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VPS ORIGINAL RESEARCH

ADR/DRUG INTERACTIONS

1. Evaluation of Drug Information Resources for Consistency of Information on Drug-Drug Interactions.

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Introduction: Though combination drug therapy is effective, it also carries the risk of drug-drug interactions and there by adverse drug outcomes. The information related to drug-drug interactions varies among the drug information (DI) resources. These variations pose challenges for clinical pharmacists in using the information in clinical practice. We reviewed eight different DI resources for scope, completeness and consistency of information related to drug-drug interactions.

Research Question or Hypothesis: How consistent are the DI resources with respect to information on drug-drug interactions?

Study Design: Systematic comparison study.

Methods: Eight different DI resources were reviewed for scope and completeness of the information related to selected interacting drug pairs. Each resource was scored for scope by calculating percentage of interactions that had an entry for each resource. Completeness score was calculated for each resource in describing severity, clinical effects, mechanism, and management of drug-drug interaction The consistency of the information among the eight DI resources was assessed using Fleiss Kappa (K) score estimated using ReCal3 0.1 (alpha) web service and SPSS version 24.

Results: The scope score was highest (100%) for Up-To-Date® and PEPID© whereas, the completeness score was highest (100%) for Drug Interaction Analysis & Management. The inter-source reliability scores among eight different DI sources was found to be poor (kappa value <0.20, $p < 0.000$) with respect to scope and documentation of information related to severity, clinical effects, mechanism and management of drug-drug interactions.

Conclusion: Variations in the information causes uncertainty in healthcare professionals with respect to use of interacting drug pairs in clinical practice. This may also increase the chances of adverse drug outcomes when interacting drug pairs are used in at risk patients. We recommend a comprehensive preventive and management strategies for drug-drug interactions depending on a uniform scale of severity and clinical effects across various DI resources.

ADULT MEDICINE

2. Trends in Pneumococcal Vaccination Coverage Among Nursing Home Residents.

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Introduction: Streptococcus pneumoniae is a serious but potentially preventable cause of pneumonia, meningitis, sepsis, and other infections, particularly among older adults and nursing home (NH) residents. The Advisory Committee on Immunization Practices (ACIP) recommends pneumococcal vaccination (PV) in adults >65 and those with chronic diseases, including most adults residing in NHs. National goals for PV are set at 90% coverage to reduce pneumococcal illness, disability, and death (HealthyPeople2020.gov).

Research Question or Hypothesis: What proportion of adult NH residents have received pneumococcal vaccination?

Study Design: This cross-sectional study used data reported to the Minimum Data Set (MDS) maintained by the Centers for Medicare & Medicaid Services collected during assessments of NH residents from 2008-2017.

Methods: Our study includes PV status of all NH residents from 2008-2017 (n = 3,799,360 in 2017). Residents were considered to be vaccinated with any PV if a "yes" response was reported on any assessment conducted during a resident's history (pre-2015) or during the calendar year assessment (2015 or later) in MDS. The primary outcome measure was the proportion of NH residents reporting receipt of any PV. Descriptive statistics and binomial probability test were used to compare annual PV coverage to the national goal of 90% (Excel, Stata/MP 15.1).

Results: National PV coverage was 77.8% in 2008 and peaked in 2010 (80.1%) among NH residents. Coverage declined steadily between 2010-2017 to 68.3% (p<0.001 for all comparisons). The average vaccination coverage among females was higher than males (82.3% vs. 79.4%) and coverage among Whites (82.93%) was higher than other race/ethnic groups, including African Americans (78.99%), Multiracial (78.17%), Hispanics/Latinos (75.92%), and Asians (75.09%) (p<0.001 for all comparisons).

Conclusion: Among adults residing in nursing homes, PV coverage has declined and is now well below the national goal of 90%. Potential disparities by sex and race/ethnicity were also evident.

3. Impact of Pharmacist-led Discharge Medication Reconciliation on Acute Rehabilitation Transfers back to the Hospital.

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Introduction: Up to 10.8% of patients transferred to a rehabilitation facility will be transferred back to the hospital. Pharmacist-led medication reconciliation has the potential to reduce the number of medication-related errors made at discharge and subsequently decrease the rates of readmission.

Research Question or Hypothesis: Does the implementation of a pharmacist-led risk assessment and discharge medication reconciliation decrease the rate of patients being transferred back to the hospital following transfer to a rehabilitation facility?

Study Design: Prospective single-center cohort study

Methods: Adults transferred to one of two Atrium Health inpatient rehabilitation facilities were available for inclusion. Pharmacist-led medication reconciliation was completed for all patients in the intervention group. A retrospective risk assessment was completed for patients in the control group, after which they were matched with patients in the intervention group based on transfer date, transfer facility, and readmission risk. The primary outcome was the number of patients transferred back to the hospital within 72 hours of rehabilitation admission. Data was analyzed using a Chi-squared test.

Results: Forty-four and 43 patients were included in the intervention and control group, respectively. One patient in the intervention group and two patients in the control group met the primary endpoint of transfer within 72 hours (p= 0.55). One patient in the intervention group and seven in the control group were transferred back to the hospital at any point during their rehabilitation stay (p=0.024). The average length of stay in rehabilitation before transfer back to the hospital was 7.6 days for the control group.

Conclusion: Further studies are needed to explore whether pharmacist-led discharge medication reconciliation service and risk assessment scoring reduce the rates of patient transfer back to the hospital within 72 hours. However, the service may reduce the total number of patients transferred back to the hospital at any point during the rehabilitation stay.

4. Retrospective Analysis of Safety and Efficacy of direct-acting Oral Anticoagulants (DOACs) Versus Warfarin in Patients with Cirrhosis.

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Introduction: Patients with cirrhosis were excluded from randomized clinical trials comparing DOACs to warfarin for treatment of atrial fibrillation (AF) and venous thromboembolism (VTE). Evidence for use of DOACs in patients with cirrhosis for AF, VTE, and portal vein thrombosis (PVT) is mostly limited to several small retrospective cohort studies that show similar safety profiles compared to warfarin and low molecular weight heparin but include few patients with Child-Turcotte-Pugh (CTP) Class B and C cirrhosis. The purpose of this study is to further evaluate the safety of DOACs in cirrhotic patients, including those classified as CTP Class B or C.

Research Question or Hypothesis: In patients with cirrhosis and VTE, AF or PVT, does treatment with DOACs result in similar rates of major bleeding compared to warfarin?

Study Design: Retrospective cohort study

Methods: Baseline characteristics were collected for adult patients with cirrhosis initiated on a DOAC or warfarin for treatment of VTE, AF or PVT between January 1, 2013 and January 1, 2019. Patients were identified by ICD-10 codes and were followed for up to 1 year utilizing chart review of the electronic health record. The primary outcome was the rate of major bleeding. Categorical variables were analyzed using Chi-square or Fisher's exact tests and continuous variables were analyzed using Student's t-test or Mann-Whitney U test. P-values were two-tailed and considered significant if < 0.05. Data analysis was performed using VassarStats.

Results: During the study period, 30 patients were treated with a DOAC and 20 were treated with warfarin. Baseline characteristics were similar between cohorts. There was no significant difference in the rate of major bleeding between the DOAC and warfarin groups (6 [20%] vs 4 [20%], P = 1).

Conclusion: Major bleeding rates appear to be similar in patients with cirrhosis treated with DOACs or warfarin for VTE, AF, or PVT. Prospective, randomized studies are needed to confirm results.

AMBULATORY CARE

5. Assessment of the Number and Cost of Hospital Visits in COPD and Asthma Patients Before and After Patient Assistance Program Enrollment.

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Introduction: Patient assistance programs (PAPs) are available to uninsured patients to obtain high cost medications for chronic diseases. PAPs can increase adherence and reduce costs for patients; however, there is a lack of literature assessing the efficacy of these resources. Non-adherence to chronic medication regimens has created a large burden for healthcare systems. The purpose of this study is to evaluate the impact of PAP enrollment on healthcare utilization in patients with asthma or COPD.

Research Question or Hypothesis: Patients enrolled in PAPs will have decreased emergency department visits and hospitalizations compared to before enrollment in PAPs.

Study Design: An IRB-exempt retrospective, observational cohort study of patients approved for PAPs to manage asthma or COPD at Piedmont Athens Regional Community Care Clinic from January 1, 2018 to March 31, 2019.

Methods: The primary outcomes were the number of ED visits and hospitalizations six months after PAP enrollment compared to six months before enrollment. Therefore, the total time period of data collection ranged from July 1, 2017 to September 30, 2019. Secondary outcomes were the estimated emergency department and hospitalization costs before and after PAP enrollment. EMR chart reviews were utilized to determine PAP enrollment date and hospital encounters within the specified time period. Financial records were provided through Piedmont Health System billing records.

Results: In patients who had at least one hospital encounter during the specified period, total ED visits decreased from 54 to 7 (median [IQR] visits per patient 1 [1-2] vs 0 [0-0], p<0.001) and total hospitalizations decreased from 13 to 0 (median visits per patient 0 [0-1] vs 0 [0-0], p=0.001). Median amount owed by patient to hospital decreased from $4683 to $0 (p<0.001) and average total hospital acquisition cost decreased from $351 to $0 (p=0.002).

Conclusion: PAPs lead to decreased utilization of acute healthcare services. Additionally, this leads to costs savings for patients and healthcare systems.

6. Evaluation of the Utilization of Cardiovascular Beneficial Anti-Diabetic Medications at a Federally Qualified Health Center.

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Introduction: The 2018 American Diabetes Association guidelines emphasized the benefits of using sodium glucose transport 2 inhibitors (SGLT2s) and glucagon-like peptide receptor agonists (GLP-1 RAs) after metformin. There are several studies indicating improved cardiovascular (CVD) outcomes for these medications however they do not include real world utilization; in particular, there is a clear gap in literature concerning use in a federally qualified health care center (FQHC) setting.

Research Question or Hypothesis: What are the prescribing patterns of SGLT2s and GLP-1 RAs in patients with type 2 diabetes (T2DM) with and without CVD comparatively and what are possible factors affecting utilization?

Study Design: Retrospective Cross-Sectional Analysis.

Methods: Data from 9,346 patients between September 2018-2019 was identified from the Bay Area LifeLong Medical Care FQHC clinics' electronic health record. Patients 18 years and older with a T2DM diagnosis and a last reported A1C in 2018 or 2019 were included and split into either with or without clinical CVD depending on diagnosis codes.

Results: 1,937 patients with T2DM qualified and 293 were categorized as having clinical CVD. There were no prescriptions for SGLT2s and utilization of GLP-1 RAs was higher in those without CVD. Demographics indicated majority were female with a BMI >27 in both groups however, patients without CVD were younger with a higher prevalence in smoking and less lifetime encounters to a clinic. A majority of patients with CVD were more likely to have an A1C <8% but had a greater incidence of complications such as albuminuria, nephropathy, retinopathy and neuropathy.

Conclusion: The utilization of GLP-1 RAs and SGLT2s at LifeLong Medical Care FQHCs is minimal however secondary outcomes indicate that a majority of patients had A1Cs that were controlled and may not necessarily need a second agent. Further analysis into utilization barriers may help increase use in those who may benefit the most but are not prescribed these agents.

7. Caring for Cardiovascular Patients on Febuxostat: a Collaborative Pharmacy Effort in Response to a Warning by the Food and Drug Administration.

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Introduction: In February 2019, the Food and Drug Administration released a warning of increased mortality risk with febuxostat based on the Cardiovascular Safety of Febuxostat or Allopurinol in Patients with Gout (CARES) trial.

Research Question or Hypothesis: Can a system-wide pharmacist communication intervention significantly reduce the prevalence of febuxostat prescribing?

Study Design: This was an institutional review board approved, prospective, pre-post study, including adults with gout who have a primary care provider (PCP) within the health-system medical group (28 clinics, approximately 500 PCPs). Pregnant patients and those not meeting criteria were excluded. Data was analyzed using the McNemar test and descriptive statistics. The primary outcome was febuxostat prescribing prevalence. Secondary outcomes include

febuxostat prevalence in patients with CVD, interventions, and adverse events.

Methods: In June 2019, the pharmacist sent an email to PCPs highlighting the FDA warning, then, with pharmacy student assistance, used an electronic medical record (EMR) report to identify patients who met study criteria and sent electronic messages (including patient-specific assessments and recommendations) directly to PCPs of patients with CVD on febuxostat. Patients with therapy changes from these recommendations were monitored for adverse events. Three months later, another EMR report was generated.

Results: Of 4,616 patients with gout, the average age was 71 years, 53.5% were male, 68% were white or Caucasian, and 28% were black or African American. Patients prescribed febuxostat was reduced from 226 before the intervention to 171 (4.9% vs 3.7%, respectively, P < 0.001, power 99.99%). For patients with CVD, the pre-post febuxostat prevalence was 3.6% and 1.9% (P < 0.001, power 93.05%). Half of the providers who were sent electronic messages took no action, 31% switched from febuxostat to another agent, 14% discontinued urate lowering therapy, and 4% provided patient education. No serious adverse events were observed.

Conclusion: The system-wide primary care pharmacist initiative was associated with a significant reduction in febuxostat prescribing.

8. Retrospective Evaluation of the Effectiveness of Continuous Glucose Monitors in Veterans with Type 2 Diabetes.

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Introduction: The use of continuous glucose monitoring (CGM) has demonstrated added glycemic control in patients with Type 1 diabetes, however, data is less clear about patients with Type 2 diabetes.[3] Many studies have shown a reduction in glycated hemoglobin (A1c) in patients using CGM vs SMBG.[2-7] In a 2019 meta-analysis, of the four trials that reported non-severe hypoglycemia, no significant results were found.[7]

Research Question or Hypothesis: Do CGMs improve glycemic control, rates of hypoglycemia, and reduce the amount of total daily insulin in veterans with Type 2 diabetes?

Study Design: A retrospective chart review examining the safety and efficacy of CGM in veterans with Type 2 diabetes at the Salem Veterans Affairs Medical Center (SVAMC).

Methods: Data was extracted from the computerized patient record system and the SVAMC data warehouse for those patients who are prescribed a CGM sensor to monitor their diabetes. The primary endpoint was the reduction of A1c following at least three months of consistent CGM use. The secondary endpoints were incidence of hypoglycemia, incidence of hyperglycemia, total daily units of insulin, and number of non-insulin antidiabetic medications.

Results: An average A1c reduction of 0.25% from baseline was observed after switching from SMBG to CGM (P=0.25). A decrease in incidence of hypoglycemia was observed with the use of CGM (75% vs 26.9%). An increase in incidence of hyperglycemia was observed with the use of CGM (61.5% vs 75%). A decrease in the total units of daily insulin was seen with the use of CGM (141 units vs. 126 units) and the average number of non-insulin antidiabetic medications remained unchanged.

Conclusion: CGM was associated with improved glycemic control, however this result was not statistically significant. CGM may be associated with decreased hypoglycemia, increased hyperglycemia, and decreased total daily insulin, however more studies are needed to determine the significance of these results.

9. Implementation of Comprehensive Medication Management in a Family Medicine Clinic.

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Introduction: Comprehensive medication management (CMM) is a patient care model implemented by clinical pharmacists that aims to evaluate individual patient medication regimens for proper indication, efficacy, safety, and adherence. Previous studies have shown the positive impact pharmacists have on patient care through CMM programs at different collaborative practice settings, but there is a lack of data comparing CMM medication interventions implemented to usual care.

Research Question or Hypothesis: Will pharmacist driven comprehensive medication management lead to resolution of more medication therapy problems compared to usual care?

Study Design: A retrospective study at a family medicine clinic in Missouri

Methods: Patient electronic health records were used to identify team-based care patients who completed at least one CMM visit with a clinical pharmacist between June 1, 2019 and September 30, 2019. Team-based care patients were matched with usual care patients based on primary care provider, basic needs assessment score, and baseline number of medications. Baseline characteristics, number and type of medication therapy problems resolved, and 90-day hospital and emergency room visits post-index visit were recorded.

Results: A total of 61 team-based care patients met inclusion criteria and were matched 1:1 to usual care patients. The team-based care group was able to resolve a total of 210 medication therapy problems, compared to 136 resolved in the usual care group. The median number of medication therapy problems resolved per patient for team-based versus usual care was 3 to 2 respectively (P = 0.001). For patients provided CMM, nearly 3 times as many efficacy, safety, and adherence medication therapy problems were resolved compared to usual care.

Conclusion: Involving pharmacists in team-based patient care models can lead to resolution of more medication therapy problems compared to usual care. Conducting repeated CMM visits with patients could lead to assessment of clinical outcomes.

10. Readmission Rates of Patients with Left Ventricular Assist Devices after Implantation.

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Introduction: Patients requiring cardiac support with left ventricular assist devices (LVADs) often face complications after implantation requiring hospital admission for management. Previous studies have identified common causes of readmission within 90 days from implantation as infection, bleeding, and volume overload.

Research Question or Hypothesis: The purpose of this project is to identify readmission reasons of patients with LVADs after device implantation within 6 months at our institution.

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

Methods: Data collection was conducted from July 1, 2018 to August 30, 2019. Patients over the age of 18 whose LVADs were implanted during this time frame were included in this study, Hospital readmissions within 6 months after discharge from LVAD implantation were included in the study. Reasons for readmission were evaluated from chart review.

Results: A total of 49 patients underwent LVAD implantation during this time frame. Of these patients, 25 had a hospital readmission within 6 months from initial hospital discharge. Of these, 13 patients were readmitted within 1 month and 22 patients within 3 months. Of those readmitted within 1 month, 4 patients (31%) were readmitted secondary to volume status, 4 patients (31%) for infection, and 5 patients (38%) for other reasons. Of the patients readmitted within 6 months from hospital discharge, 6 patients (24%) were readmitted for volume status, 7 patients (28%) for infection, 5 patients (20%) for reasons secondary to anticoagulation and 7 patients (28%) for other reasons.

Conclusion: Patients with LVADs readmitted to our hospital within 6 months from discharge after device implantation are most commonly readmitted for volume status and infection. This data will be used for quality improvement purposes to develop interventions focused on reducing readmissions.

11. Impact of Annual Wellness Visits Performed by Pharmacists for the Prevention and Treatment of Cardiovascular Disease and Osteoporosis.

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Introduction: The Center for Medicare and Medicaid services introduced annual wellness visits (AWVs) for Medicare Part B beneficiaries in 2011 to provide personalized prevention services. However, with the evolving scope of practice, the extent of impacts pharmacists can make by conducting AWVs has not been fully elucidated yet.

Research Question or Hypothesis: To what extent can care gaps be closed through AWVs performed by pharmacists in Oregon through prescribing and de-prescribing of cardiovascular and osteoporosis medications and by ordering osteoporosis screening? The care gap closure was defined as correction of differences between guideline-recommended practice and care patients were receiving prior to AWVs.

Study Design: A retrospective review of AWV charts from six ambulatory care clinics in Oregon

Methods: AWVs were conducted by ambulatory care pharmacists at six Legacy Health clinics from August 2018 to August 2019. The factors documented and assessed were: 1) use of aspirin, statins, angiotensin converting enzyme inhibitors/angiotensin receptor blockers (ACE/ARB), bisphosphonates, calcium/vitamin D, and proton pump inhibitors, and 2) osteoporosis screening with dual energy x-ray absorptiometry (DEXA) scans. The primary outcome was care gap closure captured as interventions made during pharmacists' AWVs, according to published guideline recommendations. Descriptive analyses were used to summarize collected data from retrospective chart review with JMP software.

Results: Among 416 AWVs completed by pharmacists, 233 care gaps (45% of patients) were identified, and 119 (51%) were closed. The most common care gaps were missing DEXA screenings (40%) and suboptimal statin therapy (21%). Most common reasons for not closing gaps were: 1) patients declining statin or bisphosphonate, 2) prior intolerance to statin, ACE/ARB, or bisphosphonate, and 3) patients not completing DEXA scans.

Conclusion: This study indicates that pharmacists can play a vital role in performing AWVs to close care gaps through appropriate prescribing and de-prescribing of cardiovascular and osteoporosis medications and through ordering of DEXA scans.

12. The Appropriate Use of Statin Therapy.

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Introduction: The 2013 American College of Cardiology/American Heart Association (ACC/AHA) cholesterol treatment guidelines represented a fundamental change in managing dyslipidemia. The greatest potential benefit is observed by using statin therapy as primary prevention in patients ≥ 21 years old with a low-density lipoprotein (LDL) ≥ 190 mg/dL and in diabetic patients between 40 to 75 years old with an LDL 70-189 mg/dL. Although these guidelines established the importance of statin therapy for preventing atherosclerotic cardiovascular disease (ASCVD), provider adherence to new recommendations is uncertain.

Research Question or Hypothesis: What percentage of high-risk patients receive appropriate statin therapy for the primary prevention of ASCVD?

Study Design: Single-center, retrospective chart review.

Methods: Chart review was performed between January 2015 and November 2018 on patients eligible for statin therapy based on the two benefit groups of interest. The primary outcome is the percentage of patients receiving appropriate, guideline-recommended statin therapy. Statistical analyses were conducted using SPSS. Utilized descriptive statistics for demographic data, independent, chi-squared tests for nominal data, and two-sided t-tests for ordinal data.

Results: A total of 262 patients were included, 68 in the LDL ≥ 190 mg/dL group and 194 in the diabetes group. Statin medication was prescribed to 50% (n=34) of patients with an LDL ≥ 190 mg/dL and 70% (n=135) of patients with diabetes. Altogether, 56% of patients received an appropriate statin with no significant difference between groups (p=0.247).

Conclusion: A higher percentage of patients received statin therapy in the diabetes group than the LDL≥190 mg/dL group, but a higher percentage received appropriate therapy in the LDL≥190 mg/dL group. By analyzing patterns of statin use, we can identify gaps and disparities in the care of patients at risk for ASCVD and identify better methods to optimize statin therapy.

CARDIOVASCULAR

13. Change in Ejection Fraction with Neurohormonal Antagonists for Low-Flow, Low-Gradient Severe Aortic Stenosis.

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Introduction: Renin-angiotensin-aldosterone system (RAAS) antagonists are associated with reduced cardiovascular mortality after transcatheter aortic valve replacement (TAVR), but studies have not compared effectiveness between low-flow, low-gradient severe aortic stenosis (LFLGSAS) and high gradient severe aortic stenosis (AS). LFLGSAS indicates more severe systolic dysfunction and a worse prognosis. Neurohormonal antagonists, RAAS antagonists and beta blockers, may have a greater benefit in LFLGSAS. This study compares ejection fraction (EF) and clinical outcomes post-TAVR between LFLGSAS and high gradient severe AS patients receiving neurohormonal antagonists.

Research Question or Hypothesis: Neurohormonal antagonists are associated with greater EF improvement post-TAVR for LFLGSAS than high gradient AS.

Study Design: Single-center, retrospective, chart review

Methods: Patients ≥18 years who received TAVR from January 2016 to August 2018 were eligible for inclusion. All included patients had a baseline echocardiogram confirming LFLGSAS or high-gradient AS and received a neurohormonal antagonist post-TAVR. Exclusion criteria were death prior to discharge, TAVR for aortic insufficiency, endocarditis, and pregnancy. The primary endpoint compared the change in EF 20-45 days post-TAVR between LFLGSAS and high gradient severe AS. Secondary endpoints included mortality and rehospitalization 30 days post-TAVR. Categorical data was analyzed by Fisher's exact test. Continuous data was analyzed with the two-sample t-test.

Results: Seven patients with LFLGSAS and 11 patients with high gradient severe AS were included in the study. Baseline characteristics were similar between groups, except an anticipated higher proportion of heart failure in patients with LFLGSAS. Mean change in EF 20-45 days post-TAVR was +0.6% in LFLGSAS and -6.5% in high gradient severe AS (p=0.33). No significant difference between groups was observed in mortality or rehospitalization at 30 days post-TAVR.

Conclusion: Neither change in EF nor clinical outcomes were different between LFLGSAS and high gradient severe AS patients receiving neurohormonal antagonists. A larger sample size may be necessary to observe a statistical difference.

14. Neurohormonal Antagonists and Cardiac Reverse Remodeling Post-Transcatheter Aortic Valve Replacement for Severe Aortic Stenosis: a Ailot Study.

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Introduction: Cardiac reverse remodeling after transcatheter aortic valve replacement (TAVR) is associated with reduced cardiovascular mortality and decreased hospitalizations. Neurohormonal antagonists, such as renin-angiotensin-aldosterone system (RAAS) antagonists and beta-blockers (BB), promote cardiac reverse remodeling in systolic heart failure. RAAS antagonists exert a similar effect post-TAVR, but the combined effects of RAAS antagonists and BB remain uninvestigated. The purpose of this study is to identify the relationship between neurohormonal antagonists and cardiac reverse remodeling post-TAVR.

Research Question or Hypothesis: Neurohormonal antagonists promote cardiac reverse remodeling post-TAVR for severe aortic stenosis (AS).

Study Design: Single-center, retrospective, chart review.

Methods: Patients ≥18 years who received TAVR for severe AS from January 2016 to August 2018 with a baseline echocardiogram within 1-year pre-TAVR and a follow-up echocardiogram 20-45 days post-TAVR were included in the study. Exclusion criteria included death prior to discharge, TAVR for aortic insufficiency, endocarditis, and

pregnancy. Change in left ventricular end-diastolic diameter (LVEDD), left ventricular end-systolic diameter (LVESD), poster wall thickness (PWT), and septal wall thickness (SWT) 20-45 days post-TAVR were compared between patients discharged with and without neurohormonal antagonists. Categorical data was analyzed using the Chi-squared test. Continuous data was analyzed using the Mann-Whitney-U test.

Results: 30 patients met inclusion criteria. 21 patients received a neurohormonal antagonist at discharge. 9 patients were not discharged with a neurohormonal antagonist. Baseline characteristics were similar between groups. Neurohormonal antagonist use was not associated with a change in LVEDD (0.40 cm vs. -0.10 cm, p=0.722), LVESD (-0.60 cm vs. 0.10 cm, p=0.791), PWT (0.0 cm vs. 0.0 cm, p=0.703), or SWT (0.10 cm vs. 0.0 cm, p=0.210) from baseline to 20-45 days post-TAVR.

Conclusion: Use of neurohormonal antagonists was not associated with cardiac reverse remodeling 20-45 days post-TAVR for severe AS. Longer observation may be necessary for cardiac reverse remodeling with neurohormonal antagonists post-TAVR.

15. Renin-Angiotensin-Aldosterone System Antagonist Withdrawal in Type 1 Cardiorenal Syndrome.

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Introduction: Renin-angiotensin-aldosterone system (RAAS) antagonist discontinuation during acute heart failure (AHF) is associated with increased mortality following hospitalization. Although the etiology of type 1 cardiorenal syndrome (CRS) has been linked to renal venous congestion, RAAS antagonist withdrawal (RW) theoretically promotes renal function recovery. RAAS antagonists are dose-reduced or withheld in approximately half of patients with CRS due to concerns for worsening acute kidney injury (AKI). This study assessed the effect of RAAS antagonist withdrawal on renal function and informs management of RAAS antagonists during CRS.

Research Question or Hypothesis: RW improves renal function compared to RAAS antagonist continuation (RC) during CRS.

Study Design: Retrospective, single-center chart review

Methods: Patients aged 18-89 years admitted to an urban, academic medical center from April 2018 to August 2019 with AHF and AKI were identified using discharge ICD-10 codes. All patients were treated with a RAAS antagonist before admission. Key exclusion criteria included shock, pregnancy, and end-stage renal disease. The primary endpoint was change in serum creatinine (SCr) from admission through 72 hours. Key secondary endpoints included SCr reduction ≥0.3 mg/dL at 72 hours, 30-day readmissions, and RAAS antagonist prescription at discharge. Data were analyzed utilizing chi-square and Mann-Whitney U tests with SPSS software.

Results: 111 admissions were included in the primary analysis. RAAS antagonist withdrawal was more common on admission (RW 68 vs RC 43). RW patients presented with a higher BUN (p=0.034), higher SCr (p=0.021), and lower ejection fraction (p=0.04). Median SCr change from admission to 72 hours did not differ between groups (RW -0.1 mg/dL vs RC 0.0 mg/dL, p=0.05). There was no difference in SCr reduction ≥0.3 mg/dL at 72 hours, 30-day readmissions, or RAAS antagonist prescription at discharge.

Conclusion: In patients with type 1 CRS, RW was not associated with improved renal function at 72 hours. A larger sample size is necessary to confirm these results.

