailing the expanded role of the Txp Rx in the ambulatory setting. The purpose of this analysis was to evaluate the impact of newly expanded ambulatory Txp Rx services on readmissions and patient outcomes.
RESEARCH QUESTION OR HYPOTHESIS: The expansion of transplant pharmacist services will positively impact patient outcomes.
STUDY DESIGN: Single center retrospective case control study.
METHODS: A retrospective review of all adult kidney, liver, and pancreatic transplant recipients transplanted between April 2015 and October 2016 was performed. This group was compared to a historical control group which included patients transplanted between August 2013 and December 2014. Patients included in the study group were scheduled to see a pharmacist at weeks 1 and 2 as well as months 2,3,6 and 12 post-transplant. The primary endpoint was 90-day all cause readmission. Secondary endpoints included organ-specific patient and graft survival at 1 year, rejection at 1 year and readmission rates classified by indication.
RESULTS: A total of 124 patients in the Txp Rx study group were compared to 129 patients in the historical control. Baseline characteristics were similar. The rate of readmissions at 90 days after transplant was similar between the groups (60% Txp Rx group vs 58% historical control).
CONCLUSION: Expansion of Txp Rx services into the ambulatory clinic did not appear to decrease all-cause 90-day readmission rates. Future analysis will adjust for confounders on readmission rates and determine if the number of pharmacy follow-up visits has an impact. We also plan to evaluate patient satisfaction with Txp Rx services in the clinic as well as evaluate the impact of Txp Rx services on tacrolimus variability and non-adherence.

71. Impact of a steroid free immunosuppressive regimen on patient and graft outcomes in pancreas transplant recipients. *Mariesa Cote, Pharm.D.*, Christin Rogers, Pharm.D., Khalid Khwaja, MD, Amy Evenson, MD, Martha Pavlakis, MD, Katelyn Richards, Pharm.D.; Beth Israel Deaconess Medical Center, Boston, MA
INTRODUCTION: Steroids have been a component of maintenance immunosuppression in solid organ transplant, but their adverse effect profile has led to the development of steroid withdrawal regimens. In pancreas transplant, steroid withdrawal regimens have been studied but long term data is lacking.
RESEARCH QUESTION OR HYPOTHESIS: Steroid withdrawal will not adversely impact patient and graft outcomes in pancreas transplant recipients.
STUDY DESIGN: Single center retrospective chart review.
METHODS: We performed a retrospective chart review of adult patients who underwent a pancreas transplant between May 1989 and October 2013. Maintenance immunosuppression consisted of tacrolimus, mycophenolate mofetil/sodium and prednisone until 2004 when a steroid withdrawal protocol was adopted. The primary outcome was the composite of graft survival, patient survival and rejection at three years post-transplant. Secondary outcomes include readmission rates at one and three months post-transplant, immunosuppression levels, incidence of infection, and the number of patients who resumed prednisone in the steroid free group.
RESULTS: A total of 123 pancreas transplant recipients were identified, 70 patients continued steroids and 53 underwent steroid withdrawal. The study population consisted of male (57.7%) caucasians (88.3%) at a mean age of 42.78 ± 7.25 years. There was no difference in the composite endpoint of patient death, graft loss or rejection between groups (steroid-based vs. steroid-free) at three years (36% vs. 38%, p=0.38). Tacrolimus troughs were not different between groups at any timepoint. The MMF dose was significantly lower in the steroid-free group at three years compared to the steroid group (1214 mg vs. 1656 mg, p=0.02). The total number of infections at 36 months was numerically higher (117 vs. 64) in the patients maintained on steroids.
CONCLUSION: When evaluating the composite endpoint, pancreas transplant recipients on a steroid-free regimen do not appear to be at increased risk of graft loss, patient death or rejection. Avoidance of long term prednisone may reduce the risk of infectious complications post-pancreas transplant.

72. Retrospective evaluation of immunosuppression therapy of heart transplant patients who received HeartMate II assist device. *Bert Matsuo, Pharm.D.*[1], Robert Tan, Pharm.D.[1], Christopher Hauschild, Pharm.D.[1], Javad Tafreshi, Pharm.D., BCPS-AQ[2], Huyentran Tran, Pharm.D., BCPS[2]; [1]Loma Linda University Health, Loma Linda, CA [2]Loma Linda University School of Pharmacy, Loma Linda, CA
INTRODUCTION: HeartMate II left ventricular assist device (LVAD) is a mechanical circulatory support system that has demonstrated to be a solution for patients awaiting a heart transplant (HT). Currently, data on HT outcomes associated with the use of LVAD in patients are limited.
RESEARCH QUESTION OR HYPOTHESIS: We hypothesize that LVAD implantation will impact the clinical outcomes of immunosuppression therapy in HT recipients.
STUDY DESIGN: Retrospective study.
METHODS: Study evaluated adult patients (≥18 yrs.) requiring a HT or bridged with an LVAD, prior to receiving a HT between 10/1/2010 and 8/31/2017. Patients were excluded if they died during the same hospitalization as the HT procedure. Outcomes were freedom from allograft rejection, serious infection requiring hospitalization and comparing panel reactive antibody (PRA) Class I and II, pre and post transplant.
RESULTS: Sixty-nine patients were evaluated, of which 22 (32%) received an LVAD prior to HT. Induction and maintenance immunosuppression were similar between groups. Baseline PRA Class I was significantly higher in the LVAD vs. non-LVAD group prior to device implantation (p=0.015) while PRA Class II (p=0.355) was not. LVAD implantation significantly elevated PRA Class I (p=0.011) but not Class II (p=0.332). PRA Class I and II remained similar among LVAD patients except for Class II at 6 months post transplant (p=0.042). Freedom from rejection was significantly higher in patients who received an LVAD prior to transplantation (p=0.006). Freedom from serious infection did not differ between groups (p=0.136).
CONCLUSION: LVAD implantation did not significantly affect PRA Class I or II up to two years post-transplant. Non-LVAD patients had a higher rate of rejection overall. Similar rates of infection were seen in both groups. Additional immunosuppression may not be necessary for induction or maintenance therapy for HT patients bridged with LVAD. Further evaluation is needed to determine impact.

73. Evaluation of readmissions related to neutropenia or infections in kidney transplant patients receiving induction therapy with alemtuzumab or rabbit anti-thymocyte globulin. *Jobin Johnson, Pharm.D.*, John Knorr, Pharm.D., BCPS; Einstein Medical Center Philadelphia, Philadelphia, PA
INTRODUCTION: Previous studies show comparable transplant outcomes and adverse effects between alemtuzumab and rabbit anti-thymocyte globulin (rATG) induction when used in kidney transplantation. A previous study at our institution showed comparable neutropenia rates, but more severe neutropenia and reoccurrence with alemtuzumab.
RESEARCH QUESTION OR HYPOTHESIS: Is there a difference in readmission rates associated with neutropenia or infection between these two induction agents in kidney transplant recipients (KTR)?
STUDY DESIGN: Retrospective, single-center study.
METHODS: All adult KTR that received alemtuzumab or rATG between 1/1/2016 – 7/31/2017. The primary endpoint was the readmission rate related to neutropenia or infection within 6-months post-transplant. Secondary endpoints included overall inpatient/observation readmission rates, frequency of inpatient/observation readmissions, incidence of neutropenia, severity of neutropenia, and usage of granulocyte colony stimulating factors (G-CSF). Data Analysis: Nominal data was analyzed using Fisher's exact test. Ordinal data was analyzed using Mann-Whitney U test. Continuous data was analyzed using Student t-test. All analyses were performed with Stata/IC 15.0.
RESULTS: A total of 88 KTR received either alemtuzumab (n=44) or rATG (n=44). Demographics between groups were similar with regards to age, race, immunologic risk, immunosuppression, and infection prophylaxis. Of these, 14 patients (32%) who received alemtuzumab were readmitted for neutropenia or infection within 6 months post-transplant vs. 10 patients (23%) who received rATG (p=0.339). Comparing overall inpatient/observation readmissions, 31 (70%) and 28 (64%) patients were readmitted for any reason (p=0.651), and the rate of patients with multiple inpatient/observation readmissions was 45% vs 41% (p=0.83), in the alemtuzumab and rATG groups, respectively. The rate of neutropenia between groups was not statistically different (alemtuzumab 36% vs rATG 30%, p=0.651). There was more severe neutropenia and use of G-CSF with alemtuzumab.
CONCLUSION: KTR receiving alemtuzumab had similar readmission rates related to neutropenia or infection when compared to rATG. Despite more severe neutropenia and reoccurrence, this did not affect readmission rates.

