DOI: 10.1002/jac5.1481

jaccp Journal of the American College of Clinical Pharmacy

ABSTRACTS

2021 ACCP Virtual Poster Symposium

May 25 - 26, 2021

ORIGINAL RESEARCH

ADR/Drug Interactions

1 | Incidence of acute kidney injury in patients that have an open long bone fracture and receive aminoglycoside therapy

Nicholas J. Monkemeyer, Pharm.D. Candidate 2022[1], Kevin T. Fuji, Pharm.D., MA[1], Viren P. Punja, MBBS[2] and Stacey K. Dull, Pharm.D., BCPS[1]

[1]*Creighton University School of Pharmacy and Health Professions, Omaha, NE* [2]*CHI Health Creighton University Medical Center - Bergan Mercy, Omaha, NE*

Introduction: Open fractures are high-energy injuries with exposure of bone and tissue to the external environment. Antibiotic prophylaxis prevents infection which is the primary cause of morbidity, nonunion, and bony instability. The EAST Practice Management Guidelines for open fractures recommend antibiotics directed at gram-positive organisms for all open fractures with additional gram-negative coverage, historically with aminoglycosides, for type III open fractures. Limited data is available describing the relationship between aminoglycosides and acute kidney injury (AKI) in open fractures.

Research Question or Hypothesis: Do aminoglycosides increase the risk of AKI in trauma patients with open fractures?

Study Design: Single-center, retrospective chart review

Methods: Adult patients admitted to a level 1 trauma center with an open long bone fracture between January 2016 and March 2020 that received an aminoglycoside were included in the study. The primary endpoint was the incidence of AKI in patients that received an aminoglycoside. Secondary endpoints included the number of patients that received extended interval versus traditional dosing of aminoglycoside and developed AKI, and the severity of AKI. Baseline demographics, fracture classification, concomitant nephrotoxins, aminoglycoside regimens, and occurrence of AKI were collected. Data was analyzed descriptively.

Results: Thirty-seven patients were included in the study, and three (8.1%) developed AKI. All patients with AKI received other nephrotoxins. AKI was based on an increase in SCr $\geq$ 0.3 mg/dL in a 48-hour period within 7 days of last gentamicin dose. Of 37 patients that received gentamicin, 25 patients (67.6%) had type I or II and 2 patients (5.4%) had unspecified open fractures.

Conclusion: In our patient population, the incidence of AKI was low. Larger studies of this population are needed to characterize risk factors for AKI. Many patients with type I or II open fractures received aminoglycosides which is not recommended and warrants prescriber education regarding opportunities for antimicrobial stewardship.

Adult Medicine

3 | Corticosteroid Administration and Glycemic Outcomes in Chronic Obstructive Pulmonary Disease Exacerbation

Herman Johannesmeyer, Pharm.D.[1], Kayvan Moussavi, Pharm.D.[2] and Kristica Kolyouthapong, Pharm.D.[3]

[1]*Department of Pharmacy Practice, College of Pharmacy, Marshall B. Ketchum University, Fullerton, CA* [2]*Department of Pharmacy Practice, Marshall B. Ketchum University, Fullerton, CA* [3]*Mission Hospital, Mission Viejo, CA*

Introduction: Systemic corticosteroids are a cornerstone of pharmacotherapy in acute exacerbations of chronic obstructive pulmonary disease (AECOPD) though are associated with myriad side effects including hyperglycemia. Guidelines provide a prescriptive corticosteroid dosing regimen in AECOPD though there is notable heterogeneity in clinical practice. Previous studies have inconsistently shown associations between higher corticosteroid dosing in AECOPD and increases in hyperglycemic outcomes. Glycemic control has recently been proposed as an inpatient quality measure.

Research Question or Hypothesis: The primary objective of this study was to determine if a correlation exists between corticosteroid dose and hyperglycemia in patients hospitalized for AECOPD. Secondary objectives included determining if associations exist between corticosteroid dose, hospital length of stay (LOS), and inpatient mortality.

Study Design: Retrospective chart review.

Methods: Patients were included if they had an International Classification of Disease - 10 diagnosis code indicating AECOPD (J44.1). Patients were included in the LOS analysis if they were discharged alive and medically stable. Spearman correlations were analyzed using total hospitalization corticosteroid dose as the independent variable. Average hospitalization blood glucose (BG) and hospital LOS were used as dependent variables. A comparison of hospitalization

corticosteroid dose on the basis of mortality was analyzed using the Mann-Whitney U test. Corticosteroid dose is expressed in terms of prednisone milligram equivalents with median and interquartile ranges. Data were analyzed using the statistical package Analyse-it 5.68.

Results: A total of 212 patients were identified for inclusion. Increasing doses of corticosteroids were correlated with a higher average hospitalization BG and longer hospitalization LOS (rs = 0.246, p=0.003 and rs = 0.676, p<0.0001 respectively). No difference in corticosteroid dose was appreciated between patients that did and did not experience mortality (787 [227-1609] vs. 500 [306-756], p=0.14).

Conclusion: Increasing corticosteroid dose demonstrated a dose-dependent increase in hospitalization BG and LOS. Corticosteroid regimen did not have a measurable effect on mortality.

4 | Evaluation of steroids at discharge in patients with uncontrolled diabetes and acute exacerbation of chronic obstructive pulmonary disease

Caitlyn Valerio, Pharm.D., Amulya Uppala, Pharm.D., Kajal Patel, Pharm.D. and Sibyl Cherian, Pharm.D.
Overlook Medical Center, Summit, NJ

Introduction: The Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines recommend five days of systemic corticosteroids in patients experiencing an acute exacerbation of chronic obstructive pulmonary disease (AECOPD). Although prescribing practices vary, a 5-day course of steroids is non-inferior to a 14-day course with respect to exacerbation within six months. Patients with uncontrolled diabetes may need an escalation in anti-hyperglycemic therapy due to steroid-induced hyperglycemia.

Research Question or Hypothesis: Do institutional corticosteroid durations in patients with uncontrolled diabetes experiencing an AECOPD differ from national guideline recommendations?

Study Design: Single center, retrospective chart review

Methods: An IRB-exempt analysis was conducted in patients hospitalized between February 2019 and February 2020. Inclusion criteria consisted of adult patients with uncontrolled diabetes hospitalized with an AECOPD requiring systemic corticosteroids on discharge. The primary outcome was the median duration of steroid therapy (inpatient + outpatient) measured in days. The secondary outcome was the percentage of patients with a glucose reading of >180mg/dL on the day of discharge who had escalation of anti-hyperglycemic therapy.

Results: The median cumulative duration of steroid therapy was 17 days, with a median inpatient and outpatient duration of 6.5 days and 11 days, respectively. For the secondary outcome, 63.3% of the sample had a glucose reading ≥180mg/dL on the day of discharge. Of this population of 19 patients, 7 patients (36.8%) had an escalation of antihyperglycemic therapy.

Conclusion: Results of this study suggest that institutional prescribing practices include longer total durations of steroids than recommended in international guidelines. Despite steroid induced hyperglycemia, less than half of the patients had an escalation in antihyperglycemic therapy at discharge. Future aims are to recommend shorter steroid durations in patients presenting with an AECOPD as well as improve transitions of care for this population.

5 | Improving Transitions of Care for Patients Discharged on High-Risk Antimicrobial Therapy

Ryan Zabrosky, Pharm.D.[1], Spencer Sutton, Pharm.D.[1], Karrine Brade, Pharm.D.[1], Hope Serafin, Pharm.D.[1], Ellen Rubin, Pharm.D.[1] and Erica Liu, Pharm.D.[2]
[1]*Boston Medical Center, Boston, MA* [2]*Department of Pharmacy, Boston Medical Center, Boston, MA*

Introduction: Effective transitions of care (TOC) improves patient outcomes, including those discharged on high-risk antimicrobial therapy (HAT), defined as any duration of intravenous or select high-risk oral antimicrobials for >14 days at discharge. High-risk oral antimicrobials were defined as medications with pertinent monitoring, high risk of adverse effects, or potentially complex TOC. At baseline, 53.9% of patients discharged on HAT had successful TOC. Prior to this quality improvement (QI) initiative, no formal TOC protocol was established for patients discharged on HAT.

Research Question or Hypothesis: This quality improvement project was completed in accordance with the Institute of Healthcare Improvement's Model for Improvement.

Study Design: The aim of this QI project was to implement a TOC protocol leading to TOC success in at least 90% of patients discharged on HAT.

Methods: A novel TOC protocol was developed to identify and provide TOC services to patients discharged on HAT. Successful protocol completion and process metrics included collection of baseline laboratory values, assessment of intravenous access and medication access, evaluation of drug interactions, appropriate pharmacokinetic monitoring, appropriate documentation, and medication counseling. Outcome metrics included referral to outpatient infectious disease follow-up, 90-day readmissions, and successful TOC. Balancing metrics included pharmacist time and protocol initiation for patients not discharged on HAT. Interventions were implemented and assessed using Plan-Do-Study-Act (PDSA) cycles. Data was analyzed utilizing descriptive statistics.

Results: Between September 2020 and March 2021, 5 PDSA cycles were implemented including a total of 73 patients meeting protocol criteria. Of these, 69/73 (94.81%) were appropriately identified. Successful TOC increased from 53.9% to 87.5%, and referral to outpatient infectious disease follow-up increased from 59% to 100.0%. Failure of appropriate baseline laboratory collection decreased from 26.0% to 0%. On average, pharmacists spent 15 minutes daily performing HAT TOC.

Conclusion: The pharmacist-led process for HAT discharge has shown significant improvement in TOC and referral to outpatient infectious disease follow up.

6 | Evaluation of inpatient hyperglycemia management in non-critically ill patients

Caitlyn Valerio, Pharm.D., Kajal Patel, Pharm.D., Amulya Uppala, Pharm.D., Sibyl Cherian, Pharm.D. and Deborah Booth, Pharm.D.
Overlook Medical Center, Summit, NJ

Introduction: National guidelines recommend the use of basal-bolus insulin rather than monotherapy with sliding scale insulin for the management of inpatient hyperglycemia.

Research Question or Hypothesis: Basal insulin-containing regimens result in better glycemic control compared to basal insulin-omitting regimens for the management of inpatient hyperglycemia.

Study Design: Single center, retrospective chart review

Methods: An IRB-approved analysis was conducted in adult patients with a hemoglobin A1c >9% admitted with hyperglycemia from January 1, 2019 to February 29, 2020. Patients with basal insulin-containing regimens were placed in the guideline driven therapy group and those with basal-omitting regimens were placed in the non guideline-driven therapy group. The primary endpoint was the percentage of patients with fasting blood glucose (FBG) 80-200 mg/dL 48 hours after an initial hyperglycemic FBG of ≥200 mg/dL. Secondary endpoints included median time to FBG 80-200 mg/dL, percentage of patients with FBG 80-200 mg/dL 24 hours after initial hyperglycemic reading, percentage of patients with ≥1 hypoglycemic episode at any point during admission after insulin initiation, and percentage of patients with ≥1 hypoglycemic and/or hyperglycemic episode within 24 hours prior to discharge.

Results: Of the 136 patients that met inclusion criteria, 87 patients were in the guideline-driven arm and 49 patients in the non guideline-driven arm. The primary endpoint was achieved in 59.8% and 44.9% of patients in the guideline-driven therapy and non guideline-driven therapy group, respectively (P=0.095). The percentage of patients with ≥1 hypoglycemic episode within 24 hours of discharge was significantly higher in the guideline-driven group compared to the non guideline-driven arm (8.0% vs. 0.0%, p=0.006). All other secondary outcomes were similar between arms.

Conclusion: There was no significant difference between treatment groups in achieving normoglycemia. However, basal-containing insulin regimens (guideline-driven therapy) showed trends towards a higher amount of patients achieving normoglycemia 48 hours after an initial hyperglycemic reading. Further studies are needed with a larger patient population.

Ambulatory Care

7 | Utilization and Impact of sacubitril-valsartan on 90-day heart failure related hospitalizations and ER visits

Tanvi Patil, Pharm.D., BCPS[1], Salihah Ali, Pharm.D.[2], Alamdeep Kaur, Pharm.D..[3], Meghan Akridge, Pharm.D.[4], James Paarlberg, Pharm.D., MS[4], Nabil Jarmukli, MD[5] and Amitabh Parashar, MD[5]
[1]*Pharmacy Department, Salem Veterans Affair Medical Center, Salem, VA* [2]*Pharmacy, Salem VA Medical Center, Salem, VA* [3]*Pharmacy, Salem Veterans Affair Medical Center, Salem, VA* [4]*Salem VA Medical Center, Salem, VA* [5]*Cardiology, Salem VA Medical Center, Salem, VA*

Introduction: Real world data suggests that achieving target dose of sacubitril/valsartan (SV) is limited by hypotension, restricting the extrapolation of observed benefits in clinical trials to those on lower doses.

Research Question or Hypothesis: We evaluated the impact of SV doses utilized in routine practice on clinical outcomes, laboratory variables and indicators of systolic function in veteran patients.

Study Design: single-center-retrospective

Methods: Patients greater $\geq$ 18 years of age with diagnosis of heart failure (HF) as of July 1 and left ventricular ejection fraction (LVEF) $\leq$ 40% seen by in-house provider in the preceding 2 years were included. Baseline patient characteristics were collected. Primary outcome was to compare 90-days pre/post-SV utilization total HF-hospitalization/ER visits. Secondary outcome included comparing LVEF, eGFR, systolic BP, potassium, and left atrial diameter 90-days-pre/post-SV utilization. Outcomes were compared using paired t-test. Assuming a mean difference of 0.20 to be clinically relevant in the 90-day HF related hospitalization/ER visits between pre-and post-sacubitril use, with 0.4 standard deviation and two-sided alpha of 0.05, we calculated a sample size of 58 patients to achieve 80% power.

Results: Of 886 HF patients with reduced ejection fraction, only 61 patients (6.89%) receiving SV were included. Mean age was 70.07 with 96.7% male. Only 1 patient achieved target dose at 90-days and none of the patients discontinued SV. Majority (n=51) patients were on 24/26 mg twice daily dose. The primary outcome of 90-day total HF hospitalization and ER visit was significantly lower after SV initiation (Mean: 0.26 $\pm$ 0.68 vs.0.10 $\pm$ 0.30; p=0.049). No difference was found in the secondary outcomes pre/post-SV use.

Conclusion: We present evidence that even lower SV dose may be effective at reducing 90-day HF hospitalization and ER visits. Future studies should evaluate impact of SV utilization on indicators of systolic functions (left atrial diameter, LVEF, left atrial volume) in larger patient population with longer follow-up.

8 | Impact of a pharmacist-managed telemedicine pharmacotherapy clinic in the era of COVID-19

Francheska Marte, Pharm.D.[1], Jessica Bianco, Pharm.D.[1], Amanda Martinez, Pharm.D.[1] and Nicholas Carris, Pharm.D.[2]
[1]*Tampa General Hospital, Tampa, FL* [2]*University of South Florida, Tampa, FL*

Introduction: Telemedicine has grown dramatically since the emergence of severe acute respiratory syndrome coronavirus 2 and the resulting coronavirus disease 2019 (COVID-19) pandemic. Telemedicine has been essential in improving access to medical care, mitigating

risk for patients and healthcare professionals, and conserving personal protective equipment. In March 2020, primary care clinical pharmacy services at all Tampa General Hospital and Tampa General Medical Group clinics were converted to telemedicine in response to the pandemic.

Research Question or Hypothesis: What was the impact of expanding pharmacy telemedicine services on appointment compliance, clinical outcomes, and financial reimbursement?

Study Design: Single-center, retrospective, quasi-experimental study

Methods: Data were abstracted from patient records for pharmacist-led telemedicine visits from March 1, 2020 to September 30, 2020. These data were compared to patients scheduled for pharmacist-led face-to-face visits from March 1, 2019 to September 30, 2019. The study sites included were a hospital-based and a physician-based clinic. The primary outcome was mean difference in no-show rate. Secondary outcomes included clinical measures (mean difference in change in HbA1c, LDL cholesterol, and blood pressure) and total reimbursement over the assessed time period.

Results: A total of 316 patients were seen and 567 face-to-face visits completed during the pre-implementation period. A total of 299 patients were seen and 617 telemedicine visits completed during the post-implementation period. The mean difference (SE) in no-show rate in the hospital-based clinic was -12% (4.862; *P*=0.014), compared to 3% (3.656; *P*=0.431) in the physician-based clinic. The mean difference (SE) in change in HbA1c in the hospital-based clinic was -0.004 (0.338; *P*=0.992), compared to 0.016 (0.239; *P*=0.945) in the physician-based clinic. The mean difference (SE) in reimbursement in the hospital-based clinic was $1.93 (4.209; *P*=0.647), compared to $20.46 (3.210; *P*<0.0001) in the physician-based clinic.

Conclusion: Expansion of pharmacy telemedicine services improved appointment compliance, was as clinically effective as usual care, and resulted in similar or increased reimbursement.

9 | Assessing the success rate of behavioral and pharmacotherapy-based weight loss interventions in a veteran population

Trenton Terry, Pharm.D[1], Jennifer E Stark, Pharm.D., BCPS, FCCP[2] and Michele Walker, Pharm.D[1]

[1]*Veterans Health Care System of the Ozarks, Fayetteville, AR*

[2]*Department of Pharmacy, Veterans Health Care System of the Ozarks, Fayetteville, AR*

Introduction: Research conducted in 2014 by the U.S Department of Veterans Affairs (VA) found that 78% of veterans receiving care through VA facilities were overweight or obese, nearly double the rate of the civilian population. The VA developed an evidence-based weight management program, Managing Overweight and/or Obesity Everywhere (MOVE!), encouraging a healthier lifestyle through diet, physical activity, and behavior changes.

Research Question or Hypothesis: Is the success rate [defined as ≥ 5% loss from baseline weight] for veterans enrolled in MOVE! different than those also prescribed weight management medication (WMM)?

Study Design: A retrospective record review of patients at the Veterans Health Care System of the Ozarks enrolled in MOVE! between November 1, 2018 and August 1, 2020.

Methods: This project defines weight loss success as ≥ 5% reduction in total body weight from baseline after 6 months. The primary outcome is the percentage of patients participating in MOVE! also prescribed WMM that achieved weight loss success compared to patients in MOVE! alone. Baseline is defined as (1) the participant's weight before starting WMM or (2) the weight recorded at the initial MOVE! appointment. Anticipating 50% success rate in the WMM group, a sample size of 93 patients in each group is needed to provide 80% power to detect a 20% difference between groups.

Results: A total of 93 veterans were included in each study arm. The rate of weight loss success was significantly higher in veterans in MOVE! also prescribed WMM compared to those in MOVE! alone (39.7% vs 17.2%; p = 0.0006).

Conclusion: Although success rates were modest in both groups, MOVE! participants prescribed WMM had significantly more weight loss success than participation in MOVE! alone. This project provides real-world efficacy of WMM in addition to lifestyle changes in a veteran population.

10 | Describing the Application and Barriers of Pharmacist-Led Professional Continuous Glucose Monitoring (CGM) in the Ambulatory Care Setting

Sara Nimer, Pharm.D., BCPS[1] and Christie Schumacher, Pharm.D., BCPS, BC-ADM, CDE[2]

[1]*Midwestern University Chicago College of Pharmacy, Willowbrook, IL*

[2]*Department of Pharmacy Practice, Midwestern University Chicago College of Pharmacy, Downers Grove, IL*

Introduction: Advances in technology for continuous glucose monitoring (CGM) have contributed to an improvement in the care for persons with diabetes and CGM systems are now recommended in multiple guidelines for diabetes care. Although there are several benefits with the use of CGM, it has not been adopted in practice by many clinical pharmacists in the ambulatory care setting.

Research Question or Hypothesis: What barriers to implementing professional CGM use do ambulatory care pharmacist managing people with diabetes currently face?

Study Design: Cross-sectional survey research

Methods: This was a self-administered, web-based questionnaire distributed to a total of 2207 pharmacists in the American College of Clinical Pharmacy Ambulatory Care and Endocrine and Metabolism Practice and Research Networks. Participants were directed to one of two sections of the survey based on the current status of CGM implementation within their practice. Survey results were analyzed with descriptive statistics and chi-squared tests.

Results: A total of 213 survey responses were collected, with 185 included in the final analysis. Most respondents work in a primary care clinic (78.1%), while 8.11% work in an endocrinology office. Respondents indicated 72.14% of persons at their practice site had diabetes, with 17% using personal-use CGM. Most respondents (65.9%) indicated not using professional-use CGM; however, 72.5% indicated they were interested in implementing professional-use CGM into their practice. The most common barriers to implementation were lack of funding for startup costs (65.9%), lack of time (45.8%), and unpredictable patient follow up (48.3%). For pharmacists using CGM, 63.1% indicated they did not receive formal training and 45.2% spend less than 10 minutes incorporating professional-use CGM into their patient visits.

Conclusion: Although several pharmacists indicated that the majority of patients managed have diabetes, most specify barriers that prevent using CGM at their practice. Additional training opportunities should be considered to facilitate the implementation of CGM into clinical practice.

11 | Patient perceived value and impact of medication therapy management in the community pharmacy setting versus ambulatory care setting

Anastasia Digman, Pharm.D., Jennifer Dettra, Pharm.D., BCACP, Ashley Lam, BS and Olusola-Joy Okeyemi, BA
School of Pharmacy - Practice Department, University of Charleston, Charleston, WV

Introduction: Medication therapy management (MTM) benefits patients by improving medication adherence and reducing incidence of adverse events. Pharmacists can perform MTM in both community and ambulatory care settings.

Research Question or Hypothesis: Does the rate of medication-related problem resolution and patient perception of MTM services differ in the ambulatory care and community pharmacy settings?

Study Design: This is a prospective observational study conducted in an outpatient physician-owned clinic and a community-based independent pharmacy.

Methods: Patients qualifying for MTM were identified utilizing the OutcomesMTM® database and contacted by telephone to complete a comprehensive medication review and a post-MTM survey. Survey responses were analyzed via Mann-Whitney U test. Data related to tip outcomes, medication-related problems (MRPs) identified, and MRPs resolved were also collected.

Results: Survey results were similar between groups in relation to perceived value of pharmacy services (p=0.899). Of the 47 total tips identified, 15 (32%) were from the ambulatory care setting, and 10 (67%) of these were unnecessary, 5 (33%) were resolved, and 0 were unresolved. The remaining 32 tips (68%) were from the community setting, and 11 (34%) were unnecessary, 17 (53%) were resolved, and 4 (13%) were unresolved. Each ambulatory care patient had an average of 1.20 MRPs identified and 96.2% MRPs resolved. Each community patient had an average of 1.55 MRPs identified and 87.0% resolved.

Conclusion: Patient perceived value of pharmacy services in each setting was similar. Community pharmacy patients had a greater percentage of tips identified, resolved, and those remaining unresolved in comparison to ambulatory care patients. Ambulatory care patients had a greater percent of tips identified as unnecessary. Ambulatory care patients had fewer MRPs identified but more MRPs resolved per patient when compared to community patients. Study limitations included small sample size and limited time frame for data collection.

12 | Evaluation and description of interventions made by ambulatory care clinical pharmacists providing medication therapy management (MTM) services in the physician office setting.

Kendall Roessler, Pharm.D. Candidate[1] and Jessica Wilhoite, Pharm.D.[2]
[1]*Community Health Network, Indianapolis, IN* [2]*Department of Pharmacy, Community Health Network, Indianapolis, IN*

Introduction: Medication therapy management (MTM) has allowed pharmacists to optimize patient's therapeutic outcomes by providing medication interventions. MTM has been a service frequently provided in the community pharmacy setting; however, minimal studies have evaluated interventions made clinical pharmacists in the physician office setting. This study evaluated how Community Health Network (CHN) provided MTM services to patients using ambulatory care clinical pharmacists in a primary care setting.

Research Question or Hypothesis: The purpose of this study was to evaluate and describe the number and types of interventions made by ambulatory care clinical pharmacists completing MTM services in the physician office setting.

Study Design: This study was a retrospective chart review evaluating interventions made by clinical pharmacists through the provision of MTM services at physician offices within Community Health Network from January to December 2020.

Methods: The services were tracked using OutcomesMTM® which provided access to payable patient care opportunities for eligible patients receiving their medical care from CHN providers. Pharmacists' services included completing comprehensive medication reviews (CMR) and targeted intervention programs (TIP). Patient's charts were reviewed to assess and evaluate the outcomes of the MTM services completed by pharmacists.

Results: Pharmacists were able to provide 479 MTM services including 264 CMRs and 215 TIPs during this study. The completion of these MTM services by ambulatory care clinical pharmacists generated almost $13,000 in revenue. Types of TIPs included adherence check ins, initiating new drug therapy, and assessing current medication regimens. CMR interventions included optimizing doses of medications, recommending add-on therapy, and providing counseling on potential side effects, vaccines, and smoking cessation.

Conclusion: Pharmacists have provided many beneficial interventions including improving adherence and optimizing medication regimens through MTM services. These opportunities should continue to be available for pharmacists to maximize positive patient outcomes with medication interventions.

13 | Utilization of guideline-directed medical therapy (GDMT) in African-American Veteran patients at single-center

Tanvi Patil, Pharm.D., BCPS
Pharmacy Department, Salem Veterans Affair Medical Center, Salem, VA

Introduction: African American (AA) patients are severely underrepresented in heart failure clinical trials that have shaped the treatment pathways, especially those with reduced ejection fraction [HFrEF] . They are considered to have 50% higher relative incidence of HFrEF than general population and are at 1.8-2.4 fold increased risk of mortality.
Research Question or Hypothesis: We aim to describe the utilization of guideline-directed medical therapy (GDMT) in the AA veteran patients at single center hospital.
Study Design: Cross-sectional retrospective study
Methods: Self-identified AA Veteran patients at SALEM VAMC who had HFrEF with left-ventricular-ejection-fraction (LVEF) < =40% 1 year prior to January 1st 2020 were identified from electronic medical records and corporate database warehouse using sequel query language. Baseline variables such as LVEF, NYHA classification, serum creatinine, eGFR, potassium, magnesium, age, sex and GDMT were collected. We estimated patients eligible for Nitrates and ARNI therapy based on current guidelines and reported the proportion of these patients receiving recommended GDMT. Additionally, we evaluated the 1 year HF hospitalization rates in this patient population.
Results: There were 208 AA HFrEF patients included in the study. Mean (±SD) age was 69.3 ± 11.3 years with mainly male population (98.9%). Average weight (±SD) was 135.1±37.8 kgs. Mean(±SD) LVEF was 31.6 ±10 and heart failure related hospitalization was 0.15±0.61. The utilization of GDMT in this patient population was as follows: ACEI/ARB (44.7%), ARNI (12.5%), HF-specific beta-blocker (63.9%), aldosterone antagonist (21.6%), Nitrates (22.6%). About 13.9% (n=29) patients were on concomitant high-risk medications [cilostazol (0.5%), Calcium channel blockers (4.3%), NSAIDs (8.2%). Of those deemed as being eligible for nitrates (n=77), only (61%) received it. Of the patients deemed as being eligible for ARNI(n=68), only (38.2%) patients received it.
Conclusion: This study indicated underutilization of Nitrates as well as ARNI in this patient population identifying need for increased clinician awareness to optimize pharmacotherapy.

14 | Remote Monitoring and Pharmacist Management: A Study in Hypertension

Kaci Boehmer, Pharm.D., BCACP[1], Justin Usery, Pharm.D., BCPS[2] and *Chris Johnson, Pharm.D., M.Ed., BCACP*[1]
[1]Department of Pharmacy Practice, University of Arkansas for Medical Sciences College of Pharmacy, Little Rock, AR [2]University of Arkansas for Medical Sciences, Little Rock, AR

Introduction: Clinicians are often hesitant to adjust antihypertensive medications based solely on elevated clinic blood pressure (BP) readings. Some patients have the resources to obtain sphygmomanometers for home BP monitoring but may not have the necessary record-keeping skills to provide accurate, reliable readings upon follow-up. Educational efforts and medication adjustments to improve patient care is challenging without reliable data.
Research Question or Hypothesis: Do online platforms linked to remote BP monitoring improve home BP management and facilitate effective clinical interventions?
Study Design: Thirty uncontrolled hypertensive patients were enrolled in a pilot project and provided a Bodytrace remote BP monitor (appropriate cuff size) for home use. BP data downloaded to an online platform (cellular link) and was monitored by two ambulatory care pharmacy specialists. At least daily BP checks were requested (up to twice daily), and the pharmacists contacted patients approximately weekly via telephone for 6 months. Through approved protocols, these pharmacists made clinical decisions and individualized interventions, including lifestyle modifications, to improve patient care.
Methods: Descriptive statistics were used for demographic and clinical data (tracked prospectively).
Results: The average systolic BP reduction was 15 mmHg for the 23 patients who completed the pilot. A target BP <140/90 was achieved by 65%, and 76% had improved BP control. Patients utilized the cuff 2-4 times (n=12) or >5 times weekly (n=11). Through 261 patient contact attempts, the pharmacists changed medications (n=57) or requested more BP checks (n=62) most often. These medication changes commonly included dose increases (n=35) and additional agents (n=17) for BP control. Spironolactone (n=5) and thiazide diuretics (n=5) were the most commonly added medications.
Conclusion: Most patients were willing to check their BP when provided with devices. The majority achieved a clinically significant decrease in home BP readings, with a greater impact seen in those who checked more frequently.

15 | Identifying The Impact and Duration of A1c reduction of Pharmacist Managed Diabetes Patients in an Ambulatory Care Clinic

Brandon Ladd, Pharm.D., Anthony Albert, Pharm.D., Darren Clonts, Pharm.D., MBA and Pamela Griffin, Pharm.D
CMG Clinical Pharmacy, Cigna Medical Group, Phoenix, AZ

Introduction: The durability of impact on diabetes patients by clinical pharmacists is unclear in current literature. Cigna Medical Group (CMG), a 21 center primary care-based medical group recognized as a patient-centered medical home, currently utilizes clinical pharmacists through a referral based program to manage patients with diabetes;

primarily Medicare members with A1c>9%. Operating under collaborative practice agreements (CPAs) with primary care physicians (PCPs), pharmacists evaluate patients' diabetes status and initiate individualized care plans.

Research Question or Hypothesis: What impact does a clinical pharmacist-run diabetes management program have on A1c reduction and how durable is that change?

Study Design: Retrospective, observational

Methods: Computerized patient record systems were utilized to obtain data on patients enrolled with clinical pharmacy services for diabetes management between May 1, 2015 and May 31, 2019. Patients identified were evaluated for inclusion into the study.

The primary outcome evaluated mean reduction in A1c from enrollment in clinical pharmacy services to discharge. Secondary outcomes determined durability of A1c reduction post-discharge at pre-identified time intervals (60-219 days, 220-379 days, and 380-540 days).

Primary and secondary outcomes were evaluated using a paired t-test with statistical significance defined a-priori as p-value < 0.05.

Results: Of the 1780 patients episodes evaluated for inclusion, 382 were included that resulted in 372 unique patients for the primary outcome with 268, 265, and 201 unique patients included for the secondary outcomes, respectively.

Mean changes in A1c from enrollment to discharge, 60-219 days post-discharge, 220-379 days post-discharge, and 380-540 days post-discharge were -2.87% (95% CI -3.04% to -2.69%; p<0.05), -2.45% (95% CI -2.67% to -2.23%; p<0.05), -2.17% (95% CI -2.40% to -1.94%; p<0.05), and -1.91% (95% CI -2.33% to -1.50%; p<0.05), respectively.

Conclusion: After engaging with clinical pharmacists, patients experienced a clinically and statistically significant reduction in A1c from 10.4% at enrollment to 7.6% at discharge. This impact remained clinically and statistically significant over one year post-discharge.

16 | Impact of pharmacist intervention on 30-day readmission rates in high-risk transitions-of-care patients

Angela Sutt, Pharm.D.[1], Jeffery L Olson, Pharm.D., MBA, BCPS, BCACP[2] and Rachel Alm, Pharm.D., BCACP[3]
[1]*Intermountain Healthcare Pharmacy Services, Intermountain Healthcare, Salt Lake City, UT* [2]*Pharmacy Services, Intermountain Healthcare, Taylorsville, UT* [3]*Intermountain Healthcare Pharmacy Services, Intermountain Healthcare, Taylorsville, UT*

Introduction: Care transitions are a challenging point for many high-risk patients; errors in medication use can result in preventable hospital readmissions, which worsen patient outcomes and result in decreased reimbursement and increased expenses for health-systems. Transitions-of-care (TOC) is a point where pharmacists in the outpatient setting can prevent medication errors and decrease hospital readmissions.

Research Question or Hypothesis: Comprehensive medication reviews (CMRs) completed on high-risk TOC patients in the outpatient setting will decrease 30-day readmission rates.

Study Design: Retrospective cohort study

Methods: Patients discharged from an Intermountain hospital with a primary care provider (PCP) at select clinics and were considered high-risk for readmission and at-risk for the healthcare system were identified using an internal report. Patients were contacted by a pharmacist post-discharge for a CMR; pharmacists then relayed any medication therapy problems (MTPs) and therapeutic recommendations to the PCP prior to the patient's follow-up appointment. The primary objective was to evaluate the impact of pharmacist-conducted CMRs in the outpatient setting on 30-day hospital readmission rates in high-risk post-discharge patients. Secondary objectives included MTPs identified, recommendations or interventions made, and impact on cost savings.

Results: 2717 discharges from Intermountain hospitals occurred from October 5, 2020 through January 31, 2021. 30-day readmissions rates in the pharmacist intervention cohort vs. the comparator cohort were 24/191 (12.57%) vs. 511/2526 (20.23%), respectively, yielding a statistically significant difference in readmission rates (p < 0.05). The absolute risk of readmission was reduced by 7.66%, with a number-needed to treat of 13.04. Approximately 15 readmissions were prevented in the pharmacist intervention group, resulting in an estimated cost savings of $65,000.

Conclusion: Pharmacist intervention in the outpatient setting in high-risk transitions-of-care patients resulted in decreased 30-day readmission rates and increased cost savings. Further investigation is warranted to identify patient factors where pharmacist intervention is most beneficial to optimize use of this expensive labor resource.

17 | Evaluation of diabetes standards of care in diabetic patients living with human immunodeficiency virus

Marwah Alnewais, Pharm.D., Abdulaziz Alfehaid, Pharm.D. Candidate and Stephanie Kirk, Pharm.D
Medical University of South Carolina (MUSC), Charleston, SC

Introduction: Improvements to antiretrovirals over time has revolutionized the HIV epidemic, now allowing near normal life expectancies for patients living with HIV (PLWH). However, studies show HIV increases risks of non-AIDS-related comorbidities such as cardiovascular and renal disease. Appropriate management of diabetes standards of care (SoC) as a proactive approach in patients living with both diseases is crucial. For numerous reasons, patients may prefer their HIV provider serve as the primary care provider (PCP). It is essential to ensure matched levels of care through ID providers versus a PCP.

Research Question or Hypothesis: Investigate application of diabetes SoC among patients living with both HIV and diabetes or prediabetes with or without a PCP.

Study Design: A retrospective cohort study.

Methods: Study included PLWH at least 18 years old who received a diagnosis of diabetes or pre-diabetes with at least two follow up visits at the Medical University of South Carolina Infectious Diseases (ID) clinic between July 2018-2020. Patients were classified based on the presence of a PCP. The primary outcome included the percentage of patients meeting diabetes SoC according to ADA guidelines.

Results: A total of 487 patients were included with 74.1% with a listed PCP whereas 25.9% have their chronic diseases managed by ID providers. Baseline characteristics were comparable. Among patients at least 40 years old with no PCP, 41.1% were on statins compared to 62% in those with PCPs. More patients in the PCP group were on ACEI or ARB therapy (38.2%), achieved goal blood pressures (50.4%), had annual hemoglobin A1cs (44.6%), and annual lipid panels (27.4%), as compared to patients without a PCP (27.7%, 44.4%,35.7%, 16.6%, respectively).

Conclusion: Higher percentages of PLWH with PCPs met diabetes SoC. Integration of PCP services in the ID clinic might be feasible to improve diabetes outcomes and ultimately provide more favorable long-term outcomes in this patient population.

18 | Assessment of HgbA1c Reduction in Diabetic Patients Before and After Patient Assistance Program Enrollment

Mary Mekheil, Pharm.D., BCPS[1], Alyssa Kmet, Pharm.D., BCPS[2], Brian Chan, Pharm.D., BCPS[3] and Jessica Cookingham, Pharm.D. Candidate[4]

[1]*DMG BreakThrough Care Center, Wheaton, IL* [2]*DMG BreakThrough Care Center, Lisle, IL* [3]*DMG BreakThrough Care Center, Naperville, IL* [4]*Midwestern University College of Pharmacy, Downers Grove, IL*

Introduction: The prevalence of diabetes has risen rapidly over the years, creating a large financial burden on the healthcare system. Medicare patients often struggle with the cost of antidiabetic medications, which can lead to decreased medication adherence and poor health outcomes. There are patient assistance programs (PAPs) available to patients experiencing financial difficulties that can reduce medication costs. The purpose of this study is to evaluate the impact of PAPs on A1c reduction in Medicare patients with Type 2 Diabetes.

Research Question or Hypothesis: Patients enrolled in PAPs will demonstrate A1c reduction post-PAP enrollment.

Study Design: A retrospective chart review evaluating patients in an ambulatory care setting who received antidiabetic medications through PAPs from January 1, 2020 to December 31, 2020 and the effects on their A1c.

Methods: The primary outcome is the percentage of A1c reduction at least 3 months after PAP enrollment compared to A1c before enrollment. Total duration of study is 15 months. EMR chart reviews were utilized to determine PAP enrollment date, medication used, and A1c results.

Results: Forty patients were enrolled in PAPs for antidiabetic medications. Patients received an average of 1.68 medications through the programs, with 35 of the patients (87.5%) receiving insulin products, 30% receiving an injectable GLP-1 receptor agonist and 2.5% receiving an oral antidiabetic medication. Of the 40 patients enrolled in PAPs, 38 patients had an A1c performed at least 3 months after PAP enrollment and 25 patients (66%) demonstrated improvements in A1c, with an average A1c improvement of 1.012%. Additionally, 20% of patients with a reduction in A1c post-PAP enrollment achieved an A1c of less than 8%.

Conclusion: Patients enrolled in PAPs observed an increase in A1c reduction. PAPs make antidiabetic medications more accessible to patients by reducing their costs. This can lead to improved healthcare outcomes and cost savings.

19 | Assessing Appropriate Panel Size and Optimization of Quality Metrics for Ambulatory Care Pharmacists in the Primary Care Setting

Nimet Ozbay, Pharm.D., Benjamin King, Pharm.D., BCACP and Cynthia King, Pharm.D., BCACP

The MetroHealth System, Cleveland, OH

Introduction: Chronic disease state management utilizing pharmacists improves quality metrics, allows providers to focus on acute issues, and decreases burnout risk. However, minimal data exists on determining pharmacist panel size and its impact on patient access and quality metrics.

Research Question or Hypothesis: This study aims to determine appropriate pharmacist panel size based on workload, quality metrics, and patient access.

Study Design: A retrospective analysis of diabetic patients managed by pharmacists at seven outpatient clinics.

Methods: The primary objective calculated panel size per FTE utilizing the National Health Interview Survey (NHIS), which averaged six visits to a diabetes provider per patient per year. Secondary objectives calculated the ideal FTE based on provider to pharmacist ratio, and determined impact of pharmacist panel size on patient access and quality metrics (composite HbA1c <9%, BP <140/90, and statin therapy)

Data Analysis: Numerical data were tested for mean equivalence across study sites via single factor ANOVA tests ($p<0.05$ via two-sided testing). Pearson's chi-squared or Fisher's exact tests were performed to compare sites for distributional equality of categorical data.

Results: 4399 patients were analyzed from 2017-2019 with age (57.4-62.6 years), gender (52.5-63.5% female), race (41.2-93.7% African American), insurance type (13.3%-41% Medicaid), and mean number of medications (13.1-20.3) being significantly different between sites. Primary outcome showed actual panel sizes were less than calculated. However, secondary outcomes indicated each site was understaffed (actual 0.2-0.5 FTE, calculated 2.52-7.34 FTE), and overbooked (95-122% capacity, 17-54.2 days for time to third next available appointment). Patients met the composite quality metric 35.1-56.3% across the sites.

Conclusion: The NHIS calculation overestimates panel size for pharmacists because unlike other providers, pharmacists do not retain stable at-goal patients. Alternative tools, such as patient access metrics or provider-to-pharmacist ratio, are better suited for determining pharmacist panel size. Increasing pharmacist FTEs can help improve patient outcomes and access.

20 | Factors associated with improved glycated hemoglobin values amongst patients with uncontrolled type 2 diabetes mellitus

Shannon Walter, Pharm.D. and *Ryan Popp, Pharm.D.*
Ambulatory Clinical Pharmacy, Harris Health System, Houston, TX

Introduction: Patients with uncontrolled type 2 diabetes mellitus, defined as having a glycated hemoglobin (A1c) ≥ 9.0%, are at risk of developing complications and can be difficult to treat. It is uncertain which factors are associated with improved A1c values these patients.
Research Question or Hypothesis: Which factors are associated with improving A1c from ≥ 9.0% to < 9.0% in patients with uncontrolled type 2 diabetes mellitus?
Study Design: Retrospective case-control study.
Methods: Patients who presented to a single ambulatory care clinic between December 1, 2019 and February 28, 2020 with an A1c ≥ 9.0% were included. The patients' health records were retrospectively followed for 8 months following the index date. Data on factors that could influence diabetes control were collected for each patient including demographic information, medication use, insulin resistance status, medication adherence, number of physician visits, and use of auxiliary services including the clinical pharmacy specialist, nutritionist, or patient educator. Variables that differed significantly (using alpha of 0.05) between patients with an ending A1c ≥ 9.0% versus < 9.0% were included in a logistic regression analysis. The primary outcome was the factors (with odds ratios) associated with an improvement in A1c from ≥ 9% to < 9%. GraphPad Prism 9.0.0 (La Jolla, California) was utilized for statistical analysis.
Results: 365 patients were screened for eligibility, and 209 patients satisfied inclusion and exclusion criteria. 84 (40.2%) patients achieved an A1c of < 9.0%. Factors associated with achieving an A1c < 9.0% included medication adherence (OR 2.10 [95% CI 1.09-4.12]) and clinical pharmacy specialist visit (OR 1.82 [95% CI 1.004-3.35]). Insulin resistance decreased the odds of achieving an A1c < 9.0% (OR 0.36 [95% CI 0.16-0.77]).
Conclusion: This study identified multiple factors that may influence A1c lowering. Further research may be beneficial to determine the generalizability of these findings.