16. Tolerability of Target Doses of Metoprolol vs. Carvedilol in Patients with Heart Failure with Reduced Ejection Fraction.

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Introduction: Current guidelines recommend a beta-blocker, such as carvedilol or metoprolol succinate, in addition to other therapies, for the treatment of heart failure with reduced ejection fraction (HFrEF). The morbidity and mortality benefit of beta-blockers is based on target doses achieved in clinical trials; however, data comparing the efficacy and tolerability is conflicting.

Research Question or Hypothesis: Is there a difference in the ability to achieve and maintain the guideline-recommended target dose of metoprolol succinate versus carvedilol in patients with HFrEF?

Study Design: Single center retrospective chart review

Methods: Patients ≥ 18 years with HFrEF initiated on metoprolol succinate or carvedilol between December 2016-December 2018 with ≥ 12 months of follow-up at a BJC Medical Group Cardiology office were included. Patients treated with a non-dihydropyridine calcium channel blocker, sotalol, or mechanical ventricular assistance were excluded. The primary outcome was the proportion of patients that achieved target dose (metoprolol succinate 200mg daily, carvedilol 25mg twice daily (weight ≤ 85kg), carvedilol 50mg twice daily (weight > 85kg). Secondary objectives included: discontinuation or dose down-titration, adverse effects, time to achieve and maintained at target dose, cardiovascular mortality, and heart failure hospitalizations.

Results: Of the 84 patients included, 33.3% (n=28) received metoprolol and 66.7% (n=56) received carvedilol. The mean total daily dose of carvedilol achieved was 32.7mg and 93.8mg for metoprolol succinate. Of the patients on metoprolol, 14.3% (n=4) achieved target dose compared to 17.9% (n=10) on carvedilol (p=0.765). During the follow-up period, patients receiving carvedilol were at target dose an average of 8.8 months compared to 6.8 in the metoprolol succinate cohort (p=0.489). The most common adverse effect was hypotension occurring in 17.9% (n=5) of metoprolol and 21.4% (n=12) of carvedilol patients.

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Conclusion: No difference was observed in the achievement of guideline-recommended target doses of metoprolol succinate and carvedilol. Larger studies are warranted to confirm these results.

17. Triple Antithrombotic Therapy after Percutaneous Coronary Intervention (PCI)- Warfarin vs. Direct Oral Anticoagulants (DOACs).

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Introduction: Combining oral anticoagulation (OAC) with dual antiplatelet therapy (DAPT), known as triple therapy, increases the bleeding risk in patients who have atrial fibrillation (AF) and undergo percutaneous coronary intervention (PCI). The ideal triple therapy combination remains uncertain.

Research Question or Hypothesis: In patients with AF undergoing PCI, direct oral anticoagulants (DOACs) plus DAPT (aspirin and P2Y12 inhibitor) will have less bleeding with no increase for thrombosis compared to warfarin plus DAPT.

Study Design: Single-centered, retrospective, observational study

Methods: This study examined adult patients >18 years of age who were hospitalized with AF undergoing PCI and treated with OAC plus DAPT during admission and at hospital discharge in two separate groups receiving triple therapy: DOACs plus DAPT or warfarin plus DAPT. Sample size calculation: 868 patients. Chi-squared or Fisher's exact tests were used for nominal data and the unpaired t-test was used for continuous data. The primary objective was to determine if there is a difference in bleeding incidence for patients with AF receiving triple therapy post PCI with DOACs vs. warfarin within a six-week follow up period.

Results: A total of 106 patients were included (DOACs: 63, warfarin: 43). There was no difference in the bleeding incidence when comparing DOACs vs. warfarin (12.7% vs. 13.9%, p=0.851). There was a statistical difference between clopidogrel vs. ticagrelor or prasugrel in bleeding incidence (9.9% vs. 33.3%, p=0.038, NNH=5). There was no difference in thrombotic events. The total duration of triple therapy days (85 vs. 99, p=0.31) between DOACs vs. warfarin was not different.

Conclusion: There was no difference found in bleeding incidence or thrombotic events when comparing DOACs vs. warfarin. The use of ticagrelor or prasugrel increased the bleeding incidence compared to clopidogrel when these medications were combined with aspirin and OAC in AF patients who received triple therapy post PCI.

18. Clinical Outcomes of Atorvastatin 80mg versus 40mg in Acute Coronary Syndrome: A Retrospective Cohort Study Using Real World Data.

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Introduction: A high-intensity statin therapy defined as atorvastatin 40mg to 80mg is recommended by clinical practice guidelines for the secondary prevention of cardiovascular (CV) diseases. Landmark clinical studies have established the efficacy and safety of atorvastatin 80mg for secondary prevention. However, the effectiveness of atorvastatin 40mg versus 80mg following acute coronary syndrome (ACS) has not been widely studied, especially in real-world context.

Research Question or Hypothesis: Does atorvastatin 40mg have comparable effectiveness on CV events post-ACS compared to atorvastatin 80mg?

Study Design: A retrospective observational cohort study using real-world data was conducted to compare the effectiveness of two high-intensity statin doses (atorvastatin 80mg vs. 40mg) among ACS patients at 12 months after discharge.

Methods: The study included patients admitted with ACS to the Heart Hospital in Qatar between January 1, 2017 and December 31, 2018 and prescribed high intensity statin (atorvastatin 80mg or 40mg). The study included 2 groups: (1) patients discharged on atorvastatin 80mg; (2) patients discharged on atorvastatin 40mg. Chi square test was used to determine the association between statin use and CV outcomes.

Results: Of the 626 patients included, 151 received atorvastatin 80mg and 475 received atorvastatin 40mg upon discharge. The majority of patients included were Asian (73%), male (97%) with a mean age of 50 years, and 60% presented with ST-elevation myocardial infarction. The 12-month CV outcomes, including CV death, fatal or non-fatal ACS, and stroke did not differ between atorvastatin 80mg and atorvastatin 40mg groups (CV death: 0.7% vs. 0.2%; p-value= 0.43, ACS: 2.6% vs. 2.3%; p-value= 0.20, stroke: 0 vs. 0.8%; p-value= 0.58).

Conclusion: The use of atorvastatin 40mg after ACS in comparison to atorvastatin 80mg resulted in similar CV outcomes. Larger studies are needed to confirm these findings.

19. The Impact of Clinical Pharmacists on Medications Adherence among Myocardial Infarction Patients undergoing Primary Percutaneous Coronary Intervention: A Retrospective Observational Study.

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Introduction: Secondary prevention post myocardial infarction (MI) is achieved mainly through adherence to medications. Pharmacists provide medications counseling to ensure patients adherence. However, the impact of education provided by clinical pharmacists to patients post primary percutaneous coronary intervention (PPCI) was not yet evaluated.

Research Question or Hypothesis: Does the education provided by clinical pharmacists for MI patients undergoing PPCI improve medications adherence?

Study Design: A retrospective observational study aims to assess the impact of education provided by clinical pharmacists on adherence to post-PCI medications for 1 year after discharge among MI patients.

Methods: The study included all patients admitted with MI to the Heart Hospital in Qatar between January 1, 2016 and December 31, 2018. Adherence was assessed by medications availability 80% of the time which was monitored by rate of prescriptions refill for 1 year post discharge. Adherence was compared among those who received education by clinical pharmacists and those who did not by using Chi square test.

Results: A total of 1339 patients were included. The majority of patients included were male (96%), Asian (78%), with a mean age of 51 years. Only 26% were discharged in the morning shifts and therefore received education by clinical pharmacists, while the remaining were discharged in the evening shifts or weekends. Adherence to aspirin, P2Y12 inhibitor, statin, and beta-blocker was significantly better among patients who received education by clinical pharmacists (aspirin: 59% vs. 50% in weekend and 46% in evening shifts; p-value= 0.002, P2Y12 inhibitor: 58% vs. 49% in weekend and 46% in evening shifts; p-value= 0.004, statin: 55% vs. 48% in weekend and 44% in evening shifts; p-value= 0.012, beta-blocker: 43 vs. 38% in weekend and 33% in evening shifts; p-value= 0.001).

Conclusion: Medications counseling provided by clinical pharmacists improved significantly the adherence to post-PCI medications among MI patients.

20. Evaluation of Acute Gout Management in Hospitalized Patients with Heart Failure.

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Introduction: Glucocorticoids, non-steroidal anti-inflammatory drugs (NSAIDs), and colchicine are treatment options for acute gout. NSAIDs can be detrimental in patients with heart failure (HF). Limited data suggest that glucocorticoids are safe; however, dose and duration of therapy should be minimized. Data regarding acute gout management in hospitalized patients with HF are limited.

Research Question or Hypothesis: What is/are the most common medication(s) used to manage acute gout in hospitalized patients with HF?

Study Design: Retrospective chart review at a large, tertiary academic medical center.

Methods: Patients aged 18-70 with diagnosis of acute and/or chronic HF, admitted between January 1, 2017 and November 30, 2018, and treated for acute gout during the index hospitalization were considered for inclusion. Exclusion criteria: home corticosteroid use and/or another indication(s) for corticosteroid, NSAID, or colchicine. Data collected included demographics, concomitant diseases, type and severity of HF, laboratory data, inpatient medication doses, and route and frequency of administration, and home medications. Primary endpoint: to characterize acute gout treatment during the index hospitalization. Descriptive statistics applied.

Results: 1347 patients were screened; 52 (3.9%) remained after inclusion and exclusion criteria were applied. Of those included, the mean age was 56.7 (standard deviation (SD=11.9)), 75% were male, and 71% were black or African-American. A reduced left ventricular ejection fraction was reported for 38 patients (73%). The majority (21%, 21%) had New York Heart Association Class III/IV symptoms upon admission. Mean baseline serum creatinine was 2.38 mg/dL (SD=1.78). Seventeen (32.7%) received glucocorticoid monotherapy, 18 (34.6%) colchicine monotherapy, and 14 (26.9%) received both. Two (3.8%) received a NSAID plus colchicine. One (1.9%) received all 3 classes. Mean duration of treatment was 4.9 (SD = 5.6) days.

Conclusion: Majority of HF patients treated for a gout flare received a corticosteroid and/or colchicine. Further evaluation of the effects of treating acute gout with corticosteroids in HF patients is warranted.

21. Impact of Pharmacist Intervention in an Ambulatory Heart Failure Clinic.

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Introduction: Guideline directed medical therapy (GDMT) at target doses is known to improve outcomes in patients with heart failure with reduced ejection fraction (HFrEF). GDMT includes beta blockers, angiotensin converting enzyme inhibitors (ACEi), angiotensin receptor blockers (ARB), angiotensin receptor/neprilysin inhibitors (ARNi), and aldosterone antagonists. Pharmacist intervention can increase achievement of target doses of GDMT and reduce readmissions for patients with HFrEF. In 2014, pharmacists were incorporated into a cardiology clinic to improve adherence and assist with titration of GDMT in a large, community health-system.

Research Question or Hypothesis: The purpose of this study was to evaluate the impact of pharmacist intervention on GDMT adherence for HFrEF patients seen in the cardiology clinic.

Study Design: This study was a single-center retrospective chart review.

Methods: All patients who attended an appointment with the pharmacist in the cardiology clinic between September 1, 2014 (clinic opening) and June 30, 2019 were screened. Patients were included if they had a primary visit diagnosis of HFrEF. Patients were excluded if they saw the pharmacist only once in clinic. The primary endpoint was the percentage of patients who achieved target dose of all GDMT for HFrEF after pharmacist intervention.

Results: A total of 30 patients were included in the study. The primary endpoint occurred in 9 patients (30%). Twenty three (76.7%) patients achieved target doses of all GDMT or documented maximum tolerated doses of GDMT. Fourteen (46.7%), 15 (50%), and 22 (73.3%) patients achieved target doses of ACEi/ARB/ARNi, beta blockers, and aldosterone antagonists, respectively.

Conclusion: Incorporation of a pharmacist into the cardiology clinic increased the utilization of GDMT and assisted titration to target doses comparable with available literature At an institutional level, this data will support the growth of pharmacist services in cardiology clinics. Larger studies including cost analysis or comparisons to other disciplines could aid in further describing pharmacist benefit in this setting.

22. Assessing the need for an outpatient diuresis clinic for patients with heart failure.

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Introduction: Heart failure (HF) hospital readmissions challenge the medical field, increasing costs to patients
and hospitals. At SSM Health St. Clare Hospital-St. Louis (SC-SL), the HF readmission rate between April 1, 2018 –
March 31, 2019 was 19.2%. Previous studies found that pharmacist-led clinics and outpatient diuresis clinics reduce
hospital readmissions and costs.

Research Question or Hypothesis: How many HF readmissions to SC-SL could have been prevented if
diuresis was provided in the outpatient setting?

Study Design: Single center, retrospective review of HF readmissions.

Methods: Patients included had signs or symptoms of acute HF and a 30-day HF readmission between April 1, 2018 – March 31, 2019. Patients were excluded if they were hemodialysis-dependent, not given intravenous (IV) diuretics within 24 hours of hospitalization, or expired during the hospitalization. The primary outcome was the number of preventable 30-day HF readmissions to SC-SL, defined as patients readmitted solely for treatment with IV
diuretics. Secondary outcomes included financial consequences of readmission, total number of HF-related hospitalizations during study period, length of stay, adverse effects associated with IV diuresis, and opportunities for HF medication optimization. Data were analyzed through descriptive analysis.

Results: Ninety-three patients were included. There were 44 preventable readmissions (47.3%), accounting for a total hospital supply expense of $99,424 over 204 hospital days. Patients with preventable readmissions also accounted for a total of 130 HF-related hospitalizations during the study period. Adverse effects associated with IV
diuresis included hypotension (2.3%) and hypokalemia (18.2%). Fifty-two percent of patients had opportunities for medication optimization.

Conclusion: Nearly half of the HF readmissions studied were deemed preventable if IV diuresis had been provided in the outpatient setting. Additionally, side effects of IV diuresis were rare or remediable. These findings, in addition to the potential for decreased costs and outpatient medication optimization, support the development of a
proposal for a multidisciplinary outpatient HF diuresis clinic at SC-SL.

CLINICAL ADMINISTRATION

23. Impact of marketing tools on improving clinic utilization for clinical pharmacy specialists and patient access to care.

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Introduction: Clinical pharmacy specialists (CPS) are integral members of the healthcare team, providing comprehensive medication management services to patients. Studies have demonstrated that CPSs have a positive effect on clinical, humanistic and economic outcomes. Guidance on implementing CPS services suggests that marketing strategies may serve to optimize direct patient care activities and access to care with CPS providers. However, there is a lack of existing studies examining the impact of marketing initiatives on expansion of CPS direct patient care activities.

Research Question or Hypothesis: A quality improvement project was initiated to assess the impact of patient marketing tools on expanding clinic utilization (quantity of appointment slots filled in a clinic divided by the clinic's total capacity over a delineated timeframe) in a Mental Health (MH) Clinical Pharmacy Specialist clinic. Marketing brochures advertising MH CPS services were developed and placed at the check-in window of a multidisciplinary MH clinic. It was expected that this marketing strategy would result in improved clinic utilization and access to care.

Study Design: A before and after evaluation was conducted.

Methods: Clinic utilization for the MH CPS clinic was compared before and after the dissemination of marketing brochures. Additional metrics evaluated were number of encounters, number of unique patients, and number of clinical interventions completed by the MH CPS. The evaluation period for both groups was four months. Clinic utilization proportions were compared through statistical analysis with chi-squared for nominal data.

Results: Clinic utilization increased from 70.6% pre-intervention to 85.0% post-intervention ($p<0.01$). Number of encounters and unique patients increased by 13.9% and 11.9% post-intervention, respectively. Additionally, the number of clinical interventions completed by the MH CPS increased by 20.1% post-intervention.

Conclusion: The significant increase in clinic utilization observed, as well as increased encounter numbers, unique patients, and clinical interventions, suggest the benefit of marketing tools in improving clinic utilization and access to care in CPS clinics.

COMMUNITY PHARMACY PRACTICE

24. Pharmacy Student Knowledge and Perceptions of ASHP-Accredited PGY1 Community-Based Pharmacy Residency Programs.

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Introduction: There are currently 169 ASHP-accredited PGY1 community-based pharmacy residency programs across the country. In general, little research has been conducted on student knowledge and perceptions of PGY1 community-based residency programs. The research that has been conducted has primarily focused on past residents that have completed a community-based residency program and their career trajectory upon completing the program. There is a gap in the literature regarding how current pharmacy students perceive these programs and whether they find them valuable.

Research Question or Hypothesis: To evaluate current pharmacy students' knowledge and perceptions regarding PGY1 community-based residency programs.

Study Design: Survey-based, anonymous, multi-institutional

Methods: A 27-question survey was distributed electronically via Redcap to first through fourth year pharmacy students at 70 pharmacy schools located throughout the country. Survey questions were a mix of multiple choice, Likert scale format, and sliding scale. The questions incorporated elements of the ASHP accreditation standards to assess student knowledge and demographic-based questions to gain a better understanding of the student sample.

Results: 20 college of pharmacies sent out the survey and a total of 371 survey responses were collected. Fourth year pharmacy students felt they knew more about community residency programs compared to first, second, or third year students ($p=0.0146$). Student perceptions of being exposed to PGY1 community residency programs throughout pharmacy school curriculum did not change with year in school.

Conclusion: This study found that fourth year students believed that they knew more about community residency programs when compared to first through third year students. However, all students felt that their pharmacy schools did not expose them to this type of residency throughout their curriculum. This is a key area of opportunity for pharmacy schools and residency programs to further improve upon.

25. Working with Diabetes: An Evaluation of the Factors Associated with Enrollment in an Employer Sponsored Diabetes Management Program.

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Introduction: The success of pharmacist-led diabetes management programs have been shown through clinical and economic outcomes yet the number of patients enrolled in such programs remains less than 5% nationwide. It is the intention of this study to use data collected to drive enrollment and participation in the future.

Research Question or Hypothesis: The objective of this study is to assess the motivating factors associated with participation in a nationwide employer sponsored diabetes management program led by pharmacists. In addition, patients' perceived value regarding topic discussions and pharmacist knowledge will also be assessed.

Study Design: A survey instrument was developed by study personnel which contained 20 questions and targeted patients currently enrolled in the employer's diabetes management program.

Methods: Surveys were administered electronically via Qualtrics. Pharmacists were asked to provide all patients being seen between December 15, 2019 and February 29, 2020 the link to the survey to be completed at the patient's discretion.

Results: Survey results reveal that motivating factors include free testing supplies and medications, management support, and improving overall health. In ranking topic discussions, patients tended to rank diabetes related topics higher than those pertaining to other disease states. Over 90% of patients report that they were “very satisfied” with the discussions they've had with their pharmacists and 100% of patients reported they were “very satisfied” with their pharmacists' knowledge about diabetes. On the contrary, over half of participants

reported that lack of knowledge about the program prevented them from enrolling sooner.

Conclusion: Results support previous studies that suggest pharmacists are well-trained and play a significant role in helping patients manage their diabetes. A significant barrier to enrollment was lack of knowledge about the program and it was a major limiting factor for participation. Factors that increase likelihood of patient participation are variable, but generally focus on incentives, personalized support, and motivation to improve health.

26. Utilizing the PPCP with structured peer review to increase knowledge retention.

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Introduction: Simulated patient care activities using the Pharmacist Patient Care Process (PPCP) allow students to practice knowledge learned in the classroom. There is no research to date that incorporates the PPCP with a structured peer review process in a pharmacy self-care therapeutics course.

Research Question or Hypothesis: Using the PPCP with structured peer review will improve knowledge retention and student course evaluations in a self-care therapeutics course.

Study Design: Quantitative, comparative study of exam performance and student perception

Methods: Students in the control group were in a partially flipped classroom and received a comprehensive final exam review. Students in the study group were in a flipped classroom where simulated patient activities were used to emphasize the PPCP, and did not receive comprehensive exam reviews. The final exam performance of the control group was compared to final exam performance of the study group to evaluate if students retained knowledge throughout the semester without the need of the comprehensive exam review. Student perception of the course were evaluated using 3 questions from teacher course evaluations (TCEs).

Results: Exam Performance

The control group's exam average was 76% (0.52-0.96) with an assessment score reliability of 0.63. The study group exam average was 76% (0.52-0.94) with an assessment score reliability of 0.59.

TCE Results

A total of 234 students evaluated the course using a 5 point Likert scare. The study group evaluated the course more favorably than the control group (2.89 ± 1.15 vs 3.47 ± 1.03), the time spent as more valuable (3.56 ± 1.13 vs 4.02 ± 0.86), and the amount learned as increased (3.63 ± 1.09 vs 4.06 ± 0.82).

Conclusion: Utilizing the PPCP in a flipped style classroom increases student satisfaction and may maintain knowledge retention without the need for a comprehensive exam review.

27. Pharmacy Personnel's Perspectives and Perceived Barriers to Pharmacist-Prescribing Tobacco Cessation Services in the Community Pharmacy Setting.

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Introduction: Tobacco use is a leading cause of morbidity and mortality in the United States. Community pharmacies can help reduce rates of tobacco use by increasing patient access to tobacco cessation services. Pharmacists are permitted to prescribe tobacco cessation medications in 12 states. Potential barriers and pharmacy personnel views are needed to determine how to optimally implement this new prescriptive service.

Research Question or Hypothesis: The primary objective was to evaluate perspectives and perceived barriers Albertsons Companies' pharmacy personnel have to providing pharmacist-prescribed tobacco cessation services in the community pharmacy setting.

Study Design: This study was a descriptive cross-sectional survey of Albertsons Companies' pharmacy personnel in states with tobacco cessation prescriptive authority.

Methods: An electronic survey was posted on the company's internal bulletin for one month. The survey asked about demographics; current practices of the 5 A's Counseling Model; perceived barriers, beliefs and attitudes towards the service; and training needed to provide the service. Descriptive statistics were used for data analysis. The study received IRB approval.

Results: Results showed that 91.6% (76/83) of pharmacy personnel think that community pharmacies should provide tobacco cessation services. Pharmacists do not regularly practice the 5 A's Model. Pharmacists' responses of “never” or “somewhat infrequently” to how often they practice asking patients of their tobacco use was 74.7% (59/79). Other steps in the 5 A's model showed similar responses. The biggest barrier identified by pharmacy personnel at 51.8% (44/83) was “lack of time during normal workflow”. The top needed training pharmacists identified was “strategies developing a follow-up plan”.

Conclusion: Majority of pharmacy personnel think tobacco cessation services should be offered in the community pharmacy setting. The biggest barrier to providing these services is the lack of time. Pharmacists indicate the need for additional training in order to optimally implement the service.

28. What are Pet Owners' Perceptions, Awareness and Satisfaction with the Pharmacist's Role in Counseling and the Dispensing of Medications for Pets?.

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Introduction: There is a recent trend suggesting an increase in pet ownership among US households. In order to expand pet med services, we need to understand the pet owner's perception and expectations of the pharmacist's role within the community pharmacy setting. This study plans to fill this gap in knowledge by providing information on patients views and expectations of community pharmacist involved in pet care.

Research Question or Hypothesis: The primary objective of this study was to assess pet owners' perceptions and expectations of pharmacists' roles in dispensing medications for pets at the community pharmacy.

Study Design: The research design was descriptive, prospective, survey-based study. Data collection occurred during October 2019 to January 2020. Two community pharmacies were recruiting voluntary participants.

Methods: A cross-sectional, anonymous survey was created to assess the study objective. The survey included three sections with a variety of questions (multiple choice, Likert scale, open-ended). The first section assessed pet owner's demographic information. This section contained open-ended questions.The second section inquired about pet owner's experience with pet medication services available at the community pharmacy. The last section assessed pet owners' attitudes and satisfaction with community pharmacists. The study population inclusion criteria were Safeway pharmacy patients older than 18 that consented to voluntarily participate in the survey. Exclusion criteria included patients that don't have any pets, those under the age of 18, and those who declined to consent or voluntarily participate.

- **Results:** Total 60 pet owners enrolled into the study
- 67% of pet owners fill pet meds prescriptions at the vet office
- 43% of pet owners obtain pet vaccines from the vet office
- 73% of pet owners feel confident in community pharmacists providing education on pet meds
- 77% of pet owners feel confident in community pharmacists dispensing pet meds

Conclusion: Collected data demonstrated overall positive patients' perspective of community pharmacists involved in the pet medications dispensing and counseling.

29. Quantification of Admission Diagnoses in a Non-Targeted Employer-Based Transition of Care Program.

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Introduction: Transitions of care (TOC) programs are implemented to improve patient care, prevent hospital readmissions, and lower penalties associated with readmissions. Medicare's Hospital Readmission Reduction Program (HRRP), a value-based care model, targets acute myocardial infarction, chronic obstructive pulmonary disease, heart failure, pneumonia, coronary artery bypass graft surgery, and elective total hip or knee arthroplasty. Reimbursement restrictions apply if a patient readmits to the hospital within 30 days for the same condition. Many TOC programs target the HRRP conditions. Balls Foods Stores (BFS), a self-insured grocery store chain within the Kansas City metropolitan area, provides a non-targeted, employee-focused TOC program. Limited data exists on the prevalence of non-targeted diseases within TOC programs.

Research Question or Hypothesis: To quantify admission diagnoses in a non-targeted employer-based TOC program.

Study Design: Retrospective evaluation using data collected within the BFS TOC program.

Methods: Hospital admission ICD-10 codes were received from the plan administrator for admissions between January 1, 2017 and August 31, 2019. Each diagnosis was categorized into appropriate anatomical and physiological groups using 2020 ICD-10-CM categories. Each researcher independently reviewed admission ICD-10 code categorization to minimize misclassification.

Results: A total of 328 hospital admissions for 180 patients were included for analysis. Eighty-nine males and 91 females comprised the study population. The mean age for the study population was 53.6 ±14.4years. Forty-three individual patients accounted for 58 admissions related to HRRP conditions. Of the 21 ICD-10-CM categories, 17 categories were represented with at least one hospitalization by the study population. The highest rate of admissions for non-targeted conditions was in the digestive category (n=59) while elective total hip and knee replacement was the most prevalent HRRP condition (n=30).

Conclusion: A wide variety of diagnoses were observed in the BFS TOC program. If program eligibility were changed to focus on conditions included in the HRRP, the scope of the program would be significantly limited.

CRITICAL CARE

30. Comparing Weight Based and Non-Weight Based Norepinephrine Dosing Strategies.

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Introduction: Although norepinephrine (NE) is designated a high-risk medication, there is little guidance on how it should be dosed. Current

literature has not identified a clear benefit of either weight based (WBD) or non-weight based (non-WBD) dosing of NE.

Research Question or Hypothesis: How do different dosing strategies affect the use of norepinephrine?

Study Design: This single-centered, retrospective cohort study was conducted following a protocol update from non-WBD to WBD of NE infusions.

Methods: Critical care patients that received NE as their initial vasopressor for greater than 1 hour were included. The primary outcome was to assess differences in NE usage when using non-WBD versus WBD. Secondary outcomes included initial and maximum NE infusion rate, cumulative NE dose, and use of a second or third vasopressor. Discrete and continuous data were analyzed with the Chi Squared and Mann-Whitney U tests, respectively.

Results: Sixty-nine patients were included in the study, with 32 receiving non-WBD and 37 receiving WBD. Demographics were similar, but SOFA score (12 vs 8, p<0.001) and mortality (78% vs 24%, p<0.001) were higher in the non-WBD group. The non-WBD group received significantly higher initial (6.5 vs 3.3 mcg/min, p=0.023) and maximum (29 vs 11 mcg/min, p=0.043) NE infusion rates and required higher cumulative doses of NE (39 vs 7 mg, p=0.003). Non-WBD patients also required more second (72% vs 22%, p<0.001) and third (38% vs 8%, p=0.003) vasopressors.

Conclusion: The study was limited by its small sample size and retrospective nature, as well as significant difference in severity of illness between the groups. Although non-WBD patients received significantly higher infusion rates and dosages of norepinephrine, the finding may be confounded by the increased mortality in this group. Future research should examine the impact of NE dosing strategies on clinical outcomes.

31. Low fixed dose four factor prothrombin complex concentrate (4F-PCC) for Vitamin K antagonist (VKA) reversal.

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Introduction: 4F-PCC is approved for VKA reversal due to life-threatening bleeds or emergent surgery. In 2017, the American College of Cardiology consensus added the use of low fixed doses of 1000 and 1500 IU of 4F-PCC in addition to weight-based dosing.

Research Question or Hypothesis: Is low fixed dose 4F-PCC effective at INR reversal?