74. Impact of high dose acyclovir cytomegalovirus prophylaxis failure in abdominal solid organ transplant recipients. *Magdalena Siodlak, Pharm.D. Candidate*, Margaret Jorgenson, Pharm.D., BCPS, Jillian Fose, Pharm.D., BCPS, Glen Leverson, Ph.D., Jeannina Smith, MD, Robert Redfield, MD; University of Wisconsin Hospital and Clinics, Madison, WI
INTRODUCTION: Cytomegalovirus (CMV) is a common opportunistic infection post-transplantation. Valganciclovir is the preferred prophylactic antiviral although associated with cytotoxicity and emerging resistance. Recent literature suggests patients stratified into low-moderate risk subgroups may obtain sufficient prophylaxis with less toxic therapies, including high-dose acyclovir (HD-A). However, these patients experience more prophylaxis failure; the long-term graft and patient impact of this is unknown.
RESEARCH QUESTION OR HYPOTHESIS: Evaluate the impact of HD-A (800 mg 4 times daily) prophylaxis failure in seropositive abdominal solid-organ transplant (SOT) recipients
STUDY DESIGN: Retrospective study.
METHODS: 691 adult SOT transplanted between 1/1/2008–6/30/2013 without lymphocyte-depleting induction, prescribed 3 months of HD-A prophylaxis on discharge. CMV was detected via molecular diagnostics (PCR) or on biopsy in 54 patients while receiving HD-A (failure group). 637 did not experience CMV (comparator).
RESULTS: Mean time to failure was 64 ± 23 days. Almost all failure (98%) was attributable to viremia; 33% below the quantifiable range; 35% with only a single detectable CMV PCR. Treatment was required in 56% with median duration of 63 days; 43% were treated with valganciclovir alone. Only 28% required hospitalization for CMV disease. Immunosuppression was modified in 52%. CMV recurrence after 100 days was significantly higher in the breakthrough group (58% vs 17%, p<0.0001). There were higher rates of rejection, 1, 3 and 5 year graft loss and 1, 3 and 5 year mortality in breakthrough group on univariate analysis (43% vs 30%, p=0.045; 92%, 83%, 66% vs 96%, 88%, 83%, p=0.006; 94%, 83%, 74% vs 99%, 94%, 90%, p=0.003). Multivariate analysis demonstrated significantly higher rejection (HR 1.76, 95% CI 1–3.1, p=0.049) and non-statistically higher mortality (HR 1.6, 95% CI 0.83–3.1, p=0.16) in the breakthrough group.
CONCLUSION: HD-A prophylaxis failure was mostly limited to mild viremia but was associated with significantly reduced long term graft survival, perhaps reflecting the negative impact of CMV viremia.

75E. Acute antibody mediated rejection treatment impact on class I and class II anti-HLA antibodies in pediatric renal transplant recipients. *Elisabeth Kincaide, Pharm.D.*[1], Kelley Hitchman, MS, Ph.D.[2], Reed Hall, Pharm.D., BCPS[1], Ikuyo Yamaguchi, MD[3], Barrett Crowther, Pharm.D., BCPS, FAST[1]; [1]Department of Pharmacotherapy and Pharmacy Services, University Health System, San Antonio, TX [2]Department of Pathology, UT Health San Antonio, San Antonio, TX [3]UT Health San Antonio, San Antonio, TX
Presented at ATC June 2018

VPS Advances in International Clinical Pharmacy Practice, Education, or Training Education/Training

76. Introducing a new Innovative FADIC learning model in pharmacy training and education. Rasha Abdelsalam Elshenawey, BCPS AQ-ID, M.Sc. of Clinical Pharmacy, SIDP, CPHQ, Tanta University Hospitals, Egypt[1], Heba-t-Allah Matar Ali Matar, BCPS, M.Sc. of Clinical Pharmacy[2]; [1]FADIC, Makkah, Saudi Arabia [2]FADIC, Cairo, Egypt
SERVICE OR PROGRAM: FADIC, the first online Arabian drug information center, was launched as an experiment in October 2014. When a group of Board Certified Pharmacotherapy Specialists "BCPS" instructors offered an interactive online Drug Information program, over 120 pharmacists in 8 countries enrolled. The potential to educate at global scale of pharmacists was inspiring, and FADIC was founded to pursue a mission, to provide high quality education. After three years of intensive interaction and experimentation, today, FADIC proudly presents an innovative learning model that introduced great value to online pharmacy training and education.
JUSTIFICATION/DOCUMENTATION: FADIC holds online interactive programs, talks, symposiums, conferences and webinars to help pharmacists stay updated, and connecting pharmacists from different countries such as USA, UK, UAE, KSA, and Egypt to share their clinical experiences. FADIC forum expanded online through website (www.fadic.net/en), and social media channels. Web-Based learning is conducted through FADIC's website. Interactive sessions are conducted through GoToMeeting online meeting rooms. FADIC adopted mentorship system, with selected mentors serving as role models during pharmacist's learning process.
ADAPTABILITY: FADIC combined interactive learning, with flexibility of internet based learning, providing an easy-to-study option for pharmacists internationally. Throughout the new innovative model of FADIC programs, attendees can run real projects, and apply them in their institutions, then attendees are stay

contact through FADIC membership society, to be updated with any news related to programs. Finally, attendees receive the program certification after completing the program.
SIGNIFICANCE: FADIC offers its activities, and programs in a convenient way. The service is continuously gaining more attention and appreciation. This integrated new innovative model approach ensures that attendees are fully prepared to succeed in their clinical practice. Thus, FADIC is expected to gain a leading position in the following years, becoming one of the most demanded evidenced-based educational services.

77. Allied health team group patient medication education improves patient satisfaction and establishes the pharmacist's role in ambulatory cardiac clinics. Joyce WS Chan, Pharm.D., MSc, BCPS AQ Cardiology, CDE, ACPR, Amita Woods, Pharm.D., ACPR; Department of Pharmacy, University Health Network, Toronto, ON, Canada
SERVICE OR PROGRAM: Patient medication education is an essential element in ambulatory care to improve adherence, enhance patient safety and positive outcomes. A liaison pharmacist role was recently initiated in our Canadian adult tertiary care cardiac centre with over 60 clinics including cardiac subspecialties such as regional congenital, heart failure, mechanical circulatory support, cardio-oncology, arrhythmia, cardiovascular surgery programs. A patient group medication education program on different cardiology topics each time is conducted quarterly by the pharmacist. This pharmacy program has now expanded to include invitation of other allied health team members, the social worker and the dietitian, to co-facilitate topics such as medication access, and nutrition supplements.
JUSTIFICATION/DOCUMENTATION: Since there is only a finite time and resource for individual medication education in busy ambulatory clinics, and many patients have similar medication topic questions, a group education program provides a great way to improve their learning needs. Topics chosen are based on patient consultation and provider surveys, to ensure patient-centered focus.
ADAPTABILITY: With patients who are unable to attend the live program, a video and handout archive will be set up in our cardiac centre Intranet. The multi-modal opportunity to promote allied health services, and interdisciplinary model of patient education is also highly adaptable to other disease sub-specialties.
SIGNIFICANCE: In addition to improving patient knowledge and satisfaction on medication-related needs, interdisciplinary collaboration increased both role understanding and cross referrals among the allied health professionals (pharmacist-social worker-dietitian). There is also a significant increase in provider referrals to the pharmacist due to increased visibility and patient feedback. This also led to additional allied health clinical initiatives involving the pharmacist based on patient needs identified from the talks, such as Smoking Cessation program, Peripheral Artery Disease Risk Factors Reduction Initiative in the cardiac clinics.

Managed Care

78. Implementing a patient centric unit based pharmacist (UBP) care model to improve quality of patient care and caregiver engagement at Cleveland Clinic Abu Dhabi. *Osama Al-Quteimat, MSc, BCOP*[1], Mohamed Hisham, Pharm.D., BCCCP[2], Mohammad Siddiqui, Pharm.D., MBA, CPHIMS[1]; [1]Pharmacy Services, Cleveland Clinic Abu Dhabi, Abu Dhabi, United Arab Emirates [2]Department of Pharmacy Services, Cleveland Clinic Abu Dhabi, Abu Dhabi, United Arab Emirates
SERVICE OR PROGRAM: A full-time unit based pharmacist (UBP) is stationed on acute care floor. The UBP reviews patient's profile, documents clinical interventions, provides drug information to clinical caregivers, participates in bedside discharge counseling and suggests therapeutic interventions whenever needed.The aim of this initiative was to

- Improve bedside discharge counseling
- Improve communication between pharmacy and nursing caregivers
- Identify and manage medication issues on the floors
- Improve pharmacy caregiver engagement

JUSTIFICATION/DOCUMENTATION: We analyzed three months data:

- Before (June-September) and after (October-December) UBP implementation.
- Nursing survey to evaluate the UBP services on the floors
- Pharmacy caregiver engagement from Gallup survey

ADAPTABILITY: The UBP initiative can be applied in any inpatient health care setting as an effective tool to improve medication use and to improve the communication between the pharmacy and other health care providers.
SIGNIFICANCE: Pharmacist interventions increased from 414 (95.5% accepted) to 730 (97.9% accepted) representing 43.3% increase in the documented I-vent (3 months pre- & post-initiation of UBP, for pharmacist who worked as UBP only). Bedside discharge counseling increased from none during the 3 months before initiation of UBP to 53 patients during the 3 months after UBP initiation. Gallup survey score for 2016 showed improved pharmacist's engagement which in part resulted from offering more professional opportunities to the pharmacist to be involved in new roles as UBP model. Nursing survey showed high acceptance and appreciation of the UBP services from the nursing caregivers.
Overall, expanding the pharmacist role through UBP is an opportunity for learning and development leading to positive impact on quality of patient care, communication with nursing team, discharge process and caregiver engagement.