21 | Pharmacist Impact on Evidence-Based Prescribing of Diabetes Medications in Patients with Clinical Atherosclerotic Cardiovascular Disease (ASCVD)

Caressa Trueman, Pharm.D.[1], Anthony Donovan, Pharm.D.[2], Carrie McAdam-Marx, MCSI, Ph.D., RPh[2], Canice Coan, Pharm.D.[1] and Emily Chan, Pharm.D.[1]
[1]*Nebraska Medicine, Omaha, NE* [2]*College of Pharmacy, Department of Pharmacy Practice and Science, University of Nebraska Medical Center, Omaha, NE*

Introduction: Pharmacist integration into primary care teams improves treatment outcomes. As part of Nebraska Medicine's Patient Centered Medical Home (PCMH) primary care teams, pharmacists initiate, titrate and discontinue antidiabetic agents via collaborative practice. Current American Diabetes Association (ADA) Standards of Care recommendations for pharmacotherapy are categorized by patients' comorbidities, including use of GLP-1 receptor agonists (GLP-1RA) and SGLT-2 inhibitors (SGLT-2i) for those with clinical atherosclerotic cardiovascular disease (ASCVD). There is limited literature evaluating physician or pharmacist adherence to this ADA recommendation.
Research Question or Hypothesis: Are patients with type 2 diabetes mellitus (T2DM) and clinical ASCVD managed by PCMH pharmacists more likely to have medication lists in concordance with ADA recommendations for GLP-1RA and/or SGLT-2i therapy compared to usual care?
Study Design: Retrospective, cross-sectional study
Methods: Included patients were aged 19 years or older, with T2DM and clinical ASCVD, and seen in a primary care clinic between June 1, 2019 and May 30, 2020. Pharmacist referral and prescription orders for GLP-1RA and SGLT-2i with evidence of cardiovascular risk reduction were identified in the electronic medical record. The primary outcome was presence of a recommended GLP-1RA or SGLT-2i. Reasons for absence of GLP-1RA or SGLT-2i were identified via chart abstraction for a 10% random sample. A Chi-square test compared treatment between groups.
Results: The study identified 1969 patients of which 245 (12.4%) were managed by PCMH pharmacists. Patients managed by PCMH pharmacists were more likely to be prescribed a GLP-1RA and/or SGLT-2i with cardiovascular risk reduction versus usual care (50.2% vs 15.9%; p<.001). Of those without a recommended agent, 24 (13.5%) had contraindications against use; a majority had not been evaluated for GLP-1RA or SGLT-2i use.
Conclusion: Pharmacist care is associated with improvement in adherence to ADA prescribing guidelines in patients with clinical ASCVD within the PCMH setting. However, opportunity exists for improvement in guideline concordant medication prescribing in these patients.

22 | Assessment of Chronic Obstructive Pulmonary Disease in an Internal Medicine Clinic

Kathrine Distel, Pharm.D., Michelle Cudnik, Pharm.D., Rachel Dragovich, Pharm.D. and Julia Lantry, MD
Summa Health, Akron, OH

Introduction: Chronic obstructive pulmonary disease (COPD) is associated with significant morbidity and mortality. The Centers for Medicare and Medicaid Services (CMS) has criteria for service

reimbursement based on COPD guidelines which highlight the importance of an inhaled long-acting bronchodilator, tobacco cessation counseling, appropriate vaccinations, and hospital readmission.

Research Question or Hypothesis: The purpose of this quality improvement project is to characterize compliance with CMS criteria and guideline recommendations within Summa Health's Internal Medicine Center (IMC).

Study Design: Retrospective chart review

Methods: Included patients had COPD and were seen in the IMC January--June 2019. Data collected included COPD hospitalizations, smoking history, COPD pharmacotherapy, pulmonology referral, PFTs, and immunizations. Descriptive statistics were calculated and Pearson chi-square test was used to compare groups.

Results: Two hundred and six patients were included with 56.3% female and an average age of 61 years. Patients prescribed a long-acting bronchodilator (76%) were significantly more likely to have been referred to pulmonology than those who did not have a prescription (55.4% vs 29.3%, p=0.001). There was no association between hospitalization for COPD and prescription of long-acting bronchodilator (p=0.561). Seventy-two percent of patients had completed PFTs, 68% of whom had an FEV1/FVC ratio of 70% or less. Rates of recommended vaccinations were: 76% (Pneumovax23 prior to age 65); 61% (Pneumovax23 after age 65); 80% (Prevnar13); 75% (current TDaP); and 72% (current influenza). The majority of patients had a history of smoking, of whom 57% (n=114) were still smoking. Forty-two active smokers (37%) were prescribed smoking cessation pharmacotherapy with the majority receiving nicotine replacement therapy.

Conclusion: A majority of patients with COPD were prescribed a long-acting bronchodilator and received appropriate vaccinations. Less than half of participants had a definitive diagnosis of COPD based on spirometry. New initiatives in the clinic should focus on obtaining current PFTs, smoking cessation appointments, and appropriate inhaler selection and teaching.

23 | Impact of a pharmacist-led polypharmacy comprehensive medication review service in the primary care setting

Joshua McDonald, Pharm.D.
Pharmacy Services, Intermountain Healthcare, Taylorsville, UT

Introduction: The Centers for Disease Control and Prevention (CDC) estimate 22% of people aged 40-79 take at least 5 medications. This increases to 35% in patients aged 60-79. Polypharmacy (5 or more chronic medications), is associated with increased risk of adverse drug events and hospitalization. Pharmacists in primary care clinics are ideally situated to work with clinic teams to reduce polypharmacy.

Research Question or Hypothesis: The question of this study was what is the impact that pharmacist-led comprehensive medication reviews (CMRs) have on primary care patients who experience polypharmacy at Intermountain Healthcare.

Study Design: This was a single-institution, prospective, cohort analysis

Methods: Patients with Intermountain Healthcare primary care providers (PCPs) were identified utilizing prescription fill information. Patients were included if they had 10 or more medications, a recent fill of a high cost medication (Sodium-glucose transport protein 2 inhibitors, glucagon-like peptide 1 receptor agonists, insulin, branded inhalers), and no pharmacist CMRs within 12 months. Once identified, a pharmacist contacted patients, performed a CMR, and communicated recommendations to the patient's PCP. The primary outcome for this study was number of medication therapy problems (MTPs) identified per CMR. Secondary outcomes included recommendations and time spent per CMR and cost issues addressed, among others. This was a quality improvement initiative and deemed Institutional Review Board (IRB) exempt.

Results: Over a 6-week period, 49 patients were included in this study. The average number of medications per patient was 13.8 and each CMR took on average 46 minutes. 1.93 MTPs were identified with 2.62 recommendations per encounter. Cost issues (financial assistance programs access, copay cards, formulary changes) were addressed in 26% of encounters.

Conclusion: The insight gained from this study will be used to refine a polypharmacy medication review service for primary care patients within Intermountain Healthcare, as well as to determine other factors contributing patient benefit from pharmacist led CMRs

Cardiovascular

24 | Pharmacologic management of heart failure with recovered ejection fraction

Andrea Duque, Pharm.D. Candidate[1], Scott Arrighi, Pharm.D. Candidate[1], Dailin Sanchez, Pharm.D. Candidate[1] and *Melissa Santibañez, Pharm.D., BCCCP*[2]
[1]*Larkin University College of Pharmacy, Miami, FL* [2]*Department of Pharmacy Practice, Nova Southeastern University College of Pharmacy, Fort Lauderdale, FL*

Introduction: Heart failure with recovered ejection fraction (HFrecEF) is a subcategory of heart failure encompassing patients who previously had heart failure with reduced ejection fraction (HFrEF) but whose ejection fraction (EF) subsequently recovered upon initiation of guideline-directed evaluation and management (GDEM). HFrecEF has been most consistently defined as an initial EF ≤40% with subsequent recovery by ≥10% to a new EF ≥40% and symptom resolution after initiating GDEM.

Research Question or Hypothesis: The purpose of this study was to provide evidence-based medication recommendations to improve clinical outcomes in HFrecEF.

Study Design: Retrospective literature search.

Methods: English-language MEDLINE-indexed studies published at any time focused on adult HFrecEF patients were reviewed. Included studies addressed HFrecEF and provided either pharmacotherapy or other clinical outcomes data. The primary outcome was clinical outcomes associated with specific medication recommendations in HFrecEF.

Results: Seven studies were included in the primary analysis. HFrecEF patients with poor adherence to maintenance HF medications were 26,667 times more likely to experience further EF reductions ≥10%. Three-year mortality rates of 16.3%, 13.2%, and 4.8% have been reported in patients with HFrEF, heart failure with preserved ejection fraction (HFpEF), and HFrecEF, respectively. HFrecEF patients that subsequently relapsed into HFrEF were 11.7 times more likely to die than patients without EF relapse. Additionally, patients taking beta-blockers at less than target doses had a significantly higher probability of relapsing back to HFrEF (p=0.03). Patients with EF recovery of at least 10% above 40% in 1 year were more likely to have a subsequently relapsed EF if taking ≥3 maintenance HF medications or if aldosterone antagonists were continued.

Conclusion: Patients with HFrecEF generally have lower mortality rates than HFrEF patients, but upon EF relapse, survival is significantly reduced. Risk factors for relapsing include discontinuation of maintenance HF medications, beta-blocker usage at less than target doses, and continuation of aldosterone antagonists once EF recovers ≥50%.

25 | Hospital Pharmacists Involvement in Heart Failure Pharmacotherapy Management: Survey of Pharmacists from 4 Canadian Hospitals

Ricky Turgeon, BSc(Pharm), ACPR, Pharm.D.[1], Karen Dahri, BSc(Pharm), ACPR, Pharm.D.[2], Nichoe Huan, BSc(Pharm), ACPR[3], Leanne Leung, BSc(Pharm), ACPR, Pharm.D.[4] and Craig Roels, BSc(Pharm), ACPR, Pharm.D.[5]

[1]*Faculty of Pharmaceutical Sciences, University of British Columbia, Vancouver, BC, Canada* [2]*University of British Columbia, Vancouver, BC, Canada* [3]*Richmond Hospital, Richmond, BC, Canada* [4]*St. Paul's Hospital, Vancouver, BC, Canada (5)Royal Columbian Hospital, New Westminster, BC, Canada*

Introduction: Medications are the cornerstone of heart failure (HF) with reduced ejection fraction (HFrEF) management, yet their use is suboptimal. HF hospitalization represents an opportunity for pharmacists to optimize HFrEF pharmacotherapy.

Research Question or Hypothesis: What are current HFrEF pharmacotherapy management practices and treatment expectations of hospital pharmacists caring for acute HF patients?

Study Design: Online survey (conducted December 2020-January 2021).

Methods: Pharmacists from 4 Canadian hospitals were invited to complete the survey. The questionnaire evaluated current HFrEF pharmacotherapy initiation/titration practices in acute HF patients, outcome prioritization, and expected mortality benefit. The primary outcome was likelihood of initiating/titrating HFrEF pharmacotherapy on a 5-point Likert scale.

Results: Respondents (n=56; 33% response rate) cared for a median 8 HFrEF patients/month. Most (>90%) respondents felt at least moderately familiar and comfortable managing HFrEF pharmacotherapy. Respondents were likely to initiate an angiotensin-converting enzyme inhibitor/angiotensin-II receptor blocker (ACEI/ARB) (98%), beta-blocker (91%), and mineralocorticoid-receptor antagonist (MRA) (82%), but few would switch an ACEI/ARB to sacubitril-valsartan (39%), or initiate sacubitril-valsartan in ACEI/ARB-naïve patients (12%), ivabradine (12%), or digoxin (4%). Most respondents would initiate a sodium-glucose cotransporter-2 inhibitor (SGLT2i) in patients with type 2 diabetes (70%), but few without diabetes (18%). Similar patterns emerged for titration, with most uptitrating ACEI/ARB, beta-blocker and MRA, and fewer uptitrating sacubitril-valsartan, SGLT2i, or ivabradine. Mortality ranked as the respondents' top priority for HFrEF pharmacotherapy. In a patient with estimated 5-year mortality of 35% receiving subtarget ACEI, respondents estimated a median 5% absolute mortality reduction with ACEI uptitration or SGLT2i initiation, and 8% with switching to sacubitril-valsartan.

Conclusion: Hospital pharmacists generally felt comfortable initiating/titrating older HFrEF medications (ACEI/ARB, beta-blocker and MRA) in acute HF patients, whereas few would initiate/titrate novel HFrEF medications with additional mortality benefit despite prioritizing this outcome. Education activities and practice tools targeting these evidence-to-practice gaps may improve HFrEF outcomes.

26 | Cangrelor Bridging in those Undergoing Elective Procedures Requiring Interruption of Dual Antiplatelet Therapy

Alok Salgia, Doctor of Pharmacy[1], Chelsea Krueger, Doctor of Pharmacy[2] and Michael Gillette, Doctor of Pharmacy[1]

[1]*Michael E. DeBakey VA Medical Center, Houston, TX* [2]*VA North Texas Health Care System, Dallas, TX*

Introduction: For patients who recently received a percutaneous coronary intervention (PCI) with a drug-eluting stent, guidelines recommend dual antiplatelet therapy (DAPT) consisting of aspirin and a P2Y12 inhibitor. This can be a minimum of 6-months to mitigate the risk for major adverse cardiac events (MACEs) and stent thrombosis (ST). However, a procedure may be necessary during this time which necessitates interruption of DAPT. Due to the long half-life and bleeding risk associated with P2Y12 inhibitors, patients may require alternative agent during this time. Cangrelor has been shown to be an option due to its short-half life.

Research Question or Hypothesis: The purpose of this study is to evaluate clinical outcomes of those with a cardiac stent who were bridged with cangrelor for a procedure.

Study Design: Dual-VA medical center, retrospective study

Methods: Patients evaluated were those bridged with cangrelor for a procedure between July 2015 to August 2020. The primary outcome was bleeding using the bleeding academic research consortium

(BARC) criteria. Secondary outcomes were MACEs including stroke, myocardial infarction (MI), death, ST and revascularization for up to 30-days after.

Results: There were 42 men meeting inclusion criteria of which 24 (≈57%) were Caucasian with an average age of 70-years. Over half required interruption of DAPT due to undergoing coronary artery bypass grafting (≈38.1%) and transurethral resection of bladder tumor (≈16.7%). There were 9 patients with a BARC score of at least 1 (≈21.4%) and 4 (≈9.5%) cases with BARC bleeding of 2 or more. There were four MACEs (i.e. MI, two deaths, revascularization) occurring within 30-days. Six out of 42 (14.2%) cases also had inappropriate transition between P2Y12 treatments.

Conclusion: Our study suggests that cangrelor may be a reasonable alternative for those undergoing a procedure which requires bridging. Larger, comparative studies are needed to further define the risks versus benefits and cost effectiveness.

27 | Utilization of select guideline-directed medical therapies in heart failure patients with reduced ejection fraction

Anna Parker, Pharm.D.[1], Jennifer E Stark, Pharm.D., BCPS, FCCP[2], Lisa Barnes, Pharm.D., BCPS[1] and Carol Allred, BS, RPh[1]
[1]*Veterans Health Care System of the Ozarks, Fayetteville, AR*
[2]*Department of Pharmacy, Veterans Health Care System of the Ozarks, Fayetteville, AR*

Introduction: Guideline directed medical therapy (GDMT) decreases mortality and hospitalizations of patients with heart failure with reduced ejection fraction (HFrEF). Electronic trending reports suggest 64.7% veterans with HFrEF were prescribed an angiotensin-converting-enzyme inhibitor, angiotensin II receptor blocker, or angiotensin receptor-neprilysin inhibitor (targeted-GDMT) in 2020.

Research Question or Hypothesis: Does a pharmacist-initiated alert to initiate targeted-GDMT in patients with HFrEF increase the percentage of patients prescribed targeted-GDMT?

Study Design: Prospective self-controlled study at a rural veterans health care system

Methods: Investigators reviewed medical records of patients with ICD-10 code for HFrEF not prescribed targeted-GDMT. The project included outpatients with a diagnosis of HFrEF, a documented ejection fraction ≤40%, not prescribed targeted-GDMT at baseline, and receiving care at the study facility within 12 months of project. Electronic medical records (EMR) were screened for prescription status of targeted-GDMT and contraindications. A pharmacist-initiated alert in the EMR was sent to providers to consider prescribing targeted-GDMT in patients without contraindications. Patients served as their own control. The primary outcome was the rate of patients prescribed targeted-GDMT before and after the pharmacist-initiated alert was implemented. Chi square was used to analyze the primary outcome with alpha set at 0.05 and 80% power requiring 152 patients in each group to detect a 5% incidence of patients prescribed targeted-GDMT after intervention.

Results: Of the veterans with HFrEF at the study facility, 127 met the inclusion criteria however 37 of the 127 were contraindicated to targeted-GDMT. The most common contraindications were serum creatinine ≥3, hyperkalemia, and history of angioedema. Pharmacist-initiated alert was entered for 90 patients. After pharmacist-initiated alert, 27 of the 127 (P<0.001) enrolled patients were prescribed targeted-GDMT.

Conclusion: A pharmacist-initiated alert led to statistically significant increase of HFrEF patients prescribed targeted-GDMT. Pharmacists are a proven asset to the patient care team and can increase the prescribing of GDMT.

28 | Multi-center analysis of apixaban prescribing patterns for treatment and prevention of VTE in dialysis patients

Brittany White, Pharm.D.[1], Jason Ware, Pharm.D. Candidate[2], Megan Van Berkel Patel, Pharm.D.[1], B. Tate Cutshall, Pharm.D.[3], Sami Sakaan, Pharm.D., BCPS[4] and Adam Sawyer, Pharm.D., BCPS[5]
[1]*Department of Pharmacy, Erlanger Health System, Chattanooga, TN*
[2]*School of Pharmacy, Mercer University College of Pharmacy, atlanta, TN*
[3]*Deparment of Pharmacy, Methodist Le Bonheur Healthcare, Memphis, TN* [4]*Department of Pharmacy, Methodist Le Bonheur Healthcare, Memphis, TN* [5]*Department of Pharmacy, Huntsville Hospital, Huntsville, AL*

Introduction: Although dose modification recommendations exist for apixaban use for stroke prophylaxis in atrial fibrillation, no changes are recommended with renal impairment for venous thromboembolism (VTE). Despite a paucity of data, prescribing of apixaban in chronic dialysis patients for treatment or prevention of VTE is increasingly prevalent and discordance exists among clinicians as to the most appropriate dose which balances efficacy and bleeding risk.

Research Question or Hypothesis: Significant variation exists in apixaban dosing for treatment and prevention of VTE among patients on chronic dialysis.

Study Design: Multi-center retrospective study of three academic medical centers.

Methods: Adult patients on chronic dialysis were included if apixaban was received between May 2018-May 2020 for the indication of VTE treatment or prevention. The primary outcome was to describe prescribing patterns. Secondary outcomes included incidence of recurrent VTEs and clinically significant bleeding both during and after the index hospitalization. Results are presented using descriptive statistics.

Results: Sixty-one patients were included for analysis. The majority of patients received apixaban for acute VTE (n=29), followed by history of VTE (n=20), chronic VTE (n=16), and acute arteriovenous graft thrombosis (n=3). Several patients had multiple indications documented. Of patients with an acute VTE indication, 19 (65.5%) received a reduced dosing regimen. Nine recurrent VTEs, and 7 bleeding events were observed. Among the entire study sample, a reduced dose of 2.5 mg twice daily was observed in 28 (45.9%) of patients receiving apixaban for VTE treatment or prevention.

Conclusion: There was significant variation in apixaban dosing among dialysis patients with VTE. Unapproved apixaban dose reductions were common. The results of this study indicate an urgent need for additional larger, prospective studies to evaluate modified apixaban dosing in treatment and prevention of VTE, as well as clinician education on apixaban manufacturer dosing recommendations for this studied population.

30 | Direct Oral Anticoagulants Versus Warfarin for the Treatment of Left Ventricular Thrombus

Lauren Harris, Pharm.D. Candidate[1], Arefa Bacchus, Pharm.D. Candidate[2], Alexandria Wingler, Pharm.D. Candidate[3], Hannah Bunn, Pharm.D. Candidate[2], Alexandra Mihm, Pharm.D.[4], Sarah Nisly, Pharm.D., BCPS, FCCP[5], Kyle Davis, Pharm.D., BCPS[6] and Harry Hicklin, MD[7]

[1]*High Point University Fred Wilson School of Pharmacy, High Point, NC* [2]*Campbell University College of Pharmacy & Health Sciences, Buies Creek, NC* [3]*Wingate University School of Pharmacy, Wingate, NC* [4]*Wake Forest Baptist Health, Winston Salem, NC* [5]*Department of Pharmacy, Wake Forest Baptist Health, Winston Salem, NC* [6]*Department of Pharmacy, Wake Forest Baptist Health, Winston-Salem, NC* [7]*Department of Internal Medicine, Wake Forest Baptist Health, Winston-Salem, NC*

Introduction: Existing data on the use of direct oral anticoagulants (DOACs) for left ventricular (LV) thrombus remains controversial. Some studies support the use of DOACs for LV thrombus, while others do not. The purpose of this study was to determine the safety and efficacy of DOACs compared to warfarin for the treatment of patients with LV thrombus.

Research Question or Hypothesis: Are DOACs safe and effective treatment options compared to warfarin for LV thrombus?

Study Design: Single-center, retrospective cohort study

Methods: This was an Institutional Review Board approved retrospective cohort study of adults admitted to Wake Forest Baptist Health between January 1, 2013 and December 31, 2019 with LV thrombus and prescribed a DOAC or warfarin. The primary endpoint was stroke or systemic embolism (SSE) within 6 months of discharge. Secondary endpoints included major bleeding, bleeding-related hospital admission, thrombus resolution, and mortality within 6 months of discharge.

Results: 108 patients total received treatment, 30.6% (n=33) receiving a DOAC and 69.4% (n=75) receiving warfarin. The primary endpoint of SSE within 6 months of discharge occurred in 9.1% (n=3) patients receiving a DOAC and 5.3% (n=4) patients receiving warfarin. Major bleeding occurred in more patients receiving DOACs compared to warfarin (n=5, 15.2% vs n=2, 2.7%, $p < 0.05$). Of the 64 patients who received follow-up imaging, thrombus resolution was similar between groups.

Conclusion: DOACs were associated with a numerically greater rate of SSE and statistically greater rate of major bleeding events compared to warfarin. Considering the findings of this and other published studies, DOACs should not be considered first-line therapy for the management of LV thrombus at this time. Future studies, including larger, prospective studies, should be considered for clinical decisions regarding DOACs for LV thrombus.

31 | Medication Use Evaluation of Antiplatelet Agents in Patients with Non-ST-Elevation Myocardial Infarction in Patients who Undergo Percutaneous Coronary Intervention

Drew Wells, Pharm.D.[1], Brandon Cave, Pharm.D.[1], Shanise Patterson, Pharm.D.[2] and *Alysa Baumann, Pharm.D., MBA*[1]

[1]*Methodist University Hospital, Memphis, TN* [2]*Methodist South Hospital, Memphis, TN*

Introduction: In 2004, the American College of Cardiology/American Heart Association updated the recommendation for administering P2Y12 inhibitors (P2Y12i) in NSTEMI from "as soon as possible" to "before stenting." Currently at Methodist Le Bonheur Healthcare (MLH) adult hospitals P2Y12i are frequently administered in the emergency department rather than immediately prior to catheterization. Early administration increases the possibility for duplication of P2Y12i loading doses (LD), inappropriate timing of maintenance dosing, or multiple doses of P2Y12i in a 24-hour period agents which presents a safety concern.

Research Question or Hypothesis: The aim of this medication use evaluation was to evaluate the appropriateness of P2Y12i timing and safety for patients with NSTEMI who also underwent PCI

Study Design: Retrospective, chart review

Methods: Adult patients admitted to the MLH system between December 2019 and March 2020 with an ICD10 diagnosis code for NSTEMI who underwent PCI and had received P2Y12i therapy were included in the evaluation. Patients undergoing CABG were excluded.

Results: Of the 700 patients screened, 300 were included. Ticagrelor (55%) was the most frequently used P2Y12i. Multiple LD were given to 58 patients. Of the patients given multiple LD and ticagrelor selected as the initial agent, 83% of patients received a second ticagrelor LD. Timing of administration for the maintenance doses of clopidogrel and ticagrelor were appropriate 58% and 36% of the time, respectively. There were no statistically significant changes in hemoglobin or platelets seen on post-PCI day 1 or 2. Of the 58 patients that received a second LD, two had documented bleeding events.

Conclusion: The results from this retrospective medication use evaluation demonstrated that roughly 1 in 5 patients with a NSTEMI were likely to be given a duplicate P2Y12i LD prior to PCI. Larger observational studies are needed to evaluate the safety of duplicate loading doses of P2Y12i prior to PCI.

32 | Evaluation of amiodarone use in patients undergoing valve replacement and coronary artery bypass grafting

Emery Smith, Student Pharmacist[1], Miranda Cason, Pharm.D. Candidate[2], Thomas Szymanski, Pharm.D, BCCP[3] and Galen Kabulski, Pharm.D, BCPS, BCCP[3]

[1]West Virginia University School of Pharmacy, Morgantown, WV [2]Department of Pharmacy, West Virginia University Medicine, Morgantown, WV [3]Department of Pharmaceutical Services WVU Medicine, Morgantown, WV

Introduction: Guidelines recommend using a beta-blocker or non-dihydropyridine calcium channel blocker over intravenous (IV) amiodarone to control the ventricular rate in patients who develop POAF after cardiac surgery. At West Virginia University (WVU) Medicine, there are currently no guidelines for the use of oral and IV amiodarone in patients undergoing cardiac surgery, including those developing postoperative atrial fibrillation.

Research Question or Hypothesis: The purpose of this evaluation is to characterize the prescribing habits of amiodarone in cardiac surgery patients, specifically in those receiving coronary artery bypass grafting (CABG), valve replacements, or both.

Study Design: Retrospective chart review of adult patient undergoing CABG, valve replacement, or combined surgeries at WVU Medicine from January 1, 2019 – December 31, 2019

Methods: Patients were categorized by development of a new post-operative arrhythmia, including atrial fibrillation, atrial flutter, and ventricular tachycardia. Exclusion criteria included concomitant Cox-Maze procedure, history of atrial fibrillation or ventricular tachycardia, prior use of anti-arrhythmic medications, and mortality during index admission.

Results: Of the 87 patients meeting inclusion criteria, 41 (47%) of those patients developed POAF. A total of 14 (35.8%) patients who experienced POAF were receiving a scheduled oral beta-blocker prior to their episode and 2 (5.1%) of patients received a dose of IV metoprolol to treat the first episode. The median number of amiodarone boluses given to patients who experienced POAF was 2. The median total dose of amiodarone administered in oral milligram equivalents was 5,455 mg. The median length of time these patients received IV amiodarone was 31 hours while the median length of overlap between intravenous and oral amiodarone was 21 hours.

Conclusion: This data shows current practices of amiodarone prescribing in cardiac surgery patients at a large academic medical center and will be used to optimize selection of patients in whom amiodarone may be indicated.

33 | Efficacy of Vernakalant in Postoperative Atrial Fibrillation following Cardiac Surgery at Barts Heart Center in London, England

Grace Yun, Pharm.D. Candidate 2021[1], Stephanie Hendricks, Pharm.D. Candidate 2021[2], Sotiris Antoniou, MRPharmS[3], Monica L. Miller, Pharm.D., MS[4] and Ellen Schellhase, Pharm.D.[5]

[1]College of Pharmacy, Purdue University, West Lafayettte, IN [2]College of Pharmacy, Purdue University, West Lafayette, IN [3]Barts Health NHS, London, United Kingdom [4]Department of Pharmacy Practice, Purdue University College of Pharmacy, West Lafayette, IN [5]Purdue University, West Lafayette, IN

Introduction: Atrial fibrillation (AF) is the most common arrhythmia following surgery and while the mechanism is not fully defined, it is known that postoperative atrial fibrillation (POAF) is associated with lower health outcomes and increased healthcare costs. Currently, the European Society of Cardiology recommends the use of pharmacological and electrical cardioversion, with vernakalant and amiodarone being Class I Level A pharmacological conversion agents. Both agents are part of the POAF protocol at Barts Heart Center (BHC) in London, England.

Research Question or Hypothesis: Is vernakalant a more effective conversion agent than amiodarone in patients with POAF following cardiac surgery?

Study Design: Single center retrospective chart review

Methods: A service evaluation was performed on all patients with POAF at BHC over a 3-year period. Data collected included assessment of rate of return to stable sinus rhythm (SR) and total AF load, resource utilization (including time spent in the ICU, reinsertion of central venous line to manage arrhythmia, and time spent in hospital), and adverse effects during AF treatment.

Results: Forty-two patients met criteria for analysis. A total of 23 patients (54.8%) were cardioverted to SR with vernakalant, but 18 of those patients reverted to AF. Twenty-seven patients received amiodarone (14 reverted to AF after use of vernakalant and 13 were not cardioverted with vernakalant). A total of 22 patients were cardioverted with amiodarone (11 from each group).

The median rate of return to sinus rhythm was 30 minutes, with a standard deviation of 153.31; the median ICU stay was 6 days, with a standard deviation of 12; no patients required a line change; lastly, the median hospital stay was 11 days, with a standard deviation of 19.

Conclusion: Vernakalant was not recommended to be used over amiodarone for POAF. Further analysis of data collected will be conducted before finalizing changes to the BHC POAF protocol.

Community Pharmacy Practice

35 | Implementation of a smart adherence technology intervention in community pharmacy settings: A qualitative study

Sadaf Faisal, BPharm[1], Jessica Ivo, BSc[1], Ryan Tennant, BASc[2], Kelsey-Ann Prior, Pharm.D.[1], Kelly Grindrod, Pharm.D., MSc[1], Colleen McMillan, Ph.D.[3] and Tejal Patel, Pharm.D.[1]

[1]School of Pharmacy, University of Waterloo, Kitchener, ON, Canada [2]Faculty of Engineering, University of Waterloo, Waterloo, ON, Canada [3]Renison University College, Univeristy of Waterloo, Waterloo, ON, Canada

Introduction: Emerging medication dispensing technologies offer real-time monitoring of medication intake, providing pharmacists with an opportunity to identify and address non-adherence. However, the

integration and feasibility of using these technologies within the workflow of a community pharmacy is unknown. To support the successful adoption of such technologies, it is necessary to examine and address the barriers and promote the facilitators.

Research Question or Hypothesis:What are the factors that can affect implementation of a smart adherence technology system in community pharmacies?

Study Design: Pilot study using qualitative semi-structured interviews.

Methods: Older adults with chronic conditions were recruited to use a prototype smart multidose blister package for eight weeks. Their respective community pharmacies were recruited to package and dispense medications in these smart multidose packages and monitor real-time medication intake via a web-portal. Pharmacy staff were invited to participate in semi-structured interviews. The interview guide was based on the Technology Acceptance Model (TAM), Theory of Planned Behaviour (TPB), and Capability, Opportunity, Motivation and Behaviour (COM-B) Model. Interview transcripts were analysed thematically, and themes and sub-themes were mapped back to the TAM, TPB and COM-B Model.

Results: Three pharmacies implemented the prototype smart adherence technology system. Three pharmacists and one pharmacy assistant were interviewed. Three themes and 12 subthemes were generated including pharmacy workflow factors (sub-themes: staff availability, training and role, workload, workflow organization, cost, regulatory implication, feedback from others), integration factors (sub-themes: product and portal), and pharmacist perceived patient factors (sub-themes: potential users, concerns for users, costs to end-users and technology access for the end users).

Conclusion: Although community pharmacists value the availability real-time medication intake data to monitor medication intake and adherence of their patients, a careful evaluation of pharmacy infrastructure including staffing, workload, and budgets, along with product features is vital prior to implementing such interventions.

36 | Central Appalachian Community Pharmacists' Attitudes and Beliefs About Harm Reduction and Addiction

KariLynn Dowling-McClay, Pharm.D., MPH, BCACP, Cynthia Hicks, N/A, Zara Petzoldt, BS, Eric Whalen, BA and Nicholas Hagemeier, Pharm. D., Ph.D

Department of Pharmacy Practice, Gatton College of Pharmacy, East Tennessee State University, Johnson City, TN

Introduction: Harm reduction measures, such as naloxone and medications for opioid use disorder (MOUD), are essential to combating the opioid epidemic in Central Appalachia. With several harm reduction interventions potentially available via community pharmacies, it is important to assess pharmacists' addiction-related attitudes and beliefs as one indicator of potential engagement in these services.

Research Question or Hypothesis: What are Central Appalachian community pharmacists' attitudes and beliefs about harm reduction and addiction?

Study Design: An injection drug use-themed census survey of community pharmacies in Appalachian Tennessee, North Carolina, and Virginia was conducted via telephone in 2018.

Methods: Over five weeks, up to 10 attempts were made to contact eligible pharmacies. One response per pharmacy was recorded. An incentive drawing of six $99 gift cards was offered. Secondary analysis of a subset of Likert-type items about harm reduction and addiction was completed using SPSS 25. Descriptive statistics were calculated for all items and subgroup comparisons were conducted using nonparametric tests.

Results: 391 pharmacists completed the survey (52.3% response rate). Nearly half of respondents practiced in Tennessee (45%), followed by North Carolina (28%) and Virginia (27%). Most pharmacists supported viewing addiction as a disease (median=5, 'strongly agree') and opposed abstinence as the only addiction treatment option (median=2, 'disagree'). Pharmacists generally supported availability of MOUD and safe drug use education (median=4, 'agree'), and strongly supported naloxone availability and limiting length of MOUD treatment (median=5). Responses differed significantly across items based on reported political and religious affiliations, gender, or practice state.

Conclusion: Central Appalachian pharmacists generally expressed positive harm reduction and addiction attitudes, but MOUD beliefs (e.g. length of treatment) were not entirely evidence-based. Additionally, wide variation was noted across respondents' personal characteristics. These findings may indicate significant variability in access to evidence-based harm reduction interventions via community pharmacies in the region.

37 | The COVID-19 Vaccine Conundrum - An Assessment of Vaccine Hesitancy Amongst Patients at a Federally Qualified Health Center

Letoia Clark, Pharm.D.[1], Mark T. Sawkin, Pharm.D., AAHIVP[2], Emma Meyer, Pharm.D., FSVHP, DICVP[3] and Brittany Melton, Ph.D., Pharm.D.[4]

[1]KC CARE Health Center, Kansas City, MO [2]Division of Pharmacy Practice and Administration, University of Missouri - Kansas City School of Pharmacy, Kansas City, MO [3]Division of Pharmacology and Pharmaceutical Sciences, University of Missouri - Kansas City School of Pharmacy, Kansas City, MO [4]Department of Pharmacy Practice, University of Kansas School of Pharmacy, Kansas City, KS

Introduction: There are currently three COVID-19 vaccines that have been authorized for emergency use. Vaccine hesitancy has the potential to sabotage COVID-19 vaccination efforts and be detrimental to establishing herd immunity. In order to appreciate the extent of vaccine hesitancy, an adequate understanding of the role that self-identified barriers and epidemiologic factors may play is timely and important.

Research Question or Hypothesis: This study sought to determine answers to the following research questions:

1. Is there a correlation between vaccine hesitancy and epidemiologic factors?
2. What are the perceived patient-reported barriers associated with receiving a COVID-19 vaccine?

Study Design: A descriptive cross-sectional study

Methods: A written questionnaire was utilized to collect data from eligible patients over a 15-week period between October 2020 and February 2021. A combination of non-parametric tests and descriptive statistics were used to analyze this data.

Results: A majority of patients were either very strongly in support of (28.2%) or very strongly against (29.7%) receiving a COVID-19 vaccine. Notable statistically significant findings included patients with advanced degrees being more likely to get vaccinated (48.1%) compared to those without advanced degrees, who were more unlikely to get vaccinated (38.8%) ($p = 0.002$). There was also a statistically significant difference between races and ethnicities regarding their interest in receiving a COVID-19 vaccine. African Americans were more likely to avoid getting vaccinated compared to Caucasians and Hispanics ($p < 0.001$). The most reported barrier to receiving a COVID-19 vaccine was concern for side effects.

Conclusion: This study provides a glimpse into patient-reported barriers to receiving a COVID-19 vaccine. With widespread vaccination underway, it is imperative that we address potential concerns to ensure herd immunity is adequately achieved.

Critical Care

38 | Incidence and Associated Consequences of Hyperchloremia in Subarachnoid Hemorrhage

Brooke Barlow, Pharm.D.[1], *Kellen Greenwell, MEng*[2], Aaron Cook, Pharm.D.[3] and Melissa Thompson Bastin, Pharm.D., BCPS[4]
[1]*University of Kentucky, Lexington, KY* [2]*College of Pharmacy, University of Kentucky, Lexington, KY* [3]*Department of Pharmacy, University of Kentucky HealthCare, Lexington, KY* [4]*Department of Pharmacy Services, University of Kentucky HealthCare, Lexington, KY*

Introduction: Aneurysmal subarachnoid hemorrhage (aSAH) is considered a neurosurgical emergency. Chloride-rich fluids are often utilized in patients with aSAH to maintain euvolemia, decrease intracranial pressure, and preserve cerebral perfusion. Hyperchloremia has been associated with acute kidney injury (AKI) in other critical care populations.

Research Question or Hypothesis:

Primary question: What is the incidence of hyperchloremia (chloride > 109 mEq/L) in patients with aSAH?

Secondary questions: What is the effect of hyperchloremia on the incidence of AKI, mortality, hospital and ICU length of stay (LOS) in patients with aSAH?

Study Design: Retrospective, single-center, cohort study

Methods: Patients admitted to the intensive care unit (ICU) with index diagnosis of non-traumatic aSAH from January 1, 2015 to August 31, 2019 were included for analysis. Daily chloride intake via intravenous fluid (IVF), nutrition, or other route during the first 14 days of stay or until discharge (whichever occurred sooner) was documented for each patient. Risk of hyperchloremia and its association with identified complications was assessed using Wilcoxon Rank-sum, Student's T-Test, Pearson's Chi-square, or Fisher's Exact tests as appropriate. Additionally, a multivariable logistic regression analysis for hyperchloremia and the incidence of AKI was performed.

Results: A total of 436 patients were included for analysis. Hyperchloremia occurred in 280 patients (64%). In patients with hyperchloremia, the mean chloride dose was 120 mEq/day, compared to 114 mEq/day in patients without hyperchloremia ($p=0.4128$). Among patients with hyperchloremia, AKI occurred in 59 (21%), compared to 17 patients among those without hyperchloremia (11%, $p=0.008$). In an unadjusted analysis (i.e. not accounting for severity of illness and other confounding factors), ICU LOS and mortality were higher among patients with hyperchloremia (10.5 days vs. 4 days [$p<0.0001$], 57% vs. 20% [$p=0.048$], respectively).

Conclusion: Hyperchloremia is a common complication among patients with aSAH. Hyperchloremia was associated with higher risk of AKI, longer ICU LOS, and higher mortality.

39 | Clinical Outcomes of Concomitant Use of Enteral and Parenteral Analgesics/Sedatives in Mechanically Ventilated COVID-19 Patients

Nayoung Kang, Pharm.D.[1], Mohammed Alrashed, Pharm.D.[1], Eric Place, Pharm.D., BCPS[1], Phuongthao Nguyen, Pharm.D., BCCCP, BCPS[1] and Brian Erstad, Pharm.D., MCCM, FCCP, FASHP, BCPS[2]
[1]*Pharmacy, University of Arizona College of Pharmacy/Northwest Medical Center, Tucson, AZ* [2]*Department Head, Pharmacy Practice and Science, University of Arizona College of Pharmacy, Tucson, AZ*

Introduction: Mechanically ventilated COVID-19 patients have unusually high requirements for analgesics and sedatives compared to non-COVID 19 patients, and the need for higher dosages coupled with prolonged infusions can contribute to critical drug shortages. In an attempt to preserve the limited supply of the injectable formulations at our institution, use of enteral opioids and benzodiazepines was implemented.

Research Question or Hypothesis: To evaluate potential differences in clinical effect and analgesic/sedative usage between two groups of mechanically ventilated COVID-19 patients based on route of administration: IV+enteral versus IV alone.

Study Design: Retrospective cohort study

Methods: This IRB-approved study evaluated ventilation time and fentanyl or midazolam usage when used concurrently with enteral hydromorphone and lorazepam. Inclusion criteria: 18-89 years old patients admitted to ICU with positive SARS-CoV-2 RT-PCR or antigen test and respiratory failure requiring invasive mechanical

ventilation for >72 hours. Exclusion criteria: pregnancy or breast-feeding, and chronic opioid or benzodiazepine use within 30 days prior to admission. Data were collected in Microsoft Excel for initial analyses with subsequent inferential testing (Student's t-tests) performed using STATA® 13.1, College Station, TX. Significance for all testing was defined as alpha less than 0.05.

Results: One hundred patients were evaluated, 55 in IV+enteral group and 45 in IV only group. There was no significant difference in ventilation time between two groups (20.7±13 vs. 16.5±12 days, p=0.1068). However, there was a statistically significant increase in fentanyl (1869.2±850.5 vs. 2281.6±853.4, p=0.0002) and midazolam (126±76.7 vs. 148.9±77.2, p=0.0061) requirements on day 3 in IV alone group and increase in fentanyl requirements when compared to IV+enteral group (33±842 vs. -412.4±673.6, p= 0.0050).