Study Design: This is an institutional review board exempt single-center retrospective chart review.

Methods: Patients were included if they received 1000 or 1500 IU of 4F-PCC, were ≥18 years old, on a VKA with INR ≥1.6, and required reversal for urgent surgery and/or life-threatening bleed. The primary outcome is percent of complete INR reversal, defined as ≤1.5 and ≤1.3. A subgroup analysis evaluated patients in INR groups of <2, 2-4 and 4-6. Secondary endpoints include, incidence of thrombosis, mortality within 30 days, percent of patients administered fresh frozen plasma (FFP) or a repeat dose of 4F-PCC and length of stay (LOS).

Results: Twenty-two patients were evaluated. INR reversal to ≤1.5 and ≤1.3 was achieved in 16/22 (73%) and 11/22 (50%) patients respectively. In the INR <2 group, three (100%) patients achieved both INR goals. In the INR group 2-4, 13 (76%) patients achieved INR ≤1.5 and 17 (47%) patients achieved INR ≤1.3. In the INR 4-6 group no patients reversed to either INR goal. Incidence of thrombosis occurred in one patient and mortality within 30 days occurred in five patients. Five (23%) patients received FFP, none required a repeat dose of 4F-PCC and average LOS was 10.2 days.

Conclusion: Majority of patients with INRs <4 reversed to an INR ≤1.5. Patients with INRs >4 did not reverse with doses of 1000 or 1500 IU of 4F-PCC. Further studies are warranted to determine if low fixed doses of 4F-PCC are only efficacious in patients with lower INRs.

32. Evaluation of clevidipine versus nicardipine in the treatment of perioperative hypertension in patients undergoing cardiac surgery.

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Introduction: Recently Einstein Medical Center Philadelphia switched from nicardipine to clevidipine for perioperative blood pressure control for cardiac surgery patients. A previous pilot study at this institution suggested that clevidipine was more expensive than nicardipine, with no statistically significant differences in efficacy.

Research Question or Hypothesis: The objective of this study is to confirm our previous results with a larger patient population.

Study Design: This is an institutional review board exempt single-center retrospective study.

Methods: There were 201 cardiac surgeries performed between August 2018 to January 2019, and July 2019 to February 2020. Sixty-seven patients met our inclusion criteria of receiving either clevidipine (n = 29) or nicardipine (n = 38). Patients were followed for the duration of study drug infusion or for a maximum of 48 hours. Outcomes assessed included the percent of time spent within patient specific goal blood pressure, incidence of hypertensive events per patient, incidence of hypotensive events per group, incidence of atrial fibrillation, and difference in cost of medication treatment.

Results: The median percent of time spent within goal blood pressure for clevidipine was 55.21% compared to 36.41% for nicardipine treatment (p-value = 0.036). The median number of hypertensive episodes per patient was 3 for clevidipine and 2 for nicardipine (p-value = 0.211).

Eight patients experienced hypotensive episodes in the clevidipine group versus nine in the nicardipine group (p-value = 0.78). There was one occurrence of atrial fibrillation in the nicardipine group. The median cost of treatment required for the observed 48-hour period with clevidipine was $128.58 compared to $55.74 for nicardipine (p-value < 0.001).

Conclusion: Our findings suggest that patients undergoing cardiac surgery on clevidipine had better perioperative blood pressure control compared to nicardipine, with a significant increase in cost, but no observed difference in safety.

33. An Evaluation of Vancomycin use in Patients with Urosepsis.

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Introduction: Urosepsis originates from the urinary tract and accounts for approximately 9% of sepsis cases. Gram-negative pathogens cause most infections, while the prevalence of gram-positive bacteria, including MRSA, causing urosepsis has been reported at low rates. Vancomycin, which may be utilized as empiric therapy commonly in patients with sepsis, may be unnecessary in patients with urosepsis since MRSA is an uncommon pathogen. Outcomes of vancomycin use in this population have not been well studied.

Research Question or Hypothesis: How often is empirical vancomycin be used for urosepsis and what outcomes are associated with its use?

Study Design: Retrospective cohort study of patients admitted to a single institution from January 2018 to November 2019 with a diagnosis of urosepsis.

Methods: Investigators collected data on patient demographics, antibiotic utilization, vancomycin dosing, serum trough concentrations, urinary pathogens, and concomitant medications that may contribute to nephrotoxicity. Descriptive statistics were used to report the prevalence of vancomycin use and urinary pathogens obtained. A chi-square test was utilized to assess the primary endpoint of acute kidney injury incidence, defined as an increase by 1.5x or more the first serum creatinine level obtained upon admission.

Results: A total of 247 patients reviewed, 145 patients received vancomycin as part of an empiric regimen for urosepsis. Only two patients (0.8%), both of whom received empiric vancomycin, were found to have MRSA as a urinary pathogen. Seven (4.8%) patients receiving IV vancomycin developed an AKI compared to 2 (2%) patients in the comparator group (p = 0.3).

Conclusion: Vancomycin empirical use in urosepsis patients is not always indicated and patient-specific risk factors should be taken into consideration prior to initiation. This study indicates that the incidence of AKI was not more prevalent in patients receiving IV vancomycin compared to those that did not.

34. The Hidden Chloride Load- Assessing the impact of changing medication diluents in critically ill septic patients.

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Introduction: The Surviving Sepsis Campaign International Guidelines recommends crystalloids as the fluid therapy of choice for resuscitation in sepsis and septic shock. The use of 0.9% sodium chloride as a diluent and resuscitation fluid has recently been evaluated as a contributing factor for elevated serum chloride levels in critically ill patients. We investigate the effect of 0.9% sodium chloride and 5% dextrose in water as the diluent of choice on incidence of hyperchloremia in critically ill septic patients.

Research Question or Hypothesis: What is the impact of changing medication diluents to chloride free solutions on clinical outcomes?

Study Design: This is a quasi-experimental study in a 16-bed medical ICU (MICU) of a large academic medical center.

Methods: Patients admitted to the MICU between 1/1/2018 – 6/30/2019 with a diagnosis of sepsis were included in the pre-intervention group and those meeting the inclusion criteria between 10/1/2019 – 12/31/2019 were included in the post-intervention group. Patients were excluded if they were < 18 years of age, pregnant, had a diagnosis or suspicion of a head injury, cerebral edema or and hyperglycemic crisis.

Results: Two-hundred and ninety-six patients in the pre-protocol group and 32 patients in the post-protocol group met inclusion criteria. Seventy-seven patients (26%) in the pre-protocol and 9 patients (28.1%) in the post-protocol group were hyperchloremic (p = 0.79). Forty (13.5%) and 2 patients (6.3%) were hyponatremic in the pre-protocol and post-protocol groups respectively (p = 0.28). Twenty-three (7.8%) and 2 patients (6.3%) were hyperglycemic in the pre-protocol and post-protocol groups respectively (p = 0.76) These differences were not statistically significant and there were no differences in any other outcomes.

Conclusion: In critically ill septic patients changing medication diluents did not significantly impact the incidence of hyperchloremia.

35. Real World Experience with Angiotensin II in Refractory Shock.

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Introduction: Refractory shock is characterized by an inadequate response to conventional catecholamine vasopressors and is

associated with increased mortality. A novel agent, Giapreza™ (Angiotensin II, ATII), was FDA approved in 2017 for refractory shock. Safety and efficacy data from a pragmatic setting are lacking.

Research Question or Hypothesis: To Describe two institution's real-world experiences with ATII.

Study Design: A retrospective cohort study was conducted in the Northeast Georgia Health System. Adult patients admitted between June 2018 and January 2019 who received ATII were included.

Methods: The primary outcome was to characterize when, how, and in what patients ATII was prescribed. Secondary outcomes included hemodynamic response, incidence of venous thromboembolism (VTE), inpatient mortality, and drug expenditure. Descriptive statistics were used.

Results: Patients (n=34) were mostly female with mixed shock states, had a median age of 68 years, and were receiving a median of three vasopressors at the time of ATII initiation. Patients received ATII for a median of 18 hours (range from 18 minutes to 5 days). Median initial dose of ATII was 10ng/kg/min. Within 3 hours of ATII initiation, MAP increased by a median of 15 mmHg. The median time to reach MAP ≥65 mmHg was 16 minutes. Twenty-seven patients received VTE prophylaxis and three of these (9%) developed a VTE within 28 days. Fifteen patients (44%) did not survive to discharge. The median drug expenditure was $3,000 per patient (cumulative expenditure $186,000).

Conclusion: Limitations of this study include its small sample size, retrospective design, and lack of a control group. This is the largest case series of ATII to date and the only one to include mixed shock states. The study observed a positive hemodynamic response to ATII and a lower mortality rate in refractory states. Future research should compare the safety and efficacy of ATII to other second-line vasoactive agents (e.g., vasopressin).

36. Pharmacist-driven Fluid Stewardship Recommendations Related to Hidden Fluids in Medically Critically Ill Adults.

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Introduction: Intravenous fluids (IVF) are the most frequently administered drugs in the intensive care unit (ICU) and should be used with caution due to the risk of fluid overload, which is associated with increased mortality and organ dysfunction. Hidden fluids, defined as fluids administered as part of routine care whose volumes are not explicitly prescribed (e.g. diluents, flushes), can cause or exacerbate fluid overload.

Research Question or Hypothesis: What proportion of pharmacist-driven recommendations are related to hidden fluids?

Study Design: This single center, retrospective study included adult ICU patients that were followed on academic rounds

Methods: Pharmacist recommendations were reviewed for relevance to fluid stewardship and were further stratified to their relation to hidden fluids. Definitions of recommendations classified as fluid stewardship and as hidden fluids were defined by the investigators a priori. The primary outcome was the percentage of recommendations that related to hidden fluids. Secondary outcomes included characterization of hidden fluids according to specific recommendations. Descriptive statistics were used to report all outcomes.

Results: This study included 350 patients accounting for 905 total patient days with 2731 pharmacy recommendations reviewed. There was a total of 531 fluid stewardship recommendations with 194 (36%) related to hidden fluids. Of the 194 hidden fluid recommendations, 151 recommendations were to convert medications from IV to non-IV routes, 39 to discontinue/adjust volume of enteral fluid, 3 to concentrate infusions, and 1 to adjust volume of parenteral nutrition.

Conclusion: More than one-third of all pharmacist-driven fluid stewardship recommendations were related to hidden fluids. Pharmacists should consider hidden fluids as a routine assessment of patient care to help mitigate the consequences of fluid overload. This study was limited by its single-centered nature and the use of a singular reviewer to characterize recommendations. Future research should examine the relationship between fluid-related recommendations and patient outcomes.

37. Pharmacist-driven Fluid Stewardship Recommendations: Four Rights and ROSE Model.

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Introduction: The use of intravenous fluids (IVF) is nearly ubiquitous in the intensive care unit (ICU) and can have a significant impact on patient outcomes. The purpose of this study was to identify and categorize pharmacist recommendations related to the four rights of fluid stewardship and ROSE model of fluid administration.

Research Question or Hypothesis: It was hypothesized that a significant number of pharmacist recommendations would be related to fluid administration.

Study Design: A retrospective, single-center cohort study was performed at a community hospital. All adults admitted to the medical ICU and followed by the academic rounding team were evaluated.

Methods: The primary outcome was the percentage of pharmacy recommendations related to fluid stewardship. Secondary outcomes included the number and percentage of recommendations stratified by the four rights and stages of the ROSE model. Categorization of each recommendation type was determined by consensus of the investigators *a priori*. Descriptive statistics were used for all outcomes.
Results: A total of 905 patient days were evaluated, consisting of data from 350 patients and 2731 pharmacy recommendations. Of these recommendations, 531 (18.9%) were related to fluid stewardship. In regards to the four rights, 202 (40.9%), 92 (17.2%), 172 (30%), and 65 (11.9%) recommendations were related to the right patient, drug, route, and dose, respectively. The rescue, optimization, stabilization, and evacuation phases of the ROSE model comprised 4 (0.72%), 21 (4.1%), 418 (78.8%), and 88 (16.4%) recommendations, respectively.
Conclusion: Almost one-fifth of all pharmacist recommendations were related to fluid stewardship. The study was limited by the potential for inaccurate classification of recommendations by a single reviewer. The study highlights the frequency by which the pharmacist can impact fluid administration in the ICU and can be used as a model for clinical pharmacists. Future research will look at the acceptance rate of recommendations and subsequent effect on patient outcomes.

38. Effect of vasopressor discontinuation order on the incidence of hypotension in patients with septic shock and left ventricular dysfunction.

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Introduction: Limited data exist addressing the safest discontinuation order of vasopressors upon resolution of septic shock. Untimely discontinuation of vasopressors may precipitate hypotension. Previous data identified an increased severity of hypotension when vasopressin was discontinued before norepinephrine; however, few patients with cardiac dysfunction were analyzed. The purpose of this study was to evaluate the incidence of hypotension upon discontinuation of either norepinephrine or vasopressin in patients with septic shock and left ventricular dysfunction requiring multiple vasopressors for hemodynamic support.
Research Question or Hypothesis: Does the discontinuation order of norepinephrine and vasopressin impact the incidence of clinically significant hypotension in patients with septic shock and left ventricular dysfunction?
Study Design: Single-center retrospective cohort
Methods: In this single-center retrospective cohort study from January 2015 to June 2019, adult patients included were admitted to the ICU, met the Sepsis-3 septic shock definition, had a left ventricular ejection fraction below 40 percent, and received continuous infusions of norepinephrine and vasopressin. The primary outcome was the incidence of clinically significant hypotension. Secondary objectives included vasopressor infusion duration, ICU and hospital lengths of stay, and hospital mortality. Outcomes were evaluated with a chi-square test.
Results: A total of 78 patients were included. In the group where vasopressin was discontinued first, 75.7 percent of patients experienced clinically significant hypotension, whereas 80.5 percent of patients experienced clinically significant hypotension in the group where norepinephrine was discontinued first (p-value 0.6). The hospital mortality rate was 29.7 percent for the vasopressin group and 36.6 percent for the norepinephrine group.
Conclusion: Discontinuing vasopressin before norepinephrine led to fewer incidences of clinically significant hypotension in patients with septic shock and left ventricular dysfunction. Further and larger studies are crucial in determining significant outcomes.

39. Characteristics and consequences of dexmedetomidine-induced fever in adult critically ill patients.

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Introduction: Dexmedetomidine, a commonly used sedative, has been associated with fever in case reports. Lack of recognition may lead to unnecessary, harmful, or costly interventions. Current evidence for dexmedetomidine-induced fever (DF) is limited to case reports/series; further research is needed to characterize the incidence, severity, and consequences.
Research Question or Hypothesis: Unrecognized cases of dexmedetomidine-induced fever will lead to an escalation of care and negative consequences.
Study Design: A retrospective chart review conducted at two teaching hospitals.
Methods: The primary outcome was percentage of patients that required an escalation of care due to fever. Secondary outcomes included the percentage of patients that developed a multi-drug resistant organism (MDRO) or *C. difficile* infection (CDI). Adults who received dexmedetomidine from 2011-2019 were screened. Afebrile subjects who developed fever ≥ 39°C for two instances within 12 hours from initiation of dexmedetomidine and had resolution of fever to < 39°C within 12 hours after discontinuation were included. Subjects were required to have one temperature ≥ 38.3°C within four hours prior to discontinuation. Subjects with known causes of fever

or receiving therapies that could mask fever were excluded. Data was assessed by descriptive statistics.

Results: Eighteen of 4,116 patients met criteria for DF (0.4%). The majority were white (83.3%), male (66.7%), and underwent cardiac surgery (61.1%). Median (IQR) time to fever onset and resolution were 5.5 (3.6-7.6) and 1.3 (1.0-2.9) hours. Nine patients (50.0%) underwent infectious workup: antimicrobial initiation (5.6%), broadening of antimicrobials (22.2%), or culture collection (50.0%). Eleven patients (61.1%) underwent attempted temperature reduction. Seventeen patients (94.4%) underwent diagnostic imaging. Incidence of MDRO and CDI were low (11.1% and 16.7%, respectively).

Conclusion: Incidence of DF was low and more common in cardiac surgery. Unrecognized DF led to a significant escalation of care in most patients; however, development of MDRO and CDI were infrequent.

40. Evaluation of the use of combination intravenous vitamin C, hydrocortisone, and thiamine as adjunct therapy for treatment of septic shock in a community-hospital.

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Introduction: The results of Marik PE, et al. suggest the combination of intravenous vitamin C, hydrocortisone and thiamine may prevent progression of organ dysfunction and reduce mortality in patients diagnosed with septic shock. Although the results of the trial are both statistically and clinically significant, additional studies are warranted to confirm the results.

Research Question or Hypothesis: Does administration of combination intravenous vitamin C, thiamine, and hydrocortisone result in decreased mortality in septic shock patients at a community hospital?

Study Design: This retrospective chart review was submitted to the Pharmacy and Therapeutics committee for approval. 83 patients admitted to the adult intensive care unit (ICU) with the primary diagnosis of septic shock before and after Marik protocol implementation were included in the study.

Methods: Data was collected and compared to a pre-implementation cohort of patients from Electronic Medical Records. The primary outcome was in-hospital mortality. 6 secondary outcomes were assessed including mean ICU length of stay and duration of vasopressors. The results were analyzed with a student's t-test and statistical significance was calculated. A 2-sided p value of < 0.05 was used to indicate significance.

Results: At baseline, fewer patients in the pre-implementation group had diabetes (17.1% vs. 42.9%) and chronic kidney disease (19.5% vs. 31%). The primary endpoint of incidence of hospital mortality was moderately decreased in the treatment group (24.4% vs. 28.9%; p=0.67). Both the mean ICU length of stay (5.6 vs. 4.4; p=0.19) and duration of vasopressors (84 vs. 41.2; p=0.13) were longer in the treatment group.

Conclusion: In this small observational study, the combination of intravenous vitamin C, hydrocortisone, and thiamine showed a modest, yet statistically non-significant mortality benefit in vasopressor-dependent patients with septic shock. The results of this study suggest that more information is needed in order to recommend the use of this intravenous sepsis cocktail.

DRUG INFORMATION

41. Blood pressure effects of antihypertensive medications as reported in the labeling approved by the United States Food and Drug Administration.

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Introduction: In January 2006, the United States Food & Drug Administration (FDA) published a document describing information needed in the medication label to guide prescribing. The Clinical Studies section of the label should provide clinical trial details on how the drug was used, in whom, and monitored parameters. Since many antihypertensive medications were approved prior to 2006, it is unknown whether their labels include these details.

Research Question or Hypothesis: What evidence is provided in the FDA-approved labeling of antihypertensive medications to guide prescribing to achieve goal BP?

Study Design: Qualitative research study using document analysis

Methods: The FDA-approved labels for antihypertensive medications listed in a 2017 national guideline were obtained. The Clinical Studies section of the label was used to determine whether the label included clinical trial details, dose-specific changes in BP, and achievement of target BP values. Descriptive statistics included percentages of antihypertensive medication labels containing these elements.

Results: The labels for 57 currently marketed antihypertensive medications were included in this study. Only 18% (n=10) of the drug labels were for medications approved in 2006 or later. Clinical trial details were found in 53% (n=30) of labels. Data on BP reduction was found in 61% (n=35) of labels with 23 of those labels reporting dose-specific BP reduction data. Labels with indications for initial treatment of hypertension had higher rates of providing dose-specific BP reduction data compared to labels only indicated for subsequent use (20 of 45 [44%] vs. 3 of 12 [25%]). Only 7% (n=4) of labels provided information about attainment of target BP.

Conclusion: Important information to guide prescribing is missing in about half of the labels of currently marketed antihypertensive medications. Additional knowledge about dose-specific BP effects can assist with efficient achievement of patient-centered BP goals. An opportunity exists to obtain and report this needed information.

42. Medication use evaluation of intravenous immunoglobulin (IVIG) utilization and guideline compliance at a large community teaching hospital.

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Introduction: Intravenous immunoglobulin (IVIG) therapy was first approved for immunodeficiency disease treatment in 1952. Since then, many proposed indications have emerged and may attribute to its excessive use and the high cost. Currently, a nationwide shortage of IVIG has placed pressures on health systems to implement conservation measures.

Research Question or Hypothesis: The purpose of this study was to evaluate compliance of an IVIG guideline, medication utilization, dosing and indication at our institution.

Study Design: This single-center retrospective chart review study was performed at a large community teaching hospital. The study included adult patients who received at least one dose of IVIG from May 1, 2017 through August 31, 2019. Patients who received IVIG for outpatient use were excluded from the study. The electronic medical record was utilized to screen and identify patients for eligibility.

Methods: In the study IVIG utilization was assessed by collecting patient demographics, dosing weights, IVIG regimen duration and total dose, order indication and nursing administration. The study also aimed to evaluate institutional IVIG ideal body weight (IBW) guideline compliance as well as an estimated product savings analysis. Descriptive statistics were used to compare patient demographics and characteristics.

Results: Of the 67 total IVIG orders analyzed, the study found common IVIG dose selection included 0.4 g/kg (21, 33%) and 0.5 g/kg (19, 30%) doses with an average duration of therapy 3.3 days. Orders were primarily prescribed for ITP treatment (28, 42%). Our institution observed an IVIG cost savings of 38% due to implementation of IBW dosing guideline and remained adherent to the guideline in 96% of IVIG orders analyzed. In addition, we observed that IVIG nursing administration was inconsistently reported with only 78% of doses scanned to be administered correctly.

Conclusion: Our study demonstrated that a majority of IVIG use adhered to institutional guidelines and was prescribed for the indication of ITP.

EDUCATION/TRAINING

43. Expanding student knowledge and confidence on dietary supplements through mock patient consultations.

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Introduction: Dietary supplement (DS) usage is projected to increase in the United States. Since pharmacists are the most accessible healthcare providers, they must be able to answer DS questions and provide appropriate counseling. Accordingly, student pharmacists should be prepared to assess the appropriateness of DS for individuals who may have comorbid conditions and concomitant drugs.

Research Question or Hypothesis: The purpose of this project was to assess the impact of a mock patient consultation activity regarding common DS used in community practice on second year Doctor of Pharmacy students at the University of Rhode Island.

Study Design: Prospective cohort, pre-post test

Methods: Twenty-four detailed patient vignettes were created covering 45 supplements. Students had 10 minutes to speak with their patient actor to obtain needed information to make an appropriate recommendation in the form of a 2 to 3-minute oral response. Anonymous, voluntary pre- and post-project surveys assessing perceived DS knowledge, patient counseling skills, and attitudes about the project were conducted during class through Google Forms. For the 10-point-Likert scale survey items, we used mean ± standard deviation for analyses. The Wilcoxon Signed-Rank Test was used to determine differences in mean Likert scale score between pre- and post-test for each of the survey questions. For qualitative measures we used proportions to estimate what the students hoped to gain from completing the activity.

Results: Significant differences were found between the pre- and post-survey Likert scale means regarding abilities to use the QuEST and SCHOLAR-MAC approaches to self-care counseling, assessing appropriateness of DS and medication use, and counseling on five selected DS. Additionally, students reported both increased confidence in speaking with patients and having greater knowledge on DS.

Conclusion: Students felt more confident with patient counseling and had improved DS knowledge after completing the mock consultations. The assignment was well-received and provided the class with a practical way to advance their skills.

44. Assessing the Impact of a Journal Club Elective on Literature Evaluation Performance.

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Introduction: Data shows literature evaluation skills training improves student and preceptor perceptions of students' ability to perform these skills on advanced pharmacy practice experiences (APPE). However, there is limited data to evaluate if increased training improves student scores. Additionally, there is little data comparing faculty vs. non-faculty preceptor APPE scores.

Research Question or Hypothesis: Does an additional didactic journal club (JC) elective impact future literature evaluation performance during the first three APPEs when compared to students with standard training? Does faculty preceptorship impact scores?

Study Design: Two-year, retrospective, observational, cohort pilot study

Methods: Students who took a JC elective were compared to students who did not take the elective regarding scores on APPE JC and overall APPE literature evaluation. Factors influencing average APPE JC scores were considered, including faculty preceptorship.

Results: Of 186 eligible participants, 22 completed the JC elective. APPE JC and APPE literature evaluation scores were similar between groups. APPE JC scores during the first trimester were positively correlated with scores earned in the JC elective (R 0.452, p=0.045). One or repeat (two or more) faculty preceptors were both negatively correlated with the average APPE JC score (r -0.413, p<0.001; and r -0.428, p<0.001, respectively). In a regression analysis, JC elective score and overall APPE literature evaluation score were predictors for average APPE JC score (R 0.729, p=0.005).

Conclusion: Although students in a JC elective did not have significantly different APPE JC scores as compared to students who did not take the elective, there was a correlation and potential predictive association to APPE JC scores. A JC elective may identify students at risk of lower APPE JC performance so that support may be provided. Scores were significantly different between faculty and non-faculty preceptors which raises questions about programmatic changes to improve rubric validity and inter-rater reliability.

45. Assessing pharmacists' knowledge of narcotic inventory management using a computer-based educational platform.

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Introduction: Canada has an opioid crisis and pharmacy diversions have been identified as a contributor to the problem. Hence, it is critical for pharmacists to take all necessary steps to protect their narcotic inventory. We worked with federal and provincial regulators, to develop a module for Pharmacy5in5.ca, a computer-based educational platform, to provide pharmacy professionals with information to manage narcotic inventory.]

Research Question or Hypothesis: Can a computer-based education platform be used to educate pharmacy professionals on narcotic inventory management?

Study Design: A cross-sectional study using data collected from the first four months after module release (Fall 2019).

Methods: Pharmacy5in5 users were invited to complete the module's quizzes and self-reflection questions. Descriptive statistics were used to analyze users' performance. Regression models were used to investigate the effect of demographic factors on user performance.

Results: A total of 792 users accessed the module during the study period. Most were licenced pharmacists (64%), and female (72%). The majority received their training in Canada (68%). The highest mean score was achieved on the quiz addressing steps to reconciling inventory (93%), and lowest on the quiz reviewing how to prepare for a Health Canada inspection (66%). Most pharmacists reported having performed a physical count (92%), and full reconciliation (85%) in the previous six months, while only 50% had reported a narcotic loss to Health Canada.

Conclusion: The high uptake of the module in a relatively short period represents the high awareness about opioid crisis among pharmacists. After reviewing Pharmacy 5in5 resources, most users were knowledgeable about inventory reconciliation, but had less knowledge about managing unexpected inventory discrepancies or preparing for regulatory inspections.

46. Attitudes and perceptions for additional residency training: the value of postgraduate year three (PGY-3) residency.

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Introduction: While PGY-1 residencies offer entry-level exposure to pharmacy and PGY-2s provide an advanced specialty focus, PGY-3 residencies could fill in the gaps in key training areas. Presently there is a paucity of PGY-3 pharmacy programs, a question of its value in practice, and lack of standardization for training.

Research Question or Hypothesis: What are the attitudes and perceptions of pharmacists for PGY-3 residency compared to other avenues of career advancement?

Study Design: Cross-sectional study measuring residency program members' attitudes and perceptions of PGY-3 training.

Methods: A 28-item online questionnaire was e-mailed to all accredited residency program members between January – March 2019. Questions were anonymous and assessed participant's perceptions for PGY-3 programs regarding familiarity with concept, benefits and limitations, and program structure. Statements on a 7-point Likert scale measured the respondent's attitudes for PGY-3 residency involving its standardization, effect on the job market, and personal impact. Descriptive analyses were reported for the differences in PGY-3 residency perceptions. Categorical data was analyzed using chi-square tests with a 95% confidence interval on SPSS®.

Results: 845 individuals participated in the survey with a 22.47% response rate. Only 288 pharmacists were familiar with PGY-3 training (34.4%). Benefits of PGY-3 included job specialization (34.41%), additional training (19.93%), and research skills (5.44%). PGY-3 training limitations included finances (21.62%), lack of justification (13.83%), and time commitments (12.94%). Board certifications (49.5%), scholarly activity (19.8%), and pharmacy organizational leadership (19.2%) were higher rated areas for career advancement over PGY-3. The majority of participants opposed the standardization of PGY-3 programs and had negative preconceptions of its implications on the job market. Residents (p = 0.0001) were less likely to believe that PGY-3 training allowed for better job competency.

Conclusion: Pharmacists were opposed to the concept of PGY-3 residency and noted limited benefits of the position professionally. Participants favored on-the-job training and other areas for career advancement over PGY-3 residency.