Pharmacoeconomics/Outcomes

79. Capacity-building in pharmacoeconomics and health technology assessment: a pilot program at a comprehensive cancer center in a low-middle income country. Abeer Al-rabayah, BSc pharmacy, MBA, MSc (iHTA), Rawan AL Feroukh, Pharm.D., Razan Sawalha, BSc Pharmacy; King Hussein Cancer Center, Amman, Jordan
SERVICE OR PROGRAM: A 1-year capacity-building program in pharmacoeconomics (PE) and Health Technology Assessment (HTA) was implemented in a comprehensive cancer center in Jordan. The program targeted staff and clinical pharmacists. It consisted of eight rotations including literature searching, evidence-base medicine, formulary management skills, pharmacoeconomics, decisions analytical modeling, drug use evaluations and pharmacovigilance. The program started with four pharmacists working at the hospital, who were selected on the basis of their annual performance evaluations and their interest in PE and HTA. Participants received training after completion of their daily operational and clinical duties, for an average of 72 h per month for each participant. The program teaching methods included self reading, online courses, monthly group sessions and hands-on exercises. Assessments were conducted after completion of each rotation and at the end of the program.
JUSTIFICATION/DOCUMENTATION: PE and HTA are necessary for providing evidence-based recommendations to decision-makers at all levels. However, one of the main challenges in the developing countries is limited human resources. Therefore, the Centre for Drug Policy and Technology Assessment (CDPTA) at a comprehensive cancer center in Jordan developed this 1-year capacity-building program in PE and HTA.
ADAPTABILITY: Two participants completed all the components of the program and demonstrated their ability to perform the major PE and HTA-related functions of the CDPTA. The participants reported that the increased workload was the main challenge. Our experience demonstrated that a capacity-building program in PE and HTA can be implemented on the hospital

level provided that there are qualified instructors and participants who are willing to learn.
SIGNIFICANCE: Implementing a structured hospital-based PE and HTA capacity-building program was feasible and provided an opportunity to develop PE and HTA skills among hospital pharmacists.

VPS Case Reports

ADR/Drug Interactions

176. Repeated extrapyramidal symptoms with ondansetron in hyperemesis gravidarum: case report. Yehia El Khawly, Pharm D, BCPS[1], Tarek Ibrahim, BPharm, MClinPharm[2], Wesam Smidi, BSP, RPH, Pharm.D.[3], Rasha El Enany, Pharm.D.[4], Amy Ann Mathew, Pharm.D.[5]; [1]Department obstetric & gynecology, Hamad Medical Corporation (HMC) Qatar, Doha, Qatar [2]Clinical Pharmacy, Al-Wakra Hospital: Hamad Medical Corporation, Al-Wakra, Qatar [3]Department of Pharmacy, Hamad Medical Corporation (HMC), Qatar, Doha Qatar, Qatar [4]Pharmacy Department, Hamad Medical Corporation (HMC), Doha, Qatar [5]Department of Clinical Pharmacy, Hamad Medical Corporation (HMC), Qatar, Doha Qatar, Qatar
INTRODUCTION: Ondansetron is a selective serotonin, 5-HT3 receptor antagonist antiemetic. Although it does not bind to dopamine receptors, it plays an important role in dopaminergic transmission by reducing mesolimbic dopamine activity. Initial clinical trial data failed to detect any EPS (Extrapyramidal symptoms) for ondansetron. However, several case reports have shown an association of EPS with intravenous ondansetron.
CASE: A 31-year-old 7 weeks primigravida presented to ER with severe dehydration due to hyperemesis. Immediate intravenous injection of metoclopramide 10 mg was given. On admission to ward, due to her ongoing complaints of vomiting, the obstetrician replaced IV metoclopramide with IV ondansetron 4 mg bid. The following day, her symptoms persisted and the dose of ondansetron was increased to 8 mg q8h. After receiving the 2nd dose of 8 mg, she began to complain of severe back pain with difficulty of movement due to stiffness accompanied by mild shortness of breath. On examination, patient developed typical dystonia and dyskinesia symptoms. Her symptoms gradually resolved with intravenous Diphenhydramine 25 mg; all anti-emetics were discontinued. Next day, another episode of EPS developed. The reaction resolved after giving 5 mg I.V midazolam push. The patient continued to receive Diphenhydramine 25 mg I.V q8h. She remained stable with no further symptoms of EPS and was discharged after five days.
DISCUSSION: Most case reports describing EPS are associated with Chemo-related emesis treatment. EPS secondary to ondansetron use may be dose dependent and related to BMI. Our patient with BMI = 15.2 had experienced EPS after four doses of ondansetron (two doses of 4 mg and two doses of 8 mg). However, since we could not exclude the effect of metoclopramide given on admission, this case appears to suggest a possible synergistic response to ondansetron and metoclopramide resulting in the manifestations of these repetitive EPS.
CONCLUSION: Patients treated with Ondansetron should be monitored for onset of extrapyramidal symptoms.

177. Rifampin augmentation in hardware infections: a case report of thrombocytopenia as a therapy limitation. Yuliya P. Mozol, Pharm.D. Candidate[1], Stephen Vickery, Pharm.D.[2], Brian Kaderli, MD[3], *Ryan E. Owens, Pharm.D., BCPS*[4]; [1]Wingate University School of Pharmacy, Hendersonville, NC [2]Hendersonville Health Sciences Center, Wingate University School of Pharmacy, Hendersonville, NC [3]Mountain Area Health Education Center-Hendersonville, Hendersonville, NC [4]Department of Pharmacy Practice, Wingate University School of Pharmacy, Hendersonville, NC
INTRODUCTION: Pathogen-specific antimicrobial therapy in combination with oral rifampin is recommended for staphylococcal infections involving retained hardware in the absence of rifampin allergy or toxicity. While reports of rifampin toxicities have been described in the setting of complex tuberculosis regimens, there is a paucity of data describing therapy limitations with its use in other infectious settings.
CASE: A 39-year-old Caucasian female with a past medical history of bipolar disorder, substance abuse and osteomyelitis presented with drainage secondary to a lumbar wound where hardware was previously placed for osteomyelitis two years prior. Imaging revealed acute on chronic vertebral osteomyelitis and blood cultures resulted with methicillin-susceptible *Staphylococcus aureus* (MSSA). Inpatient therapy consisted of cefazolin 2 g q8h, rifampin 300 mg BID and enoxaparin 40 mg daily in addition to her home medications of buspirone, aripiprazole, lamotrigine, paroxetine, prazosin and trazodone. Platelets were initially 261,000 but declined to 45,000 after 18 days of inpatient therapy, at which time enoxaparin was discontinued. Rifampin was discontinued 7 days later, following a negative HIT panel and continued platelet decline to 32,000. Four days after rifampin discontinuation, platelets increased to 136,000 and were near baseline at 254,000 upon discharge.
DISCUSSION: Early reports of rifampin-induced thrombocytopenia were isolated to high-dose, intermittent regimens utilized in tuberculosis treatment, often in combination with ethambutol and isoniazid; both of which have been implicated as a cause of thrombocytopenia. Virtually no evidence exists regarding rifampin toxicity in hardware infections. Use of the Naranjo adverse drug reaction probability scale (n=5) demonstrated a probable relationship between rifampin and thrombocytopenia. Additionally, no confounding medication changes were made throughout the hospitalization.
CONCLUSION: Given its off-label use in hardware infections, clinicians may be unfamiliar with rifampin toxicities. Our case highlights the need for more prompt recognition of rifampin as a cause of thrombocytopenia and subsequent discontinuation to prevent possible adverse bleeding events.