Conclusion: Duration of mechanical ventilation in patients with COVID-19 is not reduced with combined IV+enteral compared to IV only analgesics/sedatives, but the combination may reduce IV analgesic requirements ameliorating the impact of IV shortages.

40 | The Impact of Clinical Pharmacist Interventions on Albumin Utilization in an Intensive Care Unit

Dina Belal, B.Sc Pharm, M.Sc Pharm,[1], *May Shawki, B.Sc Pharm, M.Sc Pharm, Ph.D.*[2], Mohamed Solayman, B.Sc Pharm, M.Sc Pharm, Ph.D.[3] and Nagwa Sabri, BSc Pharm, MSc Pharm, Ph.D.[1]

[1]Cairo, Egypt [2]Clinical Pharmacy, Faculty of Pharmacy, Ain Shams University, Cairo, Egypt [3]Department of Clinical Pharmacy, Faculty of Pharmacy, Ain Shams University, Cairo, Egypt

Introduction: Albumin is a non-blood plasma substitute known for its high cost and limited availability which has been reported to be inappropriately used in healthcare settings. Hence, interventions are required to control its irrational use.

Research Question or Hypothesis: To evaluate the impact of clinical pharmacist implemented local protocol and restriction dispensing form on albumin use in an intensive care unit (ICU).

Study Design: A retrospective prospective interventional study was conducted at an ICU in a tertiary Egyptian hospital for a period of 2 years.

Methods: The study included three phases; Retrospective 1-year phase where medical records of all patients who have been admitted to ICU and prescribed albumin were reviewed for albumin use appropriateness, Preparation phase where a local albumin use protocol and specific dispensing form were prepared by clinical pharmacists and were approved for use by the hospital drugs and therapeutics committee board, and a Prospective 1-year implementation phase where the developed protocol and the dispensing form were applied. The pattern of albumin dispensing, and consumption were evaluated and compared for the retrospective and implementation phase.

Results: In the retrospective phase, 190 patients received albumin of whom 159 (83.6%) were considered inappropriate indications while in the prospective phase only 44 patients received albumin of whom 7 (16%) were considered inappropriate (p-value <0.001). The use of local protocol and dispensing form significantly decreased the percent of inappropriate dispensed vials from 87% (749 out of 862) in the retrospective phase to 14% (19 out of 136) in the implementation phase.

Conclusion: The current study highlighted the inappropriate albumin misuse and that clinical pharmacist–led interventions reduced inappropriate albumin use significantly.

41 | Anticoagulation management using Thromboelastrography during extracorporeal membrane oxygenation

Miranda Bowers, Pharm.D.[1], Ryan Hobbs, BS Pharm[2] and Lovkesh Arora, MBBS, MD[1]

[1]University of Iowa Hospitals and Clinics, Iowa City, IA [2]Department of Pharmaceutical Care, University of Iowa Hospitals and Clinics, Iowa City, IA

Introduction: Extracorporeal membrane oxygenation (ECMO) is a temporary treatment providing circulatory and respiratory support. Adverse effects related to ECMO include, but are not limited to, life-threatening thrombosis and excessive bleeding. Systemic anticoagulation with unfractionated heparin is commonly used to prevent blood clotting provoked by contact with the nonbiologic surfaces of the ECMO circuit. There are multiple strategies used for the monitoring of anticoagulation including partial thromboplastin time (PTT) and thromboelastography (TEG). In October 2018, the UIHC Adult Heparinization Guidelines for ECMO patients were updated, and dose adjustment recommendations are now based on TEG reaction time.

Research Question or Hypothesis: Average therapeutic dose of unfractionated heparin will be lower in the TEG-based group, with no difference in bleeding or thrombotic events.

Study Design: IRB-approved retrospective, observational cohort study.

Methods: Chart review was performed for adult intensive care patients who received therapeutic heparin on ECMO between October 2016 and October 2020. The primary outcome was the average therapeutic heparin dose. Secondary outcomes included bleeding and systemic thrombotic events, time to therapeutic, time in therapeutic range, and antithrombin III supplementation.

Results: Eighty-two patients were included. The average therapeutic heparin dose was higher in the PTT group (15.3 units/kg/hr vs. 14.6 units/kg/hr, p = 0.63). Time to reach an initial therapeutic level was similar between PTT and TEG groups (12.4 h vs. 12.6 h, p = 0.97), however, the time in therapeutic range was significantly higher in the TEG group (38% vs. 71%, p <0.01). Bleeding occurred more in the TEG patients (51.2% vs. 63.4%, OR 0.61, pp = 0.27), while new systemic thrombosis occurred less (72.7% vs. 18.2%, OR 11.94, p = 0.03).

Conclusion: Managing heparin with a TEG-based protocol is a safe and feasible option for both VA- and VV-ECMO patients. It may be associated with lower therapeutic heparin doses, and a significantly higher amount of time within therapeutic range.

42 | Post-Implementation Assessment of a Benzodiazepine Sparing Alcohol Withdrawal Protocol in the Intensive Care Unit

Kara Kubbs, Pharm.D. and Rebecca Bookstaver, Pharm.D., BCCCP
Wake Forest Baptist Medical Center, Winston-Salem, NC

Introduction: Benzodiazepines widely represent first line treatment for alcohol withdrawal syndrome (AWS). However, their use is accompanied with potential complications that lead our institution's trauma intensive care unit (TICU) to implement a benzodiazepine sparing alcohol withdrawal protocol (BZD sparing protocol). Patients are initially classified into a monitoring, prophylaxis, or treatment arm based upon Prediction of Alcohol Withdrawal Severity Score (PAWSS) and blood alcohol concentration. Patients are escalated into higher protocol arms based upon symptoms or Clinical Institute Withdrawal Assessment for Alcohol/Minnesota Detoxification Scale (CIWA-Ar/MINDS) scores. The protocol utilizes medications including gabapentin, clonidine, and valproic acid with dexmedetomidine and lorazepam serving as rescue agents for breakthrough AWS.
Research Question or Hypothesis: To assess if appropriate utilization of a BZD sparing protocol prevents AWS progression and escalation of care.
Study Design: Single-center, retrospective, single-cohort, quality-improvement study
Methods: Patients admitted to the TICU from 1/1/2020 through 10/31/2020 receiving the BZD sparing protocol were screened for inclusion. Patients were excluded if crossover with the benzodiazepine AWS protocol occurred or if a scheduled benzodiazepine order was active while receiving the BZD sparing protocol. The primary outcome was incidence of at least one protocol escalation. Secondary outcomes included incidence of rescue medication utilization, median CIWA-Ar/Minds scores, protocol deviations, appropriateness of initial protocol arm, and drug specific adverse effects.
Results: 65 patients were included with 43.1% requiring at least one protocol escalation and 16.9% requiring rescue medication utilization. The most common protocol deviation was inadequate escalation when indicated, which occurred in 15 patients. Additionally, 21.5% were initially started in the incorrect protocol arm, most commonly over-treatment. Leading adverse effects included bradycardia and hypotension among patients receiving clonidine or dexmedetomidine.
Conclusion: A large number of patients were initially placed in higher protocol arms and over half received or triggered a protocol escalation. These results indicate a trend for possible progression of AWS while receiving the BZD sparing protocol.

43 | Hidden Fluids Stewardship: Pharmacist-driven Recommendations for Critically Ill Patients With and Without COVID-19

Diana Dang, Pharm.D. Candidate[1], W. Anthony Hawkins, Pharm.D., BCCCP[2], Ryan Bok, Pharm.D. Candidate[1], Rachel Rikard, Pharm.D. Candidate[1] and Susan E. Smith, Pharm.D., BCCCP, BCPS[3]
[1]*University of Georgia College of Pharmacy, Athens, GA* [2]*Department of Pharmacology and Toxicology, Medical College of Georgia at Augusta University, Albany, GA* [3]*Department of Clinical and Administrative Pharmacy, University of Georgia College of Pharmacy, Athens, GA*

Introduction: Intravenous fluids are routinely administered in the intensive care unit (ICU). This includes hidden fluids, which are defined as fluids requisite to routine care, but the volumes of which are not explicitly prescribed (e.g., medication diluents, flushes). With the distinct patient phenotype presented by coronavirus disease 2019 (COVID-19), careful management of fluids is crucial to minimize risks associated with fluid overload.
Research Question or Hypothesis: How do pharmacist-driven hidden fluids recommendations differ in critically ill adults with and without COVID-19?
Study Design: This single-center, retrospective, IRB-approved, observational study conducted at a community hospital included adult ICU patients with and without COVID-19.
Methods: Recommendations made by the pharmacy rounding team were classified based on pre-determined criteria. The primary outcome was the percentage of pharmacy recommendations related to hidden fluids. Secondary outcomes classified the individual types of recommendations. The quantity of recommendations and average per patient day were compared in patients with and without COVID-19 using the Chi-squared test and t-test, respectively, conducted in SPSS with an alpha of 0.05.
Results: A total of 420 COVID and 895 non-COVID patient days were reviewed. COVID patients received more pharmacy recommendations per patient day (3.189 vs 2.902, p=0.024), fewer fluid-related recommendations (0.421 vs 0.556, p=0.003), and a similar number of hidden fluids-related recommendations (0.202 vs 0.203, p=0.972). The most common hidden fluids recommendations were: IV to non-IV conversion (n=59 vs 148 recommendations, p=0.268), adjust dose of enteral fluid (n=16 vs 23, p=0.217), discontinue enteral water (n=6 vs 8, p=0.378), adjust volume of parenteral nutrition (n=2 vs 1, p=0.197), change albumin concentration (n=1 vs 0, p=0.144), and concentrate infusions (n=1 vs 2, p=0.959).
Conclusion: The average number of hidden fluids-related recommendations was similar in patients with and without COVID-19. The study was limited by its single center and retrospective design. Future research should examine the relationship between hidden fluids-related recommendations and patient outcomes.

44 | Identification of facilitators and barriers to clinicians' response to receiving clinical decision support alerts in the Intensive Care Unit (ICU)

Lauren Snader, BSPS, Pharm.D. Candidate[1], *Yu Hyeon Soh, Pharm.D. Candidate*[1], Lucas Berenbrok, Pharm.D., MS, BCACP[1], Adrian Wong, Pharm.D., MPH[2] and Sandra Kane-Gill, Pharm.D., MS, FCCP, FCCM[1]
[1]*University of Pittsburgh, School of Pharmacy, Pittsburgh, PA* [2]*MCPHS University, Boston, MA*

Introduction: Clinical decision support alerts generated during care of a patient are designed to support clinical decision making. Understanding clinicians' behavior in responding to alerts is necessary to optimize the benefits and mitigate potential alert fatigue. Clinicians within the intensive care unit (ICU) may be more vulnerable to a lack of response and fatigue, given the number of medications and labs these patients are ordered.

Research Question or Hypothesis: To identify perceived facilitators and barriers for clinical decision support alert response by ICU pharmacists and physicians.

Study Design: A deductive qualitative approach was conducted for a thematic analysis of semi-structured interviews.

Methods: Two researchers conducted the interviews in a convenience sample of 10 pharmacists and 10 physicians from institutions across the United States. Interview questions were informed by the Theoretical Domains Framework (TDF) and a Technology Acceptance Framework (TAF), containing eleven and eight domains, respectively. A total of 48 TDF and 20 TAF questions were asked, with follow-up questions permitted. Interview transcriptions were coded by two independent investigators using NVivo, followed by collaboration to resolve coding discrepancies. Common themes of facilitators and barriers were identified.

Results: Nine themes were identified including facilitators of (1) Understanding that safety is the purpose of alerts; (2) Ease of response; (3) Specific and meaningful alerts; (4) Prioritization of alerts by urgency; (5) Optimization using feedback. Barriers included (1) Too many alerts; (2) Work environment and stressors; (3) Lack of specificity and relevance; (4) Difficulty of multi-step alerts.

Conclusion: Identification of facilitators and barriers for alert response has the potential to improve alert systems and enhance patient safety in the ICU. However, there still remains a need to effectively implement these changes into practice. This study is the first step toward creating an implementation plan with the goal of alert optimization and patient care improvement in the ICU.

45 | Improving the Transitions of Care from Intensive Care Unit to Step Down Unit Using Pharmacist Review

Andrea Lippucci, Pharm.D.[1], Mike Maccia, Pharm.D.[1], Wesam Yacoub, MD[1] and Randy Absher, Pharm.D.[2]

[1]*Cone Health Moses H. Cone Memorial Hospital, Greensboro, NC*

[2]*Assistant Director, Pharmacy Clinical Services, Cone Health, Wesley Long Hospital Pharmacy, Greensboro, NC*

Introduction: Transitions of care impact overall patient outcomes. As medications are started for temporary indications in the intensive care unit (ICU), there is risk of continuation upon transition to step down units and discharge from the hospital. Lack of communication and accountability between providers are two major reasons for poor transitions of care. A clinical pharmacist in the ICU could fill this gap in care with review of patient medication lists upon discharge from the ICU to intervene on medications that are no longer indicated.

Research Question or Hypothesis: Does a clinical pharmacist's review of medications upon transfer out of the ICU decrease the amount of medications continued at discharge without an appropriate indication?

Study Design: Prospective case-control study with an intervention arm in a community teaching hospital with 35 patients in each cohort.

Methods: Focus medication classes include antipsychotics/anticonvulsants, opioids, benzodiazepines, stress ulcer prophylaxis agents, antibiotics, and steroids. Clinical pharmacists working in the ICU were educated on the study medications and possible interventions. During rounds when the intensivist suggested a patient would be transferred, the clinical pharmacist suggested discontinuing or tapering the study medications that were no longer indicated.

Results: The retrospective group had 28 medications continued on transfer out of the ICU without an indication compared to three in the intervention arm. There was a statistical difference in amount of opioids, stress ulcer prophylaxis agents, and antibiotics inappropriately continued. There was no statistical difference in continuation of antipsychotics, anticonvulsants, benzodiazepines, or steroids.

Conclusion: A pharmacist's review of a patient's medication list before transferring out of the ICU can yield statistically significant differences in appropriate discontinuation or de-escalation of therapy. Opioids, stress ulcer prophylactic agents, and antibiotics were associated with benefit of pharmacist intervention. These results align with previous studies showing reduction of inappropriate medication continuation at discharge from the ICU.

46 | Predicting Inpatient Mortality Using Medication Regimen Complexity Score for Critically Ill Adult Patients

Todd Brothers, Pharm.D.[1], Jacob Strock, Ph.D. Candidate[2], Wenqui Cao, Ph.D..[3], David Sabatino, Pharm D.[3], Andrea Sikora Newsome, Pharm.D., BCPS, BCCCP[4] and Mohammad Al-Mamun, Ph.D.[5]

[1]*College of Pharmacy, University of Rhode Island, Kingston, RI* [2]*School of Oceanography, The University of Rhode Island, Narragansett, RI*

[3]*University of Rhode Island, Kingston, RI* [4]*Department of Clinical and Administrative Pharmacy, Univeristy of Georgia College of Pharmacy, Augusta, GA* [5]*Department of Pharmacy Practice, University of Rhode Island, Kingston, RI*

Introduction: Medications are essential in the management of critically ill patients as greater than 20 medications are frequently prescribed daily. The medication regimen complexity (MRC) refers to the combinations of medications, dosages, and frequencies. The previous tool, medication regimen complexity index (MRCI), was not assessed in ICU patients. A novel tool, MRC-ICU, evaluates the relationship between MRC scores and pharmacist interventions. However, no comparative studies evaluating how MRC-ICU improves outcomes compared to the MRCI score exist.

Research Question or Hypothesis: Does the MRC-ICU score improve outcomes in critically ill patients?

Study Design: Retrospective cohort

Methods: 231 electronic medical records were reviewed at Roger Williams Medical Center between February and July of 2020. Data collected included: demographics, vital signs, laboratory indices, oxygenation modalities, and medications. Four multivariable logistic regression models were developed. Model I: demographics, time of mechanical ventilation (TOMV), APACHE II, and SAPS-II scores. Model II: demographics, TOMV, and MRCI score. Model III: demographics, TOMV, MRCICU score, and Model IV: all variables. The best fit model was chosen based on the Akaike information criterion (AIC) and the area under the receiver operator characteristics curve (AUC) was used to identify the best predictive model for inpatient mortality. This study was approved by the institution's IRB.

Results: BMI and SAPS-II were statistically significant variables for the baseline model where MRC-ICU score at 72 hours was significant in the MRC-ICU model. When comparing model predictions, the AUC values are 0.75, 0.44, 0.65, and 0.63 for Models I, II, III, and IV, respectively. The results suggest when compared with Model II (MRCI), the MRC-ICU (Model III), demonstrated improved prediction measurement.

Conclusion: The results suggest that the medication regimen complexity scoring tool is a better predictor of mortality when compared to the MRCI score. Further, its application in clinical practice may improve patient outcomes and avoid adverse medication risks.

Drug Information

47 | Characterization and comparison of drug information questions submitted to an academic drug information center from community and hospital pharmacists

Madelin Baysden, Pharm.D., MBA, Darren Hein, Pharm.D. and Shana Castillo, Pharm.D., MBA
School of Pharmacy and Health Professions, Creighton University, Omaha, NE

Introduction: While similarities exist, differences in medical conditions encountered, drug therapies utilized, and site-specific responsibilities suggest drug information questions submitted by community and hospital pharmacists will differ.

Research Question or Hypothesis: Are there differences between community and hospital pharmacists with respect to urgency of request, type of question, and means of documentation?

Study Design: Retrospective review and descriptive analysis

Methods: Drug information requests submitted by community and hospital pharmacists to an academic drug information center from November 15, 2010 to November 15, 2020 were analyzed to compare the following: preferred response method, turnaround time, and request classifications. A chi-squared test was conducted to analyze differences between response method and turnaround time. Turnaround time was determined by the preferred response time initially selected. Requests could have more than one classification.

Results: Of the 6271 requests received over the ten-year period, 1374 (21.9%) were from community pharmacists, and 1928 (30.7%) were from hospital pharmacists. Hospital pharmacists requested email responses over two times more than community pharmacists (86.5% vs. 41.8%; p<0.00001). Community pharmacists requested fax (12.6% vs. 1.6%; p<0.00001) and phone (45.6% vs. 11.9%; p<0.00001) responses more and requested consultations be answered more quickly than hospital pharmacists (24 to 48 hours: 64.9% vs. 48.3%; p<0.00001). Community pharmacists asked more questions on adverse effects, compounding, dietary supplements/alternative medicine, immunizations, interactions, laws/regulations, over-the-counter medications/self-care, product availability/cost, and tablet identification. Hospital pharmacists asked more questions on disease information, dosing/administration, pharmacokinetics, poison/toxicology, stability/compatibility, therapeutics, and other topics. Questions on pregnancy/lactation were comparable between the two settings.

Conclusion: Community pharmacists prefer questions submitted to an academic drug information service be answered more quickly via phone or fax compared with hospital pharmacists. The types of questions pharmacists ask vary relative to if they are in the community or hospital setting.

48 | Physicochemical and Microbiological Stability of Rituximab Biosimilar, ABP 798, in Intravenous Bags after Preparation and Storage

Jeremy Gastwirt, BS, Jeff Brown, Masters, Monica Goss, Ph.D. and David Lai, Ph.D
Amgen, Thousand Oaks, CA

Introduction: ABP 798 (RIABNI™) is a rituximab (RITUXAN®) biosimilar supplied as a sterile, single-use, preservative-free solution (10 mg/mL) in a vial for intravenous (IV) infusion. Extended physicochemical and microbiological stability under in-use conditions is valuable to enable administration flexibility.

Research Question or Hypothesis: Is the physicochemical and microbiological stability of ABP 798 impacted after dilution with sterile 0.9% saline or 5% dextrose in an IV bag prior to administration?

Study Design: N/A

Methods: ABP 798 was diluted to 1 mg/mL and 4 mg/mL with 0.9% saline or 5% dextrose in an IV bag and stored at 2°C-8°C for up to 30 days followed by storage at 25°C or 30°C for 24 hours and then infused from the IV bag at ambient temperature. Physicochemical stability was evaluated by state-of-the-art chromatographic methods, protein concentration, bioassay, and visual inspection. Microbial trends at 2°C-8°C were evaluated by monitoring microbial growth after direct inoculation.

Results: The saline-diluted product remained physicochemically stable after 30-day storage at 2°C-8°C followed by storage at 30°C for 24 hours, and then infusion at ambient temperature as evidenced by no changes to product quality attributes (protein recovered after storage and infusion: 98%-102%); degradation was seen in the dextrose-

diluted product after 24-hour storage at 25°C or 12 hours at 30°C. Absence of microbial growth (exceeding 0.5 log growth up to 14 days) confirmed lack of changes in microbial trends.

Conclusion: These results confirm that ABP 798 would remain stable under handling and administration conditions after dilution with either 0.9% saline or 5% dextrose in IV bags. Nevertheless, the diluted product should be stored for ≤7 days at 2°C-8°C in 0.9% saline to mitigate the onset of microbial growth since it is supplied as a preservative-free product or for ≤24 hours at 2°C-8°C in 5% dextrose.

Education/Training

49 | Addressing the opioid crisis during the COVID-19 pandemic with a virtual, interactive and interprofessional opioid overdose workshop for healthcare professionals

Rebecca Leon, Pharm.D.[1], Marie Gilbert, DNP, RN, CHSE[2], Stephanie Moore, Ph.D., ATC[3], Nancy Nisbett, Ed.D. CTRS, RTC[4], Scott Sailor, EdD, ATC[5] and Maya Leiva, Pharm.D., MS, BS[6]

[1]*UCSF School of Pharmacy, Department of Clinical Pharmacy, University of California, San Francisco, San Francisco, CA* [2]*Central California Center for Excellence in Nursing, California State University - Fresno, Fresno, CA* [3]*Athletic Training Program and Department of Kinesiology, California State University - Fresno, Fresno, CA* [4]*Department of Recreation Administration, California State University - Fresno, Fresno, CA* [5]*Department of Kinesiology, California State University - Fresno, Fresno, CA* [6]*Inova Schar Cancer Institute, Inova Health System, Fairfax, VA*

Introduction: The opioid epidemic is a growing and significant public health concern in California's Fresno County. To prevent opioid misuse, overdoses, and deaths, health professionals must learn how to work collaboratively to rapidly identify overdose threats, reverse overdoses, link people to effective treatment and reduce harms associated with opioids.

A traditional interprofessional in-person workshop was not feasible due to the COVID-19 pandemic; therefore, a virtual interprofessional workshop was developed and implemented. The faculty team who developed the workshop sought to discover if a virtual approach would promote learning and influence participants' attitudes toward opioid overdose.

Research Question or Hypothesis: Does a virtual, synchronous, interprofessional workshop impact healthcare professionals' knowledge and attitudes toward opioid misuse?

Study Design: A quantitative, quasi-experimental pre and post approach was used. The target population were healthcare professional providers and students.

Methods: Participants attended a 4-hour online synchronous workshop focused on opioid overdose and Naloxone training. First-responder Naloxone kits were provided through California's Naloxone Distribution Project.

Data were collected via an online survey platform using the Opioid Overdose Knowledge Scale (OOKS) using a pre/post method, and the Opioid Overdose Attitudes Scale (OOAS), using a retrospective pre/post method. Data were confirmed to be non-parametric, so Mann-Whitney U tests were performed to compare pre- and post-test OOKS overall score and risk, sign, action, and naloxone use subscales and OOAS overall score and competence, concerns, and readiness subscales (Bonferroni adjusted $\alpha=0.006$).

Results: A total of 80 providers, students, and faculty from a variety of specialties participated. All OOKS and OOAS scores, except the readiness subscale, were significantly improved following the workshop and Naloxone training ($p<0.004$).

Conclusion: A 4-hour online synchronous workshop significantly improved knowledge of and attitudes toward opioid overdose among healthcare professional providers and students. These study findings will inform future curriculum development and enhancement of future virtual programs to efficiently train healthcare professionals about approaching an opioid overdose.

50 | Impact of Grit and Resilience on Academic Success and Self-Efficacy in Pharmacy Students

Kendra Onoh, Student Pharmacist, Haris Mujovic, Undergraduate Student, *Sara Richter, Pharm.D.*, Suzanne Bollmeier, Pharm.D. and Melanie VanDyke, Ph.D

University of Health Sciences & Pharmacy in St. Louis, St. Louis, MO

Introduction: Grit and resilience are related constructs that are important for goal attainment and well-being. The relationship between grit (passion and perseverance for long-term goals) and grades is mediated by academic self-efficacy (confidence). Resilience is the ability to adjust to difficult circumstances and is linked to academic performance and self-efficacy. This study explores the association between grit, resilience, academic success, and self-efficacy.

Research Question or Hypothesis: Grit and resilience will be correlated with each other and academic success. Grit and resilience will predict self-efficacy beyond covariates.

Study Design: Prospective cohort

Methods: 328 student pharmacists participated in this study. Pre- and post-semester online surveys included measures of student grit (Short Grit Scale [GRIT-S]) and resilience (Connor-Davidson Resilience Scale [CD-RISC-10]). In addition, students rated their confidence utilizing the Pharmacists' Patient Care Process, navigating electronic health records, and communicating with providers using SOAP notes to measure self-efficacy for professional tasks. Post-semester Integrated Pharmacotherapy grade point averages (IPGPA) were obtained from the registrar to measure academic success. Statistical analyses included correlations between grit, resilience, and IPGPA, and a multiple regression analysis to predict self-efficacy from grit, resilience, and select covariates.

Results: Pre-semester grit and resilience were found to have a moderate, significant correlation with each other ($r = 0.33$, $p = 0.001$). However, grit and resilience were not correlated with end-of-semester IPGPA ($r = 0.07$, $p = 0.213$; $r = 0.002$, $p = 0.973$). Pre-semester grit and resilience also predicted self-efficacy with covariates ($R^2 = 13.8$; $F(6, 298) = 7.97$, $p = 0.001$).

Conclusion: Grit and resilience are correlated, and while they were not directly associated with grades, they helped predict self-efficacy. Previous research showed that grit indirectly affected grades through self-efficacy, and resilient pharmacy students reported lower stress, anxiety, and depression. Further research is needed to clarify the contributions of grit, resilience, and self-efficacy to academic success and wellness.

51 | Simulation Partnerships: Collaborating with External Institutions to Enhance Student Interprofessional Education Experience

Vraj Satasia, Pharm.D. Candidate[1], *Diana Vo, Pharm.D. Candidate*[1], Sarah Nisly, Pharm.D., BCPS, FCCP[2] and Ryan E. Owens, Pharm.D.[3]
[1]Wingate University School of Pharmacy, Wingate, NC [2]Department of Pharmacy, Wake Forest Baptist Health, Winston Salem, NC [3]School of Pharmacy, Wingate University, Hendersonville, NC

Introduction: Interprofessional practice is defined as two or more individuals from different professions collaborating to improve health outcomes. Current pharmacy education literature demonstrates limited interprofessional practice incorporated into pharmacy curricula, resulting in students graduating with limited exposure to collaboration with different healthcare disciplines. However, studies have shown that patient care simulations can improve students' perceptions of interprofessional practice.

Research Question or Hypothesis: Do students' perception of interprofessional interactions and values improve after completing an acute care simulation in collaboration with multiple health science programs?

Study Design: Multicenter retrospective cohort study

Methods: A school of pharmacy and physician assistant (PA) program partnered with a local community college health sciences campus to offer an interprofessional acute care simulation in spring 2019. The simulation included 5 patient care areas that encompassed 20 patients. Students' interprofessional interactions and values were measured before and after the event, using the revised Interprofessional Practice and Education (IPEC) Competency Self-Assessment Tool. A mixed methods analysis was done using quantitative and qualitative analysis.

Results: A total of 68 students completed the simulation with 88.2% (n=60) completing the pre-survey and 92.6% (n=63) students completing the post-survey. Of those 68 students, 13.2% (n=9) were PA, 17.6% (n=12) were pharmacy, 35.3% (n=24) were nursing, 11.8% (n=8) were certified nurse assistants, 7.4% (n=5) were surgery technicians, and 14.7% (n=10) were emergency medical technicians. Of the 16-item questionnaire, 15 questions resulted in a statistically significant ($p<0.05$) improvement. The only question not resulting in improvement focused on students' perceived ability to respect the privacy of patients while maintaining confidentiality in the delivery of team-based care (p=0.09).

Conclusion: Acute care simulations with external partner institutions can be a beneficial educational experience to enhance interprofessional interactions and values.

52 | An analysis of student pharmacists' readiness for COVID-19 emergency responses

Yen Dang, Pharm.D., CTTS-M
School of Pharmacy and Health Professions, University of Maryland Eastern Shore (UMES), Princess Anne, MD

Introduction: The American Society of Hospital Pharmacists has advocated that pharmacist expand their roles in the COVID-19 pandemic by participating in immunizations, point-of-care testing, direct patient care services, and emergency response planning and coordination. While most universities teach students about public health emergency preparedness in the curriculum, there is limited information to determine if students are prepared for the COVID-19 pandemic.

Research Question or Hypothesis: Are pharmacy students prepared to respond to the COVID-19 pandemic in a clinical or logistical role?

Study Design: Cross-sectional study measuring pharmacy students' COVID-19 emergency readiness.

Methods: A 30-item online questionnaire was e-mailed to first and second-year pharmacy students in a concentrated curriculum. Questions assessed participant's knowledge and confidence to perform COVID-19 related tasks. Descriptive analyses were reported for the differences in emergency preparedness readiness. Categorical data was analyzed using chi-square tests with a 95% confidence interval on Minitab®.

Results: Forty-five students completed the survey with a 59.2% response rate. Overall, 36 (80%) students reported they were confident in assisting with COVID-19 emergency response planning and coordination. Thirty-three students (73.3%) reported they were confident serving in a clinical or logistical role during the COVID-19 pandemic. Only 14 (31%) of students reported they sufficient knowledge of how to treat and mange patients with confirmed COVID-19 infections. This group was more likely to be comfortable interacting with suspected or confirmed COVID-19 patients (P= 0.02). Students reported the biggest challenge when delivering COVID-19 pharmacy services to be a lack of information, exposure risk, and the public not following Centers for Disease Control and Prevention's guidelines. Race, gender, class year, healthcare experience, and medium of COVID-19 education were not factors that correlated with confidence to perform COVID-19 related tasks (P>0.05).

Conclusion: Pharmacy schools should implement more training and instruction about COVID-19 emergency preparedness to improve pharmacy students' capability during the COVID-19 pandemic.

53 | I.M.P.A.C.T. of Interprofessional Student Teams at a Remote Area Medical Clinic in Rural Appalachia

McKayla Barker, Student, Angela Chrisman, Student, Matthew Gouge, Student, Mason Johnson, Student and Emily Flores, Pharm.D., BCPS
Bill Gatton College of Pharmacy, Department of Pharmacy Practice, East Tennessee State University, Johnson City, TN

Introduction: Remote Area Medical (RAM), a non-profit organization serving underserved populations, partnered with East Tennessee State University to provide a unique learning opportunity for student volunteers at a clinic in rural Appalachia. Interprofessional student teams were established with undergraduate and graduate students in multiple professions.

Research Question or Hypothesis: This study examined the impact on attitudes of students who participated and the impact of student teams on the event, hypothesizing that a positive impact would be seen on both. COVID-19 adjustments made were also evaluated.

Study Design: Surveys of student participants were conducted electronically utilizing REDCap before and after participation in the event. Surveys included demographic questions, validated surveys, and open-ended questions.

Methods: Demographic questions gauged personal background, level of education, and history of interprofessional education or events. The previously validated surveys utilized were the Interprofessional Collaborative Competency Attainment Scale-Revised (ICAAS-R) and the Student Perceptions of Interprofessional Clinical Education-Revised Instrument Version 2 (SPICE-R2). Quantitative data was analyzed with SPSS version 25. Qualitative data was analyzed with deductive coding. Interventions were tallied by student teams during the event.

Results: Eighty-nine students participated logging 1,213 interventions and 84 completed portions of the survey (94% response rate). ICAAS-R (n=79) displayed mean increases from 4.19 out of 5 in the pre-survey to 4.58 in the post-survey ($p<0.05$). Matched responses for SPICE-R2 (n=69) increased for teamwork ($p<0.001$), healthcare outcomes ($p<0.001$), and roles and responsibilities ($p<0.001$) from pre-survey to post-survey. Qualitative themes acknowledged development of interprofessional competencies, identified patient need, and noted COVID-19 adjustments

Conclusion: Statistically significant quantitative findings and qualitative themes supported the hypothesis that working in interprofessional teams at a RAM event would positively impact student attitudes towards interprofessional practice, and that student teams would have a positive impact on the event. COVID-19 adjustments made were well perceived. Findings can be summarized with the I.M.P.A.C.T. neumonic.

54 | Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS) Impact in an Interprofessional Course

Meghan Matthews, B.S.[1], Ashraf Alsaidi, B.S.[1], Sarah Nisly, Pharm.D., BCPS, FCCP[2] and Ryan E. Owens, Pharm.D.[3]
[1]*Wingate University School of Pharmacy, Wingate, NC* [2]*Department of Pharmacy, Wake Forest Baptist Health, Winston Salem, NC* [3]*School of Pharmacy, Wingate University, Hendersonville, NC*

Introduction: Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS) is an evidence-based program designed to improve patient outcomes by optimizing communication and teamwork skills of healthcare professionals. While evidence exists to show the benefit of TeamSTEPPS in medical facilities, limited evidence is available on the impact of TeamSTEPPS in didactic healthcare curriculums. The purpose of this study is to evaluate the impact of an interprofessional course as a part of pharmacy and physician assistant (PA) required curriculum using the TeamSTEPPS Teamwork Attitudes Questionnaire (T-TAQ) to assess strategies for improving communication and teamwork.

Research Question or Hypothesis: Does an interprofessional TeamSTEPPS course impact student perceptions on teamwork attitudes and interprofessional communication?

Study Design: Single-center, retrospective, survey based study

Methods: All first-year pharmacy and PA students completed a 15-week one credit interprofessional teamwork course focused on TeamSTEPPS content in spring 2020. The course consisted of weekly instruction on TeamSTEPPS content followed by a small team assignment associated with a patient scenario video vignette. Students worked in the same team for the duration of the semester, which culminated in a team presentation. An anonymous pre- and post-survey of the T-TAQ was completed which consists of 30 statements to measure attitudes toward team structure, leadership, mutual support, situation monitoring, and communication, using a five-point Likert scale. Medians and interquartile ranges were analyzed for individual questions. Aggregate pre- and post-survey responses were compared using the Mann-Whitney U Test.

Results: There were 135 students enrolled in the class with 97.7% (n=132) and 94.8% (n=128) completing the pre- and post-survey, respectively. Of the 30 statements assessed, 56% (n=17) demonstrated a statistically significant increase in agreement with the corresponding statement ($p<0.05$).

Conclusion: The first-year interprofessional TeamSTEPPS course proved to be a valuable interprofessional learning tool, showing improvement in perceived communication and teamwork skills among pharmacy and PA students.

55 | Evaluation of sterile compounding instruction for second year pharmacy students before and after curricular revision

Sarah Cogle, Pharm.D., BCCCP, BCNSP[1], *Dylan Waer, Pharm.D. Candidate*[1] and Amber Hutchison, Pharm.D., BCPS, BCGP[2]
[1]*Department of Pharmacy Practice, Auburn University Harrison School of Pharmacy, Auburn, AL* [2]*Harrison School of Pharmacy, Auburn University, Auburn, AL*

Introduction: Sterile compounding is an integral part of pharmacy education, as poor aseptic technique and compounding errors can

result in significant patient harm. Sterile compounding is taught in the second year of the professional curriculum and involves a combination of didactic and laboratory instruction. Educational activities varied after a major curricular revision. In the legacy curriculum (LC) (pre-2018), two 1-hour didactic lectures were provided before two 2-hour laboratory sessions with hands-on activities. For the current, practice-ready curriculum (PRC), pre-laboratory lectures were revised to incorporate demonstration videos and practice problems. Laboratory activities were completed in two 2-hour laboratory sessions with additional focus on hands-on experience and facilitator coaching. Facilitator demonstration of excellent and poor aseptic technique was included in Year-2 of the PRC. Performance-based assessments (PBAs) evaluated student performance in both curriculums. The PBA grading rubric was modified in PRC Year-2 to more clearly delineate grading categories and provide clarity of student expectations. Evaluation of student performance is needed to assess teaching modalities.

Research Question or Hypothesis: We hypothesized that provision of enhanced pre-laboratory lectures and more opportunities for hands-on training would improve student performance on sterile compounding PBAs.

Study Design: This retrospective review analyzed PBA assessment data.

Methods: LC PBAs (combined 2015-2017 data) were compared to PRC Year-1 (2018) and PRC Year-2 (2019). Changes to the PBA rubric were implemented in 2019, thus two years of the PRC were also compared. Student's t-test compared the primary endpoint of overall student PBA performance between years.

Results: Student performance in the LC was stronger than PRC Year-1 (mean 91.1% vs 84.4%, $p<0.0001$). PBA Year-2 performance was improved vs the LC (mean 95.8% vs. 91.1%, $p<0.0001$) and vs PRC-Year 1 (mean 95.8% vs. 84.4%, $p<0.0001$).

Conclusion: Provision of enhanced pre-laboratory lectures and in-lab hands-on opportunities, combined with revision and clarification to the PBA grading rubric, significantly improved student PBA performance on sterile compounding.

56 | Development and Evaluation of a Diabetes Themed Escape Room for Students Completing an Ambulatory Care Advanced Pharmacy Practice Experience

Katherine Brown, Pharm.D. Candidate[1] and Jessica Wilhoite, Pharm.D.[2]

[1]*Butler University College of Pharmacy and Health Sciences, Indianapolis, IN* [2]*Department of Pharmacy, Community Health Network, Indianapolis, IN*

Introduction: Escape rooms have been utilized in various health disciplines as an educational tool. In professional healthcare schooling, they have been used to supplement what students learn in the classroom. As of yet, there is no published literature that analyzes the use of escape rooms in the Advanced Pharmacy Practice Experience (APPE) setting.

Research Question or Hypothesis: Does participation in a diabetes themed escape room improve student knowledge retention and satisfaction while completing an ambulatory care APPE?

Study Design: Matched pre-post survey study

Methods: The study consisted of a 10-question knowledge assessment taken before and after completion of escape room activity, as well as a satisfaction survey to provide feedback on the activity itself. Students on rotation from January 2020 through February 2021 were given the option to participate in the study.

Results: Fifty-six students participated in the escape room activity, and 46 students (82%) completed some portion of the pre/post assessment and survey. Sixteen students completed all portions of the pre/post assessment and were able to be matched for analysis. A paired t-test was used to analyze assessment questions. The mean (± SD) score for pre-assessment was 76.25% ± 11.47 and 83.75% ± 9.57 for post-assessment with a p-value of 0.0285. Twenty-four students completed the satisfaction survey following completion of the escape room and reported generally positive feedback for the escape room. Nineteen students (83%)[WJ2] agreed that this activity should be continued in the future.

Conclusion: This escape room activity helped students understand diabetes and application in practice through an enjoyable and team-building method. High rates of satisfaction indicate continued future use of this learning activity. Further studies consisting of more participants are needed to further assess the efficacy of this teaching method.

57 | Assessing a student pharmacist-led tobacco cessation educational workshop on knowledge, attitudes, and confidence among student pharmacists

Diana Allgood, Pharm.D., *Diane Ayuninjam, Pharm.D., MPH, BA, BS*, Amanda Sweat, B.S., B.S. and Kay Brooks, MEd

College of Pharmacy, University of Georgia, Athens, GA

Introduction: The United States Public Health Service Rx for Change program provides training in tobacco cessation counseling based on the Ask-Advise-Assess-Assist-and Arrange (5 A's) model. Student pharmacists can become ambassadors and lead tobacco cessation workshops. The purpose of the study was to investigate the knowledge, attitudes, and confidence among student pharmacists before and after the implementation of a student pharmacist-led tobacco cessation educational workshop.

Research Question or Hypothesis: Are student pharmacist-led tobacco cessation educational workshops associated with increased knowledge, attitudes, and confidence among student pharmacists regarding smoking cessation counseling and interventions?

Study Design: Pretest-posttest study, experimental, prospective

Methods: Identical pre- and post-surveys were created using Qualtrics. Pre-surveys were emailed to students prior to receiving access to tobacco cessation counseling materials. Students received the post-survey after completion of online tobacco cessation training

modules and a skills demonstration graded by ambassadors. Perceived knowledge, attitudes, and confidence in tobacco cessation counseling were self-rated and compared before and after the implementation of a student pharmacist-led tobacco cessation training at the University of Georgia College of Pharmacy. Chi-square analysis was conducted using SPSS 26.

Results: A total of 56 student pharmacists completed the program. Pre-survey (N=37) responses and post-survey responses (N=21) were compared. When assessing knowledge survey items, responses of "strongly agree" and "agree" increased from 70.81% to 96.19%. When assessing attitude survey items, responses of "strongly agree" and "agree" increased from 76.76% to 81.90%. When assessing confidence survey items, responses of "strongly agree" and "agree" increased from 56.76% to 88.57%. There were significant differences in knowledge ($p<0.001$), attitudes ($p=0.007$), and confidence ($p<0.001$) among student pharmacists after the implementation of smoking cessation workshops.

Conclusion: This study demonstrated that a student pharmacist-led tobacco cessation training program can be effective in increasing rates of knowledge, attitudes, and confidence among student pharmacists.

Emergency Medicine

58 | Tenecteplase versus Alteplase Administration for Acute Ischemic Stroke in a Community Health System

Liz Lucas, Pharm.D.[1], Rylee Rankin, Pharm.D.[1] and Lindsay Harris, Pharm.D., BCCCP[2]

[1]*Pharmacy, Mission Hospital, Asheville, NC* [2]*Department of Pharmacy, Mission Hospital, Asheville, NC*

Introduction: Alteplase has been considered the standard of care thrombolytic for acute ischemic stroke, but recent clinical trials have demonstrated promising reperfusion rates and clinical improvement for tenecteplase.

Research Question or Hypothesis: This study is an evaluation of the benefits and safety of tenecteplase 0.25 mg/kg for acute ischemic stroke in comparison to alteplase.

Study Design: An observational cohort study conducted on adult patients presenting as a code stroke who received alteplase in 2019 and tenecteplase from December 2020 to February 2021 in a community health system.