47. Student Perceptions of Male Faculty Teaching Female-Specific Sex and Gender Health Topics in a Pharmacy Curriculum.

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Introduction: Didactic instruction on gynecologic and obstetric health topics is an essential component of a modern pharmacy curriculum. Special considerations may need to be taken into account when designing a didactic course that addresses sexual health due to cultural taboo surrounding sexual practices. Varying perceptions about the importance of sex and gender in the context of teaching have been reported in the literature from both the student and faculty standpoints. Previous studies have indicated that among physician clinical faculty women are more likely than men to state that their own gender is of importance in clinical education.

Research Question or Hypothesis: The purpose of this study is to assess perceptions of second-year pharmacy students on the concept of male faculty instructing on female physiology, pathophysiology, and sex and gender health topics.

Study Design: Cross-sectional survey

Methods: In this study, 47 pharmacy students were given a survey on the last day of their women's health course. The survey had 10 questions based on a 5-point Likert scale assessing the student's level of agreement to various questions (1 = strongly disagree, 5 = strongly agree). Questions included whether students were comfortable with a male instructor teaching women's health topics (survey question 1) and whether they perceived their instructor's gender as important in the didactic teaching of women's health (survey question 8), among others. Data are reported as medians and interquartile ranges (IQR). Subgroup comparisons were made using the Mann-Whitney U test.

Results: Highlights of survey results showed a median and IQR of 5 (4-5) and 3 (1-3) to questions 1 and 8 respectively. There were no significant differences in question response based on gender (all p-values >0.05).

Conclusion: Students were generally amenable to male faculty teaching female-specific sex and gender health topics. This pattern was observed in both male and female students.

48. Attitudes and Perspectives of Pharmacy Students toward Smoking and Juuling.

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Introduction: The use of electronic nicotine delivery systems (ENDS) has been rising among adolescents and young adults, while the use of combustible cigarettes is declining. January 2019, Massachusetts raised the age to buy nicotine products from 18 to 21 to combat this trend. Subsequently, in September 2019, as a result of e-cigarette/vaping associated lung injury (EVALI), Massachusetts initiated a four-month ban on the sale of ENDS. Despite these restrictions, heightened awareness, and news coverage, people continued to use ENDS. Pharmacists can be utilized to address vaping issues by assisting in counseling services and product selection.

Research Question or Hypothesis: Do pharmacy students have the competencies and confidence to counsel patients on smoking cessation for ENDS compared to combustible tobacco?

Study Design: A knowledge, attitudes, and perception study conducted through an electronic survey.

Methods: College of Pharmacy (COP) students at Western New England University were surveyed on their knowledge of nicotine, opinions of smokers/vapers, and comfort counseling on smoking cessation for ENDS and combustible tobacco. Findings were examined for differences based on class year. Continuous data were analyzed using a T-test.

Results: 108 COP students responded (50.9% response rate). The results indicate that the students perceive vaping as more acceptable than smoking cigarettes ($p < 0.0001$, -1.68 to -1.24). Students were more comfortable counseling on smoking cessation for combustible tobacco than for ENDS ($p < 0.0001$, CI: 0.31 to 0.71). PY2-PY4, who had previously received instruction on smoking cessation, were more comfortable counseling on smoking cessation for combustible tobacco than PY-1, who had not ($p=0.0074$, CI: -0.84 to -0.13). However, there was no difference in comfort counseling on smoking cessation for ENDS ($p=0.6306$, CI: -0.32 to 0.52). Both groups expressed a need for increased education on smoking cessation for ENDS over combustible tobacco ($p < 0.0001$, CI: -0.64 to -0.21).

Conclusion: Results indicate the need for more education regarding ENDS.

49. Oncology Boot Camp: A Preparatory Curriculum for Advanced Pharmacy Practice Experience Students.

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Introduction: Oncology is a highly specialized practice setting with unique challenges for Advanced Pharmacy Practice Experience (APPE) students. When starting rotation, most students require significant time to relearn basic oncology principles. The oncology boot camp is a deliberate educational tool intended to identify and correct learner deficits earlier in the rotation to help optimize learning opportunities.

Research Question or Hypothesis: What are the implications of a four-hour intensive, autonomously-directed oncology boot camp on APPE student knowledge and comfort levels?
Study Design: Prospective, single-center, observational study
Methods: All APPE students rotating through our institution between November 2019 and March 2020 were enrolled. The 4-hour boot camp included five video lectures embedded with case-based application questions followed by one cumulative interactive practice case. The impact on student learning was measured by pre- and post-intervention assessments involving 10 questions validated by APPE oncology preceptors. A 5-point Likert scale survey collected student perceptions evaluating their comfort with oncology-specific drug knowledge and APPE rotations tasks. Statistical testing utilized SPSS (version 25) which included: Paired Sample t-test, Fisher's exact test, and Chi-squared analysis, where appropriate.
Results: Fifty students (100%) completed the pre- and post-intervention assessments. Overall, pre-intervention exam scores (mean: 55.4%, SD:21.8%) improved by 23.2% following the boot camp (mean: 78.6%, SD:19.2%; $p<0.001$). Students performed better on all 10 exam questions, with 6 questions showing a statistically significant improvement ($p<0.05$). Forty-five students (90%) completed the perceptions survey. Of those who completed the survey, 93% agreed that it effectively reinforced important oncology knowledge, 91% supported the autonomous design, and 82% would recommend the oncology boot camp for future APPE oncology students.
Conclusion: The oncology boot camp proved to be an effective educational tool that enhanced student knowledge and confidence in navigating common oncology concepts. Students valued the ability to independently complete the activities and supported its continuation.

50. How much instructions are required to play a game? An evaluation of game-based learning strategies for pharmacy professional skills..

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Introduction: Serious games with cognitively authentic virtual environments for healthcare training can prevent real patients from harm due to mistakes committed by inexperienced trainees. Thus, a three-dimensional multiplayer online role-playing game (RetroZfecT) was developed and implemented to teach pharmacy professional skills (PPS) to pre-clinical students.
Research Question or Hypothesis: Pharmacy students can be engaged to learn PPS effectively through playing RetroZfecT with minimal instructions on gameplay.
Study Design: Prospective cohort study.
Methods: Over two weeks, 162 Year-two pharmacy students from the National University of Singapore played five self-care, prescription and compounding game-scenarios (set in a post-apocalyptic fantasy game storyline) individually or as a team during class hours, through interactive decision-making game-play and use of motion-capture technologies. No briefing on storyline/gameplay was provided. A post-game survey was administered to assess students' experience and self-reported learning. A pre-and-post paper-test (total score of 9) was used to evaluate students' actual learning.
Results: Majority of the students liked the fantasy storyline (74.1%), found the motion-capture technology easy to use (79%), enjoyed working with their pre-assigned team mates (91.6%) and would enjoy the game regardless of being in a self-formed or pre-assigned group (76.5%). Although only 55.6% of students reported being clear about the objectives of the game from the beginning, students reported learning “very much” (median = 4) about patient counselling from the game, and “moderately” (median = 3) about patient history-taking, drug information skills, extemporaneous compounding and pharmacotherapy. More than 61.3% of the students expressed potential for the game to supplement current teaching methods of lectures, role-play simulation practicals and compounding labs. A significant post-game improvement in the test scores was also observed (Mean = 5.31 vs 6.00, p-value < 0.01).
Conclusion: RetroZfecT is naturally engaging for promoting active learning of PPS, especially through collaborative in-game tasks. Even with minimal instructions, the game can be an effective supplement to enhance students' learning.

51. Meditative mindfulness training for pharmacy students: a longitudinal pilot.

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Introduction: Professional organizations across all health disciplines have recognized the potential for burnout in practitioners and students. Evidence-based methods to foster stress management, resilience, and wellbeing are needed. Mindfulness has been shown to reduce burnout, increase empathy, and may improve the overall experience in healthcare education. Pharmacy students and professionals should be encouraged to learn techniques to foster wellbeing.
Research Question or Hypothesis: What effect does meditative mindfulness (MM) have on pharmacy student wellbeing, stress management and resilience?
Study Design: Longitudinal survey study of third year pharmacy students.
Methods: Third year pharmacy students were invited to participate in 3 to 5-minute MM sessions each week for 14 weeks. Headspace®, an established system for guided mindfulness, was utilized to deliver the sessions. Students completed a Mindful Attention Awareness Scale (MAAS) before and after the pilot. Statistical analysis of this data was performed using the Fisher's exact test and the t-test.

Results: A total of 28 students participated in the study. In the pre-intervention survey, 100% of students completed the MAAS and 68% completed it post-intervention. MM training may have improved student ability to focus on the present (57.1% vs 36.8% p=0.2375). A change was also seen in student reports of awareness and performing tasks automatically (39.3% vs 63.1% p=0.1425). Although no changes were statistically significant, students who participated in mindfulness meditation showed an increase in their perceived abilities to stay focused and aware while completing daily tasks.

Conclusion: Our pilot provides preliminary evidence to support meditative mindfulness as a tool to improve pharmacy students' focus and awareness. Implementation of brief meditative mindfulness sessions throughout a semester may decrease pharmacy student burnout and foster student wellbeing and resilience. Larger studies should be done to further evaluate effects of mindfulness training.

52. Impact of a Two-Week Hands-On Continuous Glucose Monitoring Classroom Activity for Students and Practicing Pharmacists.

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Introduction: Continuous glucose monitoring (CGM) can improve diabetes-related outcomes and decrease adverse effects. While new devices have recently received FDA approval, many pharmacy schools lack instruction regarding these novel devices. Furthermore, no studies regarding hands-on CGM pedagogy have been published.

Research Question or Hypothesis: Does hands-on CGM pedagogy improve knowledge and confidence levels regarding CGM use in students and practicing pharmacists?

Study Design: Prospective single-center interventional study with pre-post analysis

Methods: Third-year pharmacy students enrolled in a diabetes elective course and invited practicing pharmacists completed a two-week CGM module overseen by two pharmacist faculty members. Week one included a CGM lecture and hands-on CGM sensor placement. Participants wore a CGM for one week while recording dietary and lifestyle activities. Week two consisted of reviewing CGM reports and patient cases. Participants were given their individual reports and discussed experiences, correlation to activity log, clinical utility, and patient perspective/empathy. Pre-post surveys included demographics, CGM knowledge, and confidence in utilizing CGM. The primary outcome of change in knowledge and confidence levels was evaluated using descriptive statistics and paired t-tests in SPSSv26 (alpha: 0.05).

Results: Of 37 enrolled students, 36 completed surveys. On a 10-point scale, CGM knowledge improved significantly (4.1 vs. 7.0, p=0.01). Students reported improved self-confidence in placing CGM, counseling on device, educating provider, analyzing results, dispensing, and handling insurance billing (p<0.001). Results of the five pharmacist participants' pre-post responses showed similar trends in knowledge and self-confidence improvement (statistical significance not calculated due to small sample size). Students and pharmacists strongly agreed or agreed on the importance of this hands-on CGM instructional method for continuing education and would recommend the two-week module to others.

Conclusion: Students and pharmacists valued this two-week hands-on CGM activity and demonstrated improvements in knowledge and self-confidence. Findings of low knowledge and confidence regarding this technology prior to the educational intervention demonstrate the need for CGM continuing education.

53. Impact on Student Attitudes through Participation in Interprofessional Student Teams at a Remote Area Medical Event in Rural Appalachia.

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Introduction: Interprofessional teamwork is being adopted as optimal patient care and incorporated into training programs, however, it is unclear how students view interprofessional collaboration when volunteering together. The objective of this research is to determine changes in health profession students' attitudes toward interprofessional collaboration through participation in a Remote Area Medical (RAM) event in rural Appalachia.

Research Question or Hypothesis: Working in interprofessional teams will have a positive impact on student attitudes toward interprofessional practice.

Study Design: Deductive applied research in a mixed methods cross-sectional fixed field research design.

Methods: Research Electronic Data Capture (REDCap) was utilized to administer validated surveys, Student Perceptions of Interprofessional Clinical Education-Revised Instrument, Version 2 (SPICE-R2) and Interprofessional Collaborative Competency Attainment Scale-Revised (ICCAS-R), along with open-ended questions to interprofessional student volunteers before and after their participation in interprofessional student teams at the event. Quantitative data analysis was conducted using SPSS version 25 and primary descriptive qualitative data was analyzed using deductive coding.

Results: There were 107 pre-survey responses, 108 post-survey responses, and 70 matched responses. There were no statistically significant changes in any of the three SPICE-R2 factors from pre-survey to post-survey. A significant change was seen in the mean overall composite score of the ICCAS-R as it increased from 3.65 on the pre-event portion to 4.03 (out of 5) on the post-event portion ($p < 0.001$). Coded themes matched interprofessional competencies.

Conclusion: The lack of significant difference in SPICE-R2 factors could be attributed to students having significant interprofessional education within their curricula. The significant improvement seen in interprofessional collaborative behaviors as measured by the ICCAS-R

could be attributed to students having the opportunity to practice interprofessionally in a real world setting beyond their classroom training. A positive impact of this specific activity on improving student self-assessment of their interprofessional collaborative behaviors was demonstrated quantitatively and qualitatively.

54. Care One Clinic - Utilization of an Interprofessional Collaboration Approach to Impact Student Education and Patient Outcomes.

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Introduction: The UF Health Care One Clinic (COC) was established in 2012 to correct overutilization of their emergency department (ED). The COC utilizes an Interprofessional Practice and Education (IPE) model to optimize the delivery of care to medically and socially complex patients and provides learning opportunities for pharmacy, dental and medical students.

Research Question or Hypothesis: This study aimed to determine if participation in an IPE model within a clinic setting impacted patient outcomes and student views of collaboration.

Study Design: A retrospective scorecard analysis and study review design. Data from November 2012 to June 2019 was available. Patient and student testimonials were collected during the experience to determine perceived benefit.

Methods: Patients are invited to COC based on specific criteria including number of hospital visits. The COC scorecard was analyzed to determine trends in patent care quality parameters. Post-COC graduation surveys were administered to patients during routine 4-week follow-up calls. Students completed an exit survey after their final shift at the COC. Responses from both surveys were analyzed for general impression using NVivo version 12.

Results: From the scorecard, the COC has engaged 2,576 patients and conducted 9,408 visits in the past 7 years. This data shows clinic enrollment has prevented 2,355 hospital admissions and 2,392 ED visits and, the average LOS has decreased by 13.76% for these patients. Student surveys indicated observed value in this experience and identified that interprofessional collaboration is an essential practice. Majority of patients (88%) also viewed the experience as positive.

Conclusion: The IPE approach allows for holistic patient care by a team to devise an individualized and comprehensive patient care plan. The COC has found that the provision of dental services, in conjunction with medical, pharmacy, and social work services have positively impacted the clinic's ability to deliver integrated care to patients and provide unique learning opportunities for students which is highly appreciated.

55. Developing a Co-Curriculum for First Year Pharmacy Students: A Qualitative Analysis.

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Introduction: The 2018 Accreditation Council for Pharmacy Education (ACPE) Standards outline expectations of co-curricular activities including: augmentation alongside curriculum, deliberate and intentional programming, and documentation of how activities advance professional development. To date, there is little published on best practices for programming or activities that compliments the curriculum. However studies have demonstrated students who participate in co-curricular activities are more likely to hold leadership positions, earn higher GPAs, and develop and improve personal leadership skills. The purpose of this study was to qualitatively analyze students' perceived importance of professional development via co-curricular implementation.

Research Question or Hypothesis: Capturing student perceptions of their professional development will garner insight for co-curricular programming.

Study Design: Prospective qualitative analysis with focus group interviews

Methods: Data collection was done via semi-structured focus group interviews. First year students from both the Wingate and Hendersonville campuses were recruited by email. Informed consent and IRB approval for audio recordings. Data was transcribed and a thematic analysis conducted using NVivo 12. Data was coded independently by individual investigators. A coding comparison was done and discrepancies were resolved by the lead investigator. Codes were grouped into similar categories to identify major themes.

Results: Two first year focus groups totaling 8 students were interviewed. The coding comparison revealed >90% agreement between researchers (Kappa 0.17). Seven different data codes were combined into 3 themes: 1) The co-curriculum should be streamlined in marketing, content, and execution (Kappa 0.04) 2) Students have a rudimentary understanding of professionalism (Kappa 0.48) 3) Faculty should demonstrate continuous professional development (Kappa 0.14). Subthemes included: students are able to reflect on their individual professional growth, suggestions for Co-curriculum improvement, and targeted faculty development opportunities.

Conclusion: Student focus group interviews yielded opportunities for student and faculty growth. Co-curricular programming and delivery should be merged to serve as a continuous professional development for all school of pharmacy members.

56. Engaging in Epidemics: Characterizing Colleges/Schools of Pharmacy's Opioid-Related Activities.

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Introduction: In the USA, opioid overdose deaths have surged in recent years; it is an epidemic. To address the current opioid crisis, various colleges/schools of pharmacy have implemented different Opioid-Related Activities (ORAs).

Research Question or Hypothesis: As colleges/schools of pharmacy address the opioid epidemic, are there systematic differences in the types of ORAs undertaken between public and private institutions?

Study Design: Retrospective, observational analysis of an ORA database

Methods: The American Association of College of Pharmacy (AACP) has maintained a database of ORAs. Data was downloaded for analysis on 1/30/2020. First, participating institutions in this database were described (number, region, private/public). Next, ORAs were re-coded from categories and tags within. Coding was for activities (education, practice, service, advocacy, and research), as well as thematic categories (education, treatment, community-service, partnership, healthcare-professionals, regulation, funding, and research). Then, odds-ratios characterized activities and categories, with further chi-square analysis.

Results: One-hundred-seven colleges/schools of pharmacy were from South (38), Midwest (28), Northeast (19), and West (22) Census-bureau regions. Institutions (55 private, 52 public) provided 436 unique ORAs. Odd-Ratios of private-to-public institutions for ORAs were: EDUCATION 0.51 (p=0.001); PRACTICE 1.37 (p=0.408); SERVICE 1.66 (p=0.028); ADVOCACY 1.8 (p=0.316); RESEARCH 2.5 (p<0.001). Furthermore, category odds-ratios were: EDUCATION 0.56 (p=0.005); TREATMENT 0.97 (p=0.899); COMMUNITY-SERVICE 1.0 (p=0.981), PARTNERSHIP 1.01 (p=0.952); HEALTHCARE-PROFESSIONALS 1.15 (p=0.487); REGULATION 1.35 (p=0.136); FUNDING 1.78 (p=0.005); RESEARCH 2.52 (p=0.001). Analysis of this database was limited by voluntary participation from database-inputters at each institution, as well as different interpretation of codes by those database-inputters.

Conclusion: Within this AACP database, education-related ORAs were more common among private institutions, while research and service ORAs were more common among public institutions. Similarly, differences related to education and research/funding were seen for thematic categories as well. Overall, colleges/schools of pharmacy showed strong engagement, through a variety of activities, with the opioid epidemic facing the USA.

EMERGENCY MEDICINE

57. Evaluation of the Treatment of Asymptomatic Bacteriuria in Psychiatric Patients Discharged from the Emergency Department.

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Introduction: Despite current recommendations from the Infectious Diseases Society of America, asymptomatic bacteriuria is a significant contributor to inappropriate antimicrobial use in both ambulatory and hospital settings. At our institution, medical assessments completed in the emergency department for patients with psychiatric complaints commonly include the completion of a urinalysis (UA). Abnormal UA results, such as pyuria and bacteriuria, in the absence of symptoms are not indications for antibiotic treatment.

Research Question or Hypothesis: We hypothesized that the rates of inappropriate antibiotic treatment would decrease over time after the establishment of a pharmacist-led antibiotic stewardship program.

Study Design: This study was a retrospective chart review.

Methods: Records of patients presenting to the emergency department for medical assessment during a psychiatric emergency for three time periods (2014, 2016, and 2018) were reviewed. Rate of inappropriate treatment was compared between early antibiotic stewardship (2014), established stewardship (2016), and mature stewardship (2018). Treatment was considered appropriate if patients received antibiotics in the presence of symptoms and if antibiotic selection and duration adhered to local empiric therapy recommendations.

Results: A total of 180 patients were enrolled, sixty within each study group. The rate of inappropriate antibiotic treatment decreased over time with the presence of a pharmacist-led antibiotic stewardship program (50% in 2014, 40% in 2016 and 25% in 2018, p = 0.018). The use of a first-line antibiotic in patients that exhibited urinary symptoms increased among the three years studied (13.3% in 2014, 25% in 2016 and 68.8% in 2018, p <0.001).

Conclusion: These data suggest that a mature antibiotic stewardship program results in fewer incidences of inappropriate antibiotic use in patients seen in the emergency department for psychiatric complaints.

58. Sepsis fluid resuscitation and volume overload in obesity.

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Introduction: The Surviving Sepsis Campaign recommends an initial fluid resuscitation bolus of 30 mL/kg as part of the 1-hour bundle of early goal directed therapy to rapidly restore tissue perfusion pressure and vascular volume, regardless of body habitus. Excessive fluid administration resulting in volume overload remains a question in obese patients.

Research Question or Hypothesis: Does the recommended 30 ml/kg fluid bolus in obese septic patients contribute to volume overload?

Study Design: Retrospective, single center, analysis of adult patients who received fluid resuscitation for presumed sepsis in a community emergency department.

Methods: Adult patients who received fluid resuscitation for presumed sepsis in the emergency department between July 2018 and

June 2019 were included. Outcomes were compared between patients with a body mass index (BMI) less than 30 kg/m2, 30-39.9 kg/m2 and ≥40 kg/m2. The primary outcome is incidence of fluid overload as defined as a composite of the following: body weight gain of greater than 10% compared to admission weight at 24 and 48 hours and use of diuretic therapy and or renal replacement therapy for volume overload.

Results: Of the 2796 patients analyzed, 2080 met inclusion criteria. Volume received across BMI classifications was higher for non-obese patients (52.9 ml/kg) than those with either a BMI of 30-39.9 (36.5 ml/kg) or those with a BMI ≥40 (29 ml/kg) at 24 hours ($p<0.01$) and 48 hours ($p<0.01$). There was no difference in incidence of volume overload between groups at 24 or 48 hours.

Conclusion: Fluid resuscitation with the recommended 30 mL/kg bolus was not associated with increased volume overload in obese patients compared to non-obese patients; however, weight-based fluid volume was higher in the non-obese population potentially indicating a biased reduction in fluid administered to obese patients. Further prospective research is warranted to address the impact of fluid resuscitation in obesity.

59. Intravenous insulin for the management of hyperglycemia without metabolic derangements in the emergency department.

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Introduction: Despite approximately 12.1 million annual diabetes-related emergency department (ED) encounters, there is currently no consensus regarding the necessity of ED glucose reduction to manage hyperglycemia in patients presenting without a hyperglycemic emergency. Prior studies demonstrate a modest reduction in glucose with the administration of insulin in the ED, with no associated difference in ED length of stay. Known consequences of intravenous (IV) insulin administration include hypoglycemia, hypokalemia, and increased ED length of stay.

Research Question or Hypothesis: The aim of this study is to assess the efficacy and safety of IV insulin for glucose reduction in patients presenting to the ED with hyperglycemia without metabolic derangements.

Study Design: This was a retrospective, observational study of patients at least 18 years or older who received IV regular insulin and were discharged from the ED at a large academic Level 1 Trauma Center from January 1, 2015 to August 1, 2018. This study was IRB approved.

Methods: The electronic medical record was utilized by study investigators to identify and review patients for enrollment. Using descriptive statistics, univariate analysis, and multivariable regression analysis, included patients were evaluated for the primary outcome assessing if an association exists between IV insulin administration and ED length of stay.

Results: A total of 405 patients were included in the study. In patients that received insulin doses > 5 units, there was a reduction in blood glucose of 37.4 mg/dL and no difference in ED length of stay relative to doses ≤ 5 units. Furthermore, 7.9% of patients developed hypokalemia and 0.4% hypoglycemia.

Conclusion: The use of >5 units of IV regular insulin for the management of isolated hyperglycemia in the ED resulted in a modest reduction in blood glucose and no difference in ED length of stay in patients compared with those that received ≤5 units.

60. Impact of Pharmacist Education on Documentation of Symptoms of Urinary Tract Infections in Patients Admitted to the Emergency Department.

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Introduction: Pharmacist education of providers in the emergency department (ED) has been shown to improve prescribing patterns for patients diagnosed with urinary tract infections (UTIs).

Research Question or Hypothesis: Does pharmacist education of providers improve documentation of UTI symptoms and treatment?

Study Design: Single-center, retrospective chart review

Methods: Data was compared from all cases of UTIs from patients who presented to the ED from November 1, 2018 to February 28, 2019 and November 1, 2019 to February 28, 2020. Education was provided to ED prescribers in October 2019 on the IDSA guidelines for asymptomatic bacteriuria and acute uncomplicated cystitis. The primary outcome was change in the percentage of patients diagnosed with a UTI in which UTI symptoms were documented during the 4-month periods prior to and after education. Secondary outcomes included change in the percentage of patients diagnosed with an uncomplicated UTI who were prescribed a first-line antibiotic.

Results: Prior to education, 354 patients were diagnosed with a UTI, and 203 (57.3%) had at least 1 symptom documented. Post-education, 267 patients were diagnosed with a UTI, and 222 (83.1%) had at least 1 symptom documented ($p<0.001$). Prior to education, 92/149 (61.7%) uncomplicated patients were prescribed a 1st line antibiotic. Post-education, 81/107 (75.7%) uncomplicated patients were prescribed a 1st line antibiotic ($p=0.019$).

Conclusion: Pharmacist education of ED prescribers is effective in improving provider documentation and prescribing of guideline-recommended antibiotics for UTIs.

61. Evaluation of the impact of opioid alternative care sets and education on the use of opioids and opioid alternatives for acute pain management in the emergency department.

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Introduction: As the opioid epidemic continues, health care providers seek ways to slow the growth. This project evaluates the use of opioid alternatives for acute management of headache/migraine, musculoskeletal, and abdominal pain after education is presented to emergency department providers on new opioid alternative care sets.

Research Question or Hypothesis: It is hypothesized that there will be a reduction in morphine equivalent doses (MEDs) in the emergency department after the implementation of the care sets and provider education.

Study Design: A retrospective chart review was completed on ordering trends in the emergency department before and after care set implementation and education to emergency department providers on new opioid alternative care sets.

Methods: Data was evaluated from January 2019 to February 2020. Patients were identified through the electronic medical record and were included if they were at least 18 years old and received a medication in the emergency department for acute headache/migraine, musculoskeletal, or abdominal pain. The primary outcome was change in MEDs administered in the emergency department. Secondary outcomes included if an opioid or opioid alternative was ordered, need for a rescue medication, or return to the emergency department within 5 days with the same chief complaint. Chi-Square and Mann-Whitney U tests were used to evaluate data.

Results: 135 patients met inclusion criteria in both the pre and post implementation group. There was no difference in mean MEDs in the pre- vs. post-data group (4.805 vs. 4.952, p=0.918) or in opioids received (40% vs. 38%, p=0.709). Those who received an opioid required a rescue medication more frequently vs. those who did not receive an opioid (22% vs. 11%, p<0.001).

Conclusion: While implementation and education about opioid alternative care sets did not change the MEDs administered to emergency department patients, patients who received an opioid first were more likely to require pain medications later.

62. An Assessment of the Appropriateness of Cephalexin Dosing in an Academic Medical Center Emergency Department.

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Introduction: Cephalexin is a commonly prescribed antibiotic in our emergency department (ED). Depending on renal function, twice daily dosing may not be optimal for all indications. Dosing guidance exists via local and national guidelines but anecdotally frequent suboptimal dosing was occurring. The goal of this project was to examine if there was a need to provide electronic medical record decision support for cephalexin dosing by indication.

Research Question or Hypothesis: Are prescriptions for cephalexin 500mg BID appropriately dosed in the ED at an academic medical center

Study Design: Retrospective, observational cohort

Methods: ED discharge prescriptions for cephalexin 500mg BID from January 1st, 2018 to December 31st, 2018 were included. Prescriptions from the first seven days of each month were screened to provide a random sample and duplicates were excluded. Age and glomerular filtration rate (GFR) were collected. Indications were identified by prescriber ED notes and confirmed by clinical pharmacy specialist. The primary outcome was frequency of appropriate dosing. A 500 mg BID dose was considered appropriate for cystitis if a patient's CrCL >10 mL/min and for pyelonephritis or SSTI if CrCL <30 mL/min. Statistical analysis performed utilizing STATA to obtain mean and standard deviations for age and GFR.