Critical Care

178. Case report of a novel therapeutic use of IV ketamine for post-operative analgesia in cardiothoracic ICU patients. *Jennifer Lashinsky, Pharm.D.*[1], Paul Juang, Pharm.D.[2]; [1]Department of Pharmacy, Barnes-Jewish Hospital, Saint Louis, MO [2]Department of Pharmacy Practice, St. Louis College of Pharmacy, St. Louis, MO
INTRODUCTION: Inadequate pain control and the overuse of opioid analgesics in the postsurgical cardiothoracic patient can lead to poor patient outcomes. In an attempt to achieve adequate pain control with decreased amounts of opioid analgesics, adjunct pain agents are frequently used. Low-dose IV ketamine has become a common adjunct agent in the emergency medicine and post-operative setting because it retains its anesthetic effects on the NMDA receptor, with little adverse effect on the airway reflexes and respiratory drive. There remains; however, a paucity of data evaluating its use for post-operative pain in the cardiothoracic patient population.
CASE: Five patients (4 male, 1 female) received IV ketamine for post-operative analgesia (average of 3 days post-op). All patients were extubated and were not receiving continuous IV sedatives at the time of ketamine administration. The average age was 54 ± 13 years and patients received a mean ketamine dose of 0.175 mg/kg with an average of two doses given. The most common analgesics concomitantly administered were enteral oxycodone and IV hydromorphone. After receiving IV ketamine, all patients experienced a decrease in daily IV morphine equivalent requirement (55 ± 35 mg to 18 ± 17 mg, p=0.07 vs baseline). One patient experienced neurological side effects (hallucination

and anxiety) and two patients received sedative medications (quetiapine and haloperidol) following ketamine use.
DISCUSSION: Literature in the emergency medicine population and the pre-hospital setting have shown subdissociative dose (0.2–0.3 mg/kg) IV ketamine to be safe and efficacious, while providing opioid sparing effects. Dosing, duration and administration of IV ketamine for postoperative pain control is poorly described in this patient population. Here we report one of the largest case series describing patients who received low-dose IV ketamine for effective pain control following cardiac surgery.
CONCLUSION: The use of subdissociative dose IV ketamine appears to decrease opiate requirements with some potential for neurological adverse effects.

Emergency Medicine

179. Pulmonary embolism in pregnancy treated with recombinant tissue plasminogen activator (t-PA): a case report. *Jacob Reeder, Pharm.D., Pharm.D., BCPS*, Lamanh Le,; CoxHealth, Springfield, MO
INTRODUCTION: Pregnancy is associated with an elevated risk of thromboembolic events such as deep vein thrombosis (DVT) and pulmonary embolism (PE). The leading cause of maternal death in the United States is PE. Current guidelines for the treatment of PE in pregnancy provide minimal guidance for thrombolytic management. This case report describes the use of thrombolytic therapy for PE in pregnancy.
CASE: A 23-year-old woman presented at 27 weeks gestation immediately after bystanders witnessed a syncopal episode. The patient reported tachycardia and increased shortness of breath over the past week with an additional syncopal episode several days prior to presentation. She had a significant family history with her maternal grandfather positive for a blood clotting disorder. Upon computed tomography (CT) chest angiography, the patient was diagnosed with extensive bilateral pulmonary emboli. Echocardiogram findings were consistent with mildly increased right ventricular size and moderate pulmonary hypertension. After a multidisciplinary discussion between providers, the patient was treated with 50 mg of intravenous recombinant t-PA followed by an unfractionated heparin continuous infusion titrated to goal PTT of 48–70. She was transitioned to enoxaparin 1 mg/kg subcutaneous injection twice daily on day 2 of admission. No problems developed for the mother or fetus in the days leading up to discharge. The patient remained on therapeutic enoxaparin therapy until delivery and delivered at 39.1 weeks with no complications.
DISCUSSION: Limited guidance exists for thrombolytic management in pregnancy. Unlike previous case reports for thrombolytic use in this condition, this case report describes a much lower recombinant t-PA dose of 50 mg. This treatment approach with a lower recombinant t-PA dose provided a positive outcome for the patient and baby with no complications.
CONCLUSION: This case demonstrates that PE in pregnancy treated with a lower dose t-PA infusion did not result in complications for either the mother or the baby.

HIV/AIDS

180. Use of rilpivirine/emtricitabine/tenofovir DF every other day yields undetectable HIV viral load: a case report. *M. Gabriela Cabanilla, Pharm.D.*[1], Carly Cloud Floyd, Pharm.D.[2], Michelle Iandiorio, MD[3]; [1]Department of Pharmacy, University of New Mexico Hospitals, Albuquerque, NM [2]Department of Pharmacy, Southwest Care Center, Albuquerque, NM [3]Department of Internal Medicine, Infectious Diseases, University of New Mexico Hospitals, Albuquerque, NM
INTRODUCTION: We report a case of 51-year-old male on suboptimally dosed human immunodeficiency virus (HIV) antiretroviral therapy (ART) that yielded a continuous undetectable viral load six months later. This case report provides an in-depth analysis of the pharmacokinetics of the drug components rilpivirine/emtricitabine/tenofovir DF (Complera– Gilead) and hypothesize that their intracellular half-lives likely contributed to this patient maintaining an undetectable viral load despite sub-optimally dosed ART.
CASE: Prior to presenting to our clinic to establish new care, a 51-year old Hispanic male, originally diagnosed with HIV in 2003, had been classified as a patient with stage 1, well-controlled HIV on daily ART. Upon medication review, he revealed to have been taking rilpivirine/emtricitabine/tenofovir DF (Complera– Gilead) every other day for approximately six months given that he could not afford the insurance co-payment. Laboratory analysis revealed the viral load to have remained undetectable despite his sub-optimally dosed ART. The patient had no history of prior opportunistic infections, no hepatic or renal dysfunction, no gastrointestinal disease, and was in overall good health at the time of presentation.
DISCUSSION: Many factors might be responsible for drug response such as genetics, as well as physiological and environmental factors. Our patient did not undergo pharmacogenomics testing, thus, any existing polymorphisms in his genetic makeup, and how these may affect drug metabolism are currently unknown. What is known is that rilpivirine/emtricitabine/tenofovir DF (Complera– Gilead) exhibits intracellular half-lives of over 24 hours, which likely contributed to this patient maintaining an undetectable viral load despite six months of sub-optimally dosed ART.
CONCLUSION: The persistent undetectable viral load seen in this patient was likely due to the pharmacokinetics of his ART regimen. We believe this is something that should be further evaluated. In the meantime, we do not recommend antiretroviral administration in any other than the FDA approved dosing until further studies are done.

Infectious Diseases

181. Successful treatment of native valve endocarditis due to vancomycin-resistant *Enterococcus faecium* with daptomycin and piperacillin-tazobactam followed by daptomycin and tigecycline. Katherine Bliven, Pharm.D.[1], Sanefumi Tsuha, MD[2], Russell Benefield, Pharm.D., BCPS (AQ-ID3), Paloma Cariello, MD, MPH[2]; [1]Moffitt Cancer Center, Tampa, FL [2]Department of Infectious Diseases, University of Utah School of Medicine, Salt Lake City, UT [3]Department of Pharmacy, University of Utah Health Care, Salt Lake City, UT
INTRODUCTION: There is limited published experience to guide clinicians caring for patients with vancomycin-resistant enterococcal endocarditis.
CASE: The patient was a 53-year-old male with past medical history of deceased donor liver transplantation for primary sclerosing cholangitis, hilar cholangiocarcinoma, biliary strictures, and recent balloon angioplasty for hepatic artery stenosis complicated by vessel rupture and resulting left hepatic lobe ischemia. He presented to the hospital with fever, right upper quadrant pain, and vomiting, and was started on vancomycin and piperacillin-tazobactam empirically for presumed biliary tract infection. Blood cultures obtained at admission grew vancomycin-resistant *Enterococcus faecium* (VRE) with an elevated daptomycin minimum inhibitory concentration (MIC) (4 mg/L). Vancomycin was switched to high-dose daptomycin (10 mg/kg) and piperacillin/tazobactam was continued for empiric intra-abdominal activity and possible synergy for VRE. Repeat blood cultures continued to grow VRE, and subsequent echocardiography identified a large mitral valve vegetation. The patient was maintained on daptomycin and piperacillin-tazobactam, and his blood cultures were sterilized by day 7. He was later transitioned to daptomycin and tigecycline when *Stenotrophomonas* was isolated from his biliary fluid. The patient completed 8 weeks of combined therapy with daptomycin and tigecycline and achieved a full clinical response.

DISCUSSION: Although it is unclear if our patient's initial response was attributable to daptomycin alone, or the combination of daptomycin with piperacillin-tazobactam, several *in vitro* studies suggest synergy with combinations of daptomycin and beta-lactams against VRE strains harboring mutations in the LiaFSR pathway. These mutations are more common in VRE isolates with elevated daptomycin MICs, which was the case for our patient's isolate. Our experience may support further investigations into the use of daptomycin in combination with piperacillin-tazobactam for serious VRE infections, particularly for isolates with elevated daptomycin MICs.
CONCLUSION: Our patient was successfully treated with high-dose daptomycin and tigecycline. Piperacillin-tazobactam may have contributed to an early daptomycin response.