Methods: The primary objective of this study compares door-to-needle time for ischemic stroke patients receiving alteplase versus tenecteplase. The secondary objectives compare: length of stay, ICU length of stay, inter-hospital transfer times, discharge disposition, early NIHSS score improvement, patients who undergo interventional radiology, time to groin puncture in interventional radiology, and cost. The comparison of safety outcomes include intracranial hemorrhage, death due to any cause, and angioedema. Analysis of baseline characteristics and objectives included descriptive statistics, chi-squared analysis, and unpaired t-test.

Results: In 2019, 199 patients received alteplase for acute ischemic stroke, of whom 118 patients were included and compared to 41 patients who were treated with tenecteplase between December 2020 to February 2021. The primary endpoint, door-to-needle time, was 39 minutes [SD 36.3] vs 35 minutes [SD 18.5] for alteplase and tenecteplase, respectively (p-value = 0.4666). There was a trend towards improvement of NIHSS scores at 24 hours with tenecteplase 56.1% vs alteplase 37.3% (p-value = 0.0921). Neither incidence of intracerebral hemorrhage (tenecteplase 9.7%; alteplase 11.0%, p-value = 1) or death (tenecteplase 4.9%; alteplase 6.8%, p-value = 0.4902) were significantly different.

Conclusion: Door-to-needle time and safety outcomes did not differ between the tenecteplase and alteplase groups in a community health system.

59 | Clinical outcomes after Prothrombin Complex Concentrate for warfarin-associated intracerebral hemorrhage and baseline Glasgow Coma Scale score less than or equal to 8

Kristen Koehl, Pharm.D.[1], Nicholas Panos, Pharm.D.[2], Gary Peksa, Pharm.D., BCPS[3] and Giles Slocum, Pharm.D., BCCCP[4]

[1]*Rush University Medical Center, Chicago, IL* [2]*Chicago, IL* [3]*Departments of Pharmacy and Emergency Medicine, Rush University Medical Center, Chicago, IL* [4]*Department of Pharmacy, Rush University Medical Center, Chicago, IL*

Introduction: There is limited evidence describing the mortality benefit of utilizing 4-factor prothrombin complex concentrate (4F-PCC) in patients presenting with a warfarin-associated intracerebral hemorrhage (ICH) and a Glasgow Coma Scale (GCS) of ≤ 8. The aim of this study is to determine the potential mortality benefit of the aforementioned patient population.

Research Question or Hypothesis: Patients with a warfarin-associated ICH and baseline GCS of ≤ 8 will have a 10% mortality benefit if they received 4F-PCC compared to patients who did not receive 4F-PCC from historic cohorts.

Study Design: Retrospective cohort study

Methods: This was a retrospective chart review, performed at a comprehensive stroke center from October 2013 through August 2020. Patients were included if they were ≥ 18 years of age, experienced a spontaneous ICH with baseline GCS ≤ 8, treated with warfarin prior to admission, had a baseline INR ≥ 1.7, and received 4F-PCC for INR normalization due to warfarin-associated ICH. The primary outcome was in-hospital mortality at 30 days.

Results: There were 252 patients that received 4F-PCC in the specified time period. Of those patients, 25 patients met inclusion criteria. Sixteen patients (64%) experienced in-hospital mortality. When compared to an estimated 80% mortality rate in the studied patient population, there was no statistically significant difference (p=0.208) in mortality when 4F-PCC was utilized to reverse INR.

Conclusion: The administration of 4F-PCC in patients presenting with warfarin-related ICH and GCS ≤ 8 did not result in a mortality benefit. Our results are limited by study design and sample size. Thus, larger studies are needed to determine if a benefit exists for 4F-PCC in this patient population. Although the results are not statistically significant, our study suggests that there may be a clinically significant mortality benefit when 4F-PCC is utilized.

60 | Evaluation of Emergency Medicine Pharmacist-Facilitated Sexually Transmitted Infection Microbiologic Test Follow-up in Patients Discharged from the Emergency Department

Maribel Llamas Rangel, Pharm.D.[1], L. Hunter Reese, Pharm.D., BCPS[1], Brian McCrate, Pharm.D., BCPS, BCCCP[1], Michelle Hecker, MD[1] and M. David Gothard, Ph.D.[2]

[1]*MetroHealth Medical Center, Cleveland, OH* [2]*East Canton, OH*

Introduction: Utilization of pharmacists for positive sexually transmitted infection (STI) discharge test monitoring may decrease time to treatment interventions and repeat STI-related visits. Recently, emergency medicine pharmacists (EMPs) began providing follow-up for patients requiring treatment after emergency department (ED) discharge for positive *Trichomonas vaginalis*, *Chlamydia trachomatis*, and *Neisseria gonorrhea* nucleic acid amplification tests (NAATs) for the MetroHealth System EDs utilizing a consult agreement.

Research Question or Hypothesis: Does implementation of EMP culture follow-up impact time to patient notification, document treatment, and/or repeat STI-related visits?

Study Design: This is an IRB-exempt, single-center, pre- and post-implementation, retrospective cohort study.

Methods: Patients 16 years or older discharged from the ED with subsequent positive test for *Chlamydia trachomatis*, *Neisseria gonorrhea* and/or *Trichomonas vaginalis* were screened for inclusion. The pre-implementation group included patients who required follow-up from June 1, 2019 to September 30, 2019. The post-implementation group included patients who required follow up from June 1, 2020 to September 2020.

Results: Documentation of follow-up for all patients requiring treatment was significantly higher in the post-implementation group (98% vs 54%, p <0.00001). Documentation of follow-up in patients only requiring oral treatment was significantly higher in the post-implementation group (98.8% vs 55.7%, p <0.001). Average time from positive test result to documented patient outreach was significantly shorter in the post-implementation group (9.1 hrs. vs 33.5 hrs., p=0.002). There were significantly fewer ED or outpatient STI-related repeat visits within 30-days in the post-implementation group for patients who only required oral treatment (12% vs. 38%, p=0.001). No statistical difference was seen in the average time from positive test to documented treatment between post-implementation and pre-implementation groups (17.8 hrs. vs 207.3 hrs., p=0.072).

Conclusion: Implementation of EMP STI culture follow-up significantly reduced time from test result to patient outreach and resulted in significantly fewer STI-related repeat visits within 30 days for patients with positive *Chlamydia trachomatis* and/or *Trichomonas vaginalis* results.

61 | Evaluation of fixed-dose versus variable-dose prothrombin complex concentrate for warfarin reversal

Haley Bajdas, Pharm.D.[1], Michele Handzel, Pharm.D., BCCCP[2], Kate Kokanovich, Pharm.D., BCCCP[3], Courtney Jones, Ph.D.[4], Elizabeth Uttaro, Pharm.D. Candidate[2] and Nicole Acquisto, Pharm.D., FCCP, FASHP, BCCCP[5]

[1]*Department of Pharmacy, University of Rochester Medical Center Strong Memorial Hospital, Rochester, NY* [2]*University of Rochester Medical Center Strong Memorial Hospital, Rochester, NY* [3]*Department of Pharmacy, University of Rochester Medical Center, Rochester, NY* [4]*University of Rochester Medical Center, Strong Memorial Hospital, Rochester, NY* [5]*Department of Pharmacy, Department of Emergency Medicine, University of Rochester Medical Center, Strong Memorial Hospital, Rochester, NY*

Introduction: Fixed-dose four-factor prothrombin complex concentrate (4F-PCC) is efficacious for emergent warfarin reversal, however, the ideal fixed dose has not been established. In 2018, our institution guideline recommendations changed from variable-dose 4F-PCC to a fixed dose of 1000 units for patients with extracranial life-threatening bleeding or undergoing an urgent procedure.

Research Question or Hypothesis: Does fixed-dose 4F-PCC adequately reverse warfarin compared to variable-dose 4F-PCC?

Study Design: A retrospective study of patients with extracranial bleeding or undergoing an urgent procedure who received 4F-PCC for warfarin reversal from September 2013 through August 2020.

Methods: Hemostatic efficacy at 48 hours following fixed- or variable-dose 4F-PCC was evaluated. Patients failed to achieve hemostatic efficacy if they met modified International Society on Thrombosis and Haemostasis (ISTH) criteria for major bleeding or received blood product or blood factor after initial 4F-PCC administration. Secondary outcomes included post-4F-PCC INR ≤ 1.5, in-hospital mortality, and 4F-PCC cost. Univariate analyses were completed as appropriate and logistic regression was used to identify patient-specific factors associated with hemostatic efficacy.

Results: A total of 266 patients were included; mean age 68 ± 15 years, 60% male. Ninety-one (34.2%) received fixed-dose and 175 (65.8%) received variable-dose 4F-PCC. Hemostatic efficacy was achieved in 34 (37.4%) and 38 (21.7%) in the fixed- and variable-dose groups, respectively (p = 0.006). Achievement of an INR ≤ 1.5 occurred in 55 (61.8%) and 120 (69.4%) in the fixed- and variable-dose groups, respectively (p = 0.22), and there was no difference for in-hospital mortality. Cost was reduced in the fixed-dose group (mean

$1585/dose vs. $3402/dose). No patient-specific factors (e.g., baseline INR, weight) were identified to be associated with hemostatic efficacy in either group.

Conclusion: This study demonstrated that fixed-dose 4F-PCC is associated with a higher likelihood of achieving hemostatic efficacy and reduced cost compared to variable-dose 4F-PCC.

Endocrinology

62 | Impact of the Medicare Part D coverage gap on glycemic control in patients with type 2 diabetes

Allison Behrens, Pharm.D.[1] and Lauren McKnight, Pharm.D., CPP, BCACP[2]

[1]*UNC Hospitals, Chapel Hill, NC* [2]*UNC Endocrinology, UNC Hospitals, Chapel Hill, NC*

Introduction: Under Medicare Part D, patients enter a coverage gap once threshold for medication spending is exceeded. Patients are then responsible for a larger proportion of drug cost. Many guideline-recommended treatments for type 2 diabetes mellitus (T2DM) are expensive, resulting in high costs for patients in the gap.

Research Question or Hypothesis: This study aimed to determine whether there is an impact on A1c control for patients in the coverage gap. It is hypothesized that optimal medication therapy is changed to reduce cost.

Study Design: Retrospective, observational, single-center study.

Methods: Adults with T2DM, Medicare Part D, evaluated by endocrinology from January 1, 2019 to December 31, 2019 were included. Patients were assigned to the "coverage gap" or "non-coverage gap" group based on documentation in the medical record. The primary outcome was change in mean A1c from baseline. Secondary outcomes included difference in percent of patients discontinuing or initiating medication. Statistical analysis performed in STATA with a p-value of <0.05 considered statistically significant.

Results: 150 patients met inclusion criteria and were assigned the coverage gap (n=16) or non-coverage gap (n=134) groups. There was no difference between groups for change from baseline A1c at 3 (-0.08 vs. -0.05, p=0.926), 6 (0.5 vs. 0.22, p=0.446) or 12 months (0.13 vs. -0.01, p=0.741). There was a statistically significant increase in medication changes in the coverage gap group (62.5% vs. 35.1%, p=0.033). Of the patients in the coverage group, 75% of the medication changes were documented to be for cost reduction.

Conclusion: This study concludes medication changes occur to minimize cost for patients in the gap. This study did not find an impact of the coverage gap on A1c within a one-year time frame. Larger studies that span multiple years are warranted to analyze the true impact of the coverage gap on medication changes and glycemic control.

63 | Demographics of Patients on Insulin for the Use of Continuous Glucose Monitoring

Roxy Duan, MS, Pharm.D. Candidate[1], Yumena Kawasaki, Pharm.D. Candidate[1], Crystal Rim, Pharm.D.[2], Ryan Wargo, Pharm.D., BCACP[2], Laura Pahlmeyer, Pharm.D., BCACP, CDCES[2] and Marina Kawaguchi-Suzuki, Pharm.D., Ph.D., BCPS, BCACP[2]

[1]*Pacific University School of Pharmacy, Hillsboro, OR* [2]*Legacy Health, Portland, OR*

Introduction: Continuous glucose monitoring (CGM) is an increasingly adopted strategy. It is important to understand current CGM utilization to be prepared for future demand. This project aimed to evaluate the demographics of patients on insulin who use CGM in primary care clinics, compared to those who do not use CGM.

Research Question or Hypothesis: To identify demographics for the utilization of CGM among diabetic patients on insulin

Study Design: Cross-sectional study based on health-system data

Methods: Patient demographic data, as primary outcome of interest, were collected from electronic medical records (Epic Systems Corporation) by Web Intelligence (SAP America Inc.). Inclusion criteria for the data extraction were: adults 18 years and older, diagnosed with either type I or type II diabetes, on insulin therapy, and seen by a Legacy Health provider in a primary care clinic between 1/1/2018 to 1/12020. Data analyses were conducted with JMP Clinical 7.1.

Results: A total of 9,215 patients met the inclusion criteria; 557 patients (6%) were on CGM. Patients using CGM were younger than non-CGM users (61.2±14.4 vs 67.6±13.7 years, p<0.001). Patients' sex was associated with the user status (6.6% of male vs 5.5% of female patients on CGM, p=0.04). No significant difference was detected with patients' race or their preferred languages. Compared to 2.9% of non-CGM users, 5.7% of CGM users had hypoglycemia listed as a problem (OR 2.01; 95%CI 1.38-2.93); 89% of patients who had hypoglycemia were not using CGM yet. Similarly, more patients with hyperglycemia listed as a comorbidity use CGM (OR 1.30; 95%CI 1.06-1.60) while 93% of patients with hyperglycemia had not yet used CGM.

Conclusion: This study identified the demographics of patients who were more likely to utilize CGM. However, there is still opportunity to expand CGM use, especially among those who have hypoglycemia and hyperglycemia.

Gastroenterology

64 | Evaluating impact of glucagon-like peptide-1 receptor agonists on food content during esophagogastroduodenoscopy

Jennifer Stark, Pharm.D., BCPS, FCCP, Jennifer Cole, Pharm.D., BCPS, BCCCP, FCCP, Rachel Ghazarian, Pharm.D., BCACP and Marian Klass, Pharm.D., BCACP

Veterans Health Care System of the Ozarks, Fayetteville, AR

Introduction: Esophagogastroduodenoscopy (EGD) is widely used for screening, diagnosis, and treatment of gastrointestinal disorders. The study facility patient instructions include a standard hold on solid foods at 11:00 PM the night before EGD to ensure adequate visualization. Although the glucagon-like peptide-1 receptor agonists (GLP-1RA) class of medications have delayed gastric emptying properties, there are no reports of these effects on EGD visualization, and they are currently not held prior to EGD.

Research Question or Hypothesis: Does GLP-1RA use increase the frequency of retained food documented in patients undergoing EGD compared to those not prescribed a GLP-1RA?

Study Design: Single-center, case-control, retrospective review of electronic medical records from 1/1/2015 to 10/31/2020.

Methods: Patients prescribed a GLP-1RA at the time of EGD procedure were cross-referenced with controls who were not prescribed a GLP-1RA at the time of EGD. Controls were matched 2:1 for diagnosis of diabetes and cirrhosis. Primary endpoint was the odds of retained food documented in the EGD procedure note. Secondary endpoints included incidence of lavage and need for repeat EGD due to poor visualization. Odds ratio and Fisher's Exact test were used to compare endpoints in R Studio.

Results: There were 59 patients prescribed a GLP-1RA at the time of EGD and 118 matched controls. There were 4 patients (6.8%) in the GLP-1RA group with food retention documented in the EGD procedure note and 2 patients (1.7%) in the control group [OR 4.22 (95%CI 0.87-20.34)]. No difference was observed in the need for lavage during EGD or in the need for repeat EGD attributed to poor visualization.

Conclusion: GLP-1RA did not significantly increase the odds of retained food on EGD. Given the rare occurrence of this event, a larger cohort may find a statistical difference. However, as no procedures required repeat EGD due to poor visualization, this may represent a clinically insignificant finding.

Geriatrics

65 | Association of melatonin use with adverse events in geriatric patients admitted to inpatient medical and surgical care units

Abigail Steele, Pharm.D.[1], Michael Gionfriddo, Pharm.D., Ph.D.[2] and Casey Holliday, Pharm.D. Candidate[3]

[1]*Department of Pharmacy, UPMC Mercy, Pittsburgh, PA* [2]*School of Pharmacy, Duquesne University, Pittsburgh, PA* [3]*School of Pharmacy, University of Pittsburgh, Pittsburgh, PA*

Introduction: Geriatric patients are at an increased risk of adverse effects of medications, including falls and altered mental status, due to changes associated with age. Medications for insomnia are not recommended in geriatric patients due to the potential for increased risks of adverse events. Melatonin, a dietary supplement, is often used in geriatric patients due to perceived safety though the optimal dosage has not been defined.

Research Question or Hypothesis: Higher rates of falls, incidence of altered mental status, new onset delirium, and aspiration pneumonia are associated with higher doses of melatonin administration in older patients admitted to a medical or surgical care hospital unit.

Study Design: Retrospective electronic chart review of all inpatients ≥ 65 years of age administered at least one dose of melatonin while admitted to a medical or surgical care units at UPMC Mercy between June 1 and August 31, 2020.

Methods: Demographic information, length of stay, melatonin dose, number of doses administered during admission, occurrences of falls, altered mental status, new onset delirium, and aspiration pneumonia was collected. The relationship between melatonin dose and composite adverse outcome was assessed.

Results: A total of 336 patients were included in this study, (mean age 77 years, 47% male). The composite outcome of fall, altered mental status, new onset delirium, and aspiration pneumonia occurred in 12 patients (3.6%) administered melatonin while admitted. Patients who had an event were administered a higher median dose of melatonin (6 mg vs 3mg, p=0.0104) and had a longer average length of stay (19 versus 9 days, p=0.0305).

Conclusion: Higher doses of melatonin may be related to adverse effects in older adults admitted to the hospital.

66 | Evaluation of Clinical Pharmacist-led Appropriate Acid Suppression Therapy Stewardship Program in Hospitalized Older Patients: a randomized controlled study

Hatı̇ce Dumlu, Ph.D. (candidate)[1], Mesut Sancar, Ph.D.[2], Alı̇ Ozdemı̇r, MD[3] and Betul Okuyan, Ph.D.[2]

[1]*Department of Clinical Pharmacy,, Marmara University, İstanbul, Turkey* [2]*Clinical Pharmacy Department, Faculty of Pharmacy, Marmara University, Istanbul, Turkey* [3]*Department of Internal Medicine, Health Sciences University, İstanbul, Turkey*

Introduction: Clinical pharmacist-led services in older patients are important to decrease the use of inappropriate PPIs, which can cause negative economic and clinical outcomes.

Research Question or Hypothesis: To evaluate the impact of clinical pharmacist-led appropriate acid suppression therapy stewardship program on the frequency of appropriate PPI usage and economic outcomes in hospitalized older patients.

Study Design: Randomized controlled study

Methods: This prospective, randomized controlled study was conducted in older patients who ordered PPI at admission in an internal medicine service of tertiary training and research hospital between September 2019 and February 2020. In the intervention group, clinical pharmacist-led services (including medication reconciliation and medication review) were conducted at admission, during hospitalization and at discharge by using the guidelines and potentially inappropriate medications (PIM) criteria [AGS Beers Criteria©, 2019].

Medication Appropriateness Index (MAI), PPI cost, and total medication and hospitalization cost were calculated in both groups.

Results: One hundred ninety-seven older patients (n=97 in control group, n=100 in intervention group) have been recruited the study. The mean of MAI scores was significantly lower in the intervention group after clinical pharmacist-led services when compared with control group (13.0 vs 15.5; $p<0.001$ at admission, 12.6 vs 15.4; $p<0.001$ during hospitalization and 4.4 vs 6.1; $p<0.05$ at discharge). Clinical pharmacist-led medication review increased appropriate PPI usage during hospitalization (79.0% vs 46.4%; $p<0.05$) and reduced the presence of PIM at discharge (13% vs 29.9%; $p<0.05$) when compared with the control group. Both PPI and total medication cost were greater in older patients inappropriately used PPI at the control group when compared with the intervention group ($p<0.05$).

Conclusion: Clinical pharmacist-led appropriate acid suppression therapy stewardship program had positive impact on increasing the frequency of appropriate PPI usage and decreasing cost related to medications in hospitalized older patients.

67 | A Qualitative Study to Understand Multimorbidity and Polypharmacy through Engaging an Underserved Minority Elderly Group

Ivy Poon, Pharm.D[1], Felicia Skelton, M.D., M.S.[2], Ngozi Mbue, Ph.D., APRN, ANP-C[3], Lena Bean, M.Ed.[4], Dominique Guinn, Ph.D[5], Creaque Charles, Pharm.D., BCGP[1], Uche Ndefo, Pharm.D., BCPS[1] and Terica Jemerson, M.S.[4]

[1]*Pharmacy Practice, Texas Southern University, Houston, TX* [2]*Center for Innovations in Quality, Effectiveness and Safety, Michael E. DeBakey VA Medical Center/ Baylor College of Medicine, Houston, TX* [3]*Texas Woman's University, Houston, TX* [4]*Aging and Intergenerational Resources, Texas Southern University, Houston, TX* [5]*Texas Southern University, Houston, TX*

Introduction: Having multiple chronic medications increases the risk of adverse drug events (ADE) among elderly patients, particularly those residing in medically underserved communities. A gap still exists about medication-related problems (MRP) and intervention strategies for minority older adults, which is highly relevant to advance pharmacy practice in providing culturally appropriate services and reduce health disparities.

Research Question or Hypothesis: What is the perception of MRP by minority elderly patients with polypharmacy? What are the potential strategies to improve medication management?

Study Design: A qualitative study with a multi-disciplinary patient-centered focus group

Methods: Patients were engaged based on the Patient-Centered Outcomes Research Institute (PCORI) engagement rubric for research. Patients (age 65 years or older) taking five or more medications were recruited from a historically Black community in Houston, Texas. Structured open-ended questions were adapted from the principles of the Asset-Based Community Development (ABCD) process to guide discussion on research questions. Meetings were recorded and transcribed verbatim. Codes were developed based on the socio-ecological model. The qualitative analysis was conducted using thematic content analysis in Altas ti, Inc. Responses were categorized into codes by two investigators independently, cross-matched, and discussed to resolve discrepancies.

Results: The workgroup consisted of three patients, one caregiver, one physician, one nurse, three pharmacists, three health educators, and one social worker (n=13; 92% African Americans). The workgroup spent two one-hour sessions to discuss the research questions. Patient-level problems reported were medication complexity, forgetfulness, and lack of organization. A common theme related to health-system level problem was confusion regarding excessive prescriptions from multiple providers. Patients suggested creating medication list, medication wallet cards, using a medication reminder app, and bingo games related to standard labels on prescription bottles.

Conclusion: This study provides important insights into MRP experienced by minority elderly patients and ideas for potential strategies for future interventions.

Health Services Research

68 | Older adults' willingness to consider deprescribing when experiencing hyperpolypharmacy

Ruchi Rana, Pharm.D. Candidate 2023[1], Jae Choi, Pharm.D. Candidate 2023[1] and *Sarah Vordenberg, Pharm.D., MPH*[2]

[1]*University of Michigan, Ann Arbor, MI* [2]*Department of Clinical Pharmacy, University of Michigan, Ann Arbor, MI*

Introduction: Older adults experiencing hyperpolypharmacy (10+ medications) are at an increased risk for cognitive impairment and functional decline. Deprescribing, where medications are stopped or tapered, is one strategy to mitigate the risks.

Research Question or Hypothesis: How do older adults with hyperpolypharmacy make hypothetical deprescribing decisions using a card-sorting activity?

Study Design: Semi-structured interviews with adults 65 years and older taking at least 10 different products (prescription, over-the-counter, or dietary supplements).

Methods: We recruited participants using our institutional research recruitment website between February and November 2020. Participant spoke with a research assistant to create a medication list and then completed an interview using card-sorting activity to demonstrate how they would make hypothetical decisions about continuing or deprescribing their medications. Data from the card-sorting and interviews were organized via Excel. We used the Pharmacy Quality Alliance MTPs Categories Framework to analyze participant's reasons

for considering deprescribing. The study was deemed exempt by the Institutional Review Board.

Results: Among the 26 participants, 14 (54%) identified as female, 19 (73%) white, and 24 (92%) reported good or very good health. Participants reported a total of 315 medications (average 16, range 10-30). A total of 19 participants (73%) were interested in deprescribing 94 medications (30%), including stopping 68 medications (72%) and lowering the dose or frequency of 26 medications (28%). Common rationales for wanting to stop a medication included perceived lack of indication (n=31, 33%), adherence (general preference to not take the medication) (n=20, 21%), lack of effectiveness (n=16, 17%), and concerns about safety (n=14, 15%). We were unable to categorize 13 rationales (14%).

Conclusion: Most older adults experiencing hyperpolypharmacy were willing to consider deprescribing at least one medication. Future research is needed to identify individualized strategies for patients to reflect on their medications in clinical practice in order to increase patient involvement in the deprescribing process.

69 | Geographic and social characteristics of Medicare beneficiaries eligible for Medication Therapy Management who were not offered Comprehensive Medication Review

Merton Lee, Pharm.D.[1], Barbara Zarowitz, Pharm.D.[2], Catherine Cooke, Pharm.D., MS, BCPS, PAHM[3], Nicole Brandt, Pharm.D., MBA, BCPP, BCGP, FASCP[4] and Karen Pellegrin, Ph.D.[5]

[1]*Peter Lamy Center on Drug Therapy and Aging, Baltimore, MD* [2]*Peter Lamy Center on Drug Therapy and Aging - University of Maryland Baltimore, Baltimore, MD* [3]*Department of Pharmacy Practice and Science, University of Maryland School of Pharmacy, Baltimore, MD* [4]*MedStar Center for Successful Aging, Baltimore, MD* [5]*University of Hawaii, Hilo, HI*

Introduction: As part of Medication Therapy Management (MTM), Medicare Part D prescription drug plans must offer an annual comprehensive medication review (CMR) to eligible beneficiaries. In 2016, 138,193 beneficiaries were eligible but were not offered a CMR.

Research Question or Hypothesis: Social and geographic characteristics such as poverty, race, or state of residence, increase the likelihood that an eligible Medicare beneficiary is not offered a CMR.

Study Design: Case control study

Methods: Using the 2016 Master Beneficiary Summary and Part D files from the Centers for Medicare and Medicaid Services (CMS), we identified all beneficiaries coded as eligible for MTM and not offered a CMR. We modeled the association between social (dual eligibility status), demographic (age, gender, and race), and geographic (state) variables, with 'offer of CMR' using a multivariable logistic regression. Odds ratios (OR) and 95% confidence intervals (CI) were calculated using SAS Studio 3.8. State-level frequencies were generated; the reference value for the logistic regression of state data was set to the state that matched the overall population frequency (3.27%), which was Nebraska.

Results: Dual eligibility status for at least one month had the largest effect on whether an eligible beneficiary were offered CMR or not, holding all other variables constant (OR: 35.94 CI: 35.91-35.97). Smaller effects were observed for Black non-Hispanic race (OR: 1.18 CI: 1.18-1.18), age greater than 85 (OR: 1.10 CI: 1.10-1.10), and geographically, residence in Louisiana (OR: 1.51 CI: 1.51-1.52).

Conclusion: A CMR is intended to improve medication management and safety for a high-risk population with multimorbidity and polypharmacy who have met eligibility criteria for MTM. This study shows that social, demographic, and geographic factors are associated with CMR completion rates. Access and disparity differences may contribute to larger health inequities.

Hematology/Anticoagulation

70 | Outcome analysis of direct oral anticoagulants use in the morbidly obese adult population

Minlang Lin, Pharm.D. Candidate[1], Kisha Dunkley, Pharm.D., BCPS[2], Erin VanMeter, Pharm.D., BCACP[2] and Yijie Cheng, Pharm.D. Candidate[1]

[1]*School of pharmacy, University of Maryland, Baltimore, Baltimore, MD*
[2]*The Johns Hopkins Hospital, Baltimore, MD*

Introduction: Direct oral anticoagulants (DOACs) have shown superior efficacy and safety compared to warfarin in atrial fibrillation and venous thromboembolism (VTE). DOACs have the benefit of a fixed-dose regimen, minimal dietary restriction, and less drug monitoring. However, there are concerns with DOAC use in the morbidly obese population due to reduced drug exposure.

Research Question or Hypothesis:: Are DOACs safe and effective in morbidly obese adult population?

Study Design: A retrospective review of DOACs (apixaban, dabigatran, and rivaroxaban) in patients managed at The Johns Hopkins Hospital between July 1, 2016 to July 1,2020.

Methods: Adults with BMI > 40 kg/m^2 or weight > 120 kg who received DOACs for at least 3 months were included. Patient treated less than 3 months were included if discontinuation occurred due to major bleeding. Patients with mechanical heart valve, moderate-severe mitral stenosis, pregnancy, hepatic impairment, antiphospholipid syndrome, and insufficient follow-up were excluded. The safety outcome was composite of major or clinically relevant minor bleeding and efficacy outcome was recurrent VTE/stroke. Chi-square test was used to determine statistical difference between groups. The priori level of significance was 0.05.

Results: A total of 340 patients met study inclusion: 190 patients on apixaban, 35 on dabigatran and 115 on rivaroxaban. The mean age

was 63 ± 12.7 years, 54% were male and the mean length of therapy was 26.8 ± 20.3 months. A total of 14 patients (4.1%) had recurrent VTE/stoke. Major or clinically significant minor bleeding occurred in 21 patients (6.2%). There was no significant difference in outcomes for apixaban, dabigatran and rivaroxaban (VTE/stroke: 2.63% vs 2.86% vs 6.96%, *p=0.17* and bleeding: 5.79% vs 2.86% vs 7.83%, *p=0.53*)

Conclusion: This study suggests that DOAC use in the morbidly obese population was safe and effective, with low rate of treatment failure. Prospective studies are needed to further investigate DOACs use in the described population.

71 | Apixaban versus warfarin for the treatment of venous thromboembolism in patients with advanced chronic kidney disease and end-stage renal disease

Kisha Dunkley, Pharm.D., BCPS and Maggie Chan, Pharm.D., BCPS
The Johns Hopkins Hospital, Baltimore, MD

Introduction: Patients with chronic kidney disease (CKD) and end-stage renal disease (ESRD) have an increased risk of venous thrombotic embolism (VTE). Warfarin is traditionally recommended for VTE treatment in patients with creatinine clearance (CrCL) <30 mL/min. However, apixaban is of growing interest due to risks associated with warfarin.

Research Question or Hypothesis: Is there a difference in outcomes with apixaban versus warfarin for the treatment of VTE in CKD/ESRD patients?

Study Design: A retrospective match-cohort of apixaban and warfarin inpatient utilization in VTE patients with advanced CKD/ESRD at the Johns Hopkins Hospital from July 1, 2016 to June 30, 2019.

Methods: Adult patients who received apixaban or warfarin for VTE treatment for at-least 3 months and with CrCL<25 mL/min, SCr >2.5 mg/dL or ESRD were included. Patients treated for less than 3 months were also included if major bleeding led to discontinuation. Differences in safety outcome of major bleeding and efficacy outcome of recurrent VTE/stroke were compared. Secondary objective assessed whether dialysis affected bleeding events. Descriptive statistics and Chi square were used to assess results. The a priori level of significance was 0.05.

Results: Total of 140 patients were included (70 patients per group). The mean age was 62±16 years, 57% were male, and median duration was 6 months. The mean CrCL was 16.6±7.9 mL/min, and 51.4% of patients were on dialysis. Recurrent VTE/stroke occurred in 6 patients on apixaban and 17 on warfarin (*p=0.012*). Major bleeding occurred in 7 patients on apixaban and 19 on warfarin (*p=0.0091*). Major bleeding events were more common in dialysis versus non-dialysis patients (19 vs 7, *p=0.014*), independent of the group.

Conclusion: This study demonstrated that apixaban has efficacy and safety benefit over warfarin for treatment of VTE in advanced CKD/ESRD. Dialysis had a significant effect on rates of bleeding for both groups. Prospective studies are needed to evaluate findings in the described population.

Herbal/Complementary Medicine

72 | Non-prescription medication use among community-dwelling older adults

Michelle Fravel, Pharm.D.[1], Alice Owen, Ph.D.[2], Julia Gilmartin-Thomas, Ph.D.[2], Robyn Woods, Ph.D.[2], Suzanne Orchard, Ph.D.[2] and Michael Ernst, Pharm.D.[3]
[1]*Department of Pharmacy Practice and Science, University of Iowa, Iowa City, IA* [2]*Monash University, Melbourne, Australia* [3]*Department of Pharmacy Practice and Science, The University of Iowa College of Pharmacy, Iowa City, IA*

Introduction: Non-prescription medication use can contribute to the risk of drug interactions, polypharmacy, and healthcare expenses. Limited published literature exists describing the patterns or predictors of non-prescription medication use in community-dwelling older adults, a population highly susceptible to these risks.

Research Question or Hypothesis: What is the prevalence of non-prescription medication use among community-dwelling older adults, including types of products used and predictors of use?

Study Design: Cross-sectional analysis of community-dwelling adults from Australia and the US, aged 70 years and older (65 years for US minorities), enrolled in the ASPirin in Reducing Events in the Elderly (ASPREE) study.

Methods: Non-prescription, dietary supplement, and CAM (complimentary/alternative medicine) use data from 6,878 participants who completed their Milestone visit through June 2017 (final year of active intervention) were analyzed. Descriptive statistics were used to report the prevalence and types of products used. Factors associated with use were determined using multivariate regression.

Results: Mean age was 79.5 years, 56.4% were female, 89.4% were from Australia, 57.3% received 12 years of education or less, and 98.8% were community dwelling. A total of 63.9% of participants reported use of non-prescription medications; 65.5% reported use of CAMs specifically with 11.8% reporting use of four or more unique CAM products. Types of products used included vitamin D (33.3% of participants), fish oil (23.4%), other (non-specified) (23.1%), calcium (20.5%), glucosamine (15.2%), multivitamin (12.7%), vitamin C (8.2%), vitamin B (7.8%), coenzyme Q10 (3.0%), vitamin E (2.8%), zinc (2.7%), and ginkgo (1.3%). Female sex, US residency, higher education, polypharmacy, and history of cancer or osteoarthritis were significantly associated with increased use of non-prescription medications.

Conclusion: Non-prescription medication use is common among community-dwelling older adults in the US and Australia. A majority take three or fewer unique CAMs/supplements. Vitamin D and fish oil are the most commonly used products.

HIV/AIDS

73 | HIV Precision Medicine in Rural Areas of West-Central Africa

Victoria Cannefax, Pharm.D. Candidate, *Lauren Owen, Pharm.D. Candidate*, Edward Mutero, Pharm.D., David Gerick, Pharm.D., Jean-Jacques Bissemou, Medical Doctor and Landry Kamdem Kamdem, Pharm.D., Ph.D
Department of Pharmaceutical Sciences, Harding University College of Pharmacy, Searcy, AR

Introduction: The goal of the United Nations' program on HIV/AIDS (UNAIDS) is to ensure that 95% of HIV+ people who are on antiretroviral therapy (ART) are virally suppressed. According to the UNAIDS 2020 Global Update, the West-Central African region is far from reaching this target with only 45% being virally suppressed.
Research Question or Hypothesis: The goal of this study was to identify factors responsible for poor HIV viral load (VL) suppression among patients of West-Central Africa.
Study Design: This was a prospective observational study.
Methods: 263 HIV patients from rural areas of Cameroon receiving ART were enrolled in our IRB-approved study. Using medical records and a survey, we collected data related to patient characteristics (e.g., VL and medication adherence rates), and treatment characteristics (e.g., adverse events). We used a T-test and a One-Way ANOVA test to assess the impact of medication adherence and ART-related side effects on VL suppression, respectively.
Results: Out of 263, only 51 (18.4%) had access to HIV VL monitoring tests. Of those 51, 17 (33%) were virally suppressed. We found no association between either medication adherence ($p = 0.45$) or ART-related side effects ($p = 0.16$) and VL suppression.
Conclusion: In summary, our findings suggest that medication adherence and adverse events do not contribute to poor HIV VL suppression. However, one of the main factors responsible for poor HIV VL suppression is the lack of accessible, cost-effective, and rapid HIV VL monitoring tests. Future innovative efforts aimed at scaling-up HIV VL testing strategies in rural areas of West-Central Africa are urgently needed.

Infectious Diseases

74 | Assessment of aztreonam and ceftazidime cross-reactivity in a real world setting

Kathleen Adams, Pharm.D., BCPS[1] and Sunish Shah, Pharm.D., BCIDP[2]
[1]*Pharmacy Practice, University of Connecticut School of Pharmacy, Storrs, CT* [2]*Yale New Haven Health, New Haven, CT*

Introduction: A joint task force report authored by The American Academy of Allergy, Asthma and Immunology, the American College of Allergy, Asthma and Immunology, and the Joint Council of Allergy, Asthma and Immunology states aztreonam does not cross-react with other β-lactams except for ceftazidime, with which it shares an identical R-group side chain; however, clinical data supporting this statement is limited.
Research Question or Hypothesis: What is the likelihood of ceftazidime and aztreonam cross-reactivity in a real world setting?
Study Design: A single-center, retrospective, chart-review was chosen because skin prick and intradermal tests for aztreonam and ceftazidime are not readily available in clinical care. Additionally, skin testing is contraindicated for patients at high risk for anaphylaxis.
Methods: Patients were retrospectively identified if they were admitted to our 1500-bed academic medical center between February 2013 and January 2020. Patients were included if they had either a documented ceftazidime or aztreonam allergy in the electronic health record and subsequently received at least one documented administration of the alternative medication. The outcome of interest was a medication adverse event to the alternative agent. Events were qualitatively described.
Results: Twenty-four patients were included. Twenty-one patients (87.5%) had a ceftazidime allergy and three patients (12.5%) had an aztreonam allergy. All 21 patients with a ceftazidime allergy that received aztreonam tolerated the medication without any evidence of cross reactivity. Two of the 3 patients with an aztreonam allergy illustrated a complete absence of cross reactivity when administered ceftazidime. The one patient that experienced cross reactivity developed a rash to ceftazidime 4 years after developing a rash to aztreonam. The rash was managed with diphenhydramine and the patient was able to receive 12 non-consecutive days of ceftazidime therapy.
Conclusion: In the largest study to date, we identified low rates of cross-reactivity between aztreonam and ceftazidime. Further clinical studies are warranted to validate our findings.

75 | Evaluation of outpatient prescribing patterns for the treatment of urinary tract infections at a New York City Hospital

Nicole Bradley, Pharm.D., BCPS, BCIDP[1] and Kimberly Ng, Pharm.D., BCPS[2]
[1]*College of Pharmacy and Health Sciences, St. John's University, Queens, NY* [2]*College of Pharmacy and Health Sciences, St. John's University, Jamaica, NY*

Introduction: Urinary tract infections (UTIs) are the most common type of bacterial infection in the outpatient setting. It is estimated that 30-50% of outpatient antibiotics prescribed are unnecessary or inappropriate. Monitoring of these prescriptions can help identify areas for improvement and target interventions.
Research Question or Hypothesis: Evaluation of outpatient prescribing patterns for UTIs will result in opportunities for education to improve prescribing practices

Study Design: Retrospective review of hospital outpatient pharmacy prescriptions, qualitative research

Methods: This review was conducted over a 6-month period. De-identified prescription records were generated through the electronic medical record (EMR). Prescriptions for any antibiotic with a documented indication of UTI or prescriptions written for nitrofurantoin, trimethoprim/sulfamethoxazole, ciprofloxacin, or cephalexin with no documented indication were included. Included prescriptions were evaluated for factors such as antibiotic regimen, treatment duration, microbiologic data, and need for the patient to return to clinic. Descriptive statistics were used for data analysis.

Results: A total of 426 prescriptions were identified and 279 met criteria for inclusion. Nitrofurantoin was the most frequently prescribed antibiotic (103/279, 36.9%), followed by trimethoprim/sulfamethoxazole (89/279, 31.9%), and ciprofloxacin (60/279, 21.5%). The mean treatment duration for nitrofurantoin was 6.6 days, trimethoprim/sulfamethoxazole was 4.8 days, and ciprofloxacin 6.6 days. Urinalysis and urine culture were obtained in 75.3% (210/279) and 64.5% (180/279) of patients prior to initiation of antibiotics, and E.coli was the most frequently identified pathogen (94/279, 33.7%). Few patients (29/279, 10.4%) required return to clinic for continued UTI care after their initial prescription.

Conclusion: Antibiotics prescribed for UTIs were generally consistent with IDSA guideline recommendations. However, improvements such as decreasing treatment duration and minimizing fluoroquinolone use can be made at our institution through creation of an outpatient UTI treatment protocol and provider education.

76 | Impact of the long-term care antimicrobial stewardship mandate on the rates of multi-drug resistant and *Clostridioides difficile* infections among residents admitted to a regional hospital

Elias Chahine, Pharm.D., FCCP, FASCP, FFSHP, BCPS, BCIDP, Ryan Cook, Pharm.D. Candidate and Tanya Carrion, Pharm.D. Candidate
Palm Beach Atlantic University Lloyd L. Gregory School of Pharmacy, West Palm Beach, FL

Introduction: Nursing home residents are often admitted to the hospital with multi-drug resistant (MDR) and *Clostridium difficile* infections (CDI) resulting in prolonged lengths of stay and costly treatments. The Centers for Medicare and Medicaid Services made antimicrobial stewardship (AMS) a requirement for participation for long-term care facilities (LTCF) in 2017. It is unknown whether this mandate has had an impact on the rates of nursing home-acquired infections necessitating hospital admission.

Research Question or Hypothesis: Is the LTCF AMS mandate associated with a change in the rates of MDR infections and CDI among residents admitted to our hospital?

Study Design: Retrospective quasi-experimental study at a 233-bed regional hospital.