Results: During study period, 478 prescriptions were written, 170 were screened and 153 were included. Mean(SD) age was 41.8 (18.7) years and GFR was 57.7(7.4) ml/min/1.73m2. Indications were cystitis (56%), pyelonephritis (17%), SSTI (24%) and other (3%). Approximately 61% (93/153) were dosed correctly and 39% (60/153) were sub optimally dosed. Of the suboptimally dosed prescriptions, 24/60 were for pyelonephritis and 36/60 were for SSTI.

Conclusion: Prescribed doses of cephalexin 500mg BID did not follow recommendations for indication specific dosing. Based on these results, indication specific discharge order panels were developed. Further evaluation of prescribed cephalexin doses should be performed to assess effectiveness of changes.

63. Description of Analgesia in Patients Receiving Outpatient Buprenorphine Presenting to the Emergency Department with Acute Traumatic Injuries.

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Introduction: Moderate to severe pain occurs in 91% of traumatic injury patients presenting to the emergency department (ED) and inadequate analgesia is common. Patients treated with chronic buprenorphine (BUP) often require increased opioid doses due to

tolerance and the unique pharmacology. Multimodal analgesia is proposed but evidence is limited.

Research Question or Hypothesis: What analgesic interventions are used for chronic BUP patients presenting to the ED with traumatic injuries?

Study Design: Retrospective, descriptive study at a large academic, level 1 trauma center.

Methods: Adult patients (≥ 18 years) were identified through the trauma registry and included if they presented to the ED from July 2014 to 2019 with traumatic injury, initial Glasgow Coma Score > 13, and on chronic BUP. Those requiring mechanical ventilation in the ED or not surviving their ED stay were excluded. The primary endpoint was to describe pharmacologic pain management interventions. Secondary endpoints included time to first analgesic dose, percent of patients achieving adequate analgesia (improved numeric pain scale with absolute difference of ≥ 2 or relative difference of 33%), and safety. Descriptive data are presented.

Results: Thirteen patients were included with nine (69%) receiving multimodal analgesia. Ten patients (77%) received 20 total opioid doses. Seven patients (70%) received multiple doses, 5 of which increased compared to previous. Fentanyl was the most common opioid (46% patients) with a median total dose of 175 mcg (IQR 112.5 to 200 mcg). Ketorolac and ketamine were the most common non-opioids, received by 4 (31%) and 3 (23%) patients respectively. Time to first analgesic dose was 36 min (IQR 22 to 128 min). Three (23%) patients achieved adequate analgesia. One patient experienced emergence phenomenon with ketamine.

Conclusion: Multimodal analgesia was common but few patients achieved adequate analgesia. Opioid doses did not appear empirically increased given BUP use. Further investigation of optimal analgesia in BUP patients with traumatic injuries is warranted.

64. Norepineprhine, Epinephrine, or Dopamine for Hemodynamic Support after Cardiac Arrest in Emergency Department Patients.

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Introduction: The optimal vasoactive agent for management of patients with return of spontaneous circulation (ROSC) after cardiac arrest has not been identified. The 2015 Advanced Cardiac Life Support (ACLS) guidelines recommend initiation of norepinephrine (NE), epinephrine (EPI), or dopamine (DA) infusions to maintain hemodynamics after ROSC is achieved.

Research Question or Hypothesis: Is there a difference in clinical outcomes amongst post ROSC patients based on initial vasopressor used to maintain hemodynamics.

Study Design: A retrospective review of electronic medical records.

Methods: Patients from January 2015 to August 2017 who received vasopressors in the ED after achieving ROSC pre-hospital, or during the ED encounter were included. The primary outcome evaluated was a composite of re-arrest or need for a second vasopressor post ROSC.

Results: In total 453 were screened and 94 post-ROSC patients were included for analysis, NE (n=48), EPI (n=40), and DA (n=6). The primary composite outcome occurred at a higher percentage in the EPI group (38/40, 95%) compared to the NE (40/48, 83.3%) and DA (5/6 83.3%) groups; however, this was not statistically significant (p=0.144). This observation was significant when comparing EPI vs NE alone (aOR 4.21) p=0.048. Within the primary outcome, re-arrest or death occurred at a significantly higher percentage in the EPI group (37/40 92.5%) compared to NE (36, 75.0%) and DA (4/6, 66.7%) p=0.042, and remained significant when comparing EPI to NE alone (p=0.045).

Conclusion: There was a significant increase in in rates of re-arrest or death observed in the EPI group compared to NE and DA. This finding remained significant when comparing EPI and NE alone. This data suggests further study is needed to determine the optimal vasopressor strategy in emergency department patients with ROSC due to the disparity in mortality and re arrest amongst treated groups.

ENDOCRINOLOGY

65. Hypoglycemia risk in surgical patients with diabetes treated with sulfonylurea therapy versus non-sulfonylurea therapy.

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Introduction: In 2008, our 195-bed community hospital implemented an inpatient diabetes task force. One initiative was to reduce hypoglycemia (blood glucose level ≤70 mg/dl) through adopting the American Diabetes Association (ADA) Standards of Care, which included minimizing use of oral diabetes agents. Efforts were successful in reducing sulfonylurea use for hospitalist-treated patients, however occurrences of sulfonylurea-related hypoglycemia in non-hospitalist-treated patients prompted review of residual sulfonylurea prescribing.

Research Question or Hypothesis: Are surgical diabetes patients treated with sulfonylurea therapy (SUT) more likely to experience hypoglycemia than those treated with non-sulfonylurea therapy (NSUT)?

Study Design: This IRB-approved project was a retrospective review of patients admitted to our hospital for surgery between 01/01/2018 and 06/30/2019 who received diabetes therapy and glucose monitoring.

Methods: Patients were excluded if no diabetes therapy was administered. The primary objective was to evaluate risk of hypoglycemia in

patients treated with SUT versus patients treated with NSUT. The secondary objective was to describe the occurrence of hypoglycemia risk factors including concurrent insulin therapy, eGFR <60 ml/min, and poor dietary intake immediately prior to hypoglycemia.

Results: From 641 records screened, 534 were included. Of these, 52% received SUT. Hypoglycemia occurred in 10.8% of SUT patients and 5.1% of NSUT patients (p<0.016, odds ratio 2.24). Sixty percent of SUT and 57% of NSUT groups were ≥65 years. Admission eGFR was >60 ml/min in 65% of SUT and 69% of NSUT groups. In SUT patients who experienced hypoglycemia, 19% received correction scale insulin and 19% receieved basal +/- bolus insulin. In patients who experienced hypoglycemia, nutritional intake was "poor or very poor" in 20% of SUT and 23% of NSUT patients.

Conclusion: SUT surgical patients experienced hypoglycemia at twice the rate of NSUT patients. Reducing SUT for patients undergoing surgery should be considered as a strategy for minimizing hypoglycemia during admission, particularly in the elderly or those on concurrent diabetes therapies.

66. Impact of Pharmacist-Driven Professional Continuous Glucose Monitoring: One-Step Versus Two-Step.

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Introduction: Continuous glucose monitoring (CGM) is a burgeoning approach to measuring glycemia, but the ideal method of implementation is unknown. The expansion of clinical pharmacy allows pharmacists to be leaders in implementing this technology, but literature on the impact of pharmacist-driven professional CGM (proCGM) is lacking.

Research Question or Hypothesis: Is one-step or two-step pharmacist-driven proCGM implementation more effective at improving hemoglobin A1c (HbA1C) within a six-month follow-up period?

Study Design: Retrospective single-center cohort study

Methods: Adults identified via Current Procedural Terminology code 95250 or 95251 undergoing pharmacist-driven proCGM implementation 9/26/16 to 8/1/19 with CGM data interpretation and HbA1c within six months of implementation were included. Patients with additional CGM use during the six-month follow-up period were excluded. Patients were categorized as having one (RPh1) or two (RPh2) encounters for CGM data analysis for a single proCGM sensor (wear-life 14 days). Data collection included demographics, CGM data, CGM-associated interventions, and HbA1c during the six-month follow-up period. The primary outcome was change in HbA1c from baseline to six months. Data were analyzed via paired and independent sample t-tests using R statistical software (significance level: 0.05).

Results: Sixty-five RPh1 and 56 RPh2 patients met inclusion criteria. Demographics were similar between groups, except RPh1 patients tended to be younger, have higher body mass index, and use less bolus insulin (p=0.003, p=0.005, and p=0.01, respectively). Baseline HbA1c was 8.1% and 8.3% with mean reduction from baseline to six months of 0.73% and 0.87% for RPh1 and RPh2, respectively, with both groups achieving a mean follow-up HbA1c of 7.4%. Significant improvement in HbA1c was seen in each group compared to baseline (p<0.001), but there was no significant difference between groups (p=0.585).

Conclusion: Pharmacist-driven proCGM implementation can significantly improve glycemic control. One-step and two-step implementation methods appear to be similarly effective at lowering HbA1c during a six-month follow-up period.

GASTROENTEROLOGY

67. Assessment of Pancrelipase Utilization within a Veterans Affairs Health Care System.

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Introduction: Pancreatic enzyme replacement therapy (PERT) is recommended for exocrine pancreatic insufficiency (EPI), which can be caused by disease states such as chronic pancreatitis and cystic fibrosis. However, prescribing pancreatic enzymes can be difficult as there are multiple branded generics and arguably confusing dosing strategies. Further, many patients on PERT may not have true EPI which can lead to increased healthcare costs.

Research Question or Hypothesis: Does pancreatic enzyme prescribing at a veterans affairs health care system align with practice standards?

Study Design: Retrospective chart review

Methods: Veterans with an active prescription for pancrelipase as of March 2020 within a single healthcare system were included. Patient charts were reviewed for pancrelipase strength, dosing, indication, labs, imaging, prescriber details, and counseling. The primary objectives were to assess documentation of indication and assess appropriate dosing per manufacturer recommendations. The secondary objectives were to identify diagnostic criteria documented for EPI and assess counseling.

Results: During the study timeframe, a total of 145 patients received pancrelipase from the healthcare system. Of these, 112 (77%) had an indication corresponding to EPI on the electronic problems list and 58 (40%) received doses within the recommended dosing range per prescribing information. Positive labs and diagnostic imaging for EPI

were documented for 21 (14.5%) and 30 (20.7%) patients, respectively. Initial prescriptions were dosed appropriately by 77% (27/35) of Gastroenterology (GI) providers and 29% (22/77) of Primary Care providers (PCPs). Current prescriptions were dosed appropriately by 87% (27/31) of GI providers and 28% (27/97) of PCPs. Only three patients had documentation of adequate counseling.

Conclusion: Most patients on pancrelipase had an indication corresponding to EPI documented in their chart, but adequate documentation of evidence of EPI was uncommon. Most patients were on doses below the recommended 500-2500 units/kg/meal range. GI providers were more likely to prescribe within the recommended dosing range.

GERIATRICS

68. The Psychometric Properties of the Mini-Cog© in Turkish Elderly Patients.

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Introduction: Medication non-adherence as a consequence of forgetfulness is very common in elderly patients. Mini-Cog© scale is a simple screening tool which can be used to elucidate potential cognitive impairment that could be affected elderly patients' medication adherence especially at a community pharmacy setting.

Research Question or Hypothesis: To evaluate the psychometric properties of the Turkish version of the Mini-Cog© scale after appropriate translation and cultural adaptation.

Study Design: A methodological study

Methods: Turkish translation and cultural adaption of the Mini-Cog© scale was completed by followed process of World Health Organisation after getting permission from developers. The study was conducted with patients aged 65 years and over whose education level is at least literate at an internal medicine clinic for six months. The participants were excluded if they had depression, schizophrenia, epilepsy, long term history of antipsychotics usage, and communication problem. Turkish version of Revised Mini Mental Test (rMMSE-T) was measured in elderly patients to assess concurrent validity of The Turkish version of Mini-Cog©. Receiver Operating Characteristic (ROC) curve analysis was performed to test the sensitivity and specificity. Spearman correlation test was applied.

Results: A total of sixty elderly patients (mean of age: 76.1±5.4; female/male: 25/35) were eligible. According to ROC curve, area under the curve was 0.762 and the sensitivity, specificity, positive predictive value and negative predictive value of the Turkish versions of Mini-Cog© were 96.0%, 40%, 0.5333 and 0.9333 (if cut point was <3) and 100.0%, 82.9%, 0.8064 and 1.000 (if cut point was <4), respectively (p<0.01). There was a moderate correlation between score of Turkish versions of Mini-Cog© and rMMSE-T (r= 0.652; p<0.001).

Conclusion: The Turkish version of Mini-Cog© was a reliable screening test to assess cognitive function. This could be also used to determine forgetfulness which could be a reason for medication non-adherence in elderly patient in further studies.

69. Evaluation of Provider Acceptance of Pharmacist Recommendations in a High Utilizer Patient Population.

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Introduction: A geriatric program utilizing a multidisciplinary consultative team identified “high utilizer” patients and addressed medical and psychosocial needs. Pharmacists assessed patients newly enrolled in the program through chart review and provided recommendations to patients' providers. Randomly selected patients, based on pharmacist availability, were also interviewed. The impact of pharmacist interview and patient specific factors on acceptance rates has not previously been assessed.

Research Question or Hypothesis: The hypothesis is recommendations made by pharmacists after completing the interview plus chart review resulted in higher acceptance rate than chart review alone.

Study Design: Retrospective chart review.

Methods: Patients included were newly enrolled between March—December 2019. Pharmacists' recommendations were categorized using a validated instrument and were considered accepted if implemented within 30 days, based on documentation or active medication changes in the EMR. The primary objective was to determine whether addition of the interview impacted the acceptance rate of pharmacist's recommendations. Secondary objectives included overall acceptance rate and acceptance rates based on classification of recommendations and patient specific factors. Data were imported into SPSSv24.0 software. All statistical testing was two-sided with p<0.05 considered statistically significant.

Results: Sixty-five patients, with 20 interviewed, were included. Patients' mean age was 69 years with comorbidities including: cardiovascular disease (86%), heart failure (46%), diabetes (40%), and mental health (37%). Average total acceptance rate was 33%, with 41% acceptance rate in the interview group versus 28% in the chart review group (p=0.046). The interview group showed significantly higher acceptance rates for effectiveness (p=0.033) and patient education issues (p=0.041). Patient specific factors resulting in higher

acceptance rates in the interview group included: age <65 years (p=0.013), 10-19 medications (p=0.004), and diagnosis of mental health (p=0.02).

Conclusion: As resources are limited, this study allows pharmacists to identify patients who may have a greater benefit from addition of the interview.

70. Outcomes and impact of pharmacists medication review services in Singapore nursing homes - A nationwide multi-site retrospective cohort study.

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Introduction: In 2016, the Ministry of Health (Singapore) implemented the Enhanced Nursing Home (NH) Standards mandating 6-monthly medication review by a registered pharmacist for all NH residents. The Intermediate and Long-Term Care (PSS ILTC) Pharmacists workgroup was also set up under the Pharmaceutical Society of Singapore for pharmacists to share practices and ensure minimum standards of pharmaceutical care services provided.

Research Question or Hypothesis: What were the outcomes of pharmacists medication review services in terms of the number and types of drug-related problems (DRPs) identified, the acceptance rate of pharmacist recommendations and the impact on polypharmacy and cost among NH residents?

Study Design: Nationwide multi-site retrospective cohort study.

Methods: Relevant information pertaining to the DRPs reported by pharmacists (according to a validated locally-developed DRP classification system modified from Hepler and Strand) over the recent 2-year period was extracted from the PSS ILTC DRP reporting database. Only pharmacist recommendations accepted by healthcare professionals were included in the analysis for pre-post intervention changes in medication use and cost.

Results: Overall, 5082 DRPs were identified among 4790 residents from 37 NHs. The most common DRP types were "drug use without indication" (22.0%), "medical record-related discrepancies" (17.2%) and "inadequate monitoring" (15.4%). Of the 5788 medications implicated, the top-3 were "drugs for peptic ulcer and gastro-oesophageal reflux disease" (9.6%), "drugs for constipation" (5.2%) and "iron preparations for anemia" (5.0%). The 3760 accepted recommendations (acceptance rate = 74.0%) resulted in 195 new medication use, 1324 removal of inappropriate medication, and an estimated net decrease in drug cost of SGD 82,191.20/year.

Conclusion: This is the first large-scale nationwide impact study on pharmacists' medication review services in ILTC in Singapore. Pharmacists' recommendations resulted in net reduction in medication use and direct out-of-pocket drug cost savings for patients. Future studies are needed to evalute other costs and clinical outcomes of residents.

HEALTH SERVICES RESEARCH

71. Comparison between Two Population Health Pharmacist Implementation Approaches for Medication Optimization in Patients with Uncontrolled Hypertension or Diabetes.

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Introduction: Population health pharmacists (PHPs) are uniquely qualified to optimize medications for chronic conditions.

Research Question or Hypothesis: What are the differences in recommendation types and implementation rates between two quality-improvement PHP approaches: "Just-in-time" and "Anytime"?

Study Design: Retrospective chart review

Methods: Setting: Federally qualified health center in Connecticut with 19 practices.

Intervention: A centralized PHP performed targeted (hypertension/diabetes) medication reviews using patients' electronic health records and sent medication optimization recommendations to PCPs. PCPs reviewed the recommendations for implementation into patients' care plans.

Approach #1- "Just-in-time": Completed November 2018-February 2019 by a part-time, contracted PHP at 3 large practices. Weekly reports identified 204 patients with uncontrolled hypertension (BP≥140/90) and **next-day PCP appointments**.

Approach #2- "Anytime": Completed September 2019-November 2019 by a full-time PHP at 14 any-size practices. A one-time registry report identified 41 patients with uncontrolled hypertension (systolic BP between 140-150 mmHg) and diabetes (A1c between 9%-10%) **regardless of next appointment.**

Results: Approach #1 vs. Approach #2: Overall, 88 vs. 47 pharmacist recommendations were sent to PCPs. The main differences in pharmacist recommendation types sent included medication/dose changes (82% vs. 34%) patient re-engagement in appointments/labs (0% vs. 32%), and medication clarification (2% vs. 13%). In both approaches, 13% of recommendations sent were for adherence/lifestyle.

Overall, 42% vs. 66% of pharmacist recommendations were implemented by the PCP. Of the medication/dose change recommendations, 35% vs. 56% were implemented. Of the patient re-engagement recommendations, 0% vs. 53% were implemented. 100% vs. 100% of the medication clarification recommendations and 73% vs. 100% of adherence/lifestyle recommendations were implemented.

Conclusion: Because patients in Approach #1 had next-day appointments, there were more recommendations to change medications/doses rather than reengage patients in appointments/labs compared to Approach #2. The higher implementation rate in Approach #2 may result from the pharmacist being a full-time, proactive member of the population health team.

72. A picture is worth a thousand words: An in-home photo walkabout of medication storage and administration.

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Introduction: Medication mismanagement can lead to non-optimal management of chronic diseases and poor health outcomes. Little is known about in-home storage and administration processes used by patients to manage their medications.

Research Question or Hypothesis: How do patients store their medications and organize administration routines in their homes?

Study Design: Qualitative thematic analysis of digital photography walkabouts in patient homes.

Methods: Digital photographs and field notes of in-home medication storage locations and medication organization systems were qualitatively analyzed using exploratory inductive coding to generate themes. Data was independently analyzed by two researchers; percent agreement was 76%. Any disagreements were resolved by discussion.

Results: Data from home visits with 10 participants (mean age 76 years; range 57 – 88 years) were included in analysis. Of the 10 participants, 80% were female. On average, participants were taking 11.1 (range: 5-20) medications. Thirty photographs and 10 field notes were analyzed. Themes and sub-themes generated include; (1) Choice of storage location (sub-themes: impact on medication behaviour, need for privacy and storage with other items, (2) Limited knowledge regarding appropriate medication storage conditions (sub-themes: impact on safety of patient and impact on stability of medications), and (3) Systems to manage in-home medication management (categories: use of medication aids, following a routine/process for administration of medications).

Conclusion: Lack of knowledge causing inappropriate medication storage not only impacts the stability of medications, but also increases risk of medication errors and safety, ultimately affecting medication intake behaviours. A framework is needed to examine the storage of medications in patient's home to ensure the safety and effectiveness of therapy. This study is the first step in the development of such a framework. Future studies can be designed to address practice and policy changes to drive best practices around patient education on appropriate storage of medications by pharmacists.

73. Use of Focus Groups to identify Barriers to Type 1 Diabetes Care in Rural Communities.

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Introduction: Type 1 diabetes (T1D) affects 5% of the Nebraska population. With no pediatric endocrinologists outside of Omaha, a large portion of the state's population must travel hours for specialty services. In rural Nebraska, pharmacists and other allied health professionals are often the most accessible resource for patients to answer questions that arise following the diagnosis of T1D.

Research Question or Hypothesis: The research hypothesis was that the increased time and financial resources required by those impacted by T1D and specialty care is a major barrier in management. The purpose of this study was to identify barriers that exist with living with T1D in rural Nebraska and patient perceived needs to overcome them.

Study Design: Through use of a phenomenological design, an interprofessional team of researchers and community stakeholders completed four focus groups across the state of Nebraska. A phenomenology allows for in-depth study of a shared lived experience (Creswell & Poth, 2018).

Methods: Recruitment for the focus groups was done through advertising on social media and snowball sampling. Participants were included if they were over 8 years old, lived 60+ miles from Omaha and had a connection to T1D. Participants included diverse group of stakeholders (n=23). The researchers utilized a phenomenological analysis (Moustakas, 1994). Trustworthiness was established through researcher triangulation, reflexivity, and member checking.

Results: Four major themes were identified: dramatic family and lifestyle changes occur after diagnosis, lack of access to specialized care results in complications, isolation improves resourcefulness in management, and technology improves management and flexibility. Participants desired improved access to qualified, knowledgeable healthcare providers to help minimize barriers.

Conclusion: Dissemination of these findings will create heightened awareness to healthcare professionals and community stakeholders about struggles faced when living with T1D in rural Nebraska, thus inciting change to reduce identified barriers.

HEMATOLOGY/ANTICOAGULATION

74. A retrospective cohort study of intraocular hemorrhage in Veteran patients on oral anticoagulants.

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Introduction: Oral anticoagulants associated intracranial or gastrointestinal bleeds have been well documented in the literature, availability of post marketing surveillance data on minor bleeding such as IOH is limited albeit well established in the pivotal trials. This type of bleeding can potentially result in significant visual morbidity and may require surgical intervention.

Research Question or Hypothesis: To determine the incidence of intraocular hemorrhage (IOH) in patients on oral anticoagulants in veteran population and describe patient characteristics

Study Design: Single center retrospective cohort

Methods: Patients with ICD-10 code for any ophthalmic hemorrhage who received anticoagulants between October 1st, 2018 and October 1st, 2019 were included. Data was extracted using Sequel Query Language. Descriptive statistics was used for baseline demographics. Annual incidence of IOH was reported as proportions with associated 95 % confidence interval.

Results: We identified 20 patients out of 263 bleeding events with ICD-10 code for ophthalmic hemorrhage of which 17 patients with optometry notes were included in the study. Average population was 77-year-old and male (n=16). Anticoagulant prescribed were: apixaban (11), rivaroxaban (4), warfarin (2). Roughly 76% received anticoagulation for atrial fibrillation. Only 1 patient had hemoglobin drop of greater than 2 mg/dl at diagnosis. About 12 patients had retinal hemorrhage while 5 had conjunctival hemorrhage. All patients had spontaneous recovery without the need of any surgical intervention. Anticoagulation was discontinued in 2 patients receiving rivaroxaban. No follow up visit noted in 4 of the 17 patients. Median duration for patients who had a follow up visit was 179.5 days with IQR (98-269). We found IOH incidence of 7.6% with 95% CI (4.97 % -11.45 %). About 65% patients with intraocular hemorrhage were on apixaban.

Conclusion: Our study results align with the current evidence suggesting increased risk associated with apixaban use highlighting the importance of monitoring for prompt intervention to reduce visual morbidity.

75. Redefining Polypharmacy in Older Adults and Understanding the Impact on Allogeneic Hematopoietic Stem Cell Transplantation Outcomes.

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Introduction: Allogeneic hematopoietic stem cell transplantation (alloHSCT) offers the best potential for long term disease control for many hematologic malignancies, but carries increased toxicity and mortality in older adults. Comprehensive geriatric assessment (CGA) is one proposed method to predict tolerability of alloHSCT in older adults. Based on a single-center prospective cohort (FUN) study of pre-alloHSCT CGA, patients that reported lower functional status were significantly associated with inferior overall survival (OS) and progression-free survival (PFS) post-alloHSCT; however the impact of polypharmacy was not addressed.

Research Question or Hypothesis: Does polypharmacy and potentially inappropriate medication (PIM) use impact survival outcomes in older adults undergoing alloHSCT?

Study Design: Retrospective Analysis

Methods: We included 148 patients from the FUN study, aged 50 and older who received alloHSCT at University of California San Francisco (UCSF) Medical Center from October 2011 to September 2017. Both pre-alloHSCT and post-alloHSCT medication lists were collected from electronic medical records (EMR) and described using continuous and dichotomous medication variables. Univariate and multivariate Cox proportional hazards models were used to evaluate the association of medication variables with OS and PFS.

Results: In multivariate analysis, several continuous medication variables were predictive of post-alloHSCT survival outcomes, after adjusting for age and comorbidities. Number of medications was associated with inferior OS (hazard ratio [HR], 1.07; 95% confidence interval [CI], 1.01-1.13; p=0.01). Number of PIMs was associated with inferior OS (HR, 1.22; 95% CI, 1.06-1.4; p=0.005) and PFS (HR, 1.15; 95% CI, 1.01-1.31; p=0.04).

Conclusion: Pre-alloHSCT polypharmacy and PIM use were significantly associated with worse post-alloHSCT outcomes in adults aged 50 and older. The preliminary findings should be validated with further evidence and practical applicability for polypharmacy and PIM use as prognostic factors. If validated, increased pharmacist support in pre-alloHSCT medication review and assisting with potentially modifiable PIMs will be critical in assessment of alloHSCT candidacy.

76. Transition of Reduced intensity and Myeloablative Preparative Regimens to the Outpatient Setting in Patients with AML and MDS undergoing Allogeneic stem cell transplantation.

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Introduction: Preparative regimens for allogeneic stem cell transplants for AML and MDS are frequently administered in an inpatient setting due to potential infection concerns. Non-myeloablative regimens are frequently administered in the outpatient setting, but there is limited data on the administration of myeloablative and reduced intensity preparative regimens outpatient.

Research Question or Hypothesis: Patients that received myeloablative or reduced intensity preparative regimens for allogenic transplant in the outpatient setting for AML or MDS will have similar 100-day non-relapsed mortality compared to those that received their preparative regimens inpatient.

Study Design: A retrospective, comparative, single center chart review of patients from 1/1/15-8/1/19.

Methods: Patients ≥18 years of age that had a diagnosis of AML or MDS that underwent allogeneic and haploidentical stem cell transplant and received myeloablative or reduced intensity preparative regimens included in this study. Patients with a matched sibling donor or unrelated donor could receive myeloablative busulfan/cyclophosphamide (BuCy) or a reduced intensity preparative regimen with busulfan/fludarabine (BuFlu). Eligible haploidentical transplants received fludarabine/cyclophosphamide/total body irradiation (FluCyTBI) as a reduced intensity regimen.

Results: Two-hundred and twenty-one patients were included in the final analysis. Eighty-nine received the preparative regimen outpatient and 133 received inpatient. Preparative regimens given in the outpatient setting were associated with a similar 100-day NRM (7% vs 8%, p=0.039) and 100-day PFS (16% vs 17%, p=0.011). Preparative regimens given in the outpatient setting did not show worse 100-day non-relapsed mortality indicating transplants could be moved to the outpatient setting. Average length of stay within first 100 days was 22.8 days outpatient vs 30.6 days inpatient (p <0.001).

Conclusion: Myeloablative and reduce intensity preparative regimens given in the outpatient setting did not show worse 100-day non-relapsed mortality, progression free survival, and did not impact infection rates. However, it did allow for decrease in length of stay by day 100 when the preparative regimen was given in the outpatient setting.

77. Evaluation of a Direct Oral Anticoagulant (DOAC) Clinic Led by Pharmacists.

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Introduction: Stroke and venous thromboembolism prevention and treatment has dramatically changed since direct oral anticoagulants (DOACs) were introduced and accepted into clinical practice. Pharmacist involvement in anticoagulation management continues to expand to include DOACs and evaluation of the services is imperative to improve practice. The purpose of this study is to compare the appropriateness of DOAC dosing, based on product labeling, in patients monitored in an outpatient clinic led by pharmacists to those that received usual care.