Nephrology

182. Acute kidney injury with uremia potentiates risk for statin-induced rhabdomyolysis. *Diana Langworthy, Pharm.D.*[1], Jennifer Shulha, Pharm.D.[2]; [1]University of Minnesota College of Pharmacy, Minneapolis, MN [2]Department of Pharmacy, Mayo Clinic, Rochester, MN
INTRODUCTION: The incidence of statin-induced rhabdomyolysis is very low in the general population; however, certain patient characteristics may increase the risk of this adverse drug reaction. Patients with chronic kidney disease have not been found to be at an increased risk of developing this toxicity; however there is some literature to suggest that uremia may predispose individuals to statin-induced rhabdomyolysis.
CASE: We report a case of statin-induced rhabdomyolysis in a patient with acute kidney injury (AKI) and persistent uremia. The patient had previously been maintained on rosuvastatin therapy prior to developing acute kidney injury and had no history of myopathy or rhabdomyolysis on this medication. During her stay, she suffered from persistent and profound uremia related to a severe acute kidney injury and subsequently developed statin-induced rhabdomyolysis despite the rosuvastatin dose being adjusted for her renal impairment.
DISCUSSION: Statin-induced rhabdomyolysis is thought to be a dose-related adverse drug effect. A recent ex vivo study suggests that uremic toxins may increase cytotoxic effects of statins. In patients with acute kidney injury and persistent uremia, the risk of statin-induced rhabdomyolysis may be increased through reduced clearance and accumulation of statins and also through uremic cytotoxicity.
CONCLUSION: Clinicians should exercise caution when continuing statin therapy during in the event of acute kidney injury with uremia and dose adjustments should be implemented per manufacturer recommendations. Further research is warranted to confirm if AKI with uremia confers an increased risk of statin-induced rhabdomyolysis.

Transplant/Immunology

183. Successful treatment of genital warts with cidofovir cream in a fanconi pediatric patient. *Rula Najjar, Pharm.D., BPSC*[1], Duaa Muffarrej, Pharm.D.[1], Rand Farraj, Pharm.D.[1], Eman Khattab, MD[2]; [1]Pharmacy, King Hussein Cancer Center, Amman, Jordan [2]Bone Marrow Transplant Program, King Hussein Cancer Center, Amman, Jordan
INTRODUCTION: Genital warts are commonly caused by certain strains of the Human papillomavirus (HPV). HPV associated infections can later develop cancers. Fanconi anemia patients in particular have an inherited susceptibility to HPV associated malignancies. Prevention and early management of HPV infections is crucial. Cidofovir is a broad spectrum antiviral agent with activity against herpes viruses and HPV.
CASE: A 9 year old girl Fanconi anemia patient underwent haplo-identical stem cell transplant post primary graft failure. Transplant was complicated with chronic skin and lung GvHD requiring multiple immunosuppressant medications and extracorporeal photopheresis therapy. Patient presented with genital warts 3 year post transplant. Treatment with different local creams (emollients, corticosteroids, antibacterial and antifungals) did not have any effect on the warts. Biopsy to confirm HPV warts was unattainable and trial of cidofovir cream was started. Cidofovir was extemporaneously compounded into an unscented moisturizing cream as 1% cream. The cidofovir cream was applied on the genital warts on daily basis for 2 months. All genital lesions had completely disappeared without any erosions by the end of the treatment. No adverse events were reported. Patient is still free of lesions after more than 6 months of stopping treatment.
DISCUSSION: Treatment of genital warts can be painful and irritating to the patient. Cidofovir was used previously in different populations and it showed reduction in discomfort and inflammation caused by the warts with low rates of recurrence. Adherence to use of cidofovir cream may influence the rates of adverse events that may occur, and this may effect the rates of eradication and recurrence.
CONCLUSION: Our single experience using cidofovir cream has been successful using low concentration preparation for a highly immunocompromised pediatric patient. Further studies are needed to better describe the most proper preparation and dosing regimens of cidofovir cream for the treatment of refractory warts in all different populations.

184. Acquired factor V deficiency following conversion to belatacept in a kidney transplant recipient. *Mariesa Cote, Pharm.D.*, Joshua Etheridge, Pharm.D., Christin Rogers, Pharm.D., Katelyn Richards, Pharm.D.; Beth Israel Deaconess Medical Center, Boston, MA
INTRODUCTION: We report the case of a kidney transplant recipient who was converted from tacrolimus to belatacept due to delayed graft function post-transplant.
CASE: Two months post-transplant, the patient was readmitted with a large left thigh hematoma, found to have a prolonged PTT, PT and an elevated INR. Workup revealed a Factor V level of 2% and negative mixing studies, consistent with an acquired Factor V deficiency. A medication effect was considered given the introduction of immunosuppression and antibiotics after transplant. Multiple medication causes were considered but suspicion was highest with belatacept. Belatacept, as a monoclonal antibody, belongs to a class of agents called protein therapeutics. With repeated administration, antitherapeutic protein antibodies, or anti-drug antibodies (ADAs), can develop potentially leading to the neutralization and reduction of the clinical effect of the protein therapeutics. There is also the risk of cross-reactivity with anti-drug antibodies and autologous proteins, including clotting factors. Belatacept was discontinued and treatment with high dose corticosteroids, fresh frozen plasma and platelet infusions was initiated. Factor V levels normalized within 12 days of treatment.
DISCUSSION: The normalization of Factor V levels was observed earlier than in previously published cases treated with corticosteroids (12 days vs. 19–35 days), in correlation with the half-life of the belatacept (~10 days). The Naranjo Adverse Drug Reaction Probability Scale, used to assess whether or not there is a casual relationship between a clinical event and the medication in question, resulted in a score of 4. A total score of 4 correlates with a possible result meaning the result followed a temporal sequence after drug administration, possibly followed a recognized pattern to the suspected drug and could be explained by characteristics of the patient's disease.
CONCLUSION: To our knowledge, this is the first report of an acquired Factor V deficiency potentially related to belatacept use.

VPS Systematic Reviews/Meta-Analysis

Education/Training

185E. The role of mentorship programs on pharmacy education: a systematic review of observational studies. Rasha Abdelsalam Elshenawey, BCPS AQ-ID, M.Sc. of Clinical Pharmacy, SIDP, CPHQ, Tanta University Hospitals, Egypt[1], Fatma Elzahraa Ahmed, M.Sc. of Clinical Pharmacy, CPHQ, BCPS, Member of FADIC, UAE[2], Heba-t-Allah Matar Ali Matar, BCPS, M.Sc. of Clinical Pharmacy[3], Heba Sayed Yousef, M.Sc. of Clinical Pharmacy, Cairo University BCPS, Member of FADIC, CPHQ, PHS, UAE; [1]FADIC, Makkah, Saudi Arabia [2]FADIC, Abu-Dhabi, United Arab Emirates [3]FADIC, Cairo, Egypt [4]Dubai, United Arab Emirates

Health Services Research

186. Systematic review for development of a medicinal products and medical devices prioritization framework. *Alberto Frutos Pérez-Surio*, Mercedes Gimeno-Gracia, María Aránzazu Alcácera-López, Mª Asunción Sagredo-Samanes, Mª del Puerto Pardo-Jario, Mª del Tránsito Salvador-Gómez; Pharmacy Department, University Clinical Hospital "Lozano Blesa", Zaragoza, Spain
BACKGROUND: The purpose of the research question is to develop an explicit priority setting methodology to support decision-making regarding Medicinal Products and Medical Devices to be included in hospital pharmacy practice. The development of a comprehensive prioritization system is the outcome essential for an important benefit to the healthcare system. The aim of this paper is to identify and analyze the processes and decision criteria used internationally for priority setting in order to establish a comprehensive set of strategic criteria for starting point for the development of a Medicinal Products and Medical Devices prioritization framework.
METHODS: A systematic search of the literature was carried out in December 2017, in the main biomedical electronic databases: Medline/PubMed, Embase, Centre for Reviews and Dissemination (CRD), and Cochrane. Eligibility criteria for inclusion were based on set of predefined criteria. Systematic reviews and/or qualitative studies (interviews, surveys, expert consensus, etc) that aimed to identify prioritization criteria or develop general operational frameworks for the selection of health priorities were included. Data of the studies were analyzed and synthesized qualitatively.
RESULTS: A total of 17 documents complied with eligibility criteria, 15 were published in scientific journals and 2 were identified through web pages. The studies showed great heterogeneity. A total of 56 potentially relevant priority setting criteria were identified, which could be grouped in 8 categories: 1) Need for intervention; 2) Outcomes of intervention; 3) Type of benefit; 4) Economic consequences; 5) Existing knowledge/quality of evidence and uncertainties; 6) Implementation complexity/feasibility; 7) Priority, justice and equity; and 8) Context.
DISCUSSION: There are no standardized processes for priority setting, despite the fact some general consensus and common trends have been identified regarding criteria, models and strategies, and key actors. This research provides a thorough analysis of these approaches and offers recommendations for implementing successful prioritization approaches.
OTHER: Authors declare no COI nor funding.