Methods: An electronic health record review was conducted to determine the rates of nursing home-acquired MDR infections and CDI among residents ≥75 years of age admitted to the hospital. MDR infections were defined by a culture positive for methicillin-resistant *Staphylococcus aureus* or extended-spectrum beta-lactamase-producing Enterobacterales. CDI was defined by a positive test for *Clostridioides difficile* using a multi-step algorithm of toxins, glutamate dehydrogenase, and polymerase chain reaction. All specimens must have been collected within 48 hours of admission. Rates of nursing home-acquired MDR infections and CDI from admission data in 2015-2016 were compared to those from 2018-2019 using the Chi-squared test.

Results: There were 33 residents out of a total of 205 hospitalized patients with MDR infections and CDI in 2015-2016 resulting in a resident infection rate of 16.1%. In comparison, there were 38 residents out of a total of 253 hospitalized patients with MDR infections and CDI in 2018-2019 resulting in a resident infection rate of 15.02%. The difference in the resident infection rate after the AMS mandate was -1.08% (p=0.75).

Conclusion: The AMS mandate was not associated with a statistically significant decrease in the infection rates among residents admitted to our hospital, suggesting a need for more effective AMS in LTCF.

77 | Evaluation of aztreonam use in an academic health system

Matthew Brooks, Pharm.D. Candidate[1] and Ilya Rybakov, Pharm.D.[2]
[1]*WVU School of Pharmacy, Morgantown, WV* [2]*WVU Medicine, Morgantown, WV*

Introduction: Penicillin allergies are grossly overreported within electronic health records. Aztreonam lacks cross-reactivity with penicillin, but it is expensive, and resistance is increasing. Antimicrobial stewardship program (ASP) interventions targeting aztreonam use in patients without true penicillin allergies are able to reduce inappropriate aztreonam prescribing and provide cost savings. West Virginia University Health System (WVUHS) is exploring whether to restrict aztreonam use to patients that have β-lactam allergies with a documented reaction or that have a documented explanation for avoiding β-lactams.

Research Question or Hypothesis: To determine if at least 80% of aztreonam orders are currently utilized according to proposed restriction criteria (PRC) and determine if aztreonam use should be restricted.

Study Design: Retrospective chart review.

Methods: Reviewed 151 patients that were treated with aztreonam within WVUHS from 12/1/2019 – 12/31/2020. Data collected included: demographics, allergy information, historical β-lactam usage, aztreonam utilization, and microbiology cultures.

Results: PRC was met in 64% (n=97) of patients. This trend was seen across WVUHS hospitals, with 30 – 43% of orders not meeting PRC at hospitals with more than one aztreonam order. A total of 134 patients reported an allergy to β-lactams; however, 67% (n=90) were documented as having previously tolerated a β-lactam antibiotic. A total of 195 β-lactam allergies were charted and 32% (n=62) of

these did not specify the allergic reaction. Empiric therapy accounted for 80% (n=138) of aztreonam orders while 20% (n=35) were targeted. Of the targeted therapies, 29% (n=10) had aztreonam susceptibilities.

Conclusion: Aztreonam was found to be used in a broad, unrestricted manner across all WVUHS hospitals, with only 64% of orders meeting PRC. There are opportunities for improving documentation of allergic reactions and utilization of susceptibility testing. The WVUHS ASP will be implementing aztreonam restriction in the form of criteria for use, in addition to educating pharmacists and providers on β-lactam allergy assessment.

78 | Real-World Experience of Bamlanivimab For Outpatient Management of Patients with Mild-to-Moderate COVID-19 Infection at an Academic Community Health System

Ivy Yang, Student Pharmacist[1] and S. Lena Kang-Birken, Pharm.D.[2]
[1]*University of the Pacific Thomas J Long School of Pharmacy, Stockton, CA* [2]*Department of Pharmacy Services, Cottage Health System, Santa Barbara, CA*

Introduction: In November 2020, an emergency use authorization (EUA) was issued for the investigational monoclonal antibody bamlanivimab for treating mild-to-moderate Coronavirus Disease 2019 (COVID-19) in high risk patients. Our academic community health system implemented it at emergency department (ED) for patients who fit the EUA criteria.

Research Question or Hypothesis: We assessed clinical benefits of bamlanivimab in reducing hospitalizations in a real-world setting and overall adverse events.

Study Design: We conducted a retrospective chart review on patients that received bamlanivimab in ED between November 17th, 2020 and January 15th, 2021, identified by medication usage report.

Methods: We collected the following data: demographics, co-morbidities, eligibility criteria, infusion related adverse events, return visits to ED or hospitalization due to COVID-19 related complications.

Results: 130 patients received bamlanivimab infusion. The population consists of 68.4% ≥ 65 years of age, 60.8% white, and an average body mass index (BMI) of 29.8 kg/m^2. Almost all patients had 1 or more high risk co-morbidities such as hypertension, diabetes mellitus, asthma, and malignancy. About 25% were former/current smokers, and majority arrived from private homes. Average duration of symptoms was 4.3 days and average time since positive COVID test was 1.9 days. Older age was the predominant eligibility criteria for infusion (69%). Six patients experienced infusion-related adverse events, most commonly reduction in blood pressure or oxygen saturation, of which three patients were directly hospitalized. No anaphylactic reactions were observed. 16.9% of patients returned to ED within 30 days (average length of 5.4 days), of which half warranted no medical intervention. However, the remaining patients were subsequently hospitalized (8.5%) with average stay of 11.4 days. These patients were older in comparison to those not admitted. All-cause mortality rate was 2.3%.

Conclusion: Bamlanivimab infusion at our health system was well tolerated and effective in reducing potential hospitalizations. However, higher rates of ED visits and hospitalizations were observed than clinical trials.

79 | Deaths Post COVID-19 Vaccination: An Analysis Per VAERS

Jason Wong, Pharm.D.[1], Jui Patel, Bachelors of Biology[2], Chelsea White, Bachelors of Science in Biochemistry[3], Jonathan Ang, Bachelor of Sciences in Pharmaceutical sciences[3], Jonah Munoz, BS[3] and Stella Gee, Bachelor of Science in Pharmacological Chemistry[3]
[1]*Pharmacy Practice and Administration, School of Pharmacy, Western University of Health Sciences, Pomona, CA* [2]*University of Florida College of Pharmacy, Gainesville, FL* [3]*Western University of Health Sciences, Pomona, CA*

Introduction: To stop the spread of COVID-19, Emergency Use Authorization (EUA) vaccines from Moderna and Pfizer-BioNtech were granted in December 2020. Due to the vaccines being fast-tracked, the safety profiles are being closely studied, including fatal adverse drug events.

Research Question or Hypothesis: The purpose of this study is to identify the specific patient characteristics of those who died after receiving either the Moderna or Pfizer-BioNtech COVID-19 vaccine through the Vaccine Adverse Event Reporting System (VAERS).

Study Design: Analysis of 717 patients who died after COVID-19 vaccination in the U.S.

Methods: Using the VAERS, data was extracted from December 2020 to February 2021 on patients that died after receiving either the Moderna or Pfizer-BioNtech vaccine. Information collected included: vaccine manufacturer, patient's age, sex, state of vaccine administration, dose received, date vaccinated, date of symptoms onset, date of death, symptoms, adverse drug event (ADE) description, medication history, allergies, current medications, and illnesses. The patients were then categorized per ADEs that possibly related to death.

Results: A total of 568 patients were included ranging from ages 23 to 108 years old, with a median age of 78.5 and mean age of 77.3. Of the patients who died, 56% were male, and 44% were female. The top three adverse effect categories were respiratory (23.8%), cardiac (21.3%), and fatigue (10.9%). The reported deaths were similar after receiving either the Moderna vaccine (51.1%) or the Pfizer-BioNtech vaccine (48.9%). Eighty percent of patients died after receiving the first dose, and 20% died after receiving the second dose.

Conclusion: Based on the first three months of VAERS data, fatality post-vaccination presented more in male elderly patients. Respiratory and cardiac events were the most common adverse events in this study; however, these were not prominent in manufacturer data. Further investigation would be needed to establish a direct correlation

between the Moderna and Pfizer-BioNtech COVID-19 vaccines and death.

80 | Identification of Risk Factors Associated with Open Fracture Complications following Antimicrobial Prophylaxis

Elizabeth Cusack, Pharm.D.[1], Kaylee Maynard, Pharm.D.[1], Courtney Jones, Ph.D.[2], Ted Louie, MD[2], John Gorczyca, MD[2] and Nicole Acquisto, Pharm.D., FCCP, FASHP, BCCCP[3]
[1]*Department of Pharmacy, University of Rochester Medical Center, Strong Memorial Hospital, Rochester, NY* [2]*University of Rochester Medical Center, Strong Memorial Hospital, Rochester, NY*
[3]*Department of Pharmacy, Department of Emergency Medicine, University of Rochester Medical Center, Strong Memorial Hospital, Rochester, NY*

Introduction: Fracture site infection is a significant concern after an open fracture. Our institutional guideline follows Eastern Association for the Surgery of Trauma (EAST) recommendations regarding antibiotic selection and duration based on open fracture type.
Research Question or Hypothesis: To identify independent risk factors for open fracture complications and evaluate guideline adherence.
Study Design: A retrospective study of open fracture patients who received antibiotic prophylaxis and were admitted for at least 24 hours between March 2011 and October 2020.
Methods: Patient demographics, microbiologic cultures, and antibiotic information were collected to determine infection at the open fracture site up to 1-year post-injury, development of acute kidney injury (AKI), infection due to multi-drug resistant organisms (MDRO), development of Clostridioides difficile infection (C. diff) and guideline adherence. Data were analyzed by univariate analyses. Logistic regression was performed to identify independent risk factors associated with infection, AKI, MDRO and C. diff infection.
Results: A total of 401 patients were included; 62% (n=248) male, 77% (n=309) white. Fracture classifications were similar: 30.2% (n=121) type I, 39.4% (n=309) type II and 30.4% (n=122) type III. Infection occurred in 19.2% (n=77), AKI in 18.4% (n=74), MDRO in 3% (n=12) and zero patients developed C. diff. Fracture classification and medical management alone were independent risk factors for infection, p=0.01 and p=0.004, respectively. Receiving nephrotoxic medications was an independent risk factor for developing AKI (p=0.012). Variables such as age, body mass index, time to wound closure and fracture location were not associated with open fracture complications. Appropriate initial antibiotics defined by guidelines were selected in 83% (n=333) of patients. Of those that received too narrow antibiotic coverage, 36% (n=4/7) developed an infection (p=0.002).
Conclusion: Appropriate fracture classification and antibiotic selection is crucial to prevent risk for infection post-injury. Reducing concomitant exposure to nephrotoxic agents is necessary to reduce AKI.

81 | Development of Combined Anti-biogram for Empirical *Pseudomonas aeruginosa* Treatment in a University-affiliated Teaching Hospital

Ming-Ying Ai, MS[1], Hsin-Yi Liu, MD[2] and Bi-Li Chen, MS[1]
[1]*Department of Pharmacy, Taipei Medical University Hospital, Taipei, Taiwan., Taipei, Taiwan* [2]*Division of Infectious Diseases, Department of Internal Medicine, Taipei Medical University Hospital, Taipei, Taiwan., Taipei, Taiwan*

Introduction: Pseudomonas aeruginosa (PA) is one of the life-threatening bacteria that cause nosocomial infections. To the patient with critical illness who suspected to carry resistant PA, empirical combined antimicrobial therapy could ensures appropriate coverage.
Research Question or Hypothesis: Local traditional anti-biogram usually helped to select the optimal empirical single antibiotic treatment. However, it could not reflect the real antimicrobial resistant condition when two antimicrobial agents combined. Combination anti-biogram should be generating to help choice two appropriate antimicrobial agents to expanded PA coverage.
Study Design: Using the PA isolates susceptibility data to anti-pseudomonal agent to build local combination anti-biogram in our hospital. To figure out which combined regiment is most effective for high resistant PA empirical treatment.
Methods: A total 217 PA non-duplicate culture were isolated from aged ≧ 20 years old ICU patients in our hospital from January, 2015 to June, 2019. Antibiotic susceptibility data were obtained then classified as susceptible, resistant or intermediate according to CLSI guidelines. The coverage rate of the anti-pseudomonal drug as single agents or in combination of backbone antibiotics (piperacillin-tazobactam(PTZ), cefetazidime, cefepime or meropenem) with an Aminoglycoside (gentamicin or amikacin) or Fluroquinolone (ciprofloxacin or levofloxacin) were calculated.
Results: The sensitivity of anti-pseudomonal β-lactam single agents ranges from 18.4% to 42.1%. The combination of backbone anti-pseudomonal agent with aminoglycoside or flouroquinolone coverage rate: (1)ceftazidime + gentamicin: 73.7% (2)ceftazidime + amikacin: 94.7% (3)ceftazidime + ciprofloxacin:69.7% (4) ceftazidime+ levofloxacin: 63.2% (5)cefepime + gentamicin: 68.4% (6)cefepime + amikacin: 92.1% (7)cefepime + ciprofloxacin: 67.1% (8)cefepime + levofloxacin: 57.9% (9)meropenem + gentamicin: 81.6% (10) meropenem + amikacin: 98.7% (11)meropenem +ciprofloxacin: 71.1% (12)meropenem + levofloxacin: 65.8% (13) PTZ + gentamicin: 72.4% (14) PTZ + amikacin: 92.1% (15) PTZ + ciprofloxacin: 69.7% (16)PTZ + levofloxacin: 61.8%
Conclusion: The results indicate that an anti-pseudomonal β-lactam agent added aminoglycosides provide the best coverage rate. The Amikacin conferred greater additional coverage rate than gentamicin.

82 | Influence of bamlanivimab administration timing relative to symptoms on hospital revisit

Brynna Crovetto, Pharm.D.[1], Savanna SanFilippo, Pharm.D.[1], Marc Milano, MD[2], John Bucek, MD[2], Ronald Nahass, MD, MHCM[2] and *Luigi Brunetti, Pharm.D., Ph.D.*[3]

[1]*Department of Pharmacy, Robert Wood Johnson University Hospital Somerset, Somerville, NJ* [2]*Robert Wood Johnson University Hospital Somerset, Somerville, NJ* [3]*Department of Pharmacy Practice and Administration, Rutgers, The State University of New Jersey, Piscataway, NJ*

Introduction: Bamlanivimab is a monoclonal antibody treatment for mild-to-moderate coronavirus disease 2019 (Covid-19) in patients at high risk for severe disease progression and/or hospitalization. Despite emerging evidence that bamlanivimab plus etesevimab decreases viral load more than monotherapy, there is insufficient evidence of bamlanivimab monotherapy's effects on 28-day all-cause hospital revisit and adverse drug reactions (ADRs) considering its widespread use.

Research Question or Hypothesis: Does bamlanivimab administration within 3 days of symptom onset have a lower 30-day revisit rate versus later administration?

Study Design: Single-center, retrospective cohort study

Methods: The electronic medical record was queried for all consecutive patients who received bamlanivimab in a 2-month period. The primary outcome was 30-day post infusion revisit rate in patients who presented in < 3 days (early) versus ≥ 3 days (later) of symptom onset. Secondary outcomes included Covid-19- and ADR-related rates of revisit and 30-day hospital admission rate between groups. Chi-square and independent samples t-test were used to compare categorical and continuous data, respectively.

Results: 183 patients met the inclusion criteria and were included in the analysis. There were 70 patients with early administration and 113 with later administration. Baseline characteristics for both groups were similar. The average age was 67 years and BMI 30 mg/m^2; proportions of active smokers was roughly 4.5% and patients with diabetes were 30%. Early and late administration of bamlanivimab were alike in terms of any hospital revisit (21.4% vs. 22.1%; p=0.912). Similarly, there was no significant between group difference for COVID-19 or ADR related revisits as well as for Covid-19 hospital admission within 30 days. No variables predictive of 30-day hospital revisit were identified.

Conclusion: We did not find any difference in outcomes between early and late administration of bamlanivimab. The hospital admission rate was similar to previous studies.

83 | Optimizing antibiotic combinations based on synergistic receptor occupancy patterns in a Gram-negative superbug

Eunjeong Shin, MS[1], Alaa R. M. Sayed, Doctor[2], Nirav Shah, Doctor[2], Yinzhi Lang, Doctor[2], Jieqiang Zhou, BS[2], Carolin Werkman, BS[2] and Jürgen B. Bulitta, Doctor[2]

[1]*College of Pharmacy, University of Florida, Orlando, FL* [2]*University of Florida, Orlando, FL*

Introduction: Multidrug-resistant *Klebsiella pneumoniae* is one of the most challenging Gram-negative pathogens (i.e. a 'superbug') that causes a global human health crisis. All β-lactam antibiotics preferentially bind to and thereby inactivate one or multiple different penicillin-binding proteins (PBPs) as their high-affinity target sites. We recently published the PBP binding affinities (IC50s) of β-lactams and β-lactamase inhibitors in *K. pneumoniae*. The relationships between PBP occupancy patterns and bacterial killing are unknown in this pathogen.

Research Question or Hypothesis: Inactivating an optimized set of PBPs yields synergistic bacterial killing of *K. pneumoniae*.

Study Design: Static *in vitro* time-kill experiments over 24-h (inoculum: 5.3 $\log_{10}$ CFU/mL) assessed nine β-lactams in monotherapy and double β-lactam combinations in duplicate to systematically evaluate different sets of inactivated PBPs.

Methods: Drug concentrations were chosen based on PBP IC50s. The time-course of morphology changes were characterized via flow cytometry and automated confocal microscopy using SYTO9 and propidium iodide for live-dead staining. The time-course of bacterial killing and regrowth was modelled via Quantitative Systems Pharmacology.

Results: Inactivation of PBP2 yielded large spheres and up to ~3.5 $\log_{10}$ killing followed by near-complete regrowth by 24 h. For killing, 4 to 32x the PBP2 IC50 was required. Inactivation of PBP3 yielded long filament and ~3 to 4 $\log_{10}$ killing. Most PBP3 binding β-lactams required 1x PBP3 IC50. However, piperacillin required 128x PBP3 IC50 and its effect was not enhanced by efflux pump inhibition (suggesting poor penetration). Simultaneous inactivation of PBPs 2 and 3 yielded some synergistic killing and minimized regrowth at 24h.

Conclusion: The new flow cytometry and time-lapse confocal microscopy approach could rapidly detect morphology changes elicited by inactivation of PBP2, PBP3 and the synergy due to simultaneous inactivation of PBPs 2 and 3 in *K. pneumoniae*. This combination of assays provided mechanistic insights to optimize double β-lactams combinations.

84 | Evaluation of the use of omadacycline in adults with nontuberculous mycobacterium infections

Gracie Giang, Pharm.D.[1], Patrick Flume, MD[2], Susan Dorman, MD[3] and Wendy Bullington, Pharm.D.[4]

[1]*Department of Pharmacy, Medical University of South Carolina, Charleston, SC* [2]*Department of Medicine, Medical University of South Carolina, Charleston, SC* [3]*Department of Infectious Disease, Medical University of South Carolina, Charleston, SC* [4]*Medical University of South Carolina, Charleston, SC*

Introduction: Mycobacterium abscessus (*M. abscessus*) is a group of rapidly growing, multidrug-resistant, nontuberculous mycobacteria

(NTM), involved in pulmonary, skin and soft tissue infections (SSTIs), and disseminated infections in immunocompromised patients. Omadacycline is an aminomethylcycline antibiotic approved for community-acquired pneumonia and SSTIs. Studies have determined omadacycline can achieve in vitro minimum inhibitory concentrations (MICs) against NTM, most notably *M. abscessus*. The efficacy and tolerability surrounding the use of omadacycline in NTM patients has not been well studied. There are currently two case series published establishing the use of omadacycline for NTM, but none as large as this cohort.

Research Question or Hypothesis: How effective and well-tolerated is omadacycline for patients with NTM infections?

Study Design: Retrospective cohort study

Methods: A single center, retrospective, case series included adult patients diagnosed with an NTM infection and prescribed omadacycline for NTM treatment for at least three months. Patients prescribed omadacycline for any indication other than a mycobacterium infection were excluded.

Results: Seventeen patients were identified for this study. Most patients were female (65%) and Caucasian (94%). Twelve patients were treated for pulmonary infections and five for SSTIs. The most commonly identified mycobacterium species was *M. abscessus* (82%) and one patient was infected with *Mycobacterium chelonae*. Patients were prescribed omadacycline 300 mg daily with one patient who received 450 mg daily for two days followed by 300 mg daily. Six of the patients achieved culture conversion after initiation of omadacycline in an average of 6.14 months. Five patients are actively taking omadacycline, of which four patients have at least one negative culture since initiation of therapy. The most common adverse effect reported was nausea (35%), but did not lead to discontinuation of therapy.

Conclusion: Omadacycline has positive outcomes associated with patients diagnosed with an *M. abscessus* pulmonary infection or SSTI. It was well-tolerated among this cohort of patients and few significant adverse events were reported.

85 | Effect of Hospitalized COVID-19 Patient Demographics and Treatments on Length of Stay and Morbidity

Spencer Graczyk, Pharm.D. Candidate[1], Nida Khan, Pharm.D. Candidate[1] and Reese Cosimi, Pharm.D., BCPS, BCIDP[2]

[1]*Butler University College of Pharmacy and Health Sciences, Indianapolis, IN* [2]*St. Vincent Health, Indianapolis, IN*

Introduction: The novel COVID-19 pandemic has created a significant strain on healthcare systems throughout the world, causing over 1.8 million hospitalizations in the United States by March 2021. Studies continue to emerge better elucidating factors that affect patient clinical outcomes in the course of the disease.

Research Question or Hypothesis: What factors contribute to increased inpatient mortality and length of stay in patients hospitalized with COVID-19?

Study Design: This retrospective, single-center, quality improvement project assessed COVID-19 patients that were hospitalized at a 550 bed community-teaching hospital from March 15, 2020 to July 31, 2020. Primary endpoints include patient mortality and length of stay greater than seven days.

Methods: Eligible patients included those 18 years or older with a confirmed SARS-CoV-2 infection. Patient demographic and treatment information were collected from the medical record. This data was analyzed using descriptive statistics.

Results: Factors which demonstrated a statistically significant effect on increased mortality included: age >65 years (p=0.002), kidney disease (p=0.002), malignancy (p=0.032), diabetes mellitus (p=0.003), cardiovascular disease (p<0.001), intensive care unit (ICU) admission (p<0.001), mechanical ventilation (p<0.001), respiratory rate at admission <22 bpm (p=0.024), serum creatinine (SCr) >1.5 mg/dL (p=0.002), treatment with remdesivir (p=0.037), tocilizumab (p<0.001), and intravenous (IV) steroids (p<0.001). Factors statistically significantly associated with length of stay greater than seven days included: kidney disease (p=0.017), diabetes mellitus (p<0.001), ICU admission (p<0.001), mechanical ventilation (p<0.001), total bilirubin >1.2 mg/dL (p=0.037), SCr >1.5 mg/dL (p=0.033), treatment with remdesivir (p=0.03), tocilizumab (p<0.001), and IV steroids (p<0.001).

Conclusion: A variety of predisposing and hospital intervention factors may contribute to poor clinical outcomes in patients with COVID-19. These results should be correlated with future studies.

86 | Evaluation of prolonged versus continuous infusions of piperacillin/tazobactam in the setting of drug shortages

Emily Tschumper, Pharm.D., MS, BCPS[1], Kaitlyn Dupuis, Pharm.D.[2], Kim McCrory, Pharm.D., MBA[1] and Wes Pitts, Pharm.D., BCPS, FASHP, FMSHP[1]

[1]*North Mississippi Medical Center, Tupelo, MS* [2]*Pharmacy, North Mississippi Medical Center, Tupelo, MS*

Introduction: Extended infusions of antibiotics suggest that modified administration strategies provide a means to improve outcomes. Administering β-lactams via continuous infusion has not been widely adopted. In 2017, a national drug shortage of small volume solutions significantly affected the preparation of intravenous antibiotics. In response, a continuous infusion administration protocol for piperacillin/tazobactam (PIP/TAZ) was implemented. The current study compares the outcomes of continuous to prolonged infusions in the setting of drug shortages.

Research Question or Hypothesis: Is continuous infusion piperacillin/tazobactam a safe and effective alternative during drug shortages?

Study Design: This study is a single-center, retrospective cohort study.

Methods: Reviewed patients aged 18 years and older who received intravenous antibiotics through two different dosing strategies of intravenous antibiotics from December 2016 to January 2018.

Results: A total of 90 patients received PIP/TAZ via either prolonged (n=47) or continuous infusion (n=43) were evaluated. There were no differences between the groups in mortality (3 v. 2, p=1.00), length of therapy (6 ± 4 v. 6 ± 3, p=0.86), or length of stay (9 ± 7 v. 8 ± 6, p=0.47). Additionally, no difference between the groups was noted in a safety review of the incidences of thrombocytopenia (p=0.41), *Clostridioides difficile* infection (p=0.48), acute renal failure (p=1.00), seizures (p=1.0), or 30-day readmission rates (p=0.27).

Conclusion: Administration of continuous infusion piperacillin/tazobactam appears to be a viable mitigation strategy during small volume fluid shortages. Future cost effectiveness studies may provide information on the financial impact of continuous infusions during costly drug shortages.

87 | Antimicrobial Resistance Patterns as a Predictor of Standardized Antimicrobial Administration Ratio: A National Correlation Study

Andrew Rubio, Pharm.D
Pharmacy, HCA Healthcare Tristar Division, Nashville, TN

Introduction: Standardized Antimicrobial Administration Ratio (SAAR), generated under the AU option, compares observed to predicted days of antimicrobial therapy and can indicate excessive antimicrobial use. AR, which compares the proportion of isolates resistant to specific antimicrobial agents (%R), can be a useful tool in measuring the success of long-term stewardship efforts, evidenced by decreases in proportion resistant bacterial infections and phenotypic reports.

Research Question or Hypothesis: Bacterial proportion resistant (%R) may be contributing to SAARs >1 for broad spectrum antibacterial agents predominantly used for hospital-onset infections (BSHO) and antibacterial agents predominantly used for resistant gram positive infections (gram-pos) in adult intensive care units (ICU) and medical-surgical (M/S) wards.

Study Design: Multi-center, retrospective, observational review

Methods: Data reported to NHSN was utilized to examine the association of BSHO and Gram-positive SAARs with proportion resistant (%R) for various phenotypes by year and quarter from 2017 through the second quarter of 2020. Phenotypic categories included methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococcus* spp. (VRE), extended-spectrum cephalosporin-resistant *Escherichia coli* and *Klebsiella* spp (ESBL), carbapenem-resistant *Enterobacteriaceae* (CRE), and multi-drug resistant *Pseudomonas aeruginosa* (MDR PSA).

Results: A total of 187 institutions were included for analysis. Weak, positive correlations were observed between BSHO SAAR both in the ICU and M/S for ESBL %R and MDR PSA %R (r = 0.14 to 0.22, all p <0.0001). For the Gram-positive SAAR, there were weak positive correlations between ICU and M/S and MRSA %R and VRE %R (r = 0.20 to 0.31, all p < 0.0001).

Conclusion: Weak correlations were observed between %R and SAAR for both BSHO and gram-pos. SAARs are multifactorial, yet these results highlight that more resistant organisms possibly be contributing to higher use of antimicrobials for facilities. Future SAAR calculations could consider incorporating resistance trends from %R within the institution for increases in AU and adjusting SAARs accordingly.

Managed Care

88 | Using a Teleassessment to Evaluate Predictors of Medication Adherence in a Medicare Advantage Plan (MAP) Population

Sarah Louise Laxa, Pharm.D.[1], Tara Esse, Pharm.D.[2], Anjana Mohan, Ph. D. Graduate Student[3], Omar Serna, Pharm.D.[1], Kim Villarreal, LMSW[1] and Susan Abughosh, Ph.D.[4]
[1]*CareAllies, Houston, TX* [2]*Cigna, Houston, TX* [3]*The University of Houston, Houston, TX* [4]*Department of Pharmaceutical Health Outcomes and Policy, University of Houston, Houston, TX*

Introduction: Healthy People 2030 describes social determinants of health (SDoH) as social and physical predictors that can influence health outcomes. Our objective was to examine the impact of housing stability and isolation risk, on medication adherence among patients using angiotensin-converting enzyme inhibitors (ACEIs), angiotensin receptor blockers (ARBs), statins, and oral diabetes medications (ODMs).

Research Question or Hypothesis: Housing stability and isolation risk can negatively impact medication adherence.

Study Design: Retrospective, cross-sectional

Methods: Eligible MAP beneficiaries in Texas were referred internally if a socioeconomic gap was identified from January 2019 to September 2020. Beneficiaries who completed a teleassessment during May-September 2020 (facilitated by a dedicated interdisciplinary team focusing on SDoH) and had a proportion of days covered (PDC) for 2019 were included. Adherence was defined as a PDC ≥ 0.80. The differences between adherent and nonadherent groups were evaluated using Fisher's Exact Test and Student's T test. Covariates controlled for in the multivariable logistic regression were baseline characteristics, social predictors, and comorbidities such as stroke, mental health disease, and chronic obstructive pulmonary disease.

Results: The analysis included 237 patients. At baseline, adherent and nonadherent groups among those who took statins, ACEIs, ARBs, or ODMs were significantly different with respect to living alone (P=0.02) and number of daily medications (P=0.003). Significant predictors of adherence in the multivariate model included bathing help (OR 0.21; 95% CI 0.04-0.99; P=0.04) and feeling depressed within 2 weeks (OR 0.07; 95% CI 0.007-0.82; P=0.03).

Conclusion: Findings suggest that social isolation may negatively impact medication adherence. The majority of patients in the small sample were adherent which may have impacted the ability to

detect significant differences with other predictors. Future research in initiatives focused on social isolation and adherence may be warranted.

Medication Safety

89 | Med Talk on TikTok

Lauren Biehle, Doctor of Pharmacy[1] and *Emma Evans, Pharm.D. Candidate 2021*[2]

[1]*University of Wyoming, Laramie, WY* [2]*University of Wyoming School of Pharmacy, Laramie, WY*

Introduction: Over 80% of patients utilize the internet for medication information. TikTok is a social media platform used to make a variety of short-form videos with approximately 800 million users each month.

Research Question or Hypothesis: The objective of this study is to evaluate the videos related to medication side effects on TikTok for their validity and reliability.

Study Design: A search on TikTok was performed on the week of 08/05/2020 using the term "medication side effects". Data collected included: disease state category, medications, tone, number of likes, and if performed by a healthcare professional (HCP). Non-English videos were excluded.

Methods: The DISCERN score was used to evaluate the video data for reliability. The t test and Chi-Square test were used for statistical analysis, with a p-value of <0.05 considered significant.

Results: A search on TikTok resulted in 44.9 million views for videos about "medication" and 4.5 million views for videos about "medication side effects." The first 150 consecutive videos were assessed using the DISCERN score for validity. Most (n=136) videos were not created by HCPs. Videos produced by HCPs were significantly more valid and reliable than non-HCPs (mean score of 2.3 vs 1.3, p <0.0001). They were found to be more relevant (p<0.0001), have clear aims (p<0.0001), and were more balanced/unbiased (p=0.0001). Mental health was the most common category referenced across all videos.

Conclusion: Videos created by HCPs were significantly more valid and reliable than the videos created by non-HCPs. The videos created by HCPs were also more likely to be relevant to medication side effects. We encourage HCPs to consider producing videos regarding medication information made available to patients that is both valid and reliable.

90 | Risk optimization of direct-acting oral anticoagulants in atrial fibrillation among Managed-Medicare patients in an ambulatory care setting

Nicholas Boemio, Pharm.D., BCPS[1], Stefanie Nigro, Pharm.D., BCACP, CDCES[2] and Sindorela Frroku, Pharm.D. Candidate 2021[3]

[1]*ProHealth Physicians/OptumCare Network of Connecticut, Farmington, CT* [2]*University of Connecticut - School of Pharmacy, University of Connecticut, Storrs, CT* [3]*University of Connecticut, Storrs, CT*

Introduction: Atrial fibrillation is a highly prevalent diagnosis and its associated anticoagulation management presents a clinical challenge in older adults due to their elevated risk of both bleeding and clotting. As the utilization of direct-acting oral anticoagulants (DOACs) increases among patients with atrial fibrillation, understanding the risk/benefit ratios between agents is important. Identification of individuals at high risk of gastrointestinal hemorrhage is imperative in understanding methods of risk optimization within the population.

Research Question or Hypothesis: How does DOAC selection affect net clinical benefit ratio among Managed-Medicare patients with atrial fibrillation?

Study Design: Retrospective chart review

Methods: A retrospective chart review of 245 randomly selected Managed-Medicare patients from a single primary care organization prescribed a DOAC at the time of data collection was conducted to determine risk stratification among the population and assess the opportunity for proton pump inhibitor (PPI) use to optimize bleeding risk. Patients were excluded if the DOAC was prescribed for any indication besides atrial fibrillation.

Results: Overall, 45 patients met exclusion criteria and were not included in the study results. Analysis was conducted on the remaining 200 patients determined to be using a DOAC for atrial fibrillation. Analysis revealed apixaban improved risk stratification versus rivaroxaban [RR 0.08 (0.026-0.277; p <0.0001)] and the population as a whole [RR 0.19 (0.067-0.545; p = 0.0002)]. Forty-eight percent of patients were determined to be candidates for risk optimization with initiation of a PPI in the baseline population.

Conclusion: Retrospective analysis was helpful in understanding the baseline use of DOACs for atrial fibrillation in Managed-Medicare patients. Utilization of apixaban within the population showed a statistically significant improvement in net clinical benefit ratio when adjusted for baseline bleeding and clotting risk scores. Preferential use of apixaban and effective identification of PPI candidates for bleeding prophylaxis are potential strategies to improve bleeding risk among Managed-Medicare patients requiring anticoagulation for atrial fibrillation.

91 | What is the importance of mixing during preparation of antibiotic infusions?

Ina Barzel, Pharm.D.[1], *Janique Jessurun, Pharm.D.*[1], Soma Bahmany, BSc[1], Hugo van der Kuy, Pharm.D., Ph.D.[1], Birgit Koch, Pharm.D., Ph.D.[1] and Nicole Hunfeld, Pharm.D., Ph.D.[2]

[1]*Department of Hospital Pharmacy, Erasmus MC, University Medical Center Rotterdam, Rotterdam, Netherlands* [2]*Department of Intensive Care, Erasmus MC, University Medical Center Rotterdam, Rotterdam, Netherlands*

Introduction: Preparation of intravenous drugs poses an increased risk of medication errors and therefore patient harm. The mixing step is frequently omitted during preparation of intravenous drugs. However, the importance of mixing when preparing antibiotic infusions is unknown.

Research Question or Hypothesis: The primary aim of this study was to assess the importance of the mixing step by comparing the concentrations of unmixed antibiotic infusions (cefuroxime 1500 mg/66 mL, flucloxacillin 1000 mg/70 mL, meropenem 1000 mg/70 mL, vancomycin 1000 mg/270 mL) at regular intervals during infusion with the declared concentration. The secondary aim was to compare concentrations between preparation sites (hospital pharmacy versus clinical ward).

Study Design: Experimental study.

Methods: This study was conducted in July 2020 in Erasmus MC, University Medical Center Rotterdam. Under standard environment conditions, six infusions of each antibiotic were prepared in the hospital pharmacy and the clinical ward. Infusion bags were run through electronic infusion pumps at patient bedside following standard procedures. For cefuroxime, flucloxacillin, and meropenem, samples were collected 1, 15, and 20 minutes after starting the administration (infusion duration: 30 minutes). For vancomycin, samples were collected after 1, 60, and 110 minutes (infusion duration: 120 minutes). Cefuroxime, flucloxacillin, and meropenem concentrations were measured using a validated UPC^2-MS-MS multimethod and vancomycin concentrations using the Architect c4000 analyzer. We used descriptive statistics for the primary outcomes and the Mann-Whitney U test for the secondary outcomes.

Results: The median concentrations of the four antibiotics were comparable to the declared concentration at all three time points. No statistically significant differences in drug concentration were found between preparations sites at all three time points (p>.05).

Conclusion: This study shows that spontaneous mixing occurs during normal handling. This suggests that omission of the mixing step during preparation of cefuroxime, flucloxacillin, meropenem, and vancomycin infusions will not lead to patient harm.

Neurology

92 | Phenytoin/Fosphenytoin Loading Dose Strategies for Overweight Patients

Kelli Keats, Pharm.D., MPA, Rebecca Powell, Pharm.D. Candidate, Jody Rocker, Pharm.D., BCPS and Lindsey Sellers, Pharm.D., BCCCP
Augusta University Medical Center, Augusta, GA

Introduction: Traditional loading doses of phenytoin/fosphenytoin are 15-20 mg/kg. However, the appropriate dosing strategy in overweight patients is unknown. Previous studies indicate that overweight patients typically receive lower weight-based doses and have a higher volume of distribution, but there are mixed results regarding the impact on phenytoin levels.

Research Question or Hypothesis: Does using actual body weight (ABW) to calculate phenytoin loading doses result in more phenytoin levels within therapeutic range compared to using adjusted body weight (AdjBW) in patients >120% of their ideal body weight (IBW)?

Study Design: This was a single-center, retrospective review which compared patients who received a 20mg/kg phenytoin/fosphenytoin loading dose based on ABW versus AdjBW. The primary outcome was achievement of a therapeutic phenytoin concentration of 10-20mcg/mL.

Methods: Patients were included if they received a loading dose of phenytoin/fosphenytoin of ≥10mg/kg ABW, had a phenytoin level drawn <6 hours after the infusion, and weighed >120% of their IBW. Patients were excluded if they received intramuscular phenytoin or were already taking phenytoin.

Results: 195 patients were included (128 in AdjBW group and 67 in ABW group). There were no differences in baseline age, sex, body mass index, history of seizures, or liver or renal dysfunction. Patients in the AdjBW group weighed more (96.2kg vs. 91.2kg, p=0.04) and received lower doses in milligrams (1364 vs. 1760, p<0.0001) and in mg/kg of ABW (14.2 vs. 19.3, p<0.0001). The primary outcome (phenytoin level of 10-20mcg/mL) was achieved in 74% of patients in the AdjBW group and 57% of patients in the ABW group (p=0.02). Additionally, patients in the ABW group were more likely to have a supratherapeutic level (>20mcg/mL) (43% vs. 22%, p=0.003) although adverse reactions (nystagmus, ataxia, bradycardia, or hypotension) were not significantly different.

Conclusion: Patients weighing >120% of their IBW should be dosed with 20mg/kg based on AdjBW to achieve a therapeutic phenytoin concentration of 10-20mcg/mL.

93 | Improvement in pneumococcal vaccination practices in patients with multiple sclerosis receiving anti-CD20 monoclonal antibodies following health-system specialty pharmacy and nursing collaboration

Kristin Reindel, Pharm.D.[1], Elizabeth Rightmier, Pharm.D.[1], Julie Dean, RN[2], Brandon Qualls, MPA[3] and Julie Wawrzyniak, Pharm.D.[1]
[1]*Department of Pharmacy, University of Rochester Medical Center, Rochester, NY* [2]*Department of Neurology, University of Rochester Medical Center, Rochester, NY* [3]*Department of Clinical Nursing Research Center, University of Rochester Medical Center, Rochester, NY*

Introduction: Immunosuppressive anti-CD20 monoclonal antibodies (MABs) such as ocrelizumab and rituximab are used for disease modifying therapy in patients with multiple sclerosis (MS). It is recommended that patients receiving these therapies receive pneumococcal vaccinations prior to their first dose to ensure optimal immune response. An initial medication use evaluation (MUE) evaluated adherence to Centers for Disease Control (CDC) pneumococcal immunization recommendations at the study site and room for improvement was identified. The study site nursing team implemented workflow changes to increase nursing involvement in vaccination coordination, education, tracking and administration.

Research Question or Hypothesis: The purpose of this study was to evaluate the impact of a nursing intervention on optimal pneumococcal vaccination administration rates in patients receiving anti-CD20 MABs at an MS center.

Study Design: Single center, retrospective pre/post MUE.

Methods: This study was granted Institutional Review Board exemption. Subjects were included if they were over 18 years old with a diagnosis of MS and received their first anti-CD20 MAB infusion at the study site during the pre- or post-intervention time frames.

Data Analysis: Analyses included chi-square tests for categorical variables (statistical significance set at p<0.05). Additional categorical data measures were reported using descriptive statistics.

Results: The nursing intervention significantly improved the percentage of patients that received the optimal pneumococcal vaccination prior to their first infusion from 58% to 84% and significantly reduced the number of subjects with an unknown vaccination status from 17% to 3%. Additionally, there was an improvement in subjects who received optimal follow-up vaccination with PPSV23 after optimal PCV13 administration from 9% to 56%.

Conclusion: A nursing team intervention improved adherence to CDC pneumococcal immunization recommendations for patients receiving anti-CD20 MAB therapy at the MS Center. This project highlights the value of interdisciplinary team collaboration in the care of MS patients between health systems specialty pharmacy and nursing.

Nutrition

94 | Parenteral nutrition total energy dosing and risk for central line-associated bloodstream infection: a case-control study

Abbie N. Rosen, Pharm.D.[1], Robert C. Ross, Pharm.D.[1], Kenneth K. Tran, Pharm.D., BCPS[2] and Andrew J. Franck, Pharm.D., BCNSP, BCCCP[1]

[1]*North Florida/South Georgia Veterans Health System, Gainesville, FL*

[2]*Dana Farber Cancer Institute, Boston, MA*

Introduction: Central-line associated bloodstream infection (CLABSI) is a complication of central venous access devices used for parenteral nutrition (PN). PN overfeeding is associated with increased adverse effects including metabolic and infectious complications; however, whether risk for CLABSI is influenced by PN dosing is uncertain.

Research Question or Hypothesis: Do total energy doses, specifically overfeeding and underfeeding, effect the risk of CLABSI in a sample of hospitalized adult patients receiving PN?

Study Design: A case-control study in a single United States Veterans Health Administration Health-System

Methods: Hospitalized adult patients who developed CLABSI while receiving PN were identified and compared to a control group of patients receiving PN who did not develop CLABSI. The exposures evaluated were overfeeding, defined as greater than 30 kcal/kg/day, and underfeeding, defined as less than 20 kcal/kg/day. Weight-based doses were calculated based on the lesser of actual or ideal body weight. A case:control ratio of 1:10 was utilized and odds ratios were calculated to assess the odds associated with weight-based kcal dosing.