Research Question or Hypothesis: Does management of DOAC therapy by a pharmacist result in more appropriate dosing compared to usual care?

Study Design: Retrospective, observational cohort study.

Methods: Adult patients with a prescription for either apixaban or rivaroxaban between March 2018 and March 2019 were eligible for inclusion. The intervention group includes patients enrolled in the pharmacist-led clinic (n=85); the usual care group includes patients with DOAC therapy initiated and managed by an outside provider (n=50). The primary endpoint is the percentage of patients on the appropriate dose of either apixaban or rivaroxaban, according to product labeling. Data was imported into SPSSv25.0 software and summarized by cohort using appropriate descriptive statistics. Categorical outcomes, including the primary outcome, were compared using Pearson chi-square or Fisher's exact tests. Additionally, the types of pharmacist interventions were summarized using percentages.

Results: Patients in the pharmacist-managed group were on the appropriate DOAC dose more often than those receiving usual care (p<0.001). The pharmacist-managed group was more likely to dose conservatively, according to renal function (n=4), whereas the usual care group often had an off-label indication (n=7) for DOAC therapy. Several other pharmacist interventions were characterized, including addressing compliance or medication accessibility (29.4%).

Conclusion: Pharmacist management of DOAC therapy resulted in more appropriate dosing based on product labeling. Pharmacist-management of DOAC therapy likely improves patient compliance and medication accessibility, based on our findings.

HIV/AIDS

78. Evaluation of Smartphone Applications for Adherence-Supporting Features Desired by HIV+ Individuals.

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Introduction: Adherence to antiretroviral therapy (ART) is essential for people living with HIV (PLWH). Smartphone applications ("apps") can improve adherence primarily using medication reminders. These apps provide pharmacists with a patient-facing tool to support adherence within overall HIV self-management. However, value beyond medication reminders are needed to support sustained use of these apps, creating a need to identify additional features desired by PLWH and integration of these features into publicly-available apps.

Research Question or Hypothesis: What is the degree to which apps designed to support ART adherence within overall HIV self-management contain features desired by PLWH?

Study Design: Descriptive study using a content analysis framework for evaluating mHealth apps.

Methods: A literature search was conducted to identify features desired by PLWH for supporting ART adherence within overall HIV self-management. A checklist was created of features identified within at least two peer-reviewed publications. Free apps supporting ART adherence, in English-language, and available through both iOS and Android platforms were included in the evaluation. Identified apps were evaluated using the checklist of features.

Results: Twelve features were identified: customizable alerts; privacy; security; adherence tracking; HIV information; general health information; social support network; interoperable with health record; HIV-related news; positive/motivational statements; achievements/

"gamified"; and connected to local resources. Six apps were identified: AIDSinfo; Daily Charge; AHF Pharmacy; Every Dose, Every Day; Life4me+; and Happi App. Four apps integrated at least half of the features, but none integrated all features. Customizable alerts was the only feature within all apps, while social support network was the only feature not present within any app.

Conclusion: Current ART adherence-supporting apps do not comprehensively address patients' desires. Features not widely present are valuable in stimulating sustained use while realizing the full potential of apps in supporting ART regimens and overall HIV care. Pharmacists should be aware of the strengths and limitations of current apps when making recommendations to PLWH.

79. Evaluating pharmacist preparedness to administer long-acting injectable antiretroviral treatments in the community pharmacy setting.

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Introduction: The Integrase strand transfer inhibitor cabotegravir (CAB) and the non-nucleotide reverse transcriptase inhibitor (NNRTI) rilpivirine (RPV) are being coformulated as a long-acting injectable antiretroviral therapy (LAI-ART) option, which can be administered intramuscularly in the gluteus medius every 4 weeks. LAI-ART would replace a patient's oral antiretroviral therapy (ART), decreasing pill burden and increasing the possibility of improved medication adherence. Medication adherence is critical for patients living with Human Immunodeficiency Virus (HIV) to suppress the viral load and preserve immune function.

Research Question or Hypothesis: The primary objective of the study is to evaluate the preparedness of pharmacists, who have experience administering intramuscular (IM) treatment, to inject LAI-ART in the community pharmacy setting. The secondary objective is to identify preferred training methods for these pharmacists.

Study Design: A nationwide anonymous electronic survey was distributed to Albertsons pharmacists in 17 states using company email listservs.

Methods: Albertsons pharmacists with active pharmacist licensure in their respective states, permission to administer medication and who have experience with administering IM treatment other than immunizations were surveyed. Survey questions assessed injection technique, standard precautions, workflow and store characteristics, as well as preferred training methods for administering medication in the gluteus medius.

Results: A total of 127 survey responses were evaluated for this research. 57.3% of pharmacists felt prepared to administer LAI-ART in the community setting. Patient care pharmacists and residents felt more prepared to administer LAI-ART compared to pharmacy managers and staff pharmacists (P-value = 0.047). 30.3% of pharmacists strongly disagreed to being adequately trained to administer IM ventrogluteal (VG) injections. 97.1 % of pharmacists prefer either live sessions or written training.

Conclusion: Most community pharmacists feel prepared to administer LAI-ART. Additional training to administer IM VG injections should utilize live sessions or written materials. LAI-ART for patients living with HIV can be provided in the community pharmacy setting.

80. Evaluation of Histoplasmosis Prevalence and Benefits of Primary Prophylaxis in Patients Living with HIV in an Endemic Area.

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Introduction: Histoplasmosis is a common opportunistic infection in patients living with HIV, especially in endemic areas around the Ohio and Mississippi River valleys. Incidence of histoplasmosis among HIV patients is not well established, but studies cite an incidence of 5% as a threshold to distinguish endemic areas. Guidelines recommend primary prophylaxis for HIV patients with CD4 count <150 cells/mm^3 living in endemic areas, however this is not common practice in the HIV clinic at Regional One Health. This study aims to determine prevalence of histoplasmosis in an HIV clinic in what is thought of as an endemic area and determine if prophylaxis is warranted.

Research Question or Hypothesis: How prevalent is histoplasmosis amongst patients treated in an HIV clinic in an endemic area and would patients benefit from primary prophylaxis against Histoplasmosis?

Study Design: Retrospective electronic medical record review

Methods: This retrospective observational study included patients with HIV and histoplasmosis seen in the HIV clinic between June 1, 2013 and July 31, 2018. Electronic medical records were used to collect information including demographics, laboratory data, and pertinent medications.

Results: Utilizing ICD9 and 10 codes, 162 patients were identified as having documented histoplasmosis. 105 patients were included in the analysis. Prevalence of histoplasmosis in this population was calculated to be approximately 6.48%. Risk factors associated with histoplasmosis infection include HIV untreated with ART and CD4 count <150 cells/mm^3.

Conclusion: Histoplasmosis is not a reportable disease in Tennessee, but bordering counties have a reported incidence of 0.74 – 1.57 cases per 100,000 patients. Based on our calculated prevalence of histoplasmosis in the study, Memphis may be an endemic area for histoplasmosis. Based on prevalence observed and morbidity associated with histoplasmosis infection, primary prophylaxis against histoplasmosis would likely be beneficial.

81. Comparison of weight changes in treatment-naïve HIV-infected patients receiving integrase inhibitor-based therapy compared to protease inhibitor-based therapy.

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Introduction: Recent data regarding integrase inhibitor (INSTI) therapy indicate possible association with weight gain. The incidence and degree of weight gain seems to vary by both patient-specific and regimen-related factors, such as nucleoside reverse transcriptase (NRTI) backbone.

Research Question or Hypothesis: Antiretroviral therapy (ART)-naïve patients receiving INSTI-based regimens will experience increased weight gain compared to those receiving PI-based regimens.

Study Design: This was a retrospective chart review of previously ART-naïve Indiana University Health LifeCare Clinic patients who started an INSTI- or PI-based regimens from 1/1/13 to 7/31/19.

Methods: Adult patients without prior ART exposure receiving an INSTI- or PI-based regimen for at least 10 months were included. The primary objective was weight gain at 12 months after starting ART. Subgroup analyses were conducted by INSTI, PI, or NRTI backbone utilized. Statistical testing included Wilcoxon Rank-Sum Test and Chi Square analyses.

Results: The patient population (N=162) was predominately male and African American with relative immunocompetence, generally achieving viral suppression after 12 months of ART. Patients receiving PI-based therapy were more likely to be Asian American or Hispanic, and to receive a TDF-based regimen (p=0.04; p=0.0034). No statistically significant difference in weight change was observed between INSTI- and PI-based regimens (median weight gain 5.1 kg vs 3.9 kg, p=0.52). The proportion of obese or overweight patients in the INSTI arm increased significantly as compared to baseline (p=0.00001). Subgroup analyses demonstrated significant increases in weight gain, clinically significant weight gain, and change in BMI for tenofovir-based (TDF and TAF) regimens compared to those with abacavir and lamivudine. (p<0.05).

Conclusion: Lack of power makes meaningful interpretation of the results for the primary objective difficult. However, several of the prespecified secondary objectives and subgroup analyses demonstrated clinically significant results related to increased weight gain or BMI category changes with INSTI-, PI-, and tenofovir-based regimens. Potential weight-based complications should considered during ART selection for treatment-naive patients.

82. Comparing Weight Gain between Integrase Strand Transfer Inhibitors in Patients Living with HIV.

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Introduction:: Integrase strand transfer inhibitors (INSTI) are included in all first-line antiretroviral therapy (ART) regimens for most people living with human immune deficiency virus (PLWH). Recent studies have suggested that INSTI- based antiretroviral therapy (ART) are associated with weight gain. HIV patients are already at an increased risk for cardiovascular (CV) disease, therefore, it is important to assess if certain medications could be adding CV risk factors through weight gain.

Research Question or Hypothesis: Is there a difference in weight gain over 1 year between three INSTIs: dolutegravir, elvitegravir, and bictegravir?

Study Design: retrospective observational cohort study

Methods: We included PLWH started on dolutegravir, elvitegravir, or bictegravir with a nucleotide reverse transcriptase inhibitor (NRTI) backbone between January 1, 2014 to March 1, 2019. We assessed weight change over 12 months after initiation of the INSTI-based regimen. Patients were excluded if their ART regimen included protease inhibitors (PI) or non-nucleotide reverse transcriptase inhibitors (NNRTI). Electronic medical records were used to gather demographics, antiretroviral regimen, and laboratory values.

Results: A total of 694 patients were screened for inclusion. One hundred fifty-one patients were included with 50 being in the dolutegravir group, 50 in elvitegravir group, and 51 in the bictegravir group. The study population (n=151) was 66% male and predominantly black non-Hispanic (89%). Twenty-three percent of patients were ART naïve before starting INSTI-based regimen. The average weight gain over 12 months for dolutegravir, elvitegravir, and bictegravir was 3 ± 8.9 kg, 2.1 ± 7.3 kg , and 2.9 ± 7.4 kg, respectively (P = 0.689).

Conclusion: We found no significant difference in weight gain over 12 months for PLWH initiated on dolutegravir, elvitegravir, or bictegravir w/ an NRTI backbone.

INFECTIOUS DISEASES

83. Evaluation of Pharmacist Driven Antimicrobial Stewardship Interventions at a City Hospital.

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Introduction: Antimicrobial stewardship programs (ASPs) improve patient safety, increase cure rates, and reduce treatment failures. At a New York City hospital, antimicrobial stewardship (AS) services by pharmacy were limited due to staffing constraints. The pharmacy implemented a team antibiotic review form that was utilized by pharmacists to evaluate antimicrobials for indication, dose, duration, and necessary dose adjustments. This structured method for AS allows for

the participation of all pharmacists and contributes to the overall cost-savings associated with the ASP.

Research Question or Hypothesis: A structured pharmacy driven ASP at a 545 bed, acute care, public New York City hospital will result in substantial interventions and cost-savings.

Study Design: Retrospective review of pharmacy interventions, qualitative research

Methods: Based upon the utilization of the team antibiotic review forms, de-identified, antimicrobial stewardship intervention reports were generated through the electronic medical record (EMR) over a 10-month period from January to October 2019. Interventions included the following types: initial antibiotic consult, follow-up consult, antibiotic de-escalation, IV to PO conversion, dose adjustment, and avoidance of drug-drug interactions. Descriptive statistics were used for data analysis. Total number of interventions, frequency and associated cost-savings based on previously published literature were determined.

Results: A total of 1,679 antimicrobial stewardship interventions were documented by 19 pharmacists during the study period. The most frequent intervention types were antibiotic de-escalation (34.6%), initial antibiotic consults with (15.1%) and without pharmacokinetic calculations (28.5%), and dose adjustments (8.8%). Initial antibiotic consults generated the largest cost-savings of $149,540. Overall, antimicrobial stewardship interventions resulted in $270,183 of cost-savings.

Conclusion: Use of team antibiotic review forms allowed for pharmacist driven ASP, resulting in considerable cost-savings. Various intervention types contributed to overall cost-savings with initial antibiotic consults being the primary driver of overall savings.

84. Effectiveness and tolerability of intravenous pentamidine for *Pneumocystis carinii* pneumonia prophylaxis in adult hematopoietic stem cell transplant patients: A retrospective study.

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Introduction: *Pneumocystis carinii* pneumonia (PCP) prophylaxis is recommended after hematopoietic stem cell transplantation (HSCT). In patients who are unable to take first-line prophylaxis, trimethoprim/sulfamethoxazole, aerosolized pentamidine is recommended. This drug may not, however, be available at all institutions, and its administration requires special techniques. Therefore, intravenous pentamidine (IVP) has been used in adult patients as an alternative, despite limited data.

Research Question or Hypothesis: IVP is effective and tolerable for PCP prophylaxis in adult patients who had undergone HSCT

Study Design: Retrospective study

Methods: A single-center retrospective study was conducted of adult patients who had undergone allogenic or autologous HSCT between January 2014 and September 2018 and had received at least three doses of IVP for PCP prophylaxis. The IVP dose was 4 mg/kg administered monthly. Data on PCP infection and adverse reactions were collected from both patients' electronic medical records and the pharmacy adverse drug reactions documentation system. Patients were followed from the start of IVP up to 6 months after discontinuation of therapy. A confirmed PCP infection was defined as radiographic evidence of PCP and positive staining of a respiratory specimen. Descriptive statistics were used to analyze the study outcomes.

Results: During the study period, 187 patients were included. The median age was 36.4 years (range, 18–64), 58% were male, and 122 (65%) had received allogeneic HSCT while the remainder autologous HSCT. The median number of IVP doses administered per patient was 5 (range, 3–29). During the study period, none of the patients had evidence of confirmed PCP infection. Only one case of nausea associated with IVP administration was reported.

Conclusion: In a cohort of adult patients with HSCT who received IVP for PCP prophylaxis, there was no evidence of confirmed PCP infection, and the treatment appeared to be well tolerated. Prospective studies should be conducted to confirm the efficacy and tolerability of IVP.

85. Safety Outcomes with High-Dose Daptomycin in Patients with Acute Kidney Injury and/or End Stage Renal Disease.

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Introduction: Daptomycin (DAP) has several adverse effects which have not been fully evaluated in patients with severe renal impairment.

Research Question or Hypothesis: What are the incidence and characteristics of significant adverse effects in patients receiving high-dose DAP with severe renal impairment?

Study Design: A single-center, retrospective study was conducted to assess safety outcomes of high-dose DAP in patients with an estimated creatinine clearance less than 30 mL/min.

Methods: Adult patients aged 18 to 89 years admitted between July 1, 2015 and July 1, 2019 were eligible for inclusion. Patients must have received definitive DAP therapy with doses greater than or equal to 7.5 mg/kg based on actual body weight. The primary outcome was overall incidence of CK elevation, myopathy, and rhabdomyolysis. Descriptive statistics [e.g. median (interquartile range, IQR)] were used for analysis.

Results: A total of 74 patients who received DAP therapy were evaluated. Of these patients, 22 were excluded for the following reasons: doses less than 7.5 mg/kg (5), less than four doses of therapy (15), and inmate status (2). The population was well-distributed in terms of

gender (48% male, n=24) with a median age of 61 (48-67) years. The primary indication for DAP use was gram-positive bacteremia. The median DAP dose was 750 (600-875) mg, or 8.46 (7.92-9.96) mg/kg based on actual body weight, with a median patient weight of 81 (65-113) kg. The median duration of therapy was 27 (14-42) days. One patient experienced a significant CK elevation while on DAP therapy with rhabdomyolysis. Chart documentation indicated alternative reasons for elevation with DAP continuation. One patient experienced DAP discontinuation due to CK elevation without meeting the definition for significant CK elevation.

Conclusion: In patients with severe renal impairment treated with DAP 7.5 mg/kg or greater, one patient experienced significant CK elevation. Future research should confirm these findings, with consideration for higher mg/kg dosages and/or obese populations.

86. Clinical impact of early utilization of polymerase chain reaction (PCR) diagnostic tools in patients with bloodstream infections.

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Introduction: BioFire® is a rapid polymerase chain reaction (PCR) diagnostic tool that has shown utility in antimicrobial stewardship by determining pathogens present in positive blood cultures within 90 minutes. BioFire® was implemented at Einstein Medical Center Philadelphia (EMCP) in February 2019.

Research Question or Hypothesis: What is the impact of rapid PCR diagnostic tools at EMCP on appropriate antimicrobial regimen, length of stay, and readmission rates?

Study Design: Retrospective chart review in two separate time cohorts, February-May 2018 and February-May 2019, from before and after implementation of the BioFire® tool.

Methods: Inpatients with a positive blood culture result were included. Inpatients were excluded if they were under 18 years of age. Duplicated culture results were excluded. The endpoints were time to appropriate antimicrobial(s), length of stay, and readmission within 30 days.

Results: 297 positive blood cultures were included in this analysis. 166 cultures represent the control group (February to May 2018) and 131 cultures represent the PCR group (February to May 2019). Median time from culture result to initiation of appropriate antimicrobial was 6.53 hours (IQR 3.5-22.6) in the control group and 2.25 hours (IQR 0.48-8.55) in the PCR group (p=0.0048; CI 2.05-11.17). Median length of stay in the control group was 10.8 days (IQR 6.2-18.3) and 12.0 days (IQR 7.06-19.26) in the PCR group (p =0.6282; 95% CI -4.76-2.88). Readmissions within thirty days occurred in 33 (25.2%) of patients in the control group and 29 (27.6%) of patients in the PCR group (p=0.7662).

Conclusion: Readmission rates and length of stay did not differ between the two groups; however, if an evaluation was performed including stratification for severity of illness, there is a higher possibility of potential benefit. There was a significant difference with respect to time from culture result to initiation of appropriate antimicrobial(s), solidifying that the BioFire® PCR is providing a benefit to EMCP.

87. Implementation of a pharmacist-driven MRSA polymerase chain reaction antimicrobial stewardship initiative in the critical care unit in a rural community hospital.

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Introduction: The Infectious Diseases Society of America (IDSA) guidelines recommend empiric coverage with vancomycin for patients with suspected hospital-acquired pneumonia who have a risk factor for methicillin-resistant Staphylococcus aureus (MRSA) infection or high mortality risk. Additionally, they recommend antibiotic de-escalation; however, they are lacking in strategies to de-escalate empiric therapy in the absence of respiratory cultures. Due to adverse effects with use of broad-spectrum antibiotics, time and costs of pharmacokinetic monitoring, and increasing threat of antibiotic resistance, there is need for more efficient strategies to guide empiric antibiotic de-escalation. The MRSA polymerase chain reaction (PCR) nasal assay has been shown to have excellent negative predictive value (99.2%) for MRSA pneumonia.

Research Question or Hypothesis: In critically ill pneumonia patients, can a MRSA PCR screening initiative decrease the usage of vancomycin?

Study Design: Pre/Post-Intervention Study

Methods: Patients eighteen years and older admitted with any type of pneumonia to the critical care unit between November 2018 and January 2019, prior to provider/nursing MRSA PCR education, were compared with patients in the post-education group that were hospitalized between November 2019 and January 2020. The primary outcome is length of vancomycin therapy. Secondary outcomes include number of troughs, readmission rate, length of stay, and cost savings.

Results: Forty-seven patients within the pre-education group were compared with forty-two patients in the post-education group. Comparison between average days of vancomycin therapy showed reduction in usage (6.2 vs. 4.7 days, P=0.029). Reduction in the average number of vancomycin levels ordered per patient was also demonstrated (2.2 vs. 1.6, P=0.077). Critical care unit length of stay (3.6 vs. 4.4 days) and readmissions (3 vs. 5) were similar between groups. Cost savings were also generated as a result of this initiative.

Conclusion: Education on MRSA PCR in de-escalation of vancomycin in critically ill pneumonia patients showed to significantly reduce the average days of vancomycin in this population.

88. Evaluation of the Effects of Antimicrobial Stewardship Program Intervention Acceptance on Hospital Length of Stay.

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Introduction: Inappropriate antibiotic use is a major public health concern. Excessive exposure to antibiotics results in the emergence and spread of drug resistant bacteria, potentially avoidable adverse drug reactions, and increased healthcare utilization and cost. Findings of systematic reviews and controlled trials assessing the effect of an antimicrobial stewardship program (ASP) on hospital length of stay (LOS), mortality, and cost-savings are conflicting. Some studies reported a significant cost-savings driven by shorter hospital length of stay, while the others have found no effect and, in some cases, prolonged length of stay. Shortening the time to appropriate therapy and reducing unnecessary days of therapy have been shown to reduce the hospital LOS. The objective of this study is to evaluate the effects of prescriber acceptance to ASP interventions on hospital LOS.

Research Question or Hypothesis: Does acceptance of ASP interventions reduce hospital length of stay?

Study Design: Retrospective chart review

Methods: A retrospective chart review of patients admitted to Valley Baptist Medical Center Brownsville was performed for those who received antimicrobial treatment and an ASP intervention was performed between January 2018 and December 2019. Patients were excluded if they received more than 21 total days of antimicrobial therapy. The primary outcome is hospital LOS. Secondary outcomes include 30-day readmission rates and antibiotic days of therapy (DOT).

Results: Data from 764 medical charts were included in the study (384 with an accepted intervention and 380 with a denied intervention). Baseline characteristics did not significantly differ, except for more de-escalated interventions in the denied group ($p<0.001$). There was a significant reduction in median LOS (6.5 vs 7 days, $p=0.009$) and DOT (5 vs 7 days, $p<0.001$) in the accepted group. There was no difference in 30-day readmission rates (17% vs 17%, $p=0.98$) between the two groups.

Conclusion: Our study found that acceptance of ASP interventions significantly reduced hospital LOS and antibiotic DOT.

89. Analyzing the utility of a novel peer educational tool to promote antimicrobial stewardship on a university campus.

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Introduction: Antibiotic resistance is an urgent and growing public health threat. Appropriate antibiotic use minimizes antibiotic resistance, adverse effects, and healthcare costs.

Research Question or Hypothesis: How do students' baseline knowledge of antibiotic use change after implementation of an interactive peer educational tool?

Study Design: Data was collected through a pre and post-assessment on basic antibiotic knowledge after use of a novel educational tool by peer educators. The assessments were administered during a university wellness fair.

Methods: Pharmacy students and infectious diseases faculty developed a fortune teller tool with various case scenarios to demonstrate key antibiotic principles including: antibiotic indications; differentiation between viral vs bacterial infection; proper use of antibiotics; non-pharmacologic measures to combat infection; and antibiotic resistance. When presented with the fortune teller, students chose a number and color to select the first case for discussion. For example, “Jennifer has been diagnosed with the flu. Should she be given antibiotics to help with her symptoms?”. Students and educators continued until all of the patient cases were discussed.

Results: 143 students from various college majors participated. The average pre-assessment score was 70%, compared to the average post-assessment score of 97%. For non-science majors, the average pre-assessment score was 63%, compared to an average post-assessment score of 95%. Students performed the worst on “Antibiotics can help with viral infections like the cold or the flu.” with an average score of 40% on the pre-assessment, which increased to 92% on the post-assessment.

Conclusion: The peer education tool was effective at increasing student knowledge on antimicrobial stewardship.

90. Ampicillin/Sulbactam and the Incidence of *Clostridioides difficile* in a Trauma Population.

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Introduction: Ampicillin/sulbactam is an antibiotic with a broad spectrum of activity including normal flora in the human gastrointestinal system. This disruption in the gastrointestinal tract may place patients at increased risk for the development of pathogenic *Clostridioides difficile* infections. Ampicillin/sulbactam is part of the ventilator associated pneumonia pathway for trauma patients admitted to Regional One Health and is frequently used in these patients. Hospital acquired *C. difficile* infections increase morbidity and mortality and may lead to an increased length of stay. The purpose of this study is to determine whether amplicillin/sulbactam has a higher incidence of *C. difficile* infection compared to other antibiotics in a trauma population.

Research Question or Hypothesis: Does ampicillin/sulbactam have a higher incidence of *Clostridioides difficile* infection compared to other antibiotics in trauma surgery patients?

Study Design: Retrospective electronic medical record review

Methods: Data collected included: age, sex, race, comorbidities, pertinent lab values, date of initial antibiotics, antibiotic doses/duration, stress ulcer prophylaxis, and *C. difficile* toxin positive date. Patients were included if they were over 18 years of age, admitted to the trauma surgery service, and had prior in-hospital antibiotic use. Patients were divided into groups based on if they received ampicillin/sulbactam versus if they received other antibiotics. Patients were then assessed based on a positive diagnosis of *C. difficile* toxin by PCR.

Results: A total of 6359 patients were included. 447 patients received ampicillin/sulbactam while 5912 received other antibiotics. Of those, 18 in the ampicillin/sulbactam group and 33 in the other antibiotic group developed a positive diagnosis for *C.difficile* (P<0.0001).

Conclusion: Patients who received Ampicillin/sulbactam showed a higher incidence of *Clostridioides difficile* compared to other antibiotics.

91. Clinical outcomes of beta-lactam monotherapy versus dual *Pseudomonas aeruginosa* coverage with levofloxacin for the treatment of nosocomial pneumonia.

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Introduction: For the treatment of nosocomial pneumonia, dual coverage against *Pseudomonas aeruginosa* is advocated in several clinical practice guidelines. However, the risks of using fluoroquinolones for empiric treatment may outweigh the benefit they actually provide. The rationale for dual coverage was derived from *in-vitro* data suggesting that dual therapy may result in greater bacterial killing, but this has not been replicated in clinical outcomes.

Research Question or Hypothesis: What are the differences in clinical outcomes between dual coverage and beta-lactam monotherapy for the treatment of nosocomial pneumonia?

Study Design: Single center, IRB-approved, retrospective cohort study

Methods: This study was performed using retrospective chart review, investigating patients ≥ 18 years-old diagnosed with nosocomial pneumonia. Patients received empiric antimicrobial therapy with at least one beta-lactam with activity against *Pseudomonas aeruginosa* that was included in the study site's combination antibiogram. Data was collected via electronic medical records and included demographic information, treatments received, treatment duration, length of stay, and 30-day readmission rates.

Results: 400 patients were included in the study; 253 were empirically treated with beta-lactam monotherapy, and 147 were treated with dual therapy including levofloxacin. Patients who were administered dual therapy received a longer overall treatment course than those empirically treated with beta-lactam monotherapy (10 days vs. 9 days, $p = 0.027$). Those who received levofloxacin as part of an empiric regimen were also more likely to be readmitted within 30 days of discharge (30.6% vs. 20.9%, $p = 0.030$). There was no difference in length of stay noted between the two groups (6 days vs. 6 days, $p = 0.523$).

Conclusion: Patients with nosocomial pneumonia who empirically receive levofloxacin in addition to a beta-lactam with activity against *Pseudomonas aeruginosa* are more likely to receive a longer treatment course and be readmitted within 30 days of discharge than those who received a beta-lactam alone.

92. Knowledge and Health Behavior of the Pandemic of Coronavirus Disease 2019 (COVID-19).

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Introduction: The COVID-19 outbreak was declared by the World Health Organization as a pandemic on March 11, 2020. Preventative health behavior such as hand hygiene, social distancing, and use of face masks, are important to reduce disease transmissibility.

1. **Research Question or Hypothesis:** To assess the knowledge of COVID-19
2. To identify predictors of health behaviors (i.e. hand washing, social distancing, face mask-use)

Study Design: Quantitative survey study

Methods: An online survey was sent out to college students living in high and low-endemic areas in China. The health belief model (HBM), including perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cue-to-action, and self-efficacy, was used to examine knowledge and health behaviors. Each component was measured by a 7-point Likert scale (1 indicates extremely unlikely and 7 indicates extremely likely). Linear regression models were used to examine predictors of health behaviors (i.e. hand washing, social distancing, face mask-use).