Pharmacoepidemiology

187. A systematic review of economic evaluation studies of ophthalmic drugs. *Inês Ribeiro, Pharm.D.*, Francisco Batel-Marques, Pharm.D., Ph.D., Carlos Alves, Pharm.D., Ph.D.; Centre for Health Technology Assessment and Drug Research, AIBILI - Association for Innovation and Biomedical Research on Light and Image, Coimbra, Portugal
BACKGROUND: The number and the importance of economic evaluation studies of ophthalmic drugs have been growing. This study aims at reviewing economic evaluation studies of ophthalmic drugs and identifying the sources of effectiveness measures used.
METHODS: A systematic search, according to PRISMA orientations, was conducted in Medline and Embase from its inception until June 2017. Only full studies were included, therefore cost-minimization analyses were excluded. Therapeutic areas, interventions, type of analysis and sources of effectiveness measures were identified. The methodological-quality of the economic studies was evaluated according to the British Medical Journal (BMJ) checklist.
RESULTS: Eighty-six studies were included. Forty-three (50%) were cost-utility analysis, 28 (33%) cost-effectiveness analysis and 15 (17%) simultaneously cost-effectiveness/cost-utility analysis. The main therapeutic areas were age-related macular degeneration (n=35; 40.7%), glaucoma/ocular hypertension (n=19; 22.1%) and conjunctivitis (n=7; 8.1%). Biologic agents (n=57; 39.3%), verteporfin (n=11; 7.6%), and bimatoprost (n=11; 7.6%) were the most evaluated drugs. Of the 43 cost-utility studies, 18 (41.9%) retrieved effectiveness measures exclusively from observational studies, 9 (20.9%) exclusively from experimental studies, and four (9.3%) from both. Of the 28 cost-effectiveness studies, 15 (53.6%) retrieved effectiveness measures exclusively from experimental studies, four (14.3%) exclusively from observational studies, and one (4.2%) from both. Of the 15 cost-effectiveness/cost-utility studies, nine (60%) retrieved effectiveness data from both experimental and observational studies, and one (6.7%) exclusively from experimental studies. All studies demonstrated methodological-quality limitations.
DISCUSSION: Cost-utility analysis was the most used technique to assess the pharmacoeconomic value of ophthalmic drugs, frequently using observational data sources. However, a great methodological heterogeneity was found among studies.
OTHER: This study was partially financed by AIBILI (Association for Innovation and Biomedical Research on Light and Image, Coimbra, Portugal). It is not associated to a registration number or name and there is no conflict of interests to declare.

Pharmacogenomics/Pharmacogenetics

188. Pharmacogenetics of warfarin dose requirements in the African continent: a systematic review. *Ahmed Salem, B.Pharm, MSc.*[1], Ibrahim Abdelgawad, B.Pharm[1], Mahmoud Tammam, B.Pharm, BCPS[2], Mohamed Solayman, B.Sc Pharm, M.Sc Pharm, Ph.D.[1]; [1]Department of Clinical Pharmacy, Faculty of Pharmacy, Ain Shams University, Cairo, Egypt [2]IQVIA, Cairo, Egypt
BACKGROUND: Warfarin is a widely prescribed oral anticoagulant especially in populations with low socioeconomic status. Different populations demonstrate inconsistencies in the pharmacogenetic determinants of warfarin dose requirements. Moreover, there is a paucity of the pharmacogenetics studies conducted on the genetically diverse African populations. Hence, herein, we systematically evaluated the availability and utility of genetic and non-genetic factors affecting warfarin dosing in Africa.
METHODS: Systematic comprehensive search for relevant studies was conducted in PubMed, Scopus, and Web of Science, using appropriate search keywords. The date of last search was November 2017. We included observational pharmacogenetic studies performed on patients from any of the African countries who were on stable warfarin dose for sufficient time. Quality of the included studies was assessed using "Strengthening the Reporting of Genetic Association studies (STREGA)" guidelines.
RESULTS: We included 14 observational studies conducted on four different populations: Ghanaian, South African, Sudanese, and Egyptian in whom ten of the studies were conducted. Among the commonly studied genetic variants, *VKORC1* rs9923231 and

CYP2C9 *2 and *3 were significantly associated with variability in warfarin dose. Additionally, newly investigated genetic variants such as *CYP2C9* *5, *8, *11, g.16179 T>A, g.46028 A>G and *VKORC1* rs7294 were found to be significantly associated with warfarin dose requirements. Of non-genetic factors, age, smoking status, and concomitant medications were the most common predictors of warfarin dose.
DISCUSSION: To the best of our knowledge, this is the first systematic review to address warfarin pharmacogenetics in Africa. The number of the included studies is too small to draw a conclusion about the utility of warfarin genotype-guided dosing in the African continent. Extensive studies should be conducted in different African populations to provide clear insights into the association between genetic and non-genetic factors and warfarin dose requirements in the dark continent.
OTHER: Authors have neither source of funding nor conflict of interests.

VPS - R&S Academy Original Research

Education/Training

189. Interprofessional engagement survey of pharmacy impact at a student-run free clinic for the homeless population. *Ashley Higbea, Pharm.D., BCPS*[1], Peia Lee, Pharm.D. Candidate[2], Patti Pagels, M.P.A.S., PA-C[3], Hui Yang, M.S.[4], Adebola Adesoye, Pharm.D., BCPS[5], Sumanth Reddy, M.D. Candidate[6]; [1]Pharmacy Practice, Texas Tech University Health Science Center School of Pharmacy, Dallas, TX [2]School of Pharmacy, Texas Tech University Health Sciences Center, Dallas, TX [3]Physician Assistant Studies, Department of Family & Community Medicine, UT Southwestern, Dallas, TX [4]Texas Tech University Health Science Center, School of Pharmacy, Dallas, TX [5]Department of Pharmacy Practice, Texas Tech University Health Science Center- School of Pharmacy, Dallas, TX [6]School of Medicine, UT Southwestern, Dallas, TX
INTRODUCTION: Managing care to prevent unnecessary emergency events is pivotal. The homeless population are high-risk users of these services. Pharmacy inclusion in interprofessional educational (IPE) student-run free clinics (SRFC) may improve medication related events. Acceptance of pharmacy students (PS) in these settings is an emerging area of research.
RESEARCH QUESTION OR HYPOTHESIS: Does addition of PS to interprofessional teams change non-pharmacy students (NPS) attitudes about team approach to care? PS interaction in the indigent IPE SRFC will be valued by NPS.
STUDY DESIGN: Cross-sectional survey.
METHODS: NPS participants in the weekly SRFC were included. PS attended SRFC every other week and completed Drug Review sessions before pairing with NPS for patient visits. The Student Perceptions of Interprofessional Clinical Education – Revised (SPICE-R2) survey was distributed at the end of clinic each week. Completed surveys were included in analysis. Two-sample Wilcoxon rank-sum was used to compare positive scores (≥ 4) to negative/no change (≤ 3) of each SPICE-R2 domain based on PS interaction (Yes/No). The 3 domains were [T] = Interprofessional Teamwork/Team-based Practice, [R] = Roles/responsibilities for Collaborative Practice, and [O] = Patient outcomes from Collaborative Practice.
RESULTS: Forty-eight NPS completed the survey of which 39 NPS had PS interaction (NPS-Y) and 9 did not (NPS-N). The median and interquartile range (IQR) of each SPICE-R2 domain for NPS-Y and NPS-N was [T] 5 (IQR 5–5), [T] 5 (IQR 4.5–5), p-value=0.28; [R] 4 (IQR 4–5), [R] 4 (IQR 4–5), p-value=0.65; [O] 5 (IQR 4–5), [O] 5 (IQR 4–5), p-value=0.69, respectively. Of NPS-Y, 90% agree or strongly agree collaborating with PS is a valuable IPE experience, compared to 78% of NPS-N.
CONCLUSION: NPS attitudes toward PS collaborations in the IPE indigent population were positive but not significantly different between those that had PS interaction vs. those that did not. Collaborations with PS were found valuable in this setting.

VPS Clinical Pharmacy Forum

Ambulatory Care

190. Implementing a monitoring program for patients on direct oral anticoagulants. *Jiehyun Lee, Pharm.D., BCACP, CACP*[1], Shally Singh, Pharm.D.[2], Michael Smith, Pharm.D.[2]; [1]School of Pharmacy, Philadelphia College of Osteopathic Medicine, Suwanee, GA [2]Pharmacy Department, William W. Backus Hospital, Norwich, CT
SERVICE OR PROGRAM: Backus Hospital Medication Management Clinic provides a newly implemented Direct Oral Anticoagulant (DOAC) management service. This service is provided by a clinical pharmacist for patients with non-valvular atrial fibrillation or venous thromboembolism. The clinical pharmacist assists in the initiation, monitors for the efficacy and safety, and provides education on the benefits and risks of DOAC therapy. The clinical pharmacist communicates to the referring physicians on any significant concerns with DOAC therapy. Lifestyle, renal function, and other medication use are evaluated to ensure safety and stability. The patients are discharged from the clinic when they have been on DOAC for an extended duration. Prior to discharge, the patients are assessed to ensure that they are well-educated on signs and symptoms of adverse events to DOAC agents and what actions to take if these events occur.
JUSTIFICATION/DOCUMENTATION: Many providers choose a DOAC for anticoagulation because of the ease of administration and fewer drug and food interactions compared to warfarin. However, they forego any follow-up with patients on DOAC agents believing it is unwarranted. A growing body of evidence supports the importance of follow-up monitoring for these patients. Pharmacists can improve their adherence, monitor for adverse events, and potentially improve the outcomes.
ADAPTABILITY: DOAC management service can be implemented in pharmacist-driven anticoagulation clinics. Many anticoagulation clinics are already staffed with healthcare professionals, who are well trained at evaluating and educating patients for the signs and symptoms of thrombosis and bleeding. The same concept along with renal function monitoring is applied.
SIGNIFICANCE: The role of a clinical pharmacist is expanding rapidly in the healthcare world. Pharmacist are now viewed as a valuable member of a healthcare team. This new DOAC management program is following this trend of expanding the pharmacist's role. With the increased use of DOAC agents, pharmacist's expanded service will redefine anticoagulation care.