Results: A total of 302 patients were included in the study. Twenty-nine cases of CLABSI were identified. Odds of CLABSI were significantly higher in patients receiving greater than 30 kcal/kg/day (OR 3.66; 95% CI 1.57-8.56; $p < 0.01$). No significant difference in odds was found for patients receiving less than 20 kcal/kg/day (OR 0.76; 95% CI 0.22-2.64; $p = 0.67$).

Conclusion: Increased risk for CLABSI in hospitalized adult patients receiving PN was found to be associated with overfeeding, but not underfeeding, providing further evidence of the deleterious effects related to higher total energy doses. These results may aid clinicians in the management of patients requiring PN and in the generation of hypothesis for future investigations.

Oncology

95 | Metformin as an adjuvant treatment in non diabetic metastatic breast cancer

Hager Salah, bcps/Bsc

Helwan general hospital, cairo, Egypt

Introduction: Mounting evidence suggests that metformin halts cancer spread and acts as an antimetastatic drug.

Research Question or Hypothesis: evaluation of metformin effect as anticancer in metastatic breast cancer

Study Design: randomized control trial

Methods: Fifty women diagnosed with stage IV breast cancer were allocated randomly into two groups. The control group received chemotherapy and the metformin group received metformin plus chemotherapy for 3 months. Main outcome included measuring changes in tumors using Response Evaluation Criteria in Solid Tumors (RECIST) to evaluate disease progression before and after 3 months, whereas secondary outcomes included, overall survival (OS) and progression free survival (PFS).

Results: The control group had a significantly worse RECIST response rate than the metformin group. The metformin group had a slightly longer OS and higher PFS than the control group but this difference was not statistically significant. Hazards of mortality and disease progression were reduced with metformin use.

Conclusion: Metformin use significantly improved the radiologic response rate in nondiabetic patients with metastatic breast cancer, but did not significantly prolonged OS or PFS. Our results suggest that randomized clinical trials in patients with metastatic breast cancer are warranted.

Clinical Trial.gov ID

NCT04143282

96 | Metformin decreases insulin-like growth factor-1 (IGF-1) in metastatic breast cancer

Hager Salah, bcps/Bsc[1], Ahmed Hassan, MD[2], Ahmed A. Elberry, Ph. D.[3], Mostafa S. Sheemy, MD[4] and Hoda Rabea, Ph.D.[5]
[1]*pharmacy/research team leader, king hamad university hospital, manama, Bahrain* [2]*Clinical Oncology department, Faculty of Medicine, Beni-Suef University., Beni-Suef, Egypt* [3]*Professor, Clinical Pharmacology department, Faculty of Medicine., Beni-Suef University., Beni-Suef, Egypt* [4]*Lecturer, Medical microbiology and Immunology Department Faculty of Medicine, Beni-Suef University., Beni-Suef, Egypt* [5]*associated Professor, Clinical Pharmacology department, Faculty of pharmacy, Beni-Suef University., Beni-Suef, Egypt*

Introduction: Metformin, which is mainly used to treat type 2 diabetes, has recently been shown to possess anti-tumor properties. On the other hand, insulin-like growth factor (IGF)-1 is known to play an important, causal role in breast cancer. Hence, this study aimed to investigate the effect of metformin on IGF-1 in metastatic breast cancer.

Research Question or Hypothesis: Metformin may reduce Insulin growth factor-1 (IGF-1) as an anticancer medication in metastatic breast cancer.

Study Design: randomized clinical trial -clinicaltrials.gov (ID no. NCT04143282)

Methods: Fifty patients were randomized into 2 groups: control group (treated with standard chemotherapy) and metformin group (treated with metformin plus chemotherapy). IGF1 levels were measured by enzyme-linked immunosorbent assay at baseline and after 3 months of treatment.

Results: IGF-1 levels were found to be significantly lower in the metformin than the control group ($p = 0.011$). Furthermore, the control and metformin groups differed significantly regarding the percentage of post-treatment decline in IGF-1 levels ($p = 0.001$). We also observed that the progression-free survival of patients with post-treatment IGF-1 decline rates above 37% was significantly prolonged in the metformin group (hazard ratio, 0.384; 95% confidence interval, 0.15–0.95; $p = 0.014$).Metformin group tended to decrease the hazard of mortality (HR 0.205; 95 % CI 0.0.028 to 1.481) as well as the hazard of disease progression (HR 0.669; 95 % CI 0.262 to 1.707) than control group.

Conclusion: Addition of metformin to chemotherapy may help in further inhibition of the IGF-1 signaling pathway. Reduced IGF-1 levels are significantly associated with better radiological outcomes in patients with metastatic breast cancer.

97 | Retrospective Analysis of Ovarian Cancer Patients Treated with PARP Inhibitors

Connie Liang, Pharm.D. Candidate 2021[1], Ashley Leung, Pharm.D. Candidate 2021[1], Chung-Shien Lee, Pharm.D., BCPS, BCOP[2], Jennifer Hernandez, PA-C[3], Dimitre Stefanov, Ph.D.[4], Kit Cheng, MD[3] and Veena John, MD[3]
[1]*St. John's University College of Pharmacy and Health Sciences, Queens, NY (2)Division of Medical Oncology and Hematology, Northwell Health Cancer Institute, North New Hyde Park, NY (3)Division of Medical Oncology and Hematology, Northwell Health Cancer Institute Donald & Barbara Zucker School of Medicine at Hofstra/Northwell, Lake Success, NY (4)The Feinstein Institutes for Medical Research, Manhasset, NY*

Introduction: Targeted therapy has become the mainstay maintenance treatment of patients with ovarian cancer including patients with BRCA1 or BRCA2 mutations. Poly-ADP ribose polymerase inhibitors (PARPi) are effective in the treatment of patients who are in complete or partial remission. PARPi are known to cause hematological adverse events (AEs), but have not been compared directly to each other.

Research Question or Hypothesis: What are the differences in toxicity profiles between olaparib and niraparib?

Study Design: Retrospective

Methods: We conducted a single-institution, retrospective study on patients treated with PARPi from January 2016 to October 2020. Patients were stratified according to which PARPi they received. Our primary objective was to assess the incidence of hematological and non-hematological AEs associated with the use of PARPi used in patients with ovarian cancer. Data from absolute neutrophil, hemoglobin and platelet count during the first 2 cycles were graded for hematologic toxicity according to CTCAEv5.0.

Results: A total of 126 patients received a PARPi during the study time frame. 34 were excluded and 92 were included for analysis. Patient demographics were 64.3 (range, 33.8-92.3) years, 66 (71.7%) white, and 84 (91.3%) with ECOG PS 0/1. Thirty-one (33.7%) patients received niraparib and 61 (66.3%) patients received olaparib. The niraparib group experienced more hematologic AEs, with 11 (35.5%) (95% CI 19.2-54.6), 20 (64.5%) (95% CI 45.4-80.8), and 18 (58.1%) (95% CI 39.1-75.5) experiencing neutropenia, anemia, thrombocytopenia, respectively. Eight (13.1%) (95% CI 5.8-24.2), 24 (39.3%) (95% CI 27.1-52.7), 16 (26.2%) (95% CI 15.8-39.1) patients in the olaparib group experienced neutropenia, anemia, thrombocytopenia, respectively.

Conclusion: Although there are four FDA-approved PARPi, this study outlines and compares the hematological toxicities observed between two PARPi. Our results suggested that niraparib was associated with a higher risk for hematologic toxicities than olaparib. Our data showed anemia as the most common hematologic toxicity, consistent with what has been widely documented in the literature.

98 | Retrospective Evaluation of Extended-Interval Zoledronic Acid Dosing Strategies at Roswell Park Comprehensive Cancer Center

McKenna Butler, Pharm.D. Candidate[1], Jens Hillengass, MD, Ph.D.[2], Wenyan Ji, M.A. Biostatistics[2], Han Yu, Ph.D. Biostatistics[2] and Eugene Przespolewski, Pharm.D., BCOP[2]
[1]*University at Buffalo, Buffalo, NY* [2]*Roswell Park Comprehensive Cancer Center, Buffalo, NY*

Introduction: Zoledronic acid (ZA) is the cornerstone of bone modifying agents (BMA) in myeloma. ZA is historically dosed monthly (QM) indefinitely but due to a long half-life and complex pharmacodynamics, alternative strategies have been used such as every 3 months (Q3M) or a limited duration of 2 years. Despite this, the optimal frequency and duration has not been fully elucidated.

Research Question or Hypothesis: Is extended-interval dosing of ZA non-inferior to standard dosing?

Study Design: Retrospective, single-center chart review.

Methods: 156 patients who received entire anti-myeloma treatment at Roswell Park from 2009 – 2019 were evaluated. Patients were assigned to no BMA, ZA QM, ZA QM to Q3M (monthly transitioned to extended), or ZA Q3M. The primary endpoint was overall survival (OS). Secondary endpoints include progression free survival (PFS), adverse events, skeletal related events (SRE), and pain medication usage in morphine equivalents. Continuous variables at baseline were compared using Kruskal-Wallis test, while categorical variables were compared using Fisher's exact test. Survival curves were estimated by the Kaplan-Meier method and univariate analyses were performed using log-rank tests. The Cox proportional hazards models were further used for the multivariable analyses.

Results: Irrespective of dosing, patients who received > 5.5 doses of ZA had improved OS (median OS 92 mos v. 26 mos, p < 0.001). Patients on QM to Q3M had longer OS compared to other arms (median OS 92 mos, p=0.0136), however there is no difference in PFS on first or second progression of myeloma (p=0.33, p=0.62). There was no difference in incidence of SRE or pain medication usage but patients in QM to Q3M group had more hypocalcemic events (p=0.004).

Conclusion: ZA is essential for favorable outcomes in myeloma, is well tolerated and limited additional SRE long term regardless of dosing strategy. OS advantage might be limited by crossover in this retrospective analysis.

99 | Timing of cyanocobalamin and folic acid supplementation on incidence of neutropenia and thrombocytopenia during pemetrexed chemotherapy: a retrospective review.

Elyssa Johannesen, Pharm.D.[1] and Timothy Connolly, BS[2]
[1]*Geisinger Lewistown Hospital, Lewistown, PA* [2]*Geisinger Lewisburg Cancer Center, Lewisburg, PA*

Introduction: Prophylactic folic acid and cyanocobalamin supplementation is recommended 7 days prior to the initiation of Pemetrexed for treatment of non-squamous non-small cell lung cancer (NSCLC). This study expands on previous studies to evaluate whether a shortened duration of supplementation would impact outcomes of myelosuppression.

Research Question or Hypothesis: What is the incidence of any grade neutropenia and thrombocytopenia in patients receiving shortened duration of cyanocobalamin or folic acid therapy compared with usual care in treatment of NSCLC?

Study Design: Retrospective cohort, multi-center study

Methods: Medical records of all Geisinger Health System patients with a diagnosis of NSCLC and pemetrexed administration between July 2010 and July 2020 were reviewed. The primary outcome studied was a composite endpoint of absolute neutrophil count <1.5K OR platelet count < 100K occurring within the first 3 cycles of chemotherapy.

Results: 625 patients were included. Folic acid given < 7 days prior to pemetrexed resulted in a 50.3% incidence of the primary outcome, versus 46.2% in patients who received folic acid 7-30 days prior [RR, 1.09; 95% CI 0.90-1.32]. Cyanocobalamin administered < 7 days prior resulted in a 46.3% incidence compared to 55.8% of patients who received cyanocobalamin 7-10 days prior [RR, 0.83; 95% CI 0.63-1.09].

Conclusion: For the stated objectives, the results did not confirm an association between timing of folic acid or cyanocobalamin and incidence of any grade neutropenia or thrombocytopenia. This suggests that timing may not be critical, which would support the findings of previous studies.

Other

100 | Chronic kidney disease and in-hospital outcomes among patients treated with thrombolysis for acute ischemic stroke

Shayma Al zaidi, Pharm.D. Candidate[1], Henry Best, Pharm.D. Candidate[1] and Erin Weeda, Pharm.D.[2]
[1]*Medical University of South Carolina, Charleston, SC* [2]*College of Pharmacy, Medical University of South Carolina, Charleston, SC*

Introduction: Thrombolysis is a commonly utilized treatment option for patients presenting with acute ischemic stroke. Chronic kidney disease (CKD) is a well-established risk factor for stroke. However, very few studies have evaluated the efficacy and safety of thrombolysis in patients with CKD presenting with a stroke.

Research Question or Hypothesis: We assessed the association between CKD and in-hospital outcomes among acute ischemic stroke encounters receiving thrombolysis.

Study Design: This was a retrospective study utilizing administrative data from the United States National Inpatient Sample.

Methods: All adult encounters for acute ischemic stroke (International Classification of Diseases, Ninth Revision, Clinical Modification [ICD-9-CM] diagnostic code 433.x, 434.x, or 436 in the primary position) between January 1, 2013 and December 31, 2014 were identified. We used multivariable regression to evaluate the relationship between CKD and intracerebral hemorrhage (ICH), in-hospital mortality and length of stay (LOS) after adjusting for age and comorbidities.

Results: Of 13,993 encounters receiving thrombolysis for acute ischemic stroke, 12.4% (n= 1,739) had CKD. ICH occurred in 7.6% of patients, 7.0% experienced in hospital mortality and mean LOS was

7.5 days. CKD did not increase the odds of ICH (odds ratio [OR] = 1.00; 95% confidence interval [CI]= 0.83-1.20) or in-hospital mortality (OR= 1.19; 95% CI= 0.99-1.42). LOS was slightly longer (mean difference=0.39 days 95%; CI= 0.15-0.62) among those with CKD.

Conclusion: Among encounters treated with thrombolysis for acute ischemic stroke, CKD was not associated with a higher adjusted odds of ICH or in-hospital mortality and LOS was only slightly longer among these individuals. Studies evaluating outcomes among patients with both granular data on variables, such as stroke severity and markers of kidney function, and adequate power to detect if clinically important outcome differences exist among patients with kidney disease receiving thrombolysis are still needed.

101 | Evaluation of Pharmacy Students' Perceptions on Yoga and Its Impact on Health and Wellness

Casey Macfarlane, Pharm.D. Candidate[1], Alexis Jones, Pharm.D. Candidate[1], Sarah Nisly, Pharm.D., BCPS, FCCP[2], Ryan E. Owens, Pharm.D.[3] and Shawn Riser Taylor, Pharm.D.[3]
[1]*Wingate University School of Pharmacy, Wingate, NC* [2]*Department of Pharmacy, Wake Forest Baptist Health, Winston Salem, NC* [3]*School of Pharmacy, Wingate University, Hendersonville, NC*

Introduction: Recent studies show that yoga may be beneficial for patient populations with various disease states to not only better their quality of life, but aid in stress management while providing physical activity. Currently, pharmacy schools place lower emphasis on complementary & alternative medicine (CAM) in the didactic curriculum compared to traditional pharmacotherapy. However, health profession students should be adequately trained to understand the benefits of yoga and be comfortable recommending it to patients, since it is an underused, yet beneficial alternative medicine recommendation.

Research Question or Hypothesis: How will yoga education influence a pharmacy student's opinion on the benefits of yoga for various illnesses?

Study Design: Single-center prospective observational study

Methods: Third year pharmacy students in the fall 2020 CAM didactic course were included. A survey based assignment was completed before and after yoga education. Students were randomly assigned to groups that focused on yoga's impact in a specific area, such as pain, pulmonary, cardiovascular, musculoskeletal, or physiological, and then participated in a yoga session led by a staff member. The surveys were then unidentified and interpreted with descriptive analysis.

Results: Data was collected from third year pharmacy students (n= 67). Answers on a strongly disagree to strongly agree scale were represented as one to five, respectively. Median differences of yoga being an efficacious therapy to complement pharmacotherapy before and after education (4 vs 5, 95% CI 4-5, p= 0.005) increased. Students were more likely to recommend yoga for all the following conditions: pain, pulmonary, cardiovascular, musculoskeletal, or physiological (p< 0.05 for all).

Conclusion: Students participating in a didactic session consisting of active learning about yoga therapy found themselves more willing to recommend yoga for various medical conditions and an efficacious complement to traditional pharmacotherapy.

102 | Student Advocacy: The Key to Pharmacy's Future

Ben Massey, Pharm.D. Candidate 2022[1], Cassye Marsh, Pharm.D. Candidate 2021[1] and Nancy Borja-Hart, Doctor of Pharmacy[2]
[1]*Department of Clinical Pharmacy & Translational Science, The University of Tennessee Health Science Center College of Pharmacy, Nashville, TN* [2]*Department of Clinical Pharmacy and Translational Science, The University of Tennessee Health Science Center College of Pharmacy, Nashville, TN*

Introduction: Although patient advocacy is a key element within pharmacy education standards, the integration of this topic within curricula can be difficult. Most students receive some type of presentation or lecture within the didactic curriculum; however incorporating this topic within co-curriculum can prove to be effective.

Research Question or Hypothesis: Can participation within a state legislative day event impact student pharmacists' knowledge and attitudes towards advocacy?

Study Design: A cross-sectional survey was administered to student pharmacists that participated in the 2020 Tennessee Pharmacy Association's legislative day event.

Methods: A 39 item survey incorporated items by Mospan et al. and free text input. It was distributed to student pharmacists that attended legislative day via QuestionPro. The survey incorporated demographic information (age, pharmacy experience, degrees, voter status), experience (legislator contact), knowledge (curriculum training, impact of policy, awareness of state and federal legislators), skills (communication, expectations), and attitudes (beliefs towards policy influence, professional responsibility, plans for engagement). Descriptive statistics were used for analysis.

Results: A total of 25 student pharmacists responded to the survey with 19 complete responses. Thirteen students were female, and 15 students were between the ages of 20-25. Most students were registered voters (n=17), and all were actively involved with 2 or more organizations. The majority of respondents have contacted their legislator in the past (n=15). Some topics discussed at the event included PBM reform, insulin caps, and provider status. Most students agreed that the legislative day was worth their time and empowers them to become more involved (n=18). Most students agreed that they can influence policy (n=18). All participants agreed that participating in the legislative process is a professional responsibility of pharmacists (n=19).

Conclusion: Despite the low response rate to this survey, the responses were positive towards legislative advocacy. Students should be encouraged to participate in legislative day activities when feasible.

Pain Management/Analgesia

103 | Clinical pharmacy initiative to increase naloxone prescribing in patients with opioid use disorder

Jessica Bovio Franck, Pharm.D., BCPS, *Sylvia Tran, Pharm.D., BCPS*, Shelley Stevens, Pharm.D., BCPS, Jennifer Powers, Pharm.D., BCPS, Maria Gunn, Pharm.D., Tuong-My Nguyen, Pharm.D. and Rachel Smith, Pharm.D.

Department of Pharmacy, North Florida/South Georgia Veterans Health System, Gainesville, FL

Introduction: The national opioid epidemic has become a key focus of various health agencies. Recent data suggest increases in overdose deaths, primarily driven by synthetic opioids, during the 2019 novel coronavirus disease pandemic. A leading strategy in mitigating risk from the opioid public health crisis, including opioid use disorder (OUD), is via increased promotion and access to the lifesaving, opioid overdose-reversing medication, naloxone. Pharmacists have been recognized as integral in addressing this emergency; however, literature evaluating outcomes from multifaceted clinical pharmacy specialist (CPS) interventions and involvement are lacking.

Research Question or Hypothesis: A quality improvement project was undertaken with the expectation that CPS involvement would result in increased naloxone prescribing proportions (quantity of OUD patients with an active prescription for naloxone within the past year divided by the quantity of patients with OUD), improved patient access to care, and increased clinical interventions.

Study Design: A before and after evaluation was conducted.

Methods: CPSs spearheaded a variety of interventions to increase naloxone prescribing in patients with OUD, including naloxone informational letters, focused education with prescribers, review of clinical dashboards identifying OUD patients indicated to receive naloxone, CPS naloxone prescribing, and automated naloxone medication orders integrated into electronic health record progress note templates. Naloxone prescribing proportions were compared before and after implementation of these interventions. Other measures evaluated were number of encounters, patients and clinical interventions completed by the CPSs. The evaluation period for both groups was three months. Prescribing proportions were compared through statistical analysis with chi-squared for nominal data.

Results: Naloxone prescribing proportions increased from 21.9% to 56.0% ($p<0.01$). Number of encounters, patients and clinical interventions completed increased by 45%, 74%, and 36%, respectively.

Conclusion: The significant increase in naloxone prescribing proportions and numerically increased encounters, patients, and clinical interventions suggest the value of CPS involvement in targeting the opioid epidemic.

Pediatrics

104 | Factors affecting the effectiveness of oral and intravenous ibuprofen in the management of preterm infants. A Retrospective, cohort-based study

Dina Abushanab, MSc[1], Pallivalapilla Abdul Rouf, Mpharm, Msc, Ph.D.[1], Moza AlHail, Bsc (Pharm), PgDip[2], Samaher Al Shaibi, BSc Pharm (Student)[3] and Daoud Al-Badriyeh, Ph.D.[4]

[1]*Pharmacy, Hamad Medical Corporation, Doha, Qatar* [2]*Pharmacy Department, Hamad Medical Corporation, Doha, Qatar* [3]*College of Pharmacy, Qatar University, Doha, Qatar* [4]*Clinical Pharmacy and Practice Section, College of Pharmacy, Qatar University, Doha, Qatar*

Introduction: Patent ductus arteriosus (PDA) is one of the most common complications among preterm infants which is associated with increased mortality and morbidities. Data on the factors that affect the effectiveness of oral and intravenous (IV) ibuprofen remain unclear.

Research Question or Hypothesis: to compare the incidence of comorbidities and estimate the association of comorbidities with clinical outcomes in PDA preterm infants treated with oral or IV ibuprofen.

Study Design: Retrospective, cohort study.

Methods: The study was conducted in 99 preterm infants with PDA between 2014-2018 in the neonatal intensive care unit at Hamad Medical Corporation, Qatar. The neonates received initial course of either IV or oral ibuprofen of a regimen of 10 mg/kg followed by 5 mg/kg at 24 and 48 hours. The primary endpoint was the incidence of sepsis, renal impairment, respiratory distress syndrome, intraventricular hemorrhage, pneumothorax, pulmonary hypertension, pulmonary hemorrhage, bronchopulmonary dysplasia, periventricular leukomalacia, retinopathy of prematurity (ROP), and anemia after each course of therapy between both formulations. Secondary outcome was the association of each of the comorbidity with the ductus closure after each course of therapy. Chi-square and Fisher's exact tests were used for categorical data and a logistic regression analysis was used to estimate the association, using an $a=0.05$ via IBM SPSS Statistics version 22.

Results: No significant differences were observed between the oral and IV groups in the incidence of outcomes expect in relation to urea level after the first course (3.35±2.36 vs. 6.61±5.04,$p=0.002$), ROP after the second course (12.5% vs. 1%, $p=0.009$), and serum creatinine level after the third course (58.5±20.51 vs. 44±6.57, $p=0.001$). Only serum creatinine level after the first course of IV ibuprofen was

statistically negatively associated with ductus closure (risk ratio=0.97,p=0.03).

Conclusion: Serum creatinine, urea, and ROP during the treatment course may be considered predictors of PDA closure.

105 | Evaluation of the benefit in using Antithrombin (AT) for infants and neonates undergoing extracorporeal membrane oxygenation in the cardiac intensive care unit

Ryan Walters, Pharm.D.
Department of Pharmacy, Joe DiMaggio Children's Hospital, Hollywood, FL

Introduction: Critically ill pediatric patients with respiratory and/or cardiac failure may require extracorporeal support to sustain life. Extracorporeal membrane oxygenation (ECMO) requires anti-coagulation, predominantly with unfractionated heparin (UFH) to prevent thrombosis. The effect of UFH is heavily dependent on antithrombin (AT), which potentiates its effect. The efficacy of AT supplementation is unclear and its use to enhance the anticoagulation effect of UFH remains a controversial topic. We sought to examine the effect on pediatric patients on ECMO support at our institution.

Research Question or Hypothesis: Determine the effect of AT on hematological parameters and heparin rates in infant and neonatal ECMO patients in the cardiac intensive care unit.

Study Design: Retrospective chart review

Methods: Data from this study was obtained from the electronic health record from January 1, 2017-December 31, 2018. Patients that were less than 1 year of age admitted to the cardiac intensive care unit receiving ECMO support with UFH as their primary anti-coagulant were included for analysis. Patients were excluded if AT doses were given prior to cannulation or after de-cannulation from ECMO or if they received other agents as their primary anti-coagulant (e.g. bivalirudin).

Results: 15 patients received a total of 72 doses of AT over the study period. AT levels increased from a mean of 52% at baseline to a peak of 72% after 8 hours, then back to 64% at 24 hours. Heparin rates fluctuated between 32-34 units/kg/hr from baseline to 24 hours post AT dose. ACT levels were also relatively unchanged from a baseline of 168 to 173 seconds after 24 hours.

Conclusion: AT supplementation had minimal effect on reducing heparin rates, increasing AT levels or improving adherence to goal ACT levels. A more targeted protocol could potentially optimize the use of AT resulting in potential cost savings.

106 | Impact of Patient-Specific Aminoglycoside Monitoring for Treatment of Pediatric Cystic Fibrosis Pulmonary Exacerbations

Tanya Makhlouf, Pharm.D.[1], Brianna Hemmann, Pharm.D.[2], Elizabeth Woods, Pharm.D.[1], Mary Subramanian, Pharm.D.[1], Courtney Perry, Pharm.D.[3], Chris Gillette, Ph.D.[3] and Holly Hanes, MD[1]
[1]*Wake Forest Baptist Health, Winston-Salem, NC* [2]*Cincinnati Children's Hospital Medical Center, Cincinnati, OH* [3]*Department of Physician Assistant Studies, Wake Forest School of Medicine, Winston-Salem, NC*

Introduction: *Pseudomonas aeruginosa* is a common pathogen in pulmonary exacerbations of cystic fibrosis (CF). Current treatment guidelines recommend utilizing two anti-pseudomonal agents, which may include an aminoglycoside. The Cystic Fibrosis Foundation recommends once-daily dosing of aminoglycosides. However, there are no recommendations regarding the preferred pharmacokinetic (PK) monitoring of these agents.

Research Question or Hypothesis: What is the impact of patient-specific PK monitoring of aminoglycosides on dosing changes and clinical outcomes in pediatric patients with CF exacerbations?

Study Design: This was an ambidirectional cohort study evaluating the use of patient-specific PK (intervention group) versus trough-only (control group) monitoring of amikacin or tobramycin therapy in pediatric patients with CF at a tertiary children's hospital between June 1, 2018 and February 8, 2021.

Methods: Patients were included if they were less than 18 years of age, diagnosed with CF, admitted for a pulmonary exacerbation, and received intravenous aminoglycoside therapy. The primary outcome was the occurrence of dosing changes after analysis of initial serum concentrations in either group. Secondary outcomes included duration of antibiotics, duration of hospitalization, and occurrence of nephrotoxicity.

Results: Fifty-three patients were included, twenty-one in the control group and thirty-two in the intervention group. Twenty-four patients (75%) in the intervention group versus no patients in the control group required dosing adjustments after analysis of initial serum concentrations was completed ($p < 0.001$). There was not a statistically significant difference between the two groups for duration of antibiotics ($p=0.29$), duration of hospitalization ($p=0.76$), nor occurrence of nephrotoxicity ($p=0.14$).

Conclusion: Patient-specific PK monitoring led to significantly more dosing changes and was associated with similar duration of antibiotics, duration of hospitalization, and occurrence of nephrotoxicity when compared to trough-only monitoring.

Peri-Operative Care

107 | Effect of higher post-operative prophylactic doses of cefazolin on rates of surgical site infections in obese patients

Kelli Kronsberg, Pharm.D. and Jonathan Cho, Pharm.D., MBA
MountainView Hospital, Las Vegas, NV

Introduction: Pharmacokinetic studies suggest a need for higher doses of cefazolin pre-operatively in obese patients based upon differing tissue concentrations. From this, practice guidelines

recommend cefazolin 3g intravenous (IV) in patients who weigh greater than 120 kg for surgical procedure prophylaxis. To our knowledge, no studies have been conducted regarding post-operative administration of higher doses of cefazolin.

Research Question or Hypothesis: Is there a difference in the rate of surgical site infections in obese patients who receive IV cefazolin as post-operative prophylaxis at a dose of 3g compared to 2g?

Study Design: Retrospective single-center cohort study

Methods: Chart reviews were conducted of obese adult patients who received a 3g IV cefazolin dose pre-operatively and at least two doses of 2g or 3g IV cefazolin post-operatively between November 2014 and October 2020. The primary outcome was surgical site infection and secondary outcomes were length of stay and all-cause in-hospital mortality. Descriptive statistics were used to evaluate the outcomes and treatment groups compared via unpaired Student's t-test, with a significance level set at p≤0.05. Per group, 265,567 patients would be needed for adequate power.

Results: Twenty-eight patients were included, with fifteen receiving cefazolin 2g IV and thirteen receiving cefazolin 3g IV every eight hours post-operatively. The most common procedure categories were cardiac and orthopedic in the 2g and 3g groups, respectively. There were no documented surgical site infections or deaths prior to discharge. The average length of stay was 9.67 and 3.38 days in the 2g and 3g groups, respectively (p=0.098).

Conclusion: Although no significant differences in outcomes were seen, due to limitations in the size of this study, it is difficult to draw conclusions regarding the impact of post-operative cefazolin dose on rates of surgical site infections, mortality, or length of stay in obese adult patients. A larger study is needed to answer if higher doses translate to clinical benefit.

108 | Antibiotic Selection and Duration as a Predictor of Treatment Failure in Diverticular Abscess Post-Percutaneous Drainage

Lina Poindexter, Pharm.D.[1], Kayla Joyner, Pharm.D.[2] and Larissa Coyle, Pharm.D.[1]

[1]*Department of Pharmacy, Valley Health Winchester Medical Center, Winchester, VA* [2]*Department of Pharmacy Practice, Shenandoah University Bernard J. Dunn School of Pharmacy, Winchester, VA*

Introduction: Treatment of a diverticular abscess has previously revolved around invasive surgery. Percutaneous drainage (PCD) and antibiotics have been increasingly utilized as a minimally invasive and effective treatment that has been proven to help avoid emergent surgery and stoma creation. Current guidelines offer minimal recommendations on antibiotic selection and duration in patients post-PCD.

Research Question or Hypothesis: Do shorter antibiotic durations have decreased rates of treatment failure in a diverticular abscess post-PCD?

Study Design: This retrospective study was conducted in a 445 bed community hospital.

Methods: Patient encounters with a diverticular abscess > 3 cm who were ≥ 18 years old and received antibiotics post-PCD between August 1, 2015 and July 31, 2020 were included. The primary outcome was the composite rate of treatment failure, defined by emergency surgery, readmission within 30 days, and mortality between short (<14 days) and long (≥14 days) antibiotic duration.

Results: In 47 patient encounters, 24 (51.1%) were treated with a short antibiotics course versus 23 (48.9%) who were treated with a long antibiotic course. The rate of treatment failure was not statistically significant between the two groups (51.1% vs. 48.9%, p = 0.375). The rates of 30-day readmission (29.2% vs. 8.7%, p = 0.078) and median (IQR) length of stay [3 (3-4.5) vs 5 (2-8.5), p = 0.065] were not statistically significant. The median (IQR) duration of antibiotics was 12 days (10-17). The most common intravenous antibiotic was piperacillin-tazobactam (n=43, 91.5%) while metronidazole (n=22, 46.8%) and fluoroquinolones (n=19, 40.4%) were the most common oral antibiotics.

Conclusion: Shorter antibiotic courses were not associated with increased rates of treatment failure although they may be associated with increased 30 day readmission. This study demonstrates the potential for considering shorter antibiotic courses for patients with a diverticular abscess post-PCD.

Pharmacoeconomics/Outcomes

109 | Impact of sugammadex use on hospital length of stay and overall drug costs, neuromuscular blocker reversal agent and adjunctive agent costs in gastrointestinal/hepatobiliary surgery in a multi-center study.

Oscar Guzman, Pharm.D.[1] and Gina Bazemore, Pharm.D.[2]

[1]*Innovative Delivery Solutions, Cardinal Health, Narrowsburg, NY*

[2]*Innovative Delivery Solutions, Cardinal Health, Silver Spring, MD*

Introduction: Sugammadex is associated with faster and more predictable reversal of rocuronium and vecuronium, compared to traditional neuromuscular blocker (NMB) reversal agents. While sugammadex has been associated with shorter operating room times, use has not been consistently associated with decreased post-operative complications or shorter LOS.

Research Question or Hypothesis: Sugammadex is associated with lower hospital LOS, use of adjunctive agents and overall drug costs.

Study Design: Retrospective observational cohort study.

Methods: Thirty hospitals within the Cardinal Health Drug Cost Opportunity Analytics database were included in this analysis. Total cost of medications, NMB reversal agents, adjunctive agents used to treat post-operative complications, and LOS were assessed in patients receiving vecuronium and rocuronium for gastrointestinal/hepatobiliary surgery in DRGs 326-331, 338-343, 405-407, and 417-419 between December 2019 to November 2020. Outcomes

were compared between patients who received sugammadex, acetylcholinesterase inhibitors (AChEI), both reversal agents and no reversal agent.

Results: 11,981 patients received study NMBs for gastrointestinal/hepatobiliary procedures and were included in the analysis. 7,125 (59%), 3,001 (25%), 440 (4%) and 1,415 (12%) received sugammadex, neostigmine/pyridostigmine, both or neither agent respectively. Overall, utilization of sugammadex was associated with the same median LOS as the AChEI group (5d) and was lower than patients who received both agents (6d) and those who received none (7d). Overall drug costs, NMB reversal agent and adjunctive agent costs were $873, $125 and $161/sugammadex discharge, $620, $20, and $134/AChEI discharge, $1,148, $137 and $246/discharge in patients who received both agents and $1,174, $0, and $246/discharge in patients who received no reversal agent.

Conclusion: Among this patient cohort undergoing gastrointestinal/hepatobiliary surgery in 30 U.S. hospitals, sugammadex was associated with the same median LOS and higher overall drug costs, NMB reversal agent and adjunctive agent costs as AChEI. Patients who received both agents or no reversal agent had higher LOS and drug costs than the sugammadex and AChEI group.

Pharmacoepidemiology

110 | Prevalence, Predictors, and Health-Related Quality of Life of Continuous Glucose Monitoring Use According to the Behavioral Risk Factor Surveillance System 2014-2019

Christina H. Sherrill, Pharm.D., BCACP and Sun Lee, Pharm.D.
High Point University Fred Wilson School of Pharmacy, High Point, NC

Introduction: Continuous Glucose Monitoring (CGM) has been shown to improve behavioral and clinical outcomes. Recent technological advances have increased CGM device accuracy and accessibility, and pharmacists are ideally placed to utilize these devices. The use of CGM in real-world practice appears to be increasing; however, the actual prevalence of use and factors predicting use are unknown.

Research Question or Hypothesis: How common is CGM use by community-dwelling American adults, and how do demographics and health-related quality-of-life (HRQOL) indicators differ between users of CGM and self-monitoring of blood glucose (SMBG)?

Study Design: Serial, cross-sectional study using 2014-2019 Behavioral Risk Factor Surveillance System data

Methods: Adults with self-reported diabetes using CGM or 4-15 times daily SMBG were included. Pregnant patients were excluded. Outcomes were prevalence, demographics, and CDC-HRQOL-4 comparisons between CGM and SMBG users. Multiyear sampling weight was adjusted to combine 2014-2019 data. Weighted multiple linear regression and Rao-Scott Chi-square tests were performed using SAS.

Results: Among 11,203 included respondents, 193 (1.7%) reported using CGM, and the prevalence of CGM use increased from 0.4% (2014) to 4.7% (2019). Compared to SMBG users, CGM users were more likely to be employed (65.2% vs 42.9%, p<0.05), earn income ≥$75,000 (40.6% vs 22.5%, p<0.05), and have insurance coverage (99.8% vs 95.4%, p<0.05). CDC-HRQOL-4 revealed that CGM users were more likely to report good-to-excellent general health status (60.3% vs 43.8%, p<0.05) and experience fewer unhealthy days due to physical (7.1±1.2 vs 11.4±0.2, p<0.05) and combined physical or mental (7.0±1.6 vs 10.6±0.3, p<0.05) reasons. Unhealthy days related to mental health did not show a difference between groups (6.5±1.2 vs 6.6±0.3, p>0.05).

Conclusion: CGM use increased 2014 to 2019 but remains far less than SMBG use. While three of four CDC-HRQOL-4 items improved for CGM compared to SMBG users, economic factors appeared to predict CGM use over SMBG, indicating that cost may still limit access to CGM devices.

Pharmacogenomics/Pharmacogenetics

111 | Evaluation of a pharmacogenomics education lecture series on pharmacist knowledge in an integrated multi-campus healthcare system

Andrew Lee, Pharm.D.[1], Adrian Hui, Pharm.D., BCPS[1], Alexander Walker, Ph.D.[2], Sandra Swain, MD, FACP, FASCO[3] and D. Max Smith, Pharm.D., BCPS[3]
[1]*Pharmacy Department, MedStar Union Memorial Hospital, Baltimore, MD (2)MedStar SiTEL, Georgetown University School of Medicine, Washington, DC (3)MedStar Health, Columbia, MD*

Introduction: Due to the rapidly evolving field of pharmacogenomics (PGx), continuing education programs for pharmacists are needed. This study evaluated the effect of continuing education for pharmacists on pharmacogenomics based on a change in score on a pharmacogenomics knowledge assessment baseline and the initial post-assessment after each lecture.

Research Question or Hypothesis: Pharmacists will score higher on the initial post-assessment than the baseline assessment.

Study Design: An Accreditation Council for Pharmacy Education (ACPE)-accredited three-part weekly webinar series was presented live in January 2021. Pharmacists who practice at MedStar Health were invited to participate and received questionnaires via email at baseline (13 knowledge-based questions) and in the week after each lecture (4-5 knowledge-based questions per lecture).

Methods: The subjects were recruited from email announcements, a health system newsletter, and an in-person approach. REDCap, a secure web application for building and managing research data, was used to collect all data. The primary endpoint was a change in

the percent of correct responses between the baseline and the post-lecture assessments, which were assessed via a two-sided paired t-test. Descriptive statistics were also calculated for the responses.

Results: Of the approximately 400 pharmacists across the health system, 72, 62, and 55 attended the first, second, and third webinar respectively. Prior to the first lecture, 58 pharmacists volunteered to participate in the study and completed the baseline assessment. The average score on the baseline knowledge assessment was 43.7% (SD 2.81). Among 58 research participants, 19 were eligible for the primary analysis after completing the baseline questionnaire, attending all three lectures, and completing all three post-lecture assessments. The average score improvement was 37% (95% CI: 26% to 48%; p <0.0001).

Conclusion: The PGx lecture series increased PGx knowledge within a week following each lecture. Future work will address the long-term retention of PGx knowledge after this lecture series.

112 | Opportunities to Incorporate Nutrigenomics into Clinical Practice

Vineet Tatla, B.Pharm and Don Roosan, Pharm.D., Ph.D
Western University of Health Sciences, Pomona, CA

Introduction: Being able to integrate both pharmacogenomics and nutrigenomics into clinical practice can help to optimize overall health outcomes for patients. One barrier to the implementation of nutrigenomic and pharmacogenomic counselling is the sparsity of information available on the interaction between nutrients and genes. Understanding nutrigenomics and how it correlates with pharmacogenomics can help in the implementation of more holistic precision medicine by identifying potential dietary modifications to reduce the risk of gene-related effects.

Research Question or Hypothesis: To identify any overlap between genes that have been recognized for pharmacogenetic counselling, and genes that warrant nutrigenomics counselling.

Study Design: Literature review

Methods: We used the Clinical Pharmacogenetics Implementation Consortium (CPIC®) nutrigenomics database to identify the top 146 drug-gene pairs that had CPIC level A or B recommendations, meaning that prescribing action is recommended, and alternative therapies or dosing are highly likely to be effective and safe. We then performed a literature search and identified 27 papers with information relevant to nutrigenomic interactions. Using these results, we mapped genes that have significant drug-food interactions with genes that have CPIC level A and B recommendations.

Results: We identified 82 drug-food-gene interactions with 14 unique genes. Of the interactions identified, 28 were associated with gene-drug combinations that had a CPIC level A recommendation, 8 had a CPIC level A/B recommendation, and 46 had a CPIC level B recommendation. Additionally, 42 of the identified interactions were associated with gene-drug combinations that had an FDA actionable pharmacogenetics recommendation. Some of the most prevalent drug-food-gene interactions we identified included CYP2D6 and turmeric; SCN1A and ketogenic diet; and G6PD and fava beans.

Conclusion: Patient health outcomes can be improved by integrating nutrigenomics and pharmacogenomics to optimize therapy. Future research should aim to continue to advance the knowledge of gene-nutrient interactions to improve nutrigenomics counselling.

Psychiatry

113 | Clinical pharmacy impact in mental health intensive case management

Jessica Bovio Franck, Pharm.D., BCPS and Karrie Squires, Pharm.D., BCPP
Department of Pharmacy, North Florida/South Georgia Veterans Health System, Gainesville, FL

Introduction: Clinical pharmacy specialists (CPSs) are valuable members among interdisciplinary teams, playing an integral role in medication management (MM) in a variety of mental health settings including inpatient units, primary care, specialty care, and the community. Assertive Community Treatment teams provide intensive, community-based mental health services to patients with severe, persistent mental illnesses. Similarly, Mental Health Intensive Case Management (MHICM) is the Veterans Health Administration model providing Veterans intensive community mental health services. Studies evaluating CPS involvement and outcomes in intensive management teams are lacking.

Research Question or Hypothesis: A quality improvement project was performed to assess the impact of interdisciplinary MM meetings. It was expected that MHICM CPS collaboration would result in improved prescribing proportions (quantity of patients with an active prescription for long-acting injectable, LAI, antipsychotics or clozapine divided by the quantity of patients indicated to receive the medication), patient access to care, and clinical interventions.