Results: A total of 203 respondents completed the survey. The mean level of knowledge of COVID-19 was medium (4.41±0.95). Respondents reported being extremely likely to use a face mask (6.85±0.60), but only moderately likely to engage in hand washing (5.95±1.38) and social distancing (6.19±1.60). HBM components that predicted: 1) hand washing were cue-to-action (estimate: 0.27; 95% CI: 0.05-0.48), self-efficacy (estimate: 0.56; 95% CI: 0.39-0.73), and knowledge (estimate: 0.15; 95% CI: 0.00-0.31); 2) face mask-use were cue-to-action (estimate: 0.20; 95% CI: 0.06-0.34), self-efficacy (estimate: 0.21; 95% CI: 0.06-0.35), and knowledge (estimate: 0.09; 95% CI: 0.01-0.18); and 3) social distancing were cue-to-action (estimate: 0.19; 95% CI: 0.00-0.38) and self-efficacy (estimate 0.43; 95% CI: 0.19-0.66).

Conclusion: More education is needed to improve the knowledge of COVID-19. To prevent the spread of COVID-19, we should increase the intention to hand wash and social distance. Recommendations by health organizations, particularly those that instill self-confidence in hand washing and social distancing, can be effective.

93. Comparison of allergic reaction to carbapenems in patients with and without a documented penicillin allergy.

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Introduction: Penicillin is one of the most frequently reported drug allergies. Varying rates of cross-reactivity with carbapenems are described in literature.

Research Question or Hypothesis: Do patients with a documented penicillin allergy have an increased rate of allergic reactions to carbapenems?

Study Design: Observational, retrospective, single-center, chart-review.

Methods: Reports from the electronic medical record identified patients who had received a carbapenem from May 1, 2014 to April 30, 2019, with and without a documented penicillin allergy. All patients with a penicillin allergy were reviewed. Patients without a penicillin allergy (control group) were randomized and reviewed in blocks of 10 until at least 200 patients matched inclusion criteria. Carbapenem allergy was assessed by chart review. The primary outcome was percentage of patients who had an allergic reaction attributed to carbapenems. Secondary outcomes were type of reaction, and rate of carbapenem reaction among patients with multiple documented beta-lactam allergies.

Results: 525 patients met the criteria for a true penicillin allergy and 207 met criteria for the control group.

Nine of 525 patients (1.7%) in the penicillin allergy group and 2 of 207 patients (1.0%) in the control group experienced an allergic reaction attributed to carbapenems (p= 0.4537). The most common allergic reaction to a carbapenem was a rash. One hundred twenty three patients had a history of multiple beta-lactam allergies; 4 patients (3.3%) had an allergic reaction to a carbapenem. In comparison, 5 of 414 patients with one documented beta lactam allergy had a carbapenem reaction (1.2%; p=0.1262), and 2 of 195 with no documented beta lactam allergy (1.0%; p=0.0655).

Conclusion: The incidence of allergic reaction to carbapenems was similar in patients with or without a documented penicillin allergy, and in patients with multiple beta lactam allergies or less. This study provides further evidence for the safe use of carbapenems in patients with a documented penicillin or multiple beta lactam allergies.

94. Evaluation of Carbapenem Versus Non-Carbapenem Outcomes in Non-Bacteremic ESBL Infections.

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Introduction: Unnecessarily prolonged exposure to broad-spectrum antibiotics increases the risk of the development of resistance. The 2018 MERINO trial could not conclude non-inferiority between piperacillin/tazobactam and meropenem for bacteremia with ESBL organisms. Previous retrospective trials provide data supporting the usability of non-carbapenem alternatives in non-bacteremic ESBL infections when organism susceptibility is available.

Research Question or Hypothesis: Are non-carbapenem therapies as clinically effective as carbapenems in non-bacteremic ESBL infections?

Study Design: Retrospective chart review

Methods: Adult patients who received a carbapenem or non-carbapenem therapy for non-bacteremic ESBL infections between Jan 1, 2017 and Dec 31, 2018 were reviewed. Bacteremia secondary to urinary tract infection are included. Exclusion criteria include non-urinary tract related bacteremia within the past three months, lack of source control, ESBL infections within the past 6 months, or infected with a non-carbapenem non-susceptible ESBL organism, including piperacillin-tazobactam, fluoroquinolones (levofloxacin, ciprofloxacin), nitrofurantoin, and sulfamethoxazole-trimethoprim. The primary outcome is percentage of patients with hemodynamic stability, defined as WBC <10,000 cells/L and temperature 96.8°F<x<100.4°F, within 72 hours of therapy or at discharge if prior to 72 hours. Secondary outcomes include hospital length of stay (LOS), inpatient duration of antibiotic therapy, and 30-day re-admission rate for the same infection.

Results: A total of 162 patients were included in the analysis with 81 patients in each group. The primary outcome was met in 70% and 67% (p = 0.74) of the patients respectively for the carbapenem and non-carbapenem groups. The inpatient duration of therapy was significantly shorter in the non-carbapenem group at 4 days vs 6 days (p = 0.01). There was no difference in the incidence of re-fever, 30-day re-admission and hospital LOS.

Conclusion: Based on this study's findings, non-carbapenem therapy can be considered for non-bacteremic ESBL infections.

95. Assessment of Current Practices and Financial Analysis Regarding Clostridioides Difficile Testing within Hospitalized Patients.

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Introduction: The 2017 Infectious Diseases Society of America (IDSA) guidelines highlight the importance of stewardship in regards to testing for *C.difficile* infection (CDI). Diagnostic tests and pharmacotherapeutic treatments carry a high cost. Optimization of testing and diagnosis will reduce health care expenditures and potentially reduce antibiotic resistance.

Research Question or Hypothesis: This study was conducted to validate the IDSA criteria for CDI testing, and to analyze the current

practices and financial impact of laboratory testing in a rural hospital in New York.

Study Design: This is a retrospective, single center, case control study to assess the appropriate utilization of IDSA guidelines. Approval of the Institutional Review Board (IRB) was obtained, including exclusionary status for informed consent.

Methods: The primary outcome is to assess the proportion of patients who meet the IDSA criteria for testing and their corresponding CDI laboratory test results. Secondary outcomes include quantifying the frequency of improper testing and the financial impact. Hospitalized patients were included if they were tested for CDI via polymerase chain reaction (PCR). Patients who met criteria for testing (n = 94) were compared to patients who did not meet criteria for testing (n = 106). Chi-Square and T-test were utilized to compare patient demographics. Chi-Square and Odds Ratio (OR) were utilized to determine the statistical significance and associations between the two groups.

Results: Patients who fully met IDSA criteria for testing were more likely to test positive for CDI (OR, 2.9 [95% CI 1.64 to 5.18]). There were 106 patients who did not meet criteria for testing, which resulted in the unnecessary expenditure of $57,134 on testing alone.

Conclusion: The results of this study validate the criteria included in IDSA guidelines by showing a significant increase in positive results for those meeting criteria and the potential to reduce healthcare cost by avoidance of unnecessary testing.

96. Medication use evaluation of tigecycline at a public teaching safety net hospital.

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Introduction: Regardless of its broad spectrum activity against extended-spectrum beta-lactamases (ESBLs), Acinetobacter, methicillin resistant Staphylococcus aureus (MRSA), and vancomycin resistant Enterococcus (VRE), tigecycline is a last line antibiotic due to the Food and Drug Administration (FDA) warnings for increased mortality. At Nassau University Medical Center (NUMC), tigecycline is a tier 1 restricted antibiotic requiring infectious disease (ID) approval at all times.

Research Question or Hypothesis: In response to loosen tigecycline restrictions to allow for intensive care unit (ICU), emergency department (ED), and overnight use without ID approval, the Antimicrobial Stewardship Team (AST) conducted a medication use evaluation (MUE) to assess tigecycline use at the institution.

Study Design: This is an institutional review board approved, retrospective chart review on patients 18 years of age and over who received tigecycline from January 2018 to December 2018.

Methods: Patients were identified from antibiotic usage data monitored by the AST. Patient baseline demographics were collected, which included age, height, weight, sex, location, length of stay (LOS), creatinine clearance (CrCl), comorbidities, antibiotic allergies, tigecycline indication, dosing and duration, concomitant antibiotics, microbiological results, and 30-day all cause mortality. Quantitative analysis was used to describe data collected.

Results: The MUE included a review of 25 episodes of tigecycline use in 23 patients at NUMC in 2018. The mean duration of tigecycline therapy was 5 days. Organisms identified included multidrug-resistant (MDR) Acinetobacter (8), carbapenamase-producing Klebsiella pneumoniae (8), VRE (5), ESBL E. coli (4), Stenotrophomonas (2), and MRSA (2). Tigecycline was associated with a high 30-day mortality rate (56.5 percent).

Conclusion: Similar to published literature, tigecycline use at NUMC was associated with high mortality rates. Patients started on tigecycline at NUMC were patients with severe, complicated infections since the majority of patients were on concomitant antibiotics. Based on the results of this MUE, the AST decided not to loosen restrictions for tigecycline and will develop criteria for use, including dosing recommendations for tigecycline.

97. Vitamin D deficiency is independently associated with infectious complications in burn patients: An interim analysis of a multicenter study.

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Introduction: Vitamin D deficiency has been associated with increased rates of infections, hospital length of stay, and mortality in critically ill patients. In burn patients, vitamin D deficiency has primarily been studied in single center studies and the pediatric population. This study sought to evaluate the clinical impact of vitamin D deficiency on infectious complications in adult burn patients

Research Question or Hypothesis: Do adult burn patients with vitamin D deficiency have an increased risk of infectious complications?

Study Design: Retrospective, observational, multicenter study.

Methods: Patients aged 18 years or older who were admitted to the burn intensive care unit between January 1, 2016 and August 23, 2019 with a vitamin D level in the first seven days of admission were included. Exclusions were non-burn-related injury, total body surface area (TBSA) burn of <5%, readmissions, expired within first 48 hours, pregnant, or incarcerated. Patients were stratified into two groups based on their admission vitamin D levels; deficient (25-hydroxyvitamin D <20 ng/mL) and normal (≥20 ng/mL). Patients met the composite endpoint if they had one or more of the following: bacteremia, pneumonia, urinary tract infection, wound infection, graft loss, or death.

Results: The interim analysis included 205 patients. Among those patients, 62% (n=128) were found to be deficient. Demographics were similar between the two groups, except the deficient group had a greater median TBSA and were less likely to be taking supplementation prior to admission. Patients with deficiency were more likely to have an infectious complication (59% vs 39%; p=0.01), acute kidney injury (9% vs 0; p=0.014), and longer median length of stay (22.5 vs 12; p<0.001). After controlling for burn center, TBSA, Charlson Comorbidity Index, and inhalation injury, regression analysis revealed deficiency and days until supplementation initiation to be the best predictors of infectious complications.

Conclusion: Vitamin D insufficiency was independently associated with increased infectious complications in adult burn patients.

MANAGED CARE

98. Impact of a High-Severity Drug-Drug Interaction Edit on Antibiotic Therapy in Commercial, Medicaid, and Medicare Members Prescribed Fluoroquinolones.

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Introduction: Drug-drug interactions are one of the most common causes of adverse drug events. While there are many adverse drug events that are unpredictable, most drug-drug interactions can be anticipated and prevented. Pharmacy benefit managers use point of sale edits to alert dispensing pharmacists of drug-drug interactions. Due to the concern for life-threatening drug-drug interactions, better understanding the impact of point of sale edits on appropriate medication use is warranted.

Research Question or Hypothesis: The purpose of this study was to examine the impact of a high-severity drug-drug interaction edit on antibiotic therapy and trends in prescription override codes.

Study Design: Retrospective pharmacy claims analysis from August 2018 and July 2019.

Methods: Using a pharmacy benefit manager claims database, fluoroquinolone claims that rejected due to a high-severity drug-drug interaction edit were identified and extracted. Prescription claims identified as having stayed rejected were manually reviewed and it was determined if the fluoroquinolone was switched to another antibiotic. Time between the initial claim rejection and paid claim for the new antibiotic was calculated. Override codes were determined for all fluoroquinolone interaction rejected claims.

Results: A total of 1,309 fluoroquinolone claims rejected and were included in the analysis. A total of 284 (21.7%) claims stayed rejected and were manually reviewed, with 67 of them being switched to a different antibiotic. Of those claims that were switched to a different antibiotic, most claims (15, 22.4%) were switched to sulfamethoxazole/trimethoprim. 58 (86.6%) rejected claims received a paid claim for a new antibiotic within 24 hours. Override codes were used with 1,170 of the rejected claims. Most claims (869, 74.3%) were overridden after prescriber consultation.

Conclusion: The high-severity drug-drug interaction edit was shown to effectively prevent a significant drug-drug interaction. Additionally, the point of sale edit did not negatively impact the elapsed time for a patient to receive a paid claim for an antibiotic.

99. Effects of Morphine Milligram Equivalent Mailing On Provider Opioid Prescribing: A Retrospective Observational Study..

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Introduction: In response to rising opioid-related overdose deaths, the CDC recommends that clinicians justify exceeding 90 morphine milligram equivalents (MME) per day when prescribing opioids for chronic pain. In support, pharmacy benefit managers can provide drug utilization review to identify high-risk members and their providers.

Research Question or Hypothesis: How will an MME mailing affect opioid, naloxone, and potentiator medication prescribing?

Study Design: Retrospective drug utilization review.

Methods: Participants were included if they received an average of ≥90 MME per day over a four-month period (3/1 – 6/30/2019) but were excluded if they had a cancer diagnosis, were receiving hospice care, filled a prescription at a long-term care or oncology pharmacy and/or filled a prescription written by a hematologist or oncologist. Members were assigned to intervention or control group based on insurance coverage. The mailing, including an informational letter and patient profile(s), was sent in July 2019 to providers managing patients in the intervention group only. Claims data were acquired to compare four-month periods pre- and post-mailing.

Results: 968 members were included, with 135 in the control group and 833 in the intervention group. A greater proportion of the intervention group experienced a reduction in average daily MME to <90, but the difference was not statistically significant (20.2% vs 17.8%, p=0.518). The intervention group declined significantly (p<0.05) in number of opioid fills, total quantity filled and days' supply compared to the control group. The potentiator count declined significantly (p<0.05) only in the control group but remained higher than the intervention group throughout the study (1.35±0.07 vs 1.21±0.08). Naloxone fills were similar between groups pre-mailing, but greater in the control group post-mailing (control:0.074±0.013, intervention:0.012 ±0.005, p<0.05).

Conclusion: The decline in opioid fills, quantity filled and days' supply indicates initial benefits of an MME mailing to promote patient safety. Future studies should evaluate the long-term effects of MME mailings on opioid use.

100. Evaluating Perceptions of Social Determinants of Health Among Primary Care Physicians Serving a South Texas Market.

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Introduction: The social determinants of health (SDoH) can have a significant impact on a patient's health status, and could be responsible for up to 70-80% of a patient's overall health. Physicians and pharmacists are suitably placed to assess SDoH factors that impact clinical decision-making. However, there remains a debate regarding who is ultimately responsible for addressing SDoH. Understanding Medicare Advantage (MA)-contracted primary care physician (PCP) SDoH perceptions and their relationship to outcomes metrics, such as admissions and medication adherence, had yet to be fully explored.

Research Question or Hypothesis: To examine PCP perceptions of SDoH, analyzing associations of these perceptions with PCP CMS Part D Star performance as well as their patients' admissions per thousand (ADK) and emergency-room visits per thousand (ERK).

Study Design: A cross sectional study was conducted using an 8-item survey, which was deployed at PCP meetings held August-October 2019.

Methods: PCP perceptions of SDOH and associations with outcomes were assessed using chi-square, t-tests, Spearman's correlation coefficient, and Fisher exact test. Logistic and linear regression models were also carried out.

Results: Our survey response rate was 89% (n=77). The top 3 SDoH barriers identified: financial insecurity (24.87%), low health literacy (18.65%), and social isolation (15.03%). Safety and food insecurity were reported as the least important barriers. Approximately 36% of PCPs felt that they should be the primary addressor of SDoH, while 28.57% believe insurers should intercede. A statistically significant difference in mean ADK was noted in PCPs who believe they should primarily address SDOH (p=0.03). ERK was significantly associated with perceptions regarding lack of consistent transportation (p=0.04). No differences with Part D Star ratings were observed.

Conclusion: Safety and food insecurity were not the top SDoH barriers identified by respondents, but the literature has recognized them as key SDoH factors. Future research should examine patient perceptions of SDOH to identify ways PCPs can better assist their patients.

101. Impact of a Pharmacoadherence Mailing on Targeted Immunomodulator Medication Adherence Among Members of a Commercial Client.

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Introduction: Poor adherence in chronic inflammatory conditions can lead to disability, increased mortality, and high costs of care. Studies have shown that adherence is suboptimal for many patients, and specific strategies with targeted immunomodulators have been poorly measured.

Research Question or Hypothesis: To determine the impact of a targeted immunomodulator adherence mailing to members and their prescribers twelve months after the mailing.

Study Design: Retrospective claims analysis of two commercial clients.

Methods: Members with at least two fills of a targeted immunomodulator (abatacept, adalimumab, anakinra, baricitinib, certolizumab pegol, etanercept, golimumab, sarilumab, tocilizumab, tofacitinib, ustekinumab) and proportion of days covered (PDC) of < 0.80 in the baseline period of 9/1/2017 to 8/31/2018 were included. The intervention received a mailing in September 2018, consisting of an educational letter sent to patients and a letter containing the patient's medication profile sent to the prescriber, while the control did not. Members were followed for twelve months after the mailing. Claims were analyzed to calculate PDC, medication possession ratio (MPR), and gaps in therapy (GIT) for each time period and compared for differences.

Results: 308 members (137 in the intervention and 171 in the control) were included in the analysis. 32.8% of the intervention and 30.4% of the control improved to a PDC of ≥ 0.80 (p=0.647). There was a statistically significant improvement in mean PDC and MPR in the intervention (0.60 to 0.69 and 0.63 to 0.72, respectively, P<0.05), but not in the control. There was not a statistically significant improvement in GIT for the intervention, but there was in the control (129.46 to 107.09, P<0.05).

Conclusion: Average PDC significantly improved after a targeted immunomodulator adherence mailing, but the proportion of adherent members did not differ between groups. 94% of members used a specialty pharmacy, which is known to have an impact on adherence.

102. Using a Mixed Model to Evaluate Clinical Outcomes of a Diabetes Self-Management Education and Support (DSMES) Service in a Medicare Advantage Prescription Drug Coverage (MAPD) Type II Diabetes Population.

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Introduction: DSMES services “assist a person in implementing and sustaining behaviors needed to manage their condition.” Our objective

was to evaluate multiple time points, pre- and post-, of a DSMES intervention to demonstrate effectiveness in enhancing clinical outcomes in a MAPD population over time.

Research Question or Hypothesis: DSMES intervention will improve glycemic control and medication adherence long-term.

Study Design: A single group, pre- and post- design was used.

Methods: Eligible MAPD beneficiaries from various geographic regions of Texas were enrolled in a DSMES service from January 2016 - November 2018. The intervention was defined as participation in DSMES curriculum. Repeated mixed modeling assessed differences in HbA1c values pre- and post-intervention. Covariates controlled for in the model included region, referral source, low income subsidy (LIS) status, true out of pocket cost (TROOP) and gender. Differences in pre- and post- adherence defined as proportion of days covered ≥ 0.8 was assessed using the McNemar Test.

Results: The analysis included 484 beneficiaries. The average HbA1c pre- and post- DSMES participation was 9.12% and 8.35%, respectively. Results of the mixed model showed a significant decrease in HbA1c by 0.61% (P<0.0001) after the intervention. The East and South East regions, relative to the South region, showed the greatest reduction in HbA1c by 0.93% (P=0.005) and 0.48% (P=0.002) respectively. A specific type of referral (internal reporting) revealed a decrease in HbA1c of 0.31% (P=0.03) compared to other types of referrals. Those with LIS, relative to those without, showed a decrease in HbA1c of 0.4% (P=0.009). Every $ increase in TrOOP was associated with an HbA1c increase of 0.00013% (P=0.0004). No significant differences in adherence were observed.

Conclusion: A statistically significant reduction in HbA1c post-DSMES was observed. Further research is needed to evaluate geographic and demographic influences of DSMES on clinical outcomes. Future research should also focus on pharmacists' role in DSMES and medication adherence.

103. The Effect of Reducing the Morphine Milligram Equivalents Threshold Edit at the Point of Service for Opioid Prescription Claims.

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Introduction: There is a growing body of evidence showing that as the daily morphine milligram equivalents (MME) increases, the risk of opioid use disorder or an overdose event increases. In 2018, the daily MME edit threshold was lowered to 100 MME daily at point of sale based on CMS adoption of guidelines.

Research Question or Hypothesis: To evaluate the effect of reducing the concurrent drug utilization review (CDUR) MME threshold edit at point of service (POS) for opioid use.

Study Design: Retrospective claims analysis of a commercial, Medicaid and Medicare population at a pharmacy benefit manager.

Methods: The pre-intervention time frame was 7/1/2017-12/31/2017, where opioid medications rejected if they met or exceeded 120 MME, the member was filling at two or more different pharmacies, and prescribed from two or more providers. The post-intervention time frame was 1/1/18-6/30/18, where opioid medications rejected with the same criteria except at 100 MME. The dispensing pharmacist would review the rejected claim for appropriateness, contact the prescriber if needed and could enter an override code to allow the opioid claim to adjudicate.

Results: A total of 2,016 claims were rejected at the 120 MME threshold, with 800 (39.7%) that stayed rejected. A total of 2,183 claims rejected at the 100 MME threshold with 878 (40.2%) that stayed rejected. Oxycodone (42.6%), hydrocodone (19.2%), and morphine (9.9%) were among the most commonly prescribed opioids throughout the timeframe. The largest percentage of claims (15.1%) came from prescribers designated as surgery, followed by physician assistants (14.0%) and internal medicine (11.7%).

Conclusion: The new CDUR POS 100 MME edit initially rejected 2,183 claims with 40.2% of them staying rejected. These findings suggest actively involving the dispensing pharmacist in the opioid claim approval process may decrease inappropriate use.

104. The Effect of a Point of Service Edit on Hydrocodone or Codeine-containing Cough and Cold Medication Utilization in a Pediatric Population.

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Introduction: In April 2017, the FDA issued a drug safety announcement, stating that codeine is contraindicated in patients under 12. The risks of misuse, abuse, addiction, overdose, death, and slowed or difficult breathing outweigh the benefits of treating coughs.

Research Question or Hypothesis: To determine the impact of a point of service edit on utilization of hydrocodone or codeine-containing cough and medications in a pediatric population twelve months after implementation.

Study Design: Retrospective claims analysis of a commercial, Medicaid and Medicare population at a pharmacy benefit manager.

Methods: In March 2018, a Concurrent Drug Utilization Review (CDUR) POS edit was implemented, causing claims for cough and cold medications that contain codeine or hydrocodone to reject at the pharmacy for patients under 18 years old. The dispensing pharmacist then reviewed the claim for appropriateness, and was required to enter an override code in order to allow the patient to obtain. Retrospective claims analysis was completed twelve months post implementation of the edit, from 3/15/18 to 3/15/19.

Results: A total of 1,144 claims rejected in the twelve-month timeframe and 540 (47.2%) of them stayed rejected. Members (ages 0-11 years) were more likely to have the claim stay rejected (56.95%)

than members (12-17 years) (43.71%, p < 0.001). Most claims were processed for guaifenesin with codeine (58.8%), followed by promethazine with codeine (32.5%), homatropine and hydrocodone (4.5%), and chlorpheniramine and hydrocodone (4.1%). Codeine-containing products made up 91.3% of the total claims. No difference was found in the percentage of claims that stayed rejected between both provider specialties and specific medication. A majority of the claims were from commercial members (69%), followed by Medicaid (23.9%), and Exchange (7.1%).

Conclusion: The codeine cough and cold edited 1,144 claims and approximately half remained rejected. These findings show that actively involving the dispensing pharmacist in the pediatric cough and cold claim approval process may decrease inappropriate use.

MEDICATION SAFETY

105. Analytical Validation of a Method for Quantitative Assessment of Lansoprazole in an Extemporaneously Compounded Lansoprazole Suspension Using Handheld Raman Spectroscopy.

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Introduction: Raman Spectroscopy has been used as an analytical tool in the pharmaceutical industry for many years. A hand-held Raman spectrometer has many advantages when compared to a standard bench-top Raman spectrometer including a much smaller footprint and is often costs much less. These advantages are quite important when considering use in a compounding pharmacy. It is noteworthy that all Raman spectrometry can be challenging because inactive ingredients can interfere with the API's spectra.

Research Question or Hypothesis: For medication safety purposes, in this study, a method employing a two-step extraction method (water-methanol) and a hand-held Raman spectrometer was assessed to determine if it can accurately and precisely determine the concentration of lansoprazole in an extemporaneously compounded lansoprazole suspension.

Study Design: Our validation approach/protocol was based on the ICH guidelines and FDA guidance on Analytical Procedures and Methods Validation for Drugs and Biologics.

Methods: Specificity, linearity, accuracy, precision, range, detection limit and quantitation limit were determined by analysis of more than 200 test samples.

Results: Lansoprazole had 3 unique wavenumbers 610 cm^{-1}, 804 cm^{-1}, and 1275 cm^{-1}. The linearity of 9 concentrations (30% -110%) was proven at each of these 3 peaks with R^2 = 0.9999, 0.9989, and 0.9991 respectively. Accuracy was determined at all 3 peaks with percent relative errors of 0.64%, 0.46%, 0.33% respectively. Over the validation range (85% - 115%) suitable levels of precision, accuracy and linearity were found. The limit of detection (LOD) was determined to be 1.7 mg and the limit of quantitation (LOQ) was 2.6 mg.

Conclusion: The developed two-step extraction method followed by analysis using a hand-held Raman spectrometer was shown to be precise, accurate and robust for determination of lansoprazole in an extemporaneously compounded lansoprazole suspension. This method was shown to be suitable for quality control in compounding pharmacies.

106. Analysis of the Readability of Patient Education Material Related to Opioids.

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Introduction: Reading level of Patient Education Material (PEM) indirectly assesses health literacy. Over 47,000 people in the US died due to opioid-related overdose and an estimated 18 million people have misused opioids at least once in 2017. Some of this misuse could be attributed to patients' low health literacy.

Research Question or Hypothesis: To analyze the readability of PEM related to opioids.

Study Design: Descriptive and correlational design

Methods: Package insert and Patient Education Sheet (PES) related to opioids were obtained and scanned between May and Sept. 2019. Material unrelated to education were excluded. Word counts, number of sentences, complex or long words (>3 syllables), Lexile level, average grade level, appropriate age range were assessed. Online version of Flesch Kincaid Reading Ease, Gunning Fog Score, SMOG Index, Coleman Liau Index, Automated Readability Index, Flesch Kincaid Grade Level were used to assess the PEM readability. Use of accepted/unaccepted words as recommended by the Center for Substance Abuse Treatment (CSAT) in these PEM were also assessed.

Results: A total of 171,629 words were scanned through 17 package inserts and 15 PES of 15 different opioids. The word counts ranged between 1,660 - 13,245, with an average of 5,335 words per PEM. The Average Lexile level ranged between 700-1550. Readability of PEM was between 7-17th grade level (reading ages 12-21+). On average, the overall grade level for the PES was 6 or 7th grade (age 11-13). On the other hand, the reading level for the package inserts was that of a college sophomore or junior (grade 14-15). Overall, a total of 667 words were found to be unacceptable based on CSAT recommendations.

Conclusion: PEM was written at higher reading grade level than the average American may not be able to understand. Efforts directed at improving the readability of PEM perhaps help us to reduce some of the opioid use related issues.

107. Discharge NSAID prescribing to high-risk groups in the emergency department before and after change to state opioid prescribing limits.

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Introduction: Non-steroidal anti-inflammatory drug (NSAID) use is increasing as alternative analgesics to opioids but carry the risks of kidney injury, gastrointestinal bleeding, and cardiovascular events. This project reviewed NSAID discharge prescriptions in the Regional One emergency department before and after an amendment to Tennessee state law which imposed opioid prescription limits and went into effect on July 1st, 2018.