ADR/Drug Interactions

191. Implementation of a pharmacist-managed QTc drug interaction management program. *Travis Swihart, Pharm.D., BCPS*[1], Tina Maloney, Pharm.D.[1], Gay Alcenius, Pharm.D.[1], Ellen VanStee, BSPharm, MBA[1], Steven Johnson, Pharm.D.[2]; [1]Department of Pharmacy, Henry Ford Allegiance Health, Jackson, MI [2]Pharmacy Systems, Inc., Dublin, OH
SERVICE OR PROGRAM: A new pharmacist-managed program was implemented to enhance consistency of pharmacist interventions on patients at higher risk for QT_C prolongation/cardiac arrhythmias and on two or more medications that potentially prolong the QT_C interval.
JUSTIFICATION/DOCUMENTATION: A medication use evaluation was conducted and showed numerous opportunities to improve consistency of care in high risk patients (obtaining magnesium levels/ECG, receipt of computerized alerts and assessment of risk factors).

ADAPTABILITY: QTc drug interactions are frequently encountered in the hospital setting and a standardized approach for assessment may improve outcomes.
SIGNIFICANCE: A new pharmacist initiated QT Interval Monitoring Protocol was implemented for patients having certain risk factors for QT_C prolongation/cardiac arrhythmias and receiving two or more medications known to prolong the QT_C interval. Pharmacists screened for specific risk factors, the presence of two or more medications known to potentially prolong the QT_C interval and evaluated available ECG and lab data. Protocol-based recommendations for electrolyte monitoring and/or repletion, repeat ECG monitoring and recommendation of alternate pharmacotherapy to reduce drug interactions ensued. This new program was received favorably by the medical and pharmacy staffs.

Education/Training

192. Integration of a formalized publication process in residency training to provide trainees experience in scientific writing, publishing, and peer reviewing. *Jennifer E Stark, Pharm.D., BCPS*, Jennifer Cole, Pharm.D., BCPS, BCCCP, Marcus Costner, Pharm.D., BCPS, Amanda Chapman, Pharm.D., BCPP; Department of Pharmacy, Veterans Health Care System of the Ozarks, Fayetteville, AR
SERVICE OR PROGRAM: The PGY1 Pharmacy Residency Program at Veterans Health Care System of the Ozarks implemented a new process into its longitudinal drug information requirement. The quarterly pharmacy newsletter was expanded by forming an Editorial Board that consisted of residency trained pharmacists with experience in scientific writing, publishing, and peer reviewing. The Editorial Board developed formalized author guidelines and a peer review process for manuscripts submitted by pharmacy residents. The author guidelines were designed to reinforce important concepts and terminology to increase experience with the process of submitting a manuscript to a peer reviewed publication. These concepts and terms include: cover letter, word count, formatting requirements, predatory publication practices, impact factor, target audience and scope of publication, article types, and open access. During the second half of the program, the residents participate as peer reviewers for the newsletter.
JUSTIFICATION/DOCUMENTATION: This program was developed to facilitate the ACCP Standards of Practice for Clinical Pharmacists regarding research and scholarship. Completing and presenting a project and effective written communication are requirements of PGY1 pharmacy residencies. However, there are low rates of residency projects that result in journal publications. Additionally, clinicians who have their work published during residency training are more likely to have subsequent papers published in the future.
ADAPTABILITY: Many pharmacy residency preceptors have experience in the publication and peer review process. This process could be readily integrated into existing learning experiences of pharmacy residency training programs. Future research will assess the impact of this process on rates of subsequent publications and peer review activities.
SIGNIFICANCE: Formalized training in pharmacy residency programs that fosters publishing and peer reviewing is lacking. Training pharmacists with the skills to continue advancing our profession is essential and includes competency in writing, publishing, and peer review.

Medication Safety

193. Implementing a take-home naloxone program in a community hospital setting. *Andrea Prince, Pharm.D.*, Thomas Gregory, Pharm.D., BCPS, CPE, FASPE, Karrie Derenski, Pharm.D., BCNSP, BCCCP, CNSC, Chelsea Landgraf, Pharm.D., BCPS, BCACP; Pharmacy Department, CoxHealth South Medical Center, Springfield, MO
SERVICE OR PROGRAM: A take-home naloxone program was piloted in a community hospital setting. The purpose was to evaluate the design and implementation of a program to increase the provision of take-home naloxone in patients at risk for opioid overdose.
JUSTIFICATION/DOCUMENTATION: Opioid overdoses and opioid related deaths continue to increase throughout the United States. Opioid Overdose Education and Naloxone Distribution (OEND) have been established since the mid -1990s. Key components of OEND include prevention of overdose, recognition of overdose, reversal of overdose, and prescribing and dispensing naloxone.
ADAPTABILITY: During the pilot phase, pharmacists implemented the program within the family medicine inpatient hospital service. The program would be easily adaptable to various specialties within the acute care setting. The electronic health record was utilized to identify patients eligible for take-home naloxone. Pharmacists calculated patients' morphine equivalent daily dose (MEDD) and applied the CDC recommendations if the patient was receiving over 50 MEDD. Resources developed by the state board of pharmacy were utilized for education. In addition to pharmacists, pharmacy students can provide the education and training to patients and caregivers.
SIGNIFICANCE: Pharmacist-driven efforts to increase naloxone provision have shown feasibility and success in various settings (i.e. Veterans Administration, emergency departments, outpatient clinics and academic health systems). Currently, there are few studies showing the feasibility of an inpatient directed take-home naloxone program in the community hospital setting. Pharmacists play a key role in implementing Opioid Stewardship by identifying high-risk patients, recommending naloxone to providers, and providing education and resources to patients, caregivers, and health care providers.

Endocrinology

194. Utilization of a real-time hypoglycemia event report as part of a multidisciplinary diabetes quality assurance program. *Angela Plewa-Rusiecki, Pharm.D., BCPS*[1], Renee Xamplas, Pharm.D., BCPS[2], Jaseena Veliyathumalil, RN, MS, FNP-C, DNP[2], Yannis Guerra, MD[2]; [1]Department of Pharmacy, John H. Stroger, Jr. Hospital of Cook County, Chicago, IL [2]John H. Stroger Jr, Hospital of Cook County, Chicago, IL
SERVICE OR PROGRAM: A Diabetes Quality Assurance (DQA) multidisciplinary team consisting of clinical pharmacists, nurse practitioners and endocrinologists was formed to manage hyperglycemia, while preventing hypoglycemia, by monitoring the application of an inpatient hyperglycemia protocol and providing real-time interventions for all medical/surgical patients with episodes of severe hypoglycemia. Utilizing CERNER Millenium PowerChart®, a report was created and generated daily to identify severe hypoglycemic events (blood glucose </=50 mg/dL) in patients treated with insulin. The DQA team members then reviewed patient cases, contacted primary services, and provided guideline/protocol driven recommendations to prevent future hospital stay hypoglycemic events. A DQA template note was entered in patient charts documenting recommendations and patients were followed for the remainder of their stay.
JUSTIFICATION/DOCUMENTATION: Severe hypoglycemia is operationally defined as glucose values of 50 mg/dL or lower and has been independently associated with increased mortality [NICESUGAR]. Prevention of severe hypoglycemia is a primary goal of the DQA team and the creation of a real-time report of hypoglycemia, as part of a DQA program, is thought to allow for early identification and prevention of severe hypoglycemia.
ADAPTABILITY: With the use of computer generated real time CERNER Millenium PowerChart® Reports identifying patients

with severe hypoglycemia, patients at risk for repeat events can be quickly identified and subsequently monitored by a multidisciplinary DQA team.
SIGNIFICANCE: A reporting system/tool for a DQA hospital-wide program was successfully implemented using a multidisciplinary approach in an urban teaching hospital, leading to real-time identification of patients at risk for severe hypoglycemia, incorporation of those patients to a service expert in the management of diabetes care, and therefore possible better patient outcomes.