Study Design: A before and after evaluation was conducted.

Methods: Collaborative meetings were initiated to assess MHICM patients with schizophrenia receiving or indicated to receive clozapine and LAIs. The MHICM CPS was responsible for ordering/assessing laboratory parameters and subsequently prescribing LAIs. LAI and clozapine prescribing proportions were compared before and after implementation of MM meetings. Additional measures evaluated were number of encounters, patients, and clinical interventions completed by the MHICM CPS. The evaluation period for both groups was three months. Prescribing proportions were compared through statistical analysis with chi-squared for nominal data.

Results: Prescribing proportions for clozapine and LAIs increased from 3.4% to 4.7% (p=0.14) and 17.8% to 25.3% (p<0.01), respectively. Number of encounters, patients and clinical interventions increased by 77%, 100%, and 2423%, respectively.

Conclusion: The significant increase in LAI prescribing proportions observed, and numerically increased clozapine prescribing proportions, encounters, patients, and clinical interventions, suggest the benefit of CPS involvement in MHICM teams.

Pulmonary

114 | Reducing COPD Readmissions: A Multi-Disciplinary Approach

Rachel Swearingen, Pharm.D., Amanda Van Prooyen, Pharm.D., Allen Gandhi, Pharm.D. and Willie Smith Jr., MD
Emory University Hospital Midtown, Atlanta, GA

Introduction: Chronic Obstructive Pulmonary Disease (COPD) is a leading cause of death and hospitalizations in the United States. Poor outcomes in COPD are commonly due to misunderstanding of the disease state and nonadherence to inhaler regimens. A multi-disciplinary collaboration can provide patients with improvements in quality of life and overall outcomes.

Research Question or Hypothesis: The objective of this study is to evaluate the effectiveness of a multi-disciplinary team on 30-day readmission rates in patients admitted with acute exacerbation of COPD (AECOPD).

Study Design: A prospective, non-randomized pilot study was completed and analyzed.

Methods: Patients 18 years of age or older with AECOPD diagnosis (ICD 10 J44.1) were included. Patients received the following interventions: COPD and smoking cessation education, appropriate discharge pharmacotherapies in accordance with current guidelines, inhaler technique education, follow-up appointments and follow-up discharge phone calls. These services were provided by a multi-disciplinary team, including nurses, respiratory therapists, pharmacists, social workers, care-transition coordinators and providers. The impact of intervention on 30-day readmission rates was compared to a historical control group. Compliance with guideline-recommended maintenance and rescue inhaler regimens was compared at admission and discharge in the intervention group.

Results: A total of 44 patients were included in the intervention group (11/18/19 – 3/13/20) and 154 patients in the comparator group (11/18/18 – 3/13/19). At 30-days, 16% of patients in the intervention group had a readmission compared to 29.9% of patients in the comparator group. Guideline-recommended discharge maintenance inhaler regimens increased from 46% of patients on admission to 98% of patients at discharge (p <0.001). Guideline-recommended rescue inhaler regimens increased from 66% on admission to 95% on discharge (p 0.008).

Conclusion: A collaborative, multi-disciplinary approach may decrease 30-day COPD readmission rates and can increase prescribing of guideline-recommended maintenance and rescue inhaler regimens at discharge.

115 | Budget Impact of the Use of Digital Inhalers in Asthma Treatment in the US

Job FM van Boven, Ph.D., Pharm.D.[1], Tanisha Hill, MPH[2], Rinat Ariely, Ph.D.[2], Lee Smolen, BSEE[3], Timothy Klein, BS[4], Bogdan Muresan, MSc[5] and Ernesto Mayen Herrera, MSc[2]
[1]*University of Groningen, Groningen, Netherlands* [2]*Teva Branded Pharmaceutical Products R&D Inc, Parsippany, NJ* [3]*Medical Decision Modeling Inc, Indianapolis, IN* [4]*Medical Decision Modeling Inc., Indianapolis, IN* [5]*Teva Pharmaceuticals Europe, Amsterdam, Netherlands*

Introduction: Digital inhalers (DI) for use in asthma can provide accurate medication tracking, support treatment decision making and improve disease management, potentially reducing exacerbation rates and healthcare resource use.

Research Question or Hypothesis: Assess the budget impact of introducing a DI capable of delivering short-acting beta agonists (SABA) as rescue medication for the treatment of asthma.

Study Design: A US budget impact model compared costs associated with or without using a DI with standard of care (SoC) in patients with asthma, over 3 years.

Methods: The model used a hypothetical 1,000,000-member health plan. In total, 18,563 patients (all ages) with Global Initiative for Asthma (GINA) steps 3–5 uncontrolled asthma were assessed. Uncontrolled asthma was defined as an Asthma Control Test score of ≤19. Model assumptions were derived from published literature, SABA SoC component product labeling, and subscription-based cost resources. Model inputs included medical (exacerbation-associated hospitalizations and emergency room [ER] visits) and pharmacy acquisition (SABA and concomitant asthma controller medications) costs. Clinical (asthma control; SABA inhaler device use; hospital, ER, and outpatient visits; oral corticosteroids [OCS]), and economic (cumulative budget impact) outcomes from a payer perspective were assessed. Based on published literature, we assumed asthma control improvement of 17.4% by patients using a DI.

Results: The model estimated reductions in mean SABA canister use from three to two (GINA 3–4 patients) and five to three (GINA 5 patients), and reductions in hospitalizations (-0.47%), ER visits (-0.47%), outpatient visits (-0.22%), and OCS prescriptions (-0.22%). Use of a DI resulted in 3-year cumulative impact costs of $7,630 (or $0.01 per treated patient per month); however, the model estimated potential savings in direct medical costs attributable to better disease control and improved inhalation technique.

Conclusion: This model suggests that DI use for SABA delivery resulted in improved clinical outcomes, and decreased direct medical costs following improved asthma control and reduced SABA use.

Substance Abuse/Toxicology

116 | Prevalence and factors associated with prescription narcotic controlled substance use among people with depression and anxiety: Nhanes 2017-2018

Yoscar Ogando, Pharm.D., B.S.[1], Fadia Shaya, Ph.D., MPh[2] and Magaly Rodriguez de Bittner, Pharm.D.[3]
[1]*Pharmacy Practice and Sciences, University of Maryland, Baltimore, BALTIMORE, MD* [2]*Pharmaceutical Health Science Research, University of Maryland, Baltimore, Baltimore, MD* [3]*Pharmacy Practice and Sciences, University of Maryland, Baltimore, Baltimore, MD*

Introduction: Depression and anxiety have a high prevalence amongst US adults, 6.7% and 18.1 %, respectively.[1] The prevalence of prescription opioids in adults with mental health is estimated to be high (18.7%).[2]

Research Question or Hypothesis: Examine the prevalence of prescription opioids and other factors associated with narcotic controlled substance use among people with depression.

Study Design: Retrospective cross-sectional survey.

Methods: The most recent 2017-2018 cycle of the National Health and Nutrition Examination Survey (NHANES), representative of the US civilian national population, was the data source. The study population included adults ≥18 years of age with depression. Severity of depression was categorized using the Patient Health Questionnaire (PHQ-9). The use of prescribed opioid, defined as use of any central nervous system acting narcotic opioid analgesic, was assessed for each individual using prescription information within the database. Anxiety information was also identified via new survey questions. Descriptive analysis and logistic regression of demographic, medical, and social characteristics were conducted using SAS 9.4. An odds ratio (OR) with 95% confidence interval was used a measure of association.

Results: A total of n=1045 NHANES participants were included. Observed prescription opioid use prevalence in NHANES population with depression was 11.29%. The odds of prescription opioid use were higher amongst adults 40-59 and ≥60 years of age when compared to younger participants (OR= 1.718 CI, 1.01, 2.92) and (OR= 2.318 CI, 1.291, 4.162), respectively. The odds of opioid use were similar for families across different income to poverty ratio. The odds of an opioid prescription was similar across the various depression severity and frequency of anxiety episodes, but higher in those that indicated the use of an anti-anxiety medication (OR=2.018 CI, 1.012, 4.026).

Conclusion: As the healthcare field and patients adapt to the emerging opioid prescribing practices designed to curb the spread of opioid misuse, patients suffering from depression and anxiety should considered carefully.

117 | Evaluating short-term use of transdermal buprenorphine to transition to sublingual in veterans with opioid use disorder

Christopher Nowak, BS in Biological Sciences, Pharm.D. Candidate 2022[1], Mitchell Tam, BS in Cellular Biology, Pharm.D. Candidate 2022[1], Tessa Rife, Pharm.D., BCGP[2] and David Pennington, Ph.D.[3]
[1]*San Francisco Veterans Affairs Healthcare System, San Francisco, CA* [2]*Department of Pharmacy; School of Pharmacy, San Francisco Veterans Affairs Health Care System; University of California, San Francisco, San Francisco, CA* [3]*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*

Introduction: Sublingual buprenorphine is recommended for treatment of opioid use disorder; however, when other opioids are held for 12-24 hours prior to initiating treatment, some patients experience intolerable opioid withdrawal leading to treatment drop-out. Limited data suggests small "microdoses" of transdermal buprenorphine can be used to bridge to treatment with sublingual, reducing opioid withdrawal symptoms and increasing successful treatment initiation. The San Francisco Veterans Affairs Health Care System has a protocol for use of transdermal buprenorphine as a short-term bridge to treatment with sublingual.

Research Question or Hypothesis: How many veterans utilizing short-term transdermal buprenorphine successfully initiate sublingual buprenorphine, and how many remain on treatment with sublingual buprenorphine at 14 days?

Study Design: Retrospective single-arm cohort quality improvement study.

Methods: Veterans approved for use of transdermal buprenorphine per protocol March 2016 through April 2020 were identified (n=37). Veterans who did not initiate treatment with transdermal buprenorphine were excluded (n=2). Retrospective data were collected via electronic medical review and included sociodemographics and buprenorphine treatment outcomes.

Results: Most veterans (n=26, 74.3%) were prescribed one transdermal buprenorphine 20mcg patch. Within 14 days of transdermal buprenorphine application, a total of 31 (88.6%) veterans successfully initiated treatment with sublingual buprenorphine. Two veterans (5.7%) experienced intolerable opioid withdrawal and transitioned to treatment with methadone maintenance, and one veteran (2.9%) experienced intolerable nausea and ceased all opioid treatment. At 14 days, 25 (71.4%) veterans remained on treatment with sublingual buprenorphine.

Conclusion: Use of transdermal buprenorphine as a short-term bridge to treatment with sublingual for opioid use disorder was effective for nearly 89% of veterans, and over 71% remained on treatment at 14 days. Only 9% experienced treatment-limiting withdrawal/nausea. "Microdosing" with transdermal buprenorphine represents a promising new strategy to assist with initiating sublingual buprenorphine, and future controlled studies may be warranted.

118 | Evaluating buprenorphine extended-release injection for veterans with opioid use disorder at San Francisco Veterans Affairs Health Care System

Melissa Nguyen, Pharm.D.[1], Tessa Rife, Pharm.D., BCGP[2] and Christina Tat, Pharm.D.[3]

[1]*Department of Pharmacy, San Francisco Veterans Affairs Health Care System, San Francisco, CA* [2]*Department of Pharmacy; School of Pharmacy, San Francisco Veterans Affairs Health Care System; University of California, San Francisco, San Francisco, CA* [3]*San Francisco Veterans Affairs Health Care System, San Francisco, CA*

Introduction: Buprenorphine extended-release injection is approved for treatment of opioid use disorder and requires up to 6 months to reach steady-state. However, the average treatment duration at San Francisco Veterans Affairs Health Care System is only 5 months, indicating some veterans may stop treatment early. While patients may experience intolerable opioid withdrawal/cravings during buprenorphine initiation, limited evidence exists evaluating factors leading to early treatment drop-out or describing strategies for management of opioid withdrawal/cravings with the extended-release injection formulation.

Research Question or Hypothesis: What factors led to discontinuation of buprenorphine extended-release injection, and how was opioid withdrawal/cravings managed during treatment initiation?

Study Design: Retrospective single-arm cohort quality improvement study.

Methods: Veterans prescribed buprenorphine extended-release injection July 5, 2018 through May 28, 2020 were identified (n=16). Retrospective data 1 month prior to injection through 6 months after injection were collected via electronic medical record review and included: demographics, buprenorphine extended-release injection treatment outcomes, and pharmacotherapy for opioid withdrawal/cravings. Data were analyzed using descriptive statistics.

Results: Among 16 veterans prescribed buprenorphine extended-release injection, 14 veterans received at least one injection, and two veterans declined treatment. Short-term medications prescribed to manage opioid withdrawal/cravings included sublingual buprenorphine/naloxone (n=10), clonidine (n=1), and gabapentin (n=1). Within 6 months of initial injection, 8 veterans stopped treatment with buprenorphine extended-release injection and the most common reasons included intolerable opioid withdrawal/cravings (n=4) and pain (n=3).

Conclusion: Over 57% of veterans who initiated treatment with buprenorphine extended-release injection ultimately stopped treatment early, primarily due to uncontrolled opioid withdrawal/cravings and pain. Interestingly, the buprenorphine extended-release injection package insert only recommends use of sublingual buprenorphine to treat withdrawal after discontinuation of the injection. No guidance is provided for potential overlap during treatment initiation. Future studies should examine strategies to address opioid withdrawal/cravings and pain during treatment initiation and the potential role for short-term use of sublingual buprenorphine/naloxone.

Transplant/Immunology

119 | Retrospective Analysis of Vancomycin Use in Post-Lung Transplant Patients for Chest Tube Prophylaxis

Estefany Yanqui, Pharm.D., Jacqueline Clark, Pharm.D., Meagan Adamsick, Pharm.D. and Georgina Waldman, Pharm.D

Massachusetts General Hospital, Boston, MA

Introduction: There are currently no guideline recommendations for surgical antimicrobial prophylaxis following chest tube placement in lung transplant recipients (LTR). Our institution initiates vancomycin therapy for this indication and continues therapy for the duration of chest tube placement following the initial perioperative period.

Research Question or Hypothesis: What is the safety and efficacy of prophylactic vancomycin therapy following chest tube placement LTR during the initial perioperative period?

Study Design: Single-center, retrospective chart review

Methods: All LTR at our center between January 2018 to December 2020 who received vancomycin as initial agent for chest tube prophylaxis were included. The primary end point evaluated vancomycin days of therapy for chest tube prophylaxis during and after chest tube removal. Secondary endpoints included incidence of culture positive infections, acute kidney injury (AKI) defined by KDIGO criteria, leukopenia defined as white blood cells (WBC) < 3 K/uL, new vancomycin resistant (VRE) culture after vancomycin initiation, number of vancomycin doses and levels drawn, and number of vancomycin dose adjustments per patient.

Results: Of the 90 LTR evaluated, 42 patients (46.7%) continued vancomycin beyond day of chest tube removal. Of these 42 patients, 30 did not have a MRSA positive culture and 12 had cultures that indicated antibiotic de-escalation. Overall, AKI, leukopenia, and new vancomycin resistant Enterococcus spp culture data increased proportionally with vancomycin duration with all patients developing an AKI after 22 days of therapy.

Conclusion: There is insufficient culture data to indicate the use of prolong vancomycin therapy for chest tube prophylaxis and emphasis should be placed in de-escalating antibiotics within 72 hours of positive cultures. The increase risk of adverse effects such as AKI and positive VRE results seen in this patient population suggest that the risk outweighs the potential prophylactic benefit. With AKI, patients are faced with increase vancomycin monitoring leading to increase cost in levels, and pharmacist resources.

120 | Assessment of Pain Requirements after Robotic Assistive Kidney Transplant Surgery Compared to an Open Surgery

Bemnat Agegnehu, Pharm.D.[1], Ryan Winstead, Pharm.D.[1], Aamir Khan, MD[2] and Chandra Bhati, MD[2]
[1]*Department of Pharmacy, Virginia Commonwealth University Health System, Richmond, VA* [2]*Department of Surgery, Division of Transplant Surgery, Virginia Commonwealth University Health System, Richmond, VA*

Introduction: Kidney transplantation is the standard of care for patients with end stage renal disease and is traditionally performed as an open kidney transplant surgery (OKT). Robotic assisted kidney transplant (RAKT) has evolved as a novel surgical technique in the last decade.
Research Question or Hypothesis: Are pain medication requirements after RAKT lower compared to conventional OKT?
Study Design: This was an institutional review board approved retrospective electronic chart review of adult kidney transplant patients who underwent RAKT or OKT between July 1, 2018 and March 30, 2021.
Methods: The primary outcome was measured as the total morphine milliequivalents (MME) pain requirements within the 48 hours after end of surgery based on Centers for Medicare & Medicaid Services (CMS) guidelines.
Results: Out of 80 patients, 40 underwent OKT and 40 underwent RAKT. For the primary outcome, patients who underwent OKT had a higher mean MME of 81.88, where patients who underwent RAKT had a mean MME of 67.96 (p-value = 0.569), while not statistically significant. Mean pain score at 72 hours was higher at 4.62 for the OKT arm compared to the RAKT arm at 2.40 (p-value = 0.001). Other relevant secondary outcomes for OKT and RAKT respectively were number of patients discharged on furosemide 22/40 vs. 6/40 (p-value <0.001) and delayed graft function 20/40 vs. 7/40 (p-value = 0.002).
Conclusion: RAKT was associated with clinically but not statistically significant lower pain medication requirements at 48 hours after end of surgery compared to conventional OKT. However, pain scores at 72 hours were statistically significantly higher for OKT compared to RAKT. Future larger studies are needed to allow for higher power to determine if lower pain from RAKT can serve as another benefit and possible factor in deciding to use RAKT over OKT for a kidney transplant recipient.

VPS ADVANCES IN INTERNATIONAL CLINICAL PHARMACY PRACTICE, EDUCATION, OR TRAINING

Cardiovascular

122 | An SGLT-2 Inhibitor Prioritization Tool for Diabetic Patients at High Risk of Developing or with Established Cardiovascular Disease

Grace Yun, Pharm.D. Candidate 2021[1], Stephanie Hendricks, Pharm.D. Candidate 2021[2], Sotiris Antoniou, MRPharmS[3], Monica L. Miller, Pharm.D., MS[4] and Ellen Schellhase, Pharm.D.[5]
[1]*College of Pharmacy, Purdue University, West Lafayettte, IN* [2]*College of Pharmacy, Purdue University, West Lafayette, IN* [3]*Barts Health NHS, London, United Kingdom* [4]*Department of Pharmacy Practice, Purdue University College of Pharmacy, West Lafayette, IN* [5]*Purdue University, West Lafayette, IN*

Service or Program: With new data regarding SGLT-2 inhibitors benefits for patients living with type 2 diabetes mellitus (T2DM) at high risk of developing cardiovascular disease, St. Bartholomew's Hospital (Barts) in London, England developed a prioritization tool. This tool was created through the collaboration of Advanced Pharmacy Practice Experience (APPE) students from Purdue University College of Pharmacy and cardiology specialists at Barts. To date, the most prescribed diabetes medications in the National Health Service (NHS) were metformin, followed by DPP-4 inhibitors, sulfonylureas, SGLT-2 inhibitors, and thiazolidinediones. This tool provides clinicians guidance to determine which patients should begin SGLT-2 inhibitor therapy in order to increase health outcomes and prevent hospitalizations.
Justification/Documentation: Current European guidelines, new cardiovascular outcome trials data, and yearly NHS medication costs were analyzed to develop a decision-making tool aimed at helping providers switch patients to an SGLT-2. Patients at high risk of developing or with established cardiovascular or chronic kidney disease were prioritized highest for receiving an SGLT-2 inhibitor. Barts' pharmacists and cardiologists can use this tool to identify key patients and apply these changes.
Adaptability: This SGLT-2 inhibitor prioritization tool is adaptable to any practice setting. The prevalence of diabetes and cardiovascular disease around the world is increasing, and the benefits of this medication class have been demonstrated in both disease states. Although this tool was created with the SGLT-2 inhibitors available within the NHS and using European guidelines, the data and information can be extrapolated to other countries.
Significance: Through the collaboration between international preceptors and APPE students they impacted the practice of clinical pharmacy in another country. Using existing guidelines, a clear and

simplified tool was created that pharmacists at Barts can use to improve clinical outcomes for their patients.

Education/Training

123 | Implementation of a multi-country, virtual professional development program within PEACE and the Catholic University of Health and Allied Sciences (CUHAS)

Mana Ito, BS[1], Megumi Howard, BS, Pharm.D. Candidate[2], Seiya Abe, BS[3], Haruno Nunome, BS[1], Yasuko Kurata, Ph.D.[4], Fumi Okamoto, BS, Diploma of tropical medicine[5], Daisuke Sato, MPH, BPharm[6], Shimpei Aoyama, BS[1], Kayo Hamasaki, MSc Pharmaceutical Sciences[7], Deogratias Katabalo, MPharm[7] and Winfrida Minja, BPharm[7]
[1]*PEACE, LLC, Jacksonville, FL* [2]*Nova Southeastern University College of Pharmacy, Fort Lauderdale, FL* [3]*Kameda Medical Center, Kamogawa city , Chiba, Japan* [4]*Department of Pharmacy, Okayama University Hospital, Okayama, Japan* [5]*School of Public Health, Kyoto University, Kyoto, Japan* [6]*Department of Clinical Epidemiology and Health Economics, School of Public Health, The University of Tokyo, Tokyo, Japan* [7]*School of Pharmacy, Catholic University of Health and Allied Sciences, Mwanza, Tanzania, United Republic of*

Service or Program: Pharmacy Empowerment, Advancement and Continuing Education (PEACE) is an educational organization that aims to empower pharmacists and pharmacy students in Japan founded by internationally trained Japanese pharmacists. Currently PEACE consists of 23 members, who conducted a virtual active learning workshop for 63 pharmacy students from the Catholic University of Health and Allied Sciences (CUHAS) in Tanzania. The goals of the program were to improve foundational understanding of pharmacotherapy and professionalism for students. Participants would be able to build leadership and public speaking skills, leading to improvement of patient care in Tanzania.

Pharmacy students participated in one-hour workshop focused on Type 2 diabetes mellitus. Workshop activities include trivia, small group discussions reviewed patient case, followed by Q&A sessions and a survey.

PEACE members were delegated to lead each activity and all members conducted presentations during the workshop. The whole process of the program was rehearsed in advance to establish possible issues.

Justification/Documentation: 58 out of 63 attendees participated in our survey. Overall, 77% were satisfied with the workshop. For each activity, 93% marked "satisfied" or "very satisfied" for trivia, while 89% showed "satisfied" or "very satisfied" for small group discussions. Approximately 90% agreed that they actively participated in small group discussions and their interest in the subject had increased following the workshop.

Adaptability: The entire workshop was developed and implemented online. E-mail, Zoom and Slack were used for communication and research of local needs. Trivia was implemented using online quiz tool Kahoot!, a free software for educators and students, and materials were maintained on an online platform.

Significance: PEACE successfully assisted pharmacy students in expanding their comprehension of pharmacotherapy and professionalism with a potential of improving the future patient care in Tanzania. The uniqueness of the program was cultivated by PEACE members' diverse background including clinical experiences in multiple countries.

124 | From There to Here: A Virtual International APPE in London, England

Ellen Schellhase, Pharm.D.[1], Monica L. Miller, Pharm.D., MS[1], Michaela Todd, Doctor of Pharmac Candidate[2], Ishmum Hasan, Doctor of Pharmacy Candidate[2], Sotiris Antoniou, MRPharmS[3] and Alexandra Van-Slageren, MPharm[3]
[1]*Department of Pharmacy Practice, Purdue University College of Pharmacy, West Lafayette, IN* [2]*Purdue University, West Lafayette, IN* [3]*Barts Health NHS, London, United Kingdom*

Service or Program: Purdue University College of Pharmacy (PUCOP) has offered an 8-week international advanced pharmacy practice experience (APPE) in London, England at St. Bartholomew's Hospital since 2007. To date, 130 student pharmacists have participated within three focus areas: nuclear medicine, cardiology, and oncology. During this APPE, students participate in direct patient care and clinical research. Another key focus of this APPE is intercultural learning. Due to the COVID-19 pandemic and travel restrictions, this experience was hosted using a virtual platform during 2020.

Justification/Documentation: COVID-19 impacted many hospitals, including St. Bartholomew's, causing limited time for dedicated research and education/training. Virtual APPE students and preceptors partnered to move research projects forward and develop educational materials. PUCOP students also focused on enhancing their intercultural skills as evidenced by growth in both the Intercultural Development Inventory™ and Cultural Intelligence Assessment™.

Adaptability: This APPE demonstrated the feasibility of using virtual interactions for international APPEs and could be adapted to other settings. Given the demonstrated intercultural growth and research productivity virtual interactions could be considered when international student travel is not feasible (pandemic, cost, schedule availability). This APPE was successful due to the continued engagement with preceptors through video conferencing platforms (Microsoft Teams™) and messaging applications (WhatsApp™).

Significance: Differences between in-person and virtual international APPEs assessments provided insight into how experiential education

can be adapted and still meet the needs of the practice site and students. In the event international travel or APPEs are not feasible, virtual interactions can be an option. As demonstrated with this example, virtual experiences still allowed student pharmacists to experience healthcare in another country and broaden their knowledge, skills and attitudes. Student research projects still contributed to hospital quality improvement initiatives and clinical practice protocols. This virtual international research APPE can be a model for healthcare-related international training programs with or without a global pandemic.

125 | Assessment of Intercultural Learning During an Advanced Pharmacy Practice Experience in Medellin, Colombia

Ellen Schellhase, Pharm.D.[1], Hanna Persha, Doctor of Pharmacy Candidate[1] and Andrea Salazar Ospina, Ph.D.[2]
[1]*Purdue University, West Lafayette, IN* [2]*University of Antioquia, Medellin, Colombia*

Service or Program: In 2018, Purdue University established an Advanced Pharmacy Practice Experience (APPE) in Medellin, Colombia. It offers a unique look at pharmacy practice in Colombia, an opportunity to gain medical Spanish experience, and a focus on intercultural learning (ICL). As interest in international APPEs expands, there is a growing need to assess ICL.

Students are enrolled in a pre-requisite course the spring semester before their APPE. Students learn about pharmacy practice in Colombia, cultural norms and travel tips. They participate in ICL active-learning sessions including: Hofstede's cultural dimensions, communication and conflict styles, emotional hot buttons, and intercultural core competencies. The APPE includes an orientation at Universidad de Antioquia (UdeA) in Medellin. UdeA is partnered with Institución Prestadora de Servicios (IPS) Universitaria where students participate in patient care rounds. The remaining time is spent in IPS affiliated ambulatory care clinics. Students are encouraged to spend time with local peer guides, exploring Colombian culture in the form of art, history, cuisine, and local events. ICL is assessed using the Intercultural Development Inventory™(IDI) and the Cultural Intelligence™ (CQ) assessment at the beginning of the course and 4 weeks after APPE completion. Students also complete the Wesleyan Intercultural Competence scale™ (WICS) to assess ICL in a study abroad setting.

Justification/Documentation: Ten student pharmacists have completed both the course and APPE. The average IDI Developmental Orientation (DO) before the course was 93.7 and the post-APPE DO was 100.5 placing students in minimization. Assessment of the WICS revealed scores consistent with minimization. The CQ revealed the highest scores in Drive and Action and overall growth across all four capabilities after completion of the APPE.

Adaptability: The IDI, CQ and WICS can all be utilized to assess ICL during an international APPE.

Significance: Students demonstrated intercultural growth after completion of the orientation course and international APPE in Colombia.

CLINICAL PHARMACY FORUM

Ambulatory Care

126 | Streamlining the Workflow of Clinical Pharmacists in Primary Care

Kaylee Nichols, Pharm.D. Candidate[1], Jamie Hall, Pharm.D., BCPS[2], Sarah Cox, Pharm.D., MS[2] and Kelly Cochran, Pharm.D., BCPS[2]
[1]*School of Pharmacy, University of Missouri - Kansas City at Columbia, Columbia, MO* [2]*Division of Pharmacy Practice & Administration, University of Missouri-Kansas City School of Pharmacy, Columbia, MO*

Service or Program: Pharmacists practicing at an academic Internal Medicine and Family Medicine clinic recognized the need to identify patients who would most benefit from pharmacist intervention. The goal of this project was to evaluate the impact of a weekly generated report to guide primary care clinical pharmacists' (PCCP) patient identification process. The electronic report identified patients with at least one unmet metric who were scheduled to see their primary provider in the next seven days. The PCCP, IPPE, or APPE student identified patients who warranted intervention, addressed the clinical metric opportunity with the provider or patient, and then subsequently tracked the outcome of the intervention. The number of metrics moved from unmet to met were recorded.

Justification/Documentation: The clinic quality metrics included: hemoglobin A1c (HbA1c) >9%, annual HbA1c monitoring, annual LDL monitoring, LDL control, annual nephropathy screening, ACE inhibitor/ARB therapy use, Pneumovax vaccination, and tobacco use screening and cessation. The project was successful in identifying 245 metrics and converting 119 metrics (48.6%) over an eight-month period between September 1, 2019 and April 30, 2020. Of the 245 unmet metrics identified, 20 were HbA1c monitoring, 37 were blood pressure controlled, and 45 were LDL monitoring. PCCP interventions converted 75%, 57%, and 67% of those metrics respectively.

Adaptability: The metrics were chosen based on clinic priorities and payer contracts. These can be adapted based on individual institution and patient needs for clinics interested in adopting this framework. Limitations to adapting to other sites may include specific technology needed to create and disseminate the patient list.

Significance: The development of this report met a need for creating a consistent and uniform approach to patient identification for pharmacist intervention across primary care practice sites within the same

health system. This process allows pharmacists to identify opportunities to improve clinic quality metrics.

127 | Integration of remote pharmacist telehealth service into 3 distant, rural and underserved primary care practices

Jeremy Thomas, Pharm.D.[1], Ashlyn Tedder, BA, BS[2], Jordana M. Levitt, MS[3], Geoffrey Curran, Ph.D.[4] and Melanie Livet, Ph.D.[5]
[1]*Department of Pharmacy Practice, Center for Implementation Research, University of Arkansas for Medical Sciences College of Pharmacy, Little Rock, AR* [2]*Pharmacy Practic e, University of Arkansas for Medical Sciences, Little Rock, AR* [3]*Center for Medication Optimization, University of North Carolina Eshelman School of Pharmacy, Chapel Hill, NC*
[4]*Department of Pharmacy Practice, Center for Implementation Research, University of Arkansas for Medical Sciences, Little Rock, AR* [5]*UNC Eshelman School of Pharmacy, Chapel Hill, NC*

Service or Program: As part of a broader initiative, we sought to integrate a remote comprehensive medication management (CMM) telehealth service into 3 distant, rural and underserved primary care practices without on-site pharmacist services. Residency-trained pharmacists at an academic medical center provide CMM 12 hours a week through a telehealth platform to patients from the practices. Patients with an A1C over 9% and taking more than five medications are eligible. Clinic staff enroll and schedule patients for the initial CMM visit. Pharmacist access the EHR through a VPN. After completing an initial CMM visit, pharmacist communicate recommendations to providers through EHR messaging. Recommendations are categorized based on the PQA Medication Therapy Problems Categories Framework. Pharmacists follow up with patients with additional visits.

Justification/Documentation: CMM has poor accessibility in geographically limited areas. Delivery of CMM via telehealth allows patients in remote areas to access CMM services without the need to have a pharmacist on-site. Eighty-three recommendations were made in the first 5 months of the service for 34 patients. MTP categories were: Effectiveness (35), Safety (27), Indication (11) and Adherence (10). Baseline A1C average was 10.6%. Seven months after service initiation, the A1C average is 9.04%.

Adaptability: Remote access to the EHR through a VPN allowed our pharmacists full access to patient records and a method to communicate recommendations to providers. Using clinic staff to identify and enroll eligible patients provided credibility to the service as staff were able to describe the service prior to the initial visit. Pharmacist successfully integrated the CMM service despite no prior on-site services.

Significance: Integration of a remote CMM service allows patients in rural areas to access CMM by qualified pharmacists. Due to Covid, telehealth is a more widely accepted delivery model. This project demonstrates that a new, remote pharmacist service can be integrated into a distant practice.

Hematology/Anticoagulation

128 | A review of direct oral anticoagulant management among cancer patients and subsequent implementation of a pharmacist-driven coagulation and cancer clinic

Justin Arnall, Pharm.D., BCOP[1], *Kristyn DiSogra, Pharm.D., BCOP*[1], Laura Skaff, Pharm.D., BCACP, CPP[2], Donald Moore, Pharm.D., BCPS, BCOP, DPLA[3], Chris Larck, Pharm.D., BCOP, CPP[3] and Jai Patel, Pharm.D., BCOP, CPP[4]
[1]*Department of Pharmacy, Atrium Health Specialty Pharmacy Service, Charlotte, NC* [2]*Department of Pharmacy, Atrium Health Chronic Care Medication Management, Concord, NC* [3]*Department of Pharmacy, Levine Cancer Institute, Concord, NC* [4]*Department of Pharmacy, Levine Cancer Institute, Charlotte, NC*

Service or Program: A subspecialized coagulation clinic for patients at high risk for or following cancer-associated thrombosis was launched as a collaborative initiative between pharmacy groups at Atrium Health. The goal of this service was to support the growing complexities of anticoagulation treatment and thromboprophylaxis in cancer patients.

Justification/Documentation: Venous thromboembolism (VTE) is the second leading cause of death among cancer patients and is associated with increased morbidity and mortality. Guidelines were recently updated to include consideration of DOAC for thromboprophylaxis in high-risk patients and treatment of VTE. We recently evaluated 40 cancer patients initiated on a DOAC and identified no recurrent thrombotic events and a 2.5% discontinuation rate within 6 months of DOAC start. We also evaluated the use of thromboprophylaxis in those at highest VTE risk based on tumor type (including pancreatic, stomach, lung, bladder, lymphoma, gynecologic, and genitourinary) and noted that 55% of patients were candidates for thromboprophylaxis, but only 2.5% were initiated on thromboprophylaxis, suggesting that clinicians may not be eager to start anticoagulants despite guideline support. Our experience suggests that the broad consideration of DOACs and slow adoption of thromboprophylaxis in practice offers an opportunity for pharmacy services to support this patient population.

Adaptability: We expanded prior protocols and practice models from our ambulatory care anticoagulation clinic services and telecommunication models from our specialty pharmacy service to provide location and infrastructure for this subspecialized clinic. We collaborated with cancer center pharmacy specialists that work with the multidisciplinary team to identify clinic candidates. This model offers insight into methods of collaboration between common groups and practices to support the launch of a novel service.

Significance: With the recent data on DOAC use in cancer, updated guidelines encouraging thromboprophylaxis in high-risk patients, and the complexity of anticoagulation in malignancy there is opportunity for pharmacists to lead optimized practices.

129 | Curbside Patient Care: Anticoagulation Visits with Lab Testing amidst the COVID-19 Global Pandemic

Rachel Randolph, Pharm.D.[1], Yasmin Said, Pharm.D., BCACP[1], *Laura Skaff, Pharm.D., BCACP, CPP*[1] and Nick Wilkins, Pharm.D., BCPS, CDCES, CPP[2]

[1]*Department of Pharmacy, Atrium Health Chronic Care Medication Management, Concord, NC* [2]*Clinical Pharmacy Services - Ambulatory, Atrium Health, Concord, NC*

Service or Program: At the onset of the COVID-19 pandemic, our pharmacist-led anticoagulation clinic moved visits, including (POC) PT/INR testing, to the curbside between March-October 2020. While patients remained in their vehicles, testing was performed according to specifications of the device used and under approval from laboratory regulators. Patients received equal level of care, with no gaps, while increasing safety for all individuals involved during the early phases of the pandemic.

Justification/Documentation: In March 2020, it was increasingly clear that COVID-19 was becoming widespread in our community. Many of our patients would be at risk of severe complications from coronavirus infection and limiting their exposure was crucial. Additionally, the safety of our warfarin patients was at risk without routine PT/INR monitoring and pharmacist follow up. We concluded that the best option was to develop a curbside process that enabled patients to complete visits without entering the clinic.

Adaptability: Thanks to the teamwork of clinical pharmacists, leadership and regulators, we were able to adjust our process rapidly which allowed continued care of our complex patient population with no gaps in therapy. Two pharmacists and one registrar worked outside as a team, utilizing computers linked to the hospital Wi-Fi network to access the EMR, scheduling and billing systems.

Significance: During a period when many offices were closing, reducing patient visits, or exploring untested models such as extended interval INR testing or rapid transition to alternative anticoagulants, a unique patient-centric process allowed our anticoagulation clinic to remain fully open while limiting risk of exposure to patients and staff. We performed over 2,100 visits outdoors, complete with consent and registration, PT/INR testing, pharmacist interview and chart review, warfarin dose adjustments, written patient education, and follow-up. Patients were grateful that their care and safety were not compromised, and their trusted clinical pharmacists were accessible for healthcare and emotional support.

Psychiatry

234 | Impact of Mental Health Clinical Pharmacist Practitioners to Improve Veteran Access in VA Clinical Resource Hubs

Addison Ragan, Pharm.D., BCPS[1], Michael Tran, Pharm.D., BCPS[2] and Tera Moore, Pharm.D., BCACP[3]

[1]*National Clinical Resource Hub, U.S. Department of Veterans Affairs, Washington, DC* [2]*VA Great Lakes Health Care System (VISN 12) Clinical Pharmacy Practice Office (CPPO), Department of Veterans Affairs, Chicago, IL* [3]*Clinical Pharmacy Practice Office, Department of Veterans Affairs, Washington, DC*

Service or Program: In 2019, the VA developed a network of centralized primary care and mental health (MH) clinicians to address Veteran access. This new hub and spoke model, known as the Clinical Resource Hub (CRH), leverages "hub" clinicians to support medical centers or "spokes" by providing primary and MH care through telehealth. The 18 CRHs have hired MH prescribers including: clinical pharmacist practitioners (CPP), psychiatrists, and Advanced Practice Providers (PA/NP). In the CRH model, when spoke site's request gap coverage for MH pharmacotherapy the CRH deploys an available MH prescriber using virtual modalities. **Justification/Documentation:** The CRH MH CPPs are assigned to a spoke site Behavioral Health Interdisciplinary Program outpatient team or a Primary Care Mental Health Integration team for 3 months to 2 years. Prior to care delivery, a series of hub and spoke meetings are conducted to define MH CPP patient care activities, referrals and handoffs, team collaboration, scheduling, and nursing support. The MH CPP provides comprehensive medication management to their assigned patients through the VA Video Connect Telehealth Platform and utilizes team-based care to manage a panel of Veterans similar in size to other MH prescribers.

Adaptability: This innovative hub and spoke model can be applied to healthcare systems that have MH CPPs centrally located to leverage their expertise utilizing telehealth to expand patient access to rural areas.

Significance: Currently, there are 15 CRH MH CPPs across 11 CRHs. Since October 2020, the CRH MH CPPs have increased access to care for 2,779 Veterans and completed 6,092 visits across 39 spoke sites. The CRH model of utilizing the MH CPP to provide gap coverage for teams that previously were only utilizing psychiatrists and PA/NPs has been a catalyst to further shift the role of the CPP from "consultant" to "primary MH prescriber" across the system.

Substance Abuse/Toxicology

130 | Phenobarbital incorporation into a symptom triggered alcohol withdrawal protocol

Geremi Boom, Pharm.D.
Boulder Community Health, Boulder, CO

Service or Program: This protocol incorporates phenobarbital into a traditional benzodiazepine only symptom triggered alcohol withdrawal protocol for inpatient adults at risk for severe alcohol withdrawal. For adult patients requiring hospitalization that have a moderate to high risk of severe alcohol withdrawal, a one time IV loading dose of

phenobarbital is administered prior to initiation of symptom triggered lorazepam administration. An interdisciplinary alcohol withdrawal committee at Boulder Community Health (BCH) performed a thorough literature review of phenobarbital use for alcohol withdrawal prior to implementation with the goal of improving patient withdrawal symptoms.

Justification/Documentation: Inadequately controlling severe alcohol withdrawal symptoms with a benzodiazepine only approach puts patients at risk for complications and prolonged hospital stays. By utilizing an IV loading dose of phenobarbital early in the patient's hospital stay, we hope to improve control of alcohol withdrawal symptoms, reduce hospital length of stay, and prevent complications such as adjunct use of dexmedetomidine and mechanical intubation.

Adaptability: This protocol assessed the risk of severe alcohol withdrawal in adult patients requiring hospitalization using a Prediction of Alcohol Withdrawal Severity Score (PAWSS). Patients with a moderate to high risk of severe alcohol withdrawal were given a one time loading dose of IV phenobarbital in the ER, admitted to the Step Down Unit or Intensive Care Unit and placed on a traditional symptom triggered benzodiazepine only withdrawal protocol. For institutions seeking alternative medications for incorporation into their alcohol withdrawal protocol, phenobarbital remains an option due to its longer half life, and well cited use in alcohol withdrawal symptom management.

Significance: Overall, the incorporation of phenobarbital into the alcohol withdrawal protocol at BCH was an opportunity for pharmacists to provide the lead role in literature review, protocol development, protocol implementation, nursing/physician/pharmacist educations, chart audits and post-implementation assessment.

Women's Health

235 | Improving Access to Immediate Postpartum long-acting Reversible Contraception (LARC)

Min Zhang, Pharm.D., BCPS[1], Katharine White, MD, MPH[2], Kanan Shah, Pharm.D.[1] and Leslie Fang, Pharm.D.[1]

[1]*Department of Pharmacy Services, Boston Medical Center, Boston, MA* [2]*Department of Obstetrics and Gynecology, Boston University / Boston Medical Center, Boston, MA*

Service or Program: Improving Access to Immediate Postpartum long-acting Reversible Contraception (LARC)

Justification/Documentation: Approximately 45% of all pregnancies in the United States are unintended, with increased risks for adverse maternal health outcomes and high health care costs. Immediate LARC methods can decrease unintended pregnancy. It is cost-effective and safe when studied in several cost-benefits analyses, especially for those at the risk of not having recommended postpartum follow-up. The Centers for Medicare & Medicaid Services (CMS) released an informational bulletin in April 2016 detailing payment and policy approaches that state Medicaid agencies can use to optimize access and use of LARC methods. Education and institutional protocols are needed to raise clinician awareness and improve access to LARC use. We report our perinatal quality collaborative experience that aimed to increase access to immediate postpartum LARC.