Research Question or Hypothesis: Will a change to Tennessee state opioid prescribing limits increase inappropriate NSAID prescribing to high risk groups?

Study Design: Retrospective chart review.

Methods: NSAID electronic prescription reports for January 1st-June 30th 2018 as the pre-intervention group and July 1st-December 31st 2018 as the post-intervention group were examined. Demographic information, serum creatinine (SCr), potassium, BNP levels, NSAID prescribed, duration of NSAID treatment, past medical history of myocardial infarction, stroke, acute kidney injury, chronic kidney injury, dialysis, gastrointestinal bleeding, and inflammatory bowel disease were recorded. If the patient had any of these diagnoses, SCr ≥ 1.5, potassium level ≥5, or BNP ≥300, the prescription was deemed inappropriate.

Results: 1042 patient encounters were analyzed. The median age was 39 and 41 and the percentage of females was 55 and 53, in the pre- and post-intervention groups respectively. Most patients (88%) were African American. 5.3% (29/548) in the pre-group and 7.3% (36/494) in the post group were inappropriate prescriptions. There was an increased number of patients with myocardial infarction history in the post-group compared with the pre-group (5 vs 0, p=0.018). No other statistically significant differences in past medical history or lab values between the two groups were found.

Conclusion: Although the opioid law change appeared not to have had an effect on prescribing to most high risk groups, the number of inappropriate prescriptions to patients with history of myocardial infarction increased. Patients should be screened for high-risk disease states and with baseline lab work prior to starting NSAIDs.

NEPHROLOGY

108. The Impact of Multiple Renal Estimates on Pharmacist Dosing Recommendations: A Randomized Trial.

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Introduction: Numerous equations are used for estimation of renal function, and many electronic medical records report multiple clearance estimates to assist with drug dosing. It is unknown whether the presence of multiple estimating equations impacts clinicians' renal dosing decisions.

Research Question or Hypothesis: Does the presence of multiple renal clearance estimates impact pharmacists' decisions to adhere to approved dosing recommendations?

Study Design: Randomized controlled trial.

Methods: A randomized trial in the form of an electronic survey including four clinical vignettes was delivered to hospital pharmacists across the state of Michigan. Vignettes consisted of a patient presenting with an acute pulmonary embolism requiring enoxaparin therapy. Pharmacists were randomized to receive a single estimate of renal function or multiple estimates for all vignettes. The multiple estimates included clearance estimates from the Modified Diet in Renal Dosing and Chronic Kidney Disease Epidemiology equations as well as different variants of the Cockcroft-Gault (C-G) equation. The primary outcome was deviation from approved dosing recommendations on at least one vignette. The chi-square test was used to detect differences in deviation rates between groups. Logistic regression was performed to adjust for the effects of potentially confounding variables on the primary outcome.

Results: A total of 154 studies were completed (73 in the multiple estimate group and 81 in the single estimate group). Pharmacists presented with multiple renal estimates were significantly more likely to deviate from recommended dosing regimens than pharmacists presented with a single estimate (54.7% vs 38.2%; p=0.04). The results were driven primarily by the two vignettes which included discordant dosing recommendations among C-G equation creatinine clearance estimates. Logistic regression identified multiple estimates as the only independent predictor of deviation (p=0.04).

Conclusion: Pharmacists provided with a single renal clearance estimate are more likely to adhere to approved dosing recommendations than pharmacists provided with multiple estimates.

109. Evaluation of the Safety and Tolerability of Spironolactone in Patients with Heart Failure and Chronic Kidney Disease.

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Introduction: Spironolactone is recommended to reduce morbidity and mortality in patients with heart failure (HF) with reduced ejection fraction and to decrease hospitalizations in HF with preserved ejection fraction. To minimize the risk of hyperkalemia, patients must have an estimated glomerular filtration rate (eGFR) > 30 mL/min/1.73m^2 and potassium < 5.0 mEq/L; however, spironolactone is prescribed outside of these parameters.

Research Question or Hypothesis: Can patients with HF and chronic kidney disease (CKD) be safely treated with spironolactone?

Study Design: Single center, retrospective chart review.

Methods: Patients included were ≥ 18 years with a past medical history of HF and CKD (stages 3-5) who received ≥ 48 hours of inpatient spironolactone therapy and were hospitalized February 2018-August 2019. Exclusion criteria included: concomitant use of other potassium-sparing diuretics or calcineurin inhibitors, history of solid organ transplant or cirrhosis, pregnant or nursing, or received continuous renal replacement therapy. The primary outcome was incidence of hyperkalemia (potassium ≥ 5.5 mEq/L).

Results: Overall, 121 patients were evaluated: 52.1% (n=63) had an EF > 40% and 47.9% (n=58) had an EF < 40% with 69.4% (n=84) CKD stage 3, 24.8% (n=30) stage 4, and 5.8% (n=7) stage 5. Spironolactone was a home medication for 54.5% (n=66) of patients and 45.5% (n=55) were initiated during hospitalization. Eight patients (6.6%) experienced inpatient hyperkalemia - all admitted with spironolactone as a home medication. Patients who experienced inpatient hyperkalemia had a numerically lower eGFR that was not statistically significant (35.40 vs. 38.22 mL/min/1.73m^2; p=0.730). Patients with CKD stage 3 (n=4) had numerically higher rates of inpatient hyperkalemia than stage 4 (n=1) or 5 (n=3) (50%, 12.5%, and 37.5% respectively; p<0.05).

Conclusion: Spironolactone may be safe to initiate in hospitalized patients with HF and CKD; however, appropriateness of therapy must be assessed upon admission to the hospital. Larger studies are needed for conclusive results.

NEUROLOGY

110. Impact of Haloperidol as Adjunct Therapy to Dihydroergotamine in Intractable Migraine: A Retrospective Cohort Study.

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Introduction: Standard care for intractable migraine treatment includes intravenous dihydroergotamine (DHE) per the Raskin Protocol. This treatment does not provide relief for all patients. Evidence suggests dopamine involvement in migraine pathophysiology, supporting utility of dopamine receptor antagonists. Two small studies evaluated single-dose haloperidol, and demonstrated efficacy in reducing migraine pain.

Research Question or Hypothesis: Does the addition of haloperidol to DHE in patients with intractable migraine provide clinically significant pain reduction?

Study Design: This is a retrospective, single-center, cohort study evaluating adult patients with intractable migraine.

Methods: Comparative groups were patients receiving the Raskin protocol with or without haloperidol. Patients were matched in a 1:1 ratio based on age, gender, total DHE amount, metoclopramide, and glucocorticoid usage. The primary outcome was the mean reduction in pain score. Secondary outcomes include hospital length of stay, time to significant pain relief, pain reduction ≥ 50% from admission, rescue medication usage, opioid usage, 7-day readmission rate, and adverse effects associated with haloperidol. Nominal data was evaluated using chi-square, and continuous data was evaluated using student's t-test when normally distributed. All statistics were analyzed using SPSS version 24.

Results: A total of 60 patients were evaluated in this study. No significant difference in mean pain score reduction was observed between the two groups, (4.9 vs. 5.5, p=0.40). Median time to initiation of haloperidol was 10 hours (IQR 4.0 – 18.0) from admission, and the median dose administered was 4 mg (IQR 1.3 – 5.8). No significant differences in secondary outcomes were observed, though time to significant pain relief was numerically decreased (44 vs. 52 hours p=0.44). Haloperidol use was not associated with any significant adverse effects.

Conclusion: The addition of haloperidol to DHE in patients with intractable migraine did not provide additional pain relief. If further studied, higher dosages of haloperidol similar to previous studies or earlier time to haloperidol initiation should be investigated.

111. Evaluating the Impact of a Shortened IVIG Infusion Strategy on Safety and Hospital Length of Stay in Neuroimmunologic Patients.

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Introduction: IVIG administration is associated with an increased risk of adverse events and prolonged hospital stay. Longer duration infusions are thought to improve patient tolerability in exchange for prolonged hospitalization. However, literature favoring a particular infusion strategy is limited. In this retrospective study we assess the impact of a pharmacist-led, shortened IVIG infusion strategy at Memorial Hermann – Texas Medical Center (MH-TMC).

Research Question or Hypothesis: Does administration of an IVIG infusion over a shorter duration reduce hospital length of stay without impacting patient safety and tolerability in those treated for neuroimmunologic indications?

Study Design: Single-center, retrospective cohort study with quasi-experimental design.

Methods: We retrospectively reviewed patient charts of those admitted to MH-TMC between January 2014 and July 2019 who received at least 1 day of IVIG for any neuro-immunologic indication. Patients were divided into pre- and post-intervention cohorts, and outcomes for long (5 days) and short (3 days or less) infusion strategies were compared within each cohort. The two outcomes of interest were patient safety described as incidence of adverse events (AE), and length of hospital stay (LOS) based on days from first IVIG infusion to discharge.

Results: 163 patients were included in the study. AE rates were not statistically significantly different between groups in the post-intervention cohort ($p = 0.53$). There was a statistically significant decrease in LOS associated with the short infusion compared to the long infusion in the pre-intervention group ($p < 0.05$), with a similar trend in the post-intervention cohort favoring the short infusion strategy ($p = 0.08$).

Conclusion: Shorter infusion strategies may facilitate earlier hospital discharge with broad economic implications, and does not compromise patient safety.

ONCOLOGY

112. Neutropenia-Associated Outcomes in Patients with Solid Tumor Malignancies Receiving Myelosuppressive Chemotherapy with Reduced Doses of Pegfilgrastim.

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Introduction: Pegfilgrastim is a granulocyte colony-stimulating factor used to prevent neutropenia-associated complications in patients receiving chemotherapy. Bone pain is a common adverse event of pegfilgrastim that is treated with antihistamines and analgesics. For patients with severe or refractory bone pain, clinicians may opt to reduce the dose of pegfilgrastim. Prior studies have demonstrated that pegfilgrastim dose reductions in breast cancer patients receiving chemotherapy can improve bone pain without increasing the risk of febrile neutropenia (FN).

Research Question or Hypothesis: What is the impact of administering reduced doses of pegfilgrastim on neutropenia-associated outcomes in patients with non-breast cancer solid tumor malignancies receiving chemotherapy?

Study Design: Retrospective chart review.

Methods: Patients ≥18 years with a diagnosis of a non-breast cancer solid tumor malignancy receiving chemotherapy supported by a dose of pegfilgrastim <6 mg were included. The primary outcome was the incidence of FN. Secondary outcomes included hospitalization and use of intravenous antimicrobials for FN, incidence and severity of neutropenia, and treatment delays or chemotherapy dose reductions secondary to FN or neutropenia.

Results: A total of 73 patients received a reduced dose of pegfilgrastim following chemotherapy. A total of 233 cycles of chemotherapy were supported by reduced-dose pegfilgrastim. The most commonly utilized doses were 4 mg (n=54 [74%]) and 3 mg (n=16 [22%]). The most common malignancies included lung (41%) and sarcoma (36%). Most patients received a chemotherapy regimen with an intermediate risk of FN (58%). Two patients (3%) experienced FN. Both patients required hospitalization and intravenous antibiotics. All-grade and grade 3/4 neutropenia occurred in 19 (26%) and 6 patients (8%), respectively. Treatment delays and chemotherapy dose reductions secondary to neutropenia or FN occurred in 3 (4%) and 4 (5%) patients, respectively.

Conclusion: Reduced doses of pegfilgrastim in patients receiving chemotherapy for a non-breast cancer solid tumor malignancy resulted in a low incidence of neutropenia-associated events, including FN and grade 3/4 neutropenia.

113. Prevalence of Mental Health Treatment Utilization in Cancer Survivors Diagnosed with Depression and/or Anxiety.

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Introduction: Depression and anxiety are common mental health disorders in cancer survivors and could lead to increased morbidity and mortality if left untreated. Previous studies reported suboptimal antidepressant and anxiolytic pharmacotherapy use in cancer survivors compared to the general population (GP). However, majority of research evaluates pharmacotherapy treatment utilization and limits the assessment of psychotherapy utilization for treating mental health disorders.

Research Question or Hypothesis: Is there a difference in the prevalence of pharmacotherapy or psychotherapy utilization for depression and/or anxiety in cancer survivors compared to the GP?

Study Design: A cross-sectional analysis of the National Health Interview Survey from 2012-2018.

Methods: All participants were diagnosed with anxiety and/or depression, defined by self-reported diagnosis and/or a score of ≥13 on the Kessler 6 questionnaire. Descriptive analysis was performed to identify the prevalence of treatment utilization between cancer survivors and the GP. A Z-test was performed to assess differences in treatment utilization between the two populations.

Results: Of the 5977 adults analyzed, the mean age was 48.64 (SD ±16), 69.1% were White, 64.2% were female, and 87.5% were insured. The prevalence of receiving treatment for depression and/or anxiety was 61.9% and 60.2% (p=0.6708) in the general and cancer populations respectively. Between 2012 and 2018, the prevalence increased by 18.6% (cancer population) and 21.3% (GP). Higher utilization of psychotherapy was found for anxiety and/or depression in

the GP (50.3%) compared to the cancer population (45.8%) (p=0.1808) whereas, pharmacotherapy use between the groups were similar (GP 29.4% and cancer population 31.9%; p=0.3117).

Conclusion: The inclusion of psychotherapy as a treatment utilization option for depression and/or anxiety mitigate the disparities previously reported of lower treatment utilization in cancer survivors. However, due to over one-third of participants not receiving mental health treatment, it is imperative for clinicians to recognize depression and/or anxiety to ensure patients are educated on mental health treatment options.

114. Coordination of Care: Hypertension Management in Cancer Patients Receiving Oral Chemotherapy or Hormonal Therapy.

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Introduction: Primary care providers (PCP) are the mainstay for chronic disease management, such as hypertension. However, previous studies indicate that cancer patients prefer to see their specialists for all of their healthcare needs and therefore will not have a PCP. This poses a greater concern to patients receiving oral chemotherapy or hormonal therapy (HT) due to fewer clinic visits, which puts hypertensive patients at risk for going untreated or unmanaged.

Research Question or Hypothesis: Is hypertension appropriately managed in the community oncology clinic setting for patients receiving oral chemotherapy or HT.

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

Methods: Adult patients with a baseline blood pressure (BP) reading ≥ 120/80 mmHg who were newly initiated on oral chemotherapy or HT from August to October 2018 were included. Two to three BP readings recorded on separate visits were evaluated, averaged, and classified based on the AHA/ACC guidelines on hypertension. Hypertension was defined by a systolic ≥ 140 or diastolic ≥ 90 mmHg or a systolic ≥ 130 or diastolic ≥ 80 mmHg with a diagnosis of chronic kidney disease or diabetes. Descriptive statistics were used to evaluate the data.

Results: Of the 75 patients analyzed, the mean age was 65 (SD ±9), 67.7% were female, 54.8% were White, and the mean comorbidities was 2 (SD ±1). Forty-one percent (n=31) of patients were found to be hypertensive in which the systolic BP mean was 145 (range, 130-200) and the diastolic mean was 80 (range, 58-97) mmHg. Amongst those who were hypertensive, 26% (n =8) were not receiving antihypertensive agents, and 48% (n=15) did not have hypertension listed as a condition on their electronic record.

Conclusion: Over one-third of patients receiving oral chemotherapy or HT were found to have unmanaged hypertension, which emphasizes the need for coordination of care amongst community oncology and primary care clinics.

115. Atropine Use After Irinotecan-Based Chemotherapy at an Academic Medical Institution.

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Introduction: Irinotecan, a chemotherapeutic agent for the treatment of colorectal and pancreatic cancers, is known for its dose-limiting toxicity of cholinergic side effects, specifically diarrhea. To treat this adverse reaction in the early phase, the prescribing information suggests utilizing atropine to prevent or treat cholinergic syndrome. Although chemotherapy agents may have overlapping adverse events, atropine cannot be ruled out as a contributor to side effects such as tachycardia, arrhythmias, and muscle weakness. Therefore, it is important to recognize the indications for atropine prior to administration.

Research Question or Hypothesis: What is the incidence of atropine utilization and the indications and risk factors attributed to atropine use at Nebraska Medicine?

Study Design: This was a retrospective study, reviewing data from electronic health records of patients 19 years or older receiving irinotecan at Nebraska Medicine.

Methods: Data were collected regarding cancer diagnosis, chemotherapeutic regimen, monoclonal antibody use, atropine utilization, and hospitalizations. Descriptive analysis and chi-squared tests were used to assess the primary endpoint and demographics. Logistic regression was used to assess the risk factors for irinotecan-induced cholinergic syndrome.

Results: Atropine was utilized in 82% of the 230 patients reviewed. Of those 188 patients, 89 received the first dose of atropine prior to the first irinotecan dose, allowing 99 patients to be analyzed for cholinergic indication. Adverse events associated with atropine were reported in 13% of patients. Concurrent use of oxaliplatin and irinotecan doses ≥ 175 mg/m^2 were risk factors associated with cholinergic syndrome.

Conclusion: Our findings support other studies in that the concurrent use of oxaliplatin and irinotecan doses ≥ 175 mg/m^2 lead to increased cholinergic symptoms. With atropine utilization higher than anticipated and with the 13% incidence of atropine adverse events, education to review atropine indications may be beneficial for all staff.

116. Adjuvant Endocrine Therapy Adherence Among Patients with Breast Cancer in Community Oncology Clinics.

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Introduction: Although adjuvant endocrine therapy (AET) reduces the risk of recurrence in hormone receptor breast cancer (BC) patients, adherence to AET remains suboptimal in patients who are younger, unmarried, Medicare recipients, employed, faced with transportation barriers and a higher number of comorbidities. However, community oncology practices (COPs) are designed to increase access to healthcare and treat a wide range of patients who often fit the profile of those who are associated with non-adherence.

Research Question or Hypothesis: This study investigated if traditional factors associated with AET adherence exist in patients receiving care in a COP setting.

Study Design: Prospective, single center, cohort study.

Methods: We analyzed 68 adult patients with BC who received their first AET prescription between Aug.–Oct. 2018. Pharmacies were contacted to obtain AET pick-up dates over 6 months. Adherence rates were self-reported and was also calculated using a proportion of days covered (PDC) of ≥90% over 6 months. Binary logistic regression model was used to assess the following factors impact on AET adherence: age, sex, race, marital status, employment, cancer stage, comorbidities, distance to pharmacy, and pharmacy type (mail order/specialty pharmacy versus retail).

Results: AET adherence rate was 66.2% (mean PDC=83%, range: 16–100%). Reasons for non-adherence included forgot medication (n=5), ER admission (n=1), and negative side effects (n=2). Fifteen patients did not admit to non-adherence. After adjusting for covariates, factors associated with increase odds of being adherent included non-married patients (OR=6.15;95% CI: 1.03–36.61; p=.046) and patients with multiple comorbidities (OR=1.78; 95% CI: 1.04–3.05; p=0.03). Age, race, employment, staging of cancer, insurance type, and pharmacy factors were not significant associations with adherence.

Conclusion: Although access to care and sociodemographic factors were not associated with adherence, there was still a high proportion of patients (44%) non-adherent to AET. Future studies identifying psychosocial and physician barriers are warranted to further understand adherence in community oncology practices.

117. Safety of Inactivated Vaccines in Patients Receiving Immune Checkpoint Inhibitors.

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Introduction: Immune checkpoint inhibitors (ICI) upregulate the immune system but cause immune-related adverse events (IRAE) resulting in treatment delays or discontinuations. Concurrent vaccination is a theoretical risk factor for increased IRAE incidence. Clinical guidelines support use of inactivated vaccines in patients with cancer. Evaluation of immunotherapy with inactivated vaccines shows mixed safety data and vaccines beyond influenza have not been reported in literature.

Research Question or Hypothesis: The objective was to compare the incidence of IRAEs requiring therapeutic intervention between a matched cohort of patients who did (cohort A) and did not (cohort B) receive an inactivated vaccine. Secondary objectives include rate of immunotherapy discontinuation or therapy delays due to toxicity.

Study Design: This is a retrospective, single-center, matched-cohort (1:2, cohort A:B) chart review of patients who did or did not receive an inactivated vaccine 30 days prior to or 60 days following administration of ICI therapy from January 1, 2015 to July 31, 2019.

Methods: Chi-square tests were used to examine outcomes.

Results: A total of 213 patients were included, 71 in cohort A and 142 in cohort B. There was no difference in incidence of IRAE requiring therapeutic intervention between vaccinated and unvaccinated cohorts (23.9% vs 26.8%; p=0.658). No difference was observed between delays due to toxicity (11.3% vs 9.2%; p=0.626) or discontinuations due to toxicity (11.3% vs 9.9%; p=0.75). The most common vaccines were inactivated influenza (n=48), pneumococcal (PCV13, n=8; PPSV, n=18), and Tdap (n=8). Fifty-five patients with IRAEs required supportive therapy. The most common were pneumonitis (n=14) and rash (n=12). All patients requiring supportive therapy received a corticosteroid.

Conclusion: This analysis demonstrates receiving inactivated vaccines during immunotherapy does not increase IRAE incidence or cause further therapeutic delays and discontinuations. Though influenza vaccines were most common, this is the first study including other inactivated vaccines. Our data demonstrates safety for receiving inactivated vaccines during ICI therapy.

118. Effectiveness and safety of pembrolizumab in refractory and relapsed classical Hodgkin lymphoma as bridging to hematopoietic stem cell transplant.

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Introduction: Although pembrolizumab is approved for relapsed and refractory classical Hodgkin lymphoma (rr-cHL) treatment, there are limited data about its long-term effectiveness and safety as bridging to Hematopoietic-Stem-Cell Transplant (HSCT).

Research Question or Hypothesis: Is pembrolizumab effective and safe as bridging to HSCT in rr-cHL patients?

Study Design: A 2-year retrospective observational study from January 2016 to December 2018.

Methods: The study included adult rr-cHL patients treated with pembrolizumab as bridging to HSCT. Electronic-medical records of

the included patients were reviewed. Patients' demographics, disease and treatment-related variables including reported adverse events (AEs) and the incidence of Graft-Versus-Host Disease (GVHD) were collected. Progression-free survival (PFS) and overall survival (OS) were estimated using Kaplan-Meier analysis and the severity of the reported AEs were assessed using Hartwig severity assessment scale.

Results: Thirty-two patients were included, 59.4% of patients were males with a median age of 29.5 years (range: 18-53).The median follow-up duration was 11.6 months (range: 6.7-27.4). Patients received a median of 5 cycles (range: 1-8). Response was assessable in 29 patients, of the 25 (87.1%) patients who responded to pembrolizumab, 15 patients achieved complete response and 10 achieved partial response. Seventeen patients (68%) underwent HSCT (11 autologous, 6 allogeneic), 5 of them (29%) relapsed HSCT with a median PFS and OS of 15.7 and 26.1 , respectively. Among the entire cohort, treatment-related AEs were reported in 65.6% of the patients, pneumonitis and infections were the most common reported AEs. After allogenic-HSCT, 5 (83.3%) patients developed acute GVHD which was fatal in 1 patient, 3 of them developed chronic as well.

Conclusion: Pembrolizumab showed a promising role as bridging to HSCT in rr-HL patients that should be furtherly evaluated in larger prospective studies.

OTHER

119. Impact of Pharmacist Intervention Post Discharge in Patients with Chronic Obstructive Pulmonary Disease and/or Heart Failure.

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Introduction: The Joint Commission stated that three areas in the patient's transition of care (TOC) are ineffective: communication, patient education, and accountability. At Geisinger Medical Center a TOC program was developed for all patients discharged from a Geisinger facility with heart failure (HF) and/or chronic obstructive pulmonary disease (COPD). The patients enrolled are contacted by a community health associate (CHA) within 48 hours after discharge to have an in-person visit with the CHA and a phone encounter with a licensed pharmacist to further discuss their discharge medications.

Research Question or Hypothesis: Reduction in the number of 30-day readmissions/emergency department (ED) visits, when a pharmacist follows with a TOC phone call.

Study Design: multi-centered, observational, matched control study.

Methods: The study included patients at least 18 years of age and discharged with COPD and/or HF from December 2018 to December 2019. The primary outcome was to compare 30-day readmission rates/ED visits between patients who received a TOC call verses those who did not. Secondary outcome(s) included percentage of patients who followed up with their 2-week primary care provider (PCP) appointment, identification/resolution of medication problems, and percentage of patients referred to MTDM clinics.

Results: A total of 354 patients were included, with 177 patients in each group. The baseline characteristics were similar between groups, except for prior to admission HF diagnosis, which was higher in the TOC group (56.5% vs 49.7%, p=0.0141), though not clinically significant. The 30-day readmission rate and ED visits between the two groups were different but not statistically significant (7.3% vs 11.3%, p=0.2726) and (7.9% vs 18.6%, p=0.0044).

Conclusion: Among patients discharged with a diagnosis of COPD or HF, the 30-day readmission rates and ED visits were reduced in the TOC phone call group, however, was not statistically significant. Other benefits were observed, which included increase in follow-up PCP appointments, introduction into MTDM, and reconciliation of medication problems.

120. The Influence of Long-Term Psychostimulant Exposure in a Female Model of Parkinson's Disease.

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Introduction: Methylphenidate (Ritalin) commonly treats attention-deficit/hyperactivity disorder by inhibiting dopamine reuptake. Our laboratory's previous research found that long-term methylphenidate exposure causes dopamine-releasing neurons in the nigrostriatal pathway to become more susceptible to Parkinsonian toxin 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP) in male mice. Dopamine oxidizes to a quinone which conjugates to the antioxidant glutathione (GSH), but GSH levels deplete. Quinones then become free radicals that fatally cause nigrostriatal neurons to become more MPTP-susceptible. Here, we examined females.

Research Question or Hypothesis: Since estrogen can be neuroprotective, we hypothesized that anestrus (low-estrogen) females will experience more quinone production, GSH depletion, and dopamine cell loss than proestrus (high-estrogen) females.

Study Design: We utilized female Swiss-Webster mice, which exhibit resistance to MPTP neurotoxicity in a saline-controlled dose response design.

Methods: Ninety-six mice were divided into saline (control), 1 mg/kg (therapeutic), or 10 mg/kg (abusive) methylphenidate groups with proestrus and anestrus subgroups. All mice were injected twice daily for 12 weeks, then received either MPTP or saline. The substantia nigra and striatum of the nigrostriatal pathway were collected post-injection. We measured dopamine quinones via dot blots and GSH levels via assay kits.

Results: We analyzed data (n=8 per group) using GraphPad Prism with 3-way ANOVA and Bonferroni-Dunn multiple comparison tests. P<0.05 was considered significant. Proestrus mice experienced statistically significant dopamine neurotoxicity (p=0.036) and increased quinone production (p<0.0001) within the substantia nigra in response to MPTP. GSH levels significantly decreased in proestrus long-term methylphenidate animals (p<0.0001), and were further depleted with MPTP (p=0.005). There were no significant differences in any anestrus subgroups.

Conclusion: Contrary to our hypothesis, estrogen seemingly sensitized neurons to MPTP in both saline and methylphenidate-treated animals. Surprisingly, the only added effect of methylphenidate was glutathione depletion in this model. Overall, these data support the idea that long-term psychostimulant exposure may predispose individuals to Parkinson's disease.

PAIN MANAGEMENT/ANALGESIA

121. Outcomes associated with institutional pharmacist-driven pain stewardship programs.

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Introduction: In January 2018, The Joint Commission (TJC) implemented new pain assessment/management standards for hospitals, requiring institutional pain stewardship teams. Pharmacists are directly listed as essential healthcare providers in pain stewardship teams. There is minimal published literature on clinical outcomes associated with institutional interprofessional pain stewardship teams, especially those incorporating a pain specialist pharmacist.

Research Question or Hypothesis: The purpose of this research is to assess clinical outcomes of pharmacist-driven pain stewardship programs.

Study Design: Retrospective literature search.

Methods: A literature search was conducted through MEDLINE from its earliest entry to January 2019 using the terms: “pharmacist-driven,” “pain stewardship,” “pain management,” “opioid management,” and “opioid stewardship.” Studies were eligible for inclusion if they assessed any health-related outcome of institutional pain management teams involving pharmacists. Studies were excluded if written in a non-English language or if full text was unavailable.

Results: Eighty-five studies were obtained from the initial search, and 9 studies featuring pharmacists were included in the primary analysis. Among included studies, 5 (55.6%) showed a decrease in opioid use by incorporating pharmacists. In one community healthcare system, premature deaths associated with opioids decreased more than 50% over 2 years. A retrospective analysis of a pharmacy-