Ambulatory Care

195. Development of a first-fill failure (FFF) service utilizing RXFILL notifications. *Stormi Gale, Pharm.D., BCPS*[1], Shan Xing, Pharm.D.[2], Sadie Peters, MD, MHS[3], Catherine Cooke, Pharm.D., BCPS, PAHM[1]; [1]Department of Pharmacy Practice and Science, University of Maryland School of Pharmacy, Baltimore, MD [2]Amgen, Thousand Oaks, CA [3]Maryland Department of Health, Baltimore, MD
SERVICE OR PROGRAM: Technology advances, along with the SCRIPT standard for RXFILL, allows pharmacies to notify prescribers when their electronically prescribed (e-prescribed) medication has not been picked-up. Pharmacists in a primary care practice will utilize RXFILL notifications to identify Accountable Care Organization (ACO) members with first-fill failure (FFF) of newly prescribed antihypertensives. Pharmacists will communicate with prescribers and contact patients telephonically to evaluate the reasons for FFF and address patient and/or prescription barriers.
JUSTIFICATION/DOCUMENTATION: The prevalence of published FFF rates ranges from 17–34% for antihypertensives, with an unknown burden on health outcomes and healthcare costs. Our physicians want to be informed about FFF, but expressed concern about the time and staff needed to act on the information. RXFILL allows for efficient identification of FFF, and pharmacists can address FFF with interventions adapted from managing refill non-adherence. Success of the service will be evaluated by calculating the FFF rate (i.e., number of new e-prescribed medications that are picked up within 30 days ÷ number of new e-prescribed medications), and ACO quality measure for blood pressure control.
ADAPTABILITY: Data from 2014 show that ~70% of physicians were e-prescribing, facilitating identification of FFF through RXFILL. Hypertension is a common chronic condition nationwide and allows for implementation of the FFF service in other primary care settings. Defined workflow processes to identify and resolve FFF allow for other qualified providers to improve patient outreach. Expansion beyond antihypertensives can address the specific needs of the healthcare population being served.
SIGNIFICANCE: Prescribers are generally uninformed about prescription fill status post e-prescription transmittal, which often leads to delayed evaluation of FFF. We are unaware of any clinical pharmacy services using RXFILL to identify, and subsequently address FFF. The impact on patient outcomes, quality metrics, and the financial incentive from the Medicare Shared Savings Program will determine sustainability of the FFF service.

Medication Safety

196. Evaluating implementation of an opioid overdose education and naloxone distribution academic detailing campaign. *Tessa Rife, Pharm.D., BCGP, CACP*[1], David Pennington, Ph.D.[2]; [1]Department of Pharmacy, School of Pharmacy, San Francisco Veterans Affairs Health Care System, University of California, San Francisco, San Francisco, CA [2]Department of Psychology, Department of Psychiatry, San Francisco Veterans Affairs Health Care System, University of California, San Francisco, Weill Institute for Neurosciences, San Francisco, CA
SERVICE OR PROGRAM: Academic Detailing (AD) is an evidence-based outreach service designed to change practice via individual provider and health-system education and barrier resolution. We implemented a Clinical Pharmacy Specialist (CPS) AD campaign in fiscal year 2015 (FY15) to improve opioid Overdose Education and Naloxone Distribution (OEND) in Veterans at San Francisco Veterans Affairs Health Care System (SFVAHCS). Outreach visits were conducted with individual and small groups of priority providers (high number of panel patients at risk for overdose) via face-to-face, video teleconferencing, and telephone.
JUSTIFICATION/DOCUMENTATION: Numerous studies have demonstrated OEND efficacy in reducing overdose mortality, yet overdose rates continue to increase. Effective overdose prevention communication has been cited as a major barrier to naloxone provision. We evaluated a CPS AD OEND campaign at SFVAHCS to determine if focused outreach would improve naloxone prescribing. Using ANOVA, we compared number of prescribed naloxone kits between priority providers with zero and ≥1 visit. Then, using linear regression, we examined if number of visits predicted number of prescribed naloxone kits among priority providers with ≥1 visit. Finally, using paired T-tests, we compared mean naloxone kits prescribed/fiscal quarter between the 10 fiscal quarters pre- and post-AD OEND implementation.
ADAPTABILITY: AD is an easily adaptable, evidence-based educational outreach service utilized in many countries and healthcare settings to change practice and improve preventive, acute, and chronic disease care.
SIGNIFICANCE: At total of 146 priority providers (36.3%) had ≥1 OEND outreach visit and prescribed significantly more naloxone kits compared to those without ($p<0.001$; 6.1 ± 17.3 and 0.6 ± 3.6, respectively). Number of visits significantly predicted number of naloxone kits prescribed ($B = 0.496$; $t(144) = 6.86$; $p<0.001$). A total of 1,159 kits were prescribed FY13-FY17. Mean naloxone kits prescribed/fiscal quarter was significantly greater post- versus pre-implementation ($p<0.001$; 111.5 ± 46.9 and 4.4 ± 7.9, respectively). Implementation of a CPS AD OEND campaign at SFVAHCS was effective in improving naloxone kit prescribing and opioid safety.

Ambulatory Care

197. Defining the role of a pharmacist at a new to Mississippi, opioid addiction Medication Assisted Treatment clinic. *Samantha Odem, Pharm.D.*; Department of Pharmacy Practice & Administration, William Carey University, Gulfport, MS
SERVICE OR PROGRAM: Approximately one year ago, Mississippi opened its first licensed Medication Assisted Treatment (MAT) clinic which utilizes methadone in opioid addiction treatment. Traditional roles for pharmacists in this company in other states include dispensing, diversion prevention, and ensuring adherence to state and federal laws. Keeping the expanding role of clinical pharmacists in mind, our clinic designed and uniquely incorporated responsibilities for pharmacists focusing on interprofessional patient care, medication management and patient/provider education.
JUSTIFICATION/DOCUMENTATION: Methadone maintenance treatment (MMT) is the most common approach to MAT utilized in our clinic. Studies have shown methadone to be an effective approach to MAT; however, the recent increase in methadone-related deaths is concerning. Fatalities occur primarily during either the complex induction phase of MMT or in the context of poly-substance abuse. Pharmacists are uniquely positioned to promote patient safety. Key roles our pharmacist play include methadone titration recommendations and educational initiatives that target both patients and providers. Educational initiatives are focused on safety and addressing the stigma associated with MAT. Pharmacists conduct mandatory group sessions with

patients to discuss adverse events, induction experiences, drug interactions and benefits of MMT.
ADAPTABILITY: As more MMT clinics are established to address the national opioid crisis, other pharmacists can adopt our model. Existing clinics can expand their pharmacy services to improve patient safety and clinical outcomes.
SIGNIFICANCE: The nation is faced with an opioid abuse crisis. Numerous efforts are being employed to help this growing patient population. As the medication expects of the health care team, pharmacists in MAT clinics must take the lead in the safe delivery of MMT.

VPS Original Research

Critical Care

198. Modified medication regimen complexity scoring tool (mMRC-ICU) correlates to patient acuity and mortality for critically ill patients. *Sarah Clements, Pharm.D.*[1], Daniel Anderson, Pharm.D. Candidate 2018[2], Jennifer Waller, Ph.D.[3], Morgan Gwynn, Pharm.D.[4], Andrea Sikora Newsome, Pharm.D., BCPS, BCCCP[5]; [1]Department of Pharmacy, Augusta University Medical Center/UGA College of Pharmacy, Augusta, GA [2]UGA College of Pharmacy, Augusta University Medical Center/UGA College of Pharmacy, Augusta, GA [3]Augusta University Medical Center, Augusta, GA [4]Department of Pharmacy, AU Medical Center, Augusta, GA [5]Department of Pharmacy, UGA College of Pharmacy, Augusta, GA
INTRODUCTION: A previously developed medication regimen complexity scoring tool (MRC-ICU) demonstrated high overall validity and correlated with APACHE score, intensive care unit (ICU) length of stay (LOS), and mortality but required scoring 39 different items.
RESEARCH QUESTION OR HYPOTHESIS: The objectives of this study were to explore whether a modified MRC-ICU (mMRC-ICU) consisting of 17 items correlated to patient outcomes and to evaluate MRC-ICU changes over time in critically ill patients.
STUDY DESIGN: This study was a post-hoc analysis of a retrospective, observational review of 130 medical ICU patients between November 2016 and June 2017. Exclusion criteria were length of stay less than 24 hours due to either death or transfer, or had active transfer or hospice orders at 24 hours.
METHODS: The mMRC-ICU was calculated for the full sample of 130 patients. Demographics originally collected for the full sample of 130 patients included age, sex, ICU length of stay (LOS), and inpatient mortality. Pearson's Product Moment Correlation was calculated for APACHE score and ICU LOS and two-sample t-tests were performed for mortality. To examine differences in MRC scores over time, a random sub-sample of fifty patients were scored at 24 hours, 48 hours and discharge. Tukey-Kramer differences were calculated to look at the modified score over time.
RESULTS: The mMRC-ICU score was significantly associated with the MRC-ICU score ($p<0.0001$), ICU mortality ($p=0.0347$), and APACHE score ($p<0.0001$) but non-significantly associated with ICU LOS ($p=0.0563$). Scores were significantly greater at 24 hours than at 48 hours ($p<0.0001$) and discharge ($p<0.0001$).
CONCLUSION: The mMRC-ICU correlated with original MRC-ICU score, APACHE score, and mortality. The MRC-ICU was highest at 24 hours and decreased over time. An mMRC-ICU tool, once prospectively validated, could be integrated into the electronic medical record and used by pharmacists to prioritize and identify high-risk patients.

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