Adaptability: A multidisciplinary quality improvement (QI) team composed of clinicians, pharmacists, QI specialists, nurse managers, educators, and information technology (IT) analysts developed the project. The group established a standard operation procedure, requested LARC devices to be added to the inpatient formulary, and created electronic medication orders to facilitate prescribing. Clinical guidelines were implemented. During the first month of implementation, pharmacist education occurred at the daily huddle, weekly newsletter, and monthly department meetings to ensure insurance eligibility upon order verification. Obstetric providers were given training on immediate postpartum insertion of intrauterine devices.

Significance: About 15 LARCs per year were given to patients on a case-by-case basis before project implementation. After implementation, 404 LARC devices (86 IUDs, 318 implants) were provided to eligible and desiring women from February 2019 to December 2020. An interdisciplinary team can increase access to immediate postpartum LARC. Implementation requires a dedicated QI team and coordination with the multidisciplinary clinical teams. Verification of reimbursement is essential for project sustainability and facilitates improved reimbursement rates.

Women's Health

236 | Implementation of a pharmacist-led contraceptive prescribing service in a campus community pharmacy.

Zoona Ahmad, Pharm.D. Candidate[1], Nicole Noel, Pharm.D.[1], Trexie Rudd, Pharm.D.[2], Craig Nadelson, DO[3], Mary Ott, MD, MA[4], Tracey Wilkinson, MD, MPH[4] and Ashley Meredith, Pharm.D.[5]

[1]*Purdue University College of Pharmacy, West Lafayette, IN* [2]*Purdue University Pharmacy, Purdue University, West Lafayette, IN* [3]*Purdue University, West Lafayette, IN* [4]*Indiana University School of Medicine, Indianapolis, IN* [5]*Purdue University College of Pharmacy, Indianapolis, IN*

Service or Program: Utilizing a collaborative drug therapy management (CDTM) agreement, Purdue University Pharmacy created a service allowing pharmacists to prescribe contraception (pills, patches, rings, injections, emergency contraception) for eligible students (≥18 years old, ≥1 student health visit). Contraception prescribing was offered once per week, and has since expanded to twice per week. The service follows established contraception prescribing protocols,

charges a consultation fee, and takes approximately 15-30 minutes per encounter.

Justification/Documentation: Only 56.5% of females report contraception use with last vaginal intercourse and unplanned pregnancies remain high in unmarried young adults. Colleges can connect students to birth control. Purdue's contraception prescribing service shows a high degree of uptake. From August 2020-February 2021, 95 consultations occurred, with 89 (93.68%) prescriptions. Of these, 69 (77.5%) were for combined oral pills, 3 (3.4%) were for progestin only pills, 6 (6.8%) were for patches, 2 (2.2%) were for rings, and 9 (10.1%) were for injections. Of the 95 consultations, 94 (98.9%) were eligible to receive a hormonal contraceptive.

Adaptability: This service was conducted in a campus community pharmacy in Indiana. The CDTM could be utilized in any setting that allows for such agreements, campus or non-campus based. Pharmacists completed training via a publicly available and recognized program. Counseling materials were created with a focus on young people, but are inclusive of all those seeking contraception.

Significance: Campus-based pharmacist contraceptive prescribing provides a critical point of contraception access for those at a high risk of unintended pregnancy. College-aged people are independently navigating the health system for the first time and may come from rural areas with limited resources available for reproductive health. As scope of pharmacy practice evolves, attention should focus on creating models of care that increase access for those that are most likely to benefit. Pharmacist contraceptive prescribing can fill crucial gaps.

CASE REPORTS

ADR/Drug Interactions

212 | Euglycemic ketoacidosis secondary to empagliflozin and ketogenic diet

Jena Dresbach, Pharm.D. Candidate 2021[1], Carolina Landeen, MD[2], Cliff Janikowski, MD[2] and Mark Malesker, Pharm.D., FCCP, FCCP, FCCM, FASHP, BCPS[3]

[1]*Creighton University, Omaha, NE* [2]*Creighton University School of Medicine, Omaha, NE* [3]*Division of Pulmonary, Critical Care and Sleep Medicine, CHI Health Creighton University Medical Center Bergan Mercy, Omaha, NE*

Introduction: Ketogenic diets restrict carbohydrate intake to promote ketogenesis. Ketones represent a source of metabolic energy in situations where insulin or carbohydrate deficiencies are present. The acidic properties of ketones may potentiate acidosis if levels accumulate. Sodium glucose transport 2 inhibitors (SGLT2) such as empagliflozin carry a risk of causing euglycemic diabetic ketoacidosis. We present the case of a patient with type II diabetes mellitus who took chronic empagliflozin and presented with euglycemic diabetic ketoacidosis following the addition of a ketogenic diet.

Case: A 48-year-old male with type II diabetes and current empagliflozin use presented with dizziness and nausea. Empagliflozin was added over 18 months ago to a regimen of metformin and semaglutide. The patient experienced a 21-pound weight loss the previous week following the addition of a ketogenic diet. The patient was diagnosed with euglycemic diabetic ketoacidosis with a blood glucose of 189 mg/dL, a B-hydroxybutyric acid level greater than 60 mg/dL, a pH of 7.18 and bicarbonate of 8 mEq/L. The patient demonstrated metabolic acidosis with an anion gap of 24 mmol/L. After two days of fluids, insulin, and sodium bicarbonate in the intensive care unit the anion gap closed. Empagliflozin was discontinued and insulin glargine was added to the home medications. The patient was instructed to avoid the ketogenic diet.

Discussion: Ketogenic diets and SGLT2 inhibitors both induce ketogenesis and studies have shown that concurrent use significantly increases ketonemia. This case illustrates the dramatic effect of ketoacidosis following combination of empagliflozin and ketogenic diet.

Conclusion: Clinicians should be mindful of the complications of combining SGLT2 inhibitors and ketogenic diets. Diabetic patients on SGLT2 inhibitors should be instructed to avoid concurrent carbohydrate-restricting diets.

213 | A case of progressive neuromuscular weakness following dupilumab administration

Brittni Gochnauer, BS[1], Shraddha Narechania, MD[2], Daniel Hilleman, Pharm.D., FCCP[3], Christopher Huerter, MD[2] and Mark Malesker, Pharm.D., FCCP, FCCP, FCCM, FASHP, BCPS[4]

[1]*School of Pharmacy, Creighton University, Omaha, NE* [2]*School of Medicine, Creighton University, Omaha, NE* [3]*The Cardiac Center of Creighton University, Omaha, NE* [4]*Division of Pulmonary, Critical Care and Sleep Medicine, CHI Health Creighton University Medical Center Bergan Mercy, Omaha, NE*

Introduction: Dupilumab is a human monoclonal antibody that acts as an interleukin-4 receptor alpha antagonist. Dupilumab is used subcutaneously for the treatment of moderate-to-severe atopic dermatitis in patients whose disease is not adequately controlled with topical therapies and as add-on therapy in moderate-to-severe asthma. We report a case of progressive neuromuscular weakness following the administration of dupilumab for atopic dermatitis.

Case: A 32-year-old female with a long history of atopic dermatitis was treated with dupilumab as an outpatient. Within one week of administration, she reported the onset of motor weakness that became progressively worse. She denied any recent history of infection or viral illness. The symptoms started with dry eyes and joint pain that progressed to weakness in her extremities and decreased grip

strength. Four weeks later, she was admitted for inability to ambulate or move her upper extremities. She was monitored in the ICU for concern of diaphragmatic weakness. CSF studies, as well as brain, MRI were unremarkable. She was treated with 5 doses of IV immunoglobulin for suspected Guillain Barre Syndrome. Punch biopsy of the skin revealed atopic dermatitis. Her atopic dermatitis was managed with topical corticosteroids and oral antihistamines. The patient was ultimately discharged to a skilled nursing facility for physical therapy and rehabilitation with neurology follow-up.

Discussion: The patient's quadriparesis and xerophthalmia were likely due to dupilumab. Other causes of muscle weakness were ruled out and this reaction is not well described with dupilumab, although antibody development has been reported. The development of immune-mediated myopathy was possibly related to dupilumab with a Naranjo score of 4. Interestingly, lower levels of IL4 are found with Guillain Barre syndrome and dupilumab blocks IL4 expression.

Conclusion: Dupilumab led to a suspected case of Guillain Barre Syndrome. Further evaluation of dupilumab as a cause of muscle weakness is warranted.

214 | Eptifibatide for acute coronary syndrome: a case report of acute and profound thrombocytopenia

Amer Aljundi, BPharm, Pharm.D.[1], *Alaa Rahhal, BSc Pharm, PGY1 Pharmacy Residency, BCCP*[1], Muhammed Jameesh Moidy, MD[2] and Wafer Dabdoob, MD[2]

[1]*Hamad Medical Corporation, Heart Hospital, Pharmacy Department, Doha, Qatar, Doha, Qatar* [2]*Hamad Medical Corporation, Doha, Qatar*

Introduction: Eptifibatide is a selective inhibitor of the platelet glycoprotein IIb/IIIa receptor. It is commonly used in patients undergoing percutaneous coronary intervention (PCI) and has been associated with positive outcomes in this setting.

Case: We describe a case of a 41-year-old male patient, previously healthy, who was admitted with non-ST elevation myocardial infarction. Coronary angiography (CAG) revealed a 70% stenosis of the distal left main artery and 95% stenosis of the proximal left anterior descending artery and hence he was planned for either PCI or coronary artery bypass graft. Immediately after CAG, he was started on eptifibatide 180 μg/kg bolus dose, followed by 2μg/kg/min infusion, and a second bolus dose of 180μg/kg. His platelet count was 280,000/mm^3 on the day of coronary angiography. After eight hours, platelet count dropped to 18,000/mm^3 and 16,000/mm^3 two hours later. Therefore, eptifibatide was discontinued along with aspirin and clopidogrel. Platelet count improved to 20,000/mm^3 after 3 hours and 51000/mm^3 after 35 hours; hence aspirin and clopidogrel were resumed. Four days later, platelet count increased to 116,000/mm^3. On the eighth day post CAG, the platelet count was 345,000/mm^3, and he underwent successful PCI with two drug eluting stents. His platelet counts remained normal during hospital stay and in follow up visits.

Discussion: There are several reports suggesting an association between eptifibatide exposure and the development of thrombocytopenia. However, to the best of our knowledge, this is the first case report reporting the lowest value of platelet count associated with eptifibatide exposure. The use of the Naranjo scale also indicated a probable relationship between the administration of eptifibatide and the development of profound thrombocytopenia (score of 5).

Conclusion: Despite being uncommon, thrombocytopenia associated with eptifibatide is a clinically important complication. Thus, platelet counts should be monitored at baseline and 2-6 hours after staring eptifibatide.

Endocrinology

215 | Lipase Elevation and Subsequent Resolution with Continued Injectable Semaglutide: A Case Report

Ryan Kendall, B.S.[1] and Cortney Mospan, Pharm.D., BCACP, BCGP[2]

[1]*Franklin College of Arts and Sciences, University of Georgia, Athens, GA*

[2]*School of Pharmacy, Wingate University, Wingate, NC*

Introduction: Lipase and amylase levels have been found dose-independent, reversible events that have little predictive value for risk of acute pancreatitis. Lipase elevations have been found to occur in approximately 33% of patients taking liraglutide, yet only 0.3% of patients developed acute pancreatitis. No data is available regarding the clinical significance of lipase elevation with injectable semaglutide.

Case: A 79 year-old male with type 2 diabetes, hypertension, hyperlipidemia, macular edema, and merkel cell carcinoma was started on injectable semaglutide 0.25 mg once weekly. Other diabetes medications at treatment initiation included metformin ER 1000 mg twice daily and glipizide 10 mg twice daily. One week after injectable semaglutide was initiated, elevated lipase (259 U/L) and normal amylase (46 U/L) levels were identified as part of routine monitoring related previous chemotherapy for treatment of merkel cell carcinoma. A CT scan showed no evidence of acute pancreatitis and the patient endorsed no symptoms of acute pancreatitis. Since the patient was asymptomatic, injectable semaglutide was continued. Three weeks later, lipase (47 U/L) and amylase (29 U/L) were within normal limits. The patient was able to be successfully titrated to semaglutide 1 mg once weekly without developing acute pancreatitis.

Discussion: The findings of this case report are consistent with available literature with liraglutide showing that lipase elevation is a poor predictor of risk of acute pancreatitis and glucagon-like 1 peptide receptor (GLP-1) agonists can be continued without significant risk if lipase and/or amylase elevations are identified. This case

demonstrates resolution of lipase elevations without treatment discontinuation of injectable semaglutide.

Conclusion: Routine lipase and amylase level monitoring should not be utilized in GLP-1 therapy monitoring due to poor predictive risk of acute pancreatitis and potential to cause unwarranted short-term or permanent cessation of the medication.

Hematology/Anticoagulation

216 | Reduced Dose Alteplase in a Patient Receiving Apixaban for Pulmonary Embolism: A Case Report

Elizabeth Levins, Pharm.D., MHA, BCCCP, Anamaria Milas, DO and Lauren Benson, MD
Oregon Health & Science University, Portland, OR

Introduction: Guidelines list Direct Oral Anticoagulants (DOACs) as a relative contraindication to receiving thrombolytics due to increased bleeding complications. Laboratory normalization is recommended prior to thrombolysis, but isn't always feasible when a patient's condition deteriorates. We present a case of pulmonary embolism (PE) transitioned from heparin to apixaban complicated by cardiac arrest and treated with reduced dose alteplase.

Case: A 47-year-old woman presented to the Emergency Department with dyspnea on exertion and calf pain. A chest computerized tomography (CT) with angiography revealed bilateral PE with right heart strain. The patient was started on a heparin infusion which was transitioned to apixaban. Approximately three hours after she had respiratory distress, ultimately becoming unresponsive due to a pulseless electrical activity arrest. Acknowledging her recent apixaban administration with an anti-Xa level of 2.98U/mL, she was treated with systemic alteplase 50mg (10mg bolus followed by a 40mg infusion). Her respiratory and hemodynamic parameters improved with no bleeding detected.

Discussion: The standard treatment for PE with hemodynamic compromise is IV alteplase 100mg over 2 hours. While no time frame is specified in the current PE guidelines, the American Heart Association/American Stroke Association guidelines recommend holding thrombolysis unless it has been greater than 48 hours since the last DOAC dose or normalization of laboratory markers. Due to our patient's recent anticoagulation and elevated anti-Xa level, a reduction in thrombolytic dose was chosen. Reduced dose thrombolytics have been found to improve imaging findings on echocardiograms, ventilation perfusion lung scans and CT angiograms with reduced rates of bleeding.

Conclusion: This is the first case report to describe reduced dose alteplase use for PE in patients taking oral anticoagulation. More research is needed to determine if the recommended time frame of holding anticoagulation prior to thrombolysis can be decreased as well as the preferred dosing of alteplase in this situation.

Infectious Diseases

217 | Clinical impact of administering soda with the hepatitis C treatment sofosbuvir-velpatasvir and a proton-pump inhibitor: a case report

Jennifer Stark, Pharm.D., BCPS, FCCP and Clarice Montgomery, Pharm. D., BCPS
Veterans Health Care System of the Ozarks, Fayetteville, AR

Introduction: Sofosbuvir-velpatasvir (Epclusa®) is a fixed dose tablet indicated for the treatment of chronic hepatitis C virus (HCV) infection, and multiple drug-drug interactions (DDI) exist. The manufacturer recommends avoiding coadministration of sofosbuvir-velpatasvir with a proton pump inhibitor (PPI) due to a significant decrease in velpatasvir solubility as gastric pH increases. This interaction results in decreased velpatasvir serum concentrations which could translate to an increased risk of HCV treatment failure. A recent open-label study in 11 healthy adults reported overcoming this interaction through co-administration of velpatasvir and the PPI omeprazole with 250 ml of soda (Coca-Cola®), but there is no clinical outcome data in HCV-infected patients.

Case: A 64 year-old male with a past medical history significant for decompensated cirrhosis, chronic HCV infection, upper gastrointestinal bleed, anemia, esophagitis, and previous HCV treatment failures was in need of HCV treatment. The patient's medications included the PPI pantoprazole 40mg daily, but no other significant DDI were present. The patient was instructed to take one sofosbuvir-velpatasvir tablet, one small can of soda, and one pantoprazole 40mg tablet at the same time once daily. The patient opted for a 12 ounce can of Mountain Dew® which he was already consuming daily. Treatment duration was 24 weeks, and HCV RNA was undetectable by treatment week 3, throughout treatment, and 9 weeks after completion of treatment. The 12-week post-treatment HCV RNA, which is the measure of a clinical cure, will be reported once completed.

Discussion: Scenarios may arise during HCV treatment that necessitate coadministration of a PPI. Stopping, interrupting, or interfering with optimal absorption of HCV treatment could lead to development of resistance or treatment failure. Future studies should include this strategy for overcoming this common DDI.

Conclusion: This case demonstrates sofosbuvir-velpatasvir administered orally with soda and a PPI is potentially safe and effective for treatment of chronic HCV infection.

Pediatrics

218 | Increasing Alprostadil Infusion Requirements in a Neonate with Multiple Cardiac Anomalies for the Management of Patent Ductus Arteriosus with Administration of Rectal Acetaminophen: A Case Report

Jennifer Ryder, Pharm.D. and Esther Bae, Pharm.D.
Department of Pharmacy, Children's Hospital Colorado, Aurora, CO

Introduction: Ductal-dependent congenital heart defects (CHD) rely on the patent ductus arteriosus (PDA) to maintain adequate pulmonary or systemic circulation until surgical intervention is performed. This is the first case report to describe potential PDA narrowing with as needed rectal acetaminophen use in a ductal-dependent neonate.
Case: A 37-week estimated gestational age female with multiple anomalies including coarctation of the aorta was initiated on alprostadil 0.0125 mcg/kg/min immediately after birth. Echocardiogram (ECHO) results on day of life (DOL) one visualized a large PDA with unrestrictive shunting. On DOL six, an ECHO revealed the PDA was small and restrictive. During this time, the alprostadil infusion was increased to 0.05 mcg/kg/min to maintain adequate tissue perfusion. It was noted that the patient had received multiple doses of rectal acetaminophen (20 mg/kg) every six hours as needed. After three days, ECHO showed a successfully re-recruited, moderate PDA with restrictive, bidirectional flow.
Discussion: Literature supports the use of oral and intravenous acetaminophen as a pharmacologic agent for closure of PDAs. In this case, there may be a correlation between the administration of acetaminophen, a drug with anti-prostaglandin properties, and the effectiveness of PGE1 therapy with alprostadil. The half-life of acetaminophen in neonates ranges from four to ten hours and rectal absorption is highly variable; however, as this case depicts, a conservative as needed regimen and the rectal route may precipitate PDA closure. It is important to note that this patient had multiple genetic anomalies that were not clearly understood as this can impact the clinical decision making done by the medical team and the findings of this case.
Conclusion: In patients with ductal-dependent CHDs, it is important to prioritize PDA patency. The use of medications whose mechanisms compete with PGE1 should be done judiciously to avoid unnecessarily higher alprostadil rates or risk of PDA closure.

Pharmacokinetics/Pharmacodynamics/Drug Metabolism/Drug Delivery

219 | Successful Concomitant Use of Oral Semaglutide with Levothyroxine to Achieve Glycemic Control: A Case Report

Alexis Jones, Pharm.D. Candidate[1] and Cortney Mospan, Pharm.D., BCACP, BCGP[2]
[1]*Wingate University School of Pharmacy, Wingate, NC* [2]*School of Pharmacy, Wingate University, Wingate, NC*

Introduction: In September 2019, the US Food and Drug Administration approved the first oral glucagon-like peptide 1 receptor agonist. Use of oral semaglutide in patients taking levothyroxine presents a challenge as both medications are advised to be taken first thing in the morning, on an empty stomach. This is the first case study to describe concomitant use of oral semaglutide and levothyroxine and the impact on diabetes mellitus and hypothyroidism outcomes.
Case: A 52 year-old female with diabetes and hypothyroidism was started on oral semaglutide 3 mg daily and ultimately titrated to 14 mg daily. Other therapies at initiation included empagliflozin 25 mg daily, metformin ER 1000 mg twice daily, pioglitazone 45 mg daily and levothyroxine 25 mcg daily. A1c at treatment initiation was 11.9% which decreased to 5.4%. TSH level at oral semaglutide initiation was 2.23 uIU/mL and 2.37 uIU/mL after approximately six months of therapy. No changes in hypothyroidism symptoms were noted.
Discussion: There are no case reports describing concomitant use of oral semaglutide with levothyroxine; however, clinical drug interactions studies have shown levothyroxine exposure to be increased by 33% when co-administered with oral semaglutide. In our patient, TSH level showed a slight decrease, suggesting increased levothyroxine exposure. However, this was not clinically significant and the patient's TSH stayed within range with no changes in related symptoms. Following the stated package insert guidance of taking oral semaglutide 30 minutes before any food, drink or medication administration resulted in significant A1c lowering.
Conclusion: Initiating oral semaglutide concomitantly with levothyroxine had no clinically significant impact on TSH level or hypothyroidism symptoms. Moreover, the patient was able to successfully meet her A1c goal and deescalate therapy. Future research is needed to confirm that oral semaglutide and levothyroxine with intentional dose scheduling can be utilized together.

ENCORE PRESENTATIONS

Adult Medicine

220 | Evaluation of AUC/MIC Dosing Strategies at a Community Teaching Hospital

Jacquie Downey, Pharm.D.[1], Jessica Starr, Pharm.D.[2], Hillary Holder, Pharm.D.[1] and Kelsey Knorr, Pharm.D.[1]
[1]*Princeton Baptist Medical Center, Birmingham, AL* [2]*Auburn University, Birmingham, AL*

Presented at the Alabama Residency Conference (Virtual) April 7, 2021

Presented at the Southeastern Residency Conference (Virtual), April 22-23, 2021

Ambulatory Care

221 | Evaluating the impact of a pharmacist-led community care team on Medicare diabetes quality measures within a health-system clinically integrated network

Beatriz Jimenez Cadilla, Pharm.D.[1], Faaria Quadri, Pharm.D., BCPS[2], Jennifer Miles, Pharm.D.[1] and Elaina Rosario, Pharm.D.[3]
[1]*Baptist Health South Florida, Miami, FL* [2]*Baptist Hospital of Miami, Miami, FL* [3]*Baptist Health South Florida, Miami, FL*

Presented at Florida Health System Pharmacist Residency Conference, Miami, FL, May 13-14 2021.

222 | Pharmacist involvement in a comprehensive remote monitoring and telemanagement program

Rachel Stulock, Pharm.D.[1], James Montgomery, Pharm.D.[2], Marcie Parker, Pharm.D.[3], *Amanda Singrey, Pharm.D.*[4] and Elizabeth Zeleznikar, Pharm.D.[5]
[1]*Department of Pharmacy, Cleveland Clinic, Lakewood, OH* [2]*Department of Pharmacy, Cleveland Clinic, Solon, OH* [3]*Department of Pharmacy, Cleveland Clinic, Beachwood, OH* [4]*Department of Pharmacy, Cleveland Clinic, Twinsburg, OH* [5]*Department of Pharmacy, Cleveland Clinic, Strongsville, OH*

Presented at Cleveland Clinic GME Patient Safety Day, Cleveland, OH, March 10th, 2021.

Education/Training

223 | Inter-institutional COVID-19 Simulation During a Remote Acute Care Advanced Pharmacy Practice Experience

Michael Perry, Pharm.D.[1], Lawrence R. Kobulinsky,*[2], Amy Lynn Seybert, Pharm.D.[3], Madeline Kreider, Pharm.D.[4], Victoria Williams, Pharm.D.[2] and Pamela L. Smithburger, Pharm.D., MS, BCCCP, FCCP[5]
[1]*Division Of Pharmacy Practice, Duquesne University School of Pharmacy, Pittsburgh, PA* [2]*Pharmacy and Therapeutics, University of Pittsburgh School of Pharmacy, Pittsburgh, PA* [3]*School of Pharmacy, University of Pittsburgh, Pittsburgh, PA* [4]*Department of Pharmaceutical Sciences, University of Pittsburgh, Pittsburgh, PA* [5]*University of Pittsburgh School of Pharmacy, Department of Pharmacy and Therapeutics, University of Pittsburgh Medical Center, Pittsburgh, PA*

Presented at AACP Annual Meeting, Virtual Meeting, July 19-22, 2021

Emergency Medicine

224 | Evaluation of andexanet alfa utilization throughout the WVU Medicine Enterprise

Miranda Cason, Pharm.D. Candidate and Christina Deusenberry, Pharm.D
Department of Pharmacy, West Virginia University Medicine, Morgantown, WV

Herbal/Complementary Medicine

225 | Green accelerated solvent extraction (ASE) with solvent and temperature effect and green UHPLC-DAD analysis of phenolics in pepper fruit (*Capsicum annum* L.)

Mohammed Alyousef, Pharm.D.
Imam abdulrahman bin faisal university, Dammam city, Saudi Arabia

Presented at Duphat 2021, April 5-7, 2021.

Neurology

226 | Evaluation Of Patisiran With Concomitant Or Prior Use Of Transthyretin Stabilizers

Hollis Lin, MSc in Public HealthField Of Study Health Policy & Health Services Research[1], *Madeline Merkel, Pharm.D., MS*[1], Cecilia Hale, Ph.D.[1] and Jing Marantz, MD, Ph.D.[2]
[1]*Alnylam Pharmaceuticals, Cambridge, MA* [2]*Acceleron Pharma Inc, Cambridge, MA*

Presented at Peripheral Nerve Society Virtual Event 27-30 June 2020.

227 | HELIOS-A: 9-month Results from the Phase 3 Study of Vutrisiran in Patients with Hereditary Transthyretin-Mediated Amyloidosis with Polyneuropathy

David Adams, MD, Ph.D.[1], Ivailo Tournev, MD, Ph.D.[2], Mark Taylor, BSc(Hons I) MBBS(Hons) Ph.D. FRACP FRCPA[3], Teresa Coelho, MD,

Ph.D.[4], Violaine Planté-Bordeneuve, MD, Ph.D.[5], John Berk, MD[6], Alejandra González-Duarte, MD[7], Julian Gillmore, MD, Ph.D., FRCP[8], Soon-Chai Low, MBBS, MRCP[9], Yoshiki Sekijima, MD, Ph.D.[10], Laura Obici, MD[11], Rick Blakesley, Ph.D.[12], Seth Arum, MD[12], *Rebecca Shilling, MD*[12], John Vest, MD[12] and Michael Polydefkis, MD, MHS[13]
[1]Neurology Department, APHP, CHU Bicêtre, Université Paris-Saclay, INSERM 1195, Le Kremlin Bicêtre Cedex, France [2]Department of Cognitive Sciences, New Bulgarian University, Sofia, Bulgaria [3]Department of Clinical Immunology and Allergy, Westmead Hospital and Westmead Clinical School, University of Sydney, Sydney, Australia [4]Hospital de Santo António, Centro Hospitalar Universitário do Porto, Porto, Portugal [5]Neurology Department, CHU Henri Mondor, APHP, INSERM U955 Team 10, Université-Paris Est, Creteil, France [6]Boston Medical Center, Boston, MA [7]Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán, México D.F., Mexico [8]National Amyloidosis Centre, University College London, Royal Free Hospital, London, United Kingdom [9]Division of Neurology, Department of Medicine, University of Malaya, Kuala Lumpur, Malaysia [10]Department of Medicine (Neurology & Rheumatology), Shinshu University School of Medicine, Matsumoto, Japan [11]Amyloidosis Research and Treatment Centre, IRCCS Fondazione Policlinico San Matteo, Pavia, Italy [12]Alnylam Pharmaceuticals, Cambridge, MA [13]Department of Neurology, Johns Hopkins University School of Medicine, Baltimore, MD

Presented at American Academy of Neurology Virtual Annual Meeting, April 17-23, 2021.

VPS SYSTEMATIC REVIEWS/META-ANALYSIS

Herbal/Complementary Medicine

228 | Fish Oil in Brain Health: A Systematic Review

Spencer Chapman, Pharm.D. Candidate 2021, MBA[1], James M. Backes, Pharm.D.[2], Daniel Hilleman, Pharm.D., FCCP[3] and Mark Malesker, Pharm.D., FCCP, FCCP, FCCM, FASHP, BCPS[4]
[1]School of Pharmacy and Health Professions, Creighton University, Omaha, NE [2]Departments of Pharmacy Practice and Medicine, University of Kansas Atherosclerosis and LDL-Apheresis Center, Kansas City, KS [3]The Cardiac Center of Creighton University, Omaha, NE [4]Division of Pulmonary, Critical Care and Sleep Medicine, CHI Health Creighton University Medical Center Bergan Mercy, Omaha, NE

Background: The omega-3 fatty acids play an important role in neuronal cell function. The efficacy of omega-3 fatty acid supplements in the treatment of attention deficit hyperactivity disorder (ADHD), cognitive dysfunction, and depression have been the subject of multiple studies, but there is a lack of consensus concerning their efficacy. The objective of this systematic review was to evaluate the available evidence from randomized controlled trials (RCTs) concerning the use of fish oil for the treatment of ADHD in children and adolescents, and cognitive dysfunction, and depression in adults.
Methods: MEDLINE, PubMed, EMBASE, and the Cochrane Library were used to identify RCTs of DHA and eicosatetraenoic acid (EPA) in the treatment of ADHD in children and adolescents, cognitive dysfunction in older adults, and depression in adults. Eligible RCTs had to be prospective, randomized, double-blind and placebo controlled. A risk of bias was assessed using the criteria recommended by the Cochrane Collaboration for systematic reviews.
Results: The number of eligible RCTs in ADHD, cognitive dysfunction, and depression included in the systematic review were 19, 14, and 21, respectively. These RCTs included 20, 15, and 25 treatment cohorts in ADHD, cognitive dysfunction, and depression, respectively. Statistically significant clinical benefit with fish oil supplements were observed in 6 of 20 (30%) cohorts in ADHD, 7 of 15 (47%) cohorts in cognitive dysfunction, and 11 of 25 (44%) cohorts in depression.
Discussion: The majority of RCTs evaluating supplemental fish oil failed to demonstrate clinically meaningful improvement in ADHD, cognitive dysfunction, and depression. The majority of these RCTs were single-center studies including small sample sizes with a substantial risk of inherit bias. Fish oil supplementation cannot currently be recommended for the treatment of ADHD in children and adolescents, cognitive dysfunction in older adults, or depression in adults.
Other: No funding/registration.

Medication Safety

229 | Current and Best Practices for Evaluating Medication Safety Using Electronic Health Records (EHR): A Systematic Review

Lijie Chen, BS, Ding Quan Ng, BS, Emily Dang, BS, Mary Nguyen, BS, Michael Nguyen, BS, Sarah Samman, BS, Tiffany Nguyen, BS, Stanley Jia, BS, Lee Nguyen, Pharm.D., Alexandre Chan, Pharm.D., MPH and Christine Cadiz, Pharm.D., MA
Department of Clinical Pharmacy Practice, University of California Irvine School of Pharmacy and Pharmaceutical Sciences, Irvine, CA

Background: EHR databases are useful sources of data for drug safety research but identifying ADEs is challenging. Our objective was to determine current practices of defining drug exposures and ADEs by conducting a systematic review of pharmacoepidemiologic studies utilizing EHR.
Methods: We searched PubMed, Scopus and CINAHL for English articles published between 01/2010–11/2020. Included studies were published in peer-reviewed journals, conducted in the U.S., that analyzed EHR data and defined drug exposure and adverse drug events (ADEs). We evaluated methodological quality with a modified Newcastle-Ottawa Scale (NOS) score ranging from 0 to 9 points. Data synthesis was performed with thematic analysis.

Results: Twenty-six studies were included from 3885 identified. The majority were cohort studies (85%). All utilized EHR data and 69.2% pulled from claims databases. In 88.4% of studies, drug exposures were identified through medication dispensing/prescribing records. Over half (58%) the studies included large scale databases with greater than 10,000 participants. The majority of studies (76.9%) defined ADEs through diagnosis codes. Other methodologies to identify ADEs include objective measures (34.6%), treatment procedures (19.2%), antidote usage (11.5%), and validated outcome algorithms (34.6%). Studies were well designed with median NOS score of 9 points (range: 4-9) for overall study quality.

Discussion: Increasing availability of large EHR databases provide opportunities to conduct pharmacoepidemiologic studies with real-world data. In selected studies, medication dispensing records were preferred over prescribing records for determining drug exposure index date; if feasible, we recommend this as a more reliable indicator to reduce immortal time bias. ADEs were defined using diagnosis codes but methodologies were frequently combined. We recommend applying validated outcome algorithms along with other methods for identifying ADEs, with careful evaluation of study population and validation population, as well as clinical considerations for the drug(s) of interest.

Other: Funding: Undergraduate Research Opportunities Program intramural grant, UC Irvine, Irvine, CA.

Pain Management/Analgesia

230 | Factors that influence selection of over-the-counter analgesics among adults: A systematic review

Jae Kim, Pharm.D. Candidate 2022[1], Michaela Nyquist, Pharm.D. Candidate 2022[1], Kaitlyn Kinney, Pharm.D. Candidate 2022[1], Emily Ginier, MLIS[1] and Sarah Vordenberg, Pharm.D., MPH[2]
[1]*University of Michigan, Ann Arbor, MI* [2]*Department of Clinical Pharmacy, University of Michigan, Ann Arbor, MI*

Background: Our objective was to explore patient attitudes, beliefs, perceptions, and knowledge about the efficacy and safety of over-the-counter (OTC) analgesics and identify factors that adult patients use when selecting a product.

Methods: We searched MEDLINE, CINAHL, Scopus, and EMBASE to identify studies published in English between January 2000 and June 2019. We included randomized controlled trials, controlled trials, observational studies, systematic reviews, and meta-analyses that included OTC analgesics. Authors worked independently during study selection, data extraction, and analysis, then compared their findings and discussed discrepancies until consensus was reached. We evaluated study quality using the Study Quality Assessment Tool and Critical Appraisal of a Cross-Section Study.

Results: We identified 10,898 unique articles, of which 54 were included in this systematic review. The most common countries where the studies occurred were the United States (n=20), Australia (n=6), and United Kingdom (n=6). A total of 36 studies included acetaminophen, 25 included non-steroidal anti-inflammatory drugs (NSAIDs), and 19 did not specify a specific product. Acetaminophen was frequently preferred over NSAIDs, but it varied by condition. Adults had mixed perceptions about the effectiveness of the analgesics. Knowledge of the risks of high doses of acetaminophen (liver toxicity) and NSAIDs (gastrointestinal bleeding or nephrotoxicity) was low. Individuals with recurrent pain were more likely to take an analgesic compared to those with first-time pain. Increased pain severity was associated with a higher likelihood of exceeding the maximum dose.

Discussion: Adults frequently use OTC analgesics and possess a diverse set of beliefs about the efficacy and safety of the products. Pharmacists are well positioned to provide guidance to support the effective and safe use of these products. Our review was comprehensive; however, the quality of the studies was generally good to fair.

Other: We do not have any conflicts of interest, funding, or registration to report.

Pediatrics

231 | Vancomycin Area under the Curve to Minimum Inhibitory Concentration Ratio and Efficacy Outcomes in Pediatrics: A Systematic Review

Rou-Yee Chenhsu, Pharm.D., BCPPS
Department of Pharmacy, UC Davis Children's Hospital, Sacramento, CA

Background: Multi-society guidelines recommend vancomycin area under the curve over 24 hours to minimum inhibitory concentration by broth microdilution (AUC_{24}/MIC_{BMD}) ratio 400 - 600 mg.hr/L as the efficacy target for serious Methicillin-resistant Staphylococcus aureus (MRSA) infections, although pediatric data validating this efficacy target observed in adults were limited. The objective of this systematic review was to examine AUC_{24}/MIC and efficacy in pediatrics.

Methods: Literature search using keywords vancomycin, AUC, pediatric or children was conducted on PubMed, EMBASE and Open Forum Infectious Disease databases through March 2021. Publications in English were eligible if they enrolled pediatric patients on vancomycin for documented gram positive (G+) infections and assessed the association between AUC_{24}/MIC and efficacy. Efficacy was defined as clinical improvement, microbiological clearance, recurrence and/or mortality. The Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) was followed and the Newcastle-Ottawa scale was used with a maximum of 9 points for high-quality with low risk of bias.

Results: Among 568 publications, 10 articles and 3 abstracts (n=638) were eligible. All were retrospective with Newcastle-Ottawa score 6 to 8. Three studies on MRSA bacteremia (n=182) and 7 with G(+) infections (n=323) did not observe an AUC/MIC breakpoint of

400 with efficacy. Two studies with G(+) bacteremia (n=91) reported AUC/MIC ratio 425 and 400 with clinical improvement, and one on Staphylococcal bacteremia (n=42) found an AUC/MIC ≥ 234 as the only significant predictor of culture clearance, recurrence and mortality.

Discussion: This is the first systematic review examining vancomycin AUC/MIC and efficacy in pediatrics. Non-MRSA infections were included in most studies and extrapolating AUC/MIC goal for MRSA to non-MRSA needs to be viewed with caution. Variations in pathogens, determination in AUC, MIC and efficacy and low mortality rate may have contributed to the discordance from adult data. Collaborative studies involving more pediatric patients with severe MRSA infection are needed.

Other: unfunded

Pharmacogenomics/Pharmacogenetics

232 | The Attitudes and Confidence of Pharmacists in the United States or Canada Regarding Pharmacogenomic Testing: a systematic review

Tiffany Dominic, Pharm.D. Candidate, Sharon Joseph, Pharm.D. Candidate, Maha Saad, Pharm.D., Taehwan Park, Ph.D. and Jagannath Muzumdar, Ph.D
College of Pharmacy and Health Sciences, St. John's University, Jamaica, NY

Background: Pharmacists are uniquely positioned in the healthcare system to provide pharmacogenomic and personalized medicine services. This study aimed to explore the attitudes and confidence of pharmacists in the US and Canada regarding pharmacogenomic testing.

Methods: A PubMed, Embase, and Google-Scholar search was performed using the terms "pharmacist", "pharmacogenomics", "attitude", and "confidence". After applying the inclusion criteria (pharmacists from the US or Canada who responded to surveys using the Likert scale), 5 studies published up to 2/22/2021 were included in the systematic review. Primary outcomes assessed were pharmacists' attitudes, confidence in making recommendations and interpreting pharmacogenomic testing, and the desire for additional training and education. Studies were reviewed independently by investigators for inclusion eligibility to prevent risk of bias.

Results: Five studies with a total of 1343 pharmacists from the US or Canada were included. Three out of the five studies included data on participants' education. From the 3 studies, 17% of participants had Pharm.D.s while 71% had bachelor's degrees. Majority of participants worked at community pharmacies. Approximately 51% (384/756) of participants reported they believed pharmacogenomic testing is relevant for patients. A total of 65% (685/1059) reported confidence in making treatment recommendations based on pharmacogenomic testing. Only 13% (84/662) reported confidence in interpreting the results of pharmacogenomic testing while 77% (512/662) reported confidence in recommending pharmacogenomic testing to patients. Approximately 66% (633/965) indicated desire for additional training and continuing education in pharmacogenomics.

Discussion: As pharmacogenomics becomes more applied in practice, it is important to assess if pharmacists have confidence to accurately interpret pharmacogenomic tests and make appropriate therapy recommendations. This systematic review suggests many pharmacists need more training to become confident in pharmacogenomics application. A major limitation of this study is the subjective interpretation of survey questions from both participants and investigators.

Other: No external funding, conflict-of-interest, or disclosures to report. Study was not registered.

Transplant/Immunology

233 | Safety of antimalarials for COVID-19: a systematic review and meta-analysis of observational studies and clinical trials in patients with malaria and rheumatologic diseases treated with chloroquine or hydroxychloroquine

Taís Barros, BPharm, Lucas Okumura, BPharm, BCPS, Marinei Ricieri, BPharm, MsC, Fabio Motta, MD, Ph.D., Leonardo Soares, MD, MsC, Ariadne Albuquerque, Bpharm and Mariana Fachi, Bpharm, Ph.D
Little Prince Children's Hospital, Curitiba, Brazil

Background: Antimalarials are off-label for COVID-19. While the efficacy still is inconclusive, safety is a major concern for using these drugs. We aimed to review the safety of antimalarials in patients with malaria and rheumatologic diseases (RD), and then, we attempted to translate these findings to COVID-19.

Methods: a systematic review (PROSPERO CRD42020176659), was performed in order to identify clinical trials and observational studies in Pubmed/MEDLINE, Scopus, Cochrane and LILACS, evaluating the safety profile of chloroquine (CQ) and hydroxychloroquine (HCQ),. Random-effects proportion meta-analyses were conducted for cardiovascular, hepatic, hematologic, ocular and dermatological outcomes. **Results:** 77 studies were included (malaria=33, RD=44). Patients with malaria received CQ, 25mg/kg or 1500mg divided in three days of therapy, whilst RD patients received HCQ, 400mg od, for at least 6 months. QTc interval prolongation occurred in 4% (95%CI 2;11%) of chloroquine-exposed patients, but no deaths or ventricular arrhythmias were observed. Elevation of transaminases (CQ 7%, 95%CI 3;16%; and HCQ 6%,

95%CI 3;12%) and bilirubin (CQ 3%, 95%CI 1;14%) were common, but only one patient evolved to CQ-induced hepatitis. Through 1-3% of patients developed anemia, none of them needed transfusion. Dermatological events were presented, and were clinically manageable. Retinopathy was reported only with HCQ and was associated with prolonged treatment duration.

Discussion: When efficacy of antimalarials is still inconclusive, safety is the major driver for using them in COVID-19. Therefore, QTc prolongation and liver injury were common adverse events, but their clinical significance remains uncertain as patient-related factors, such as underlying diseases and concomitant treatments are determinant for developing such adverse reactions. **Other:** N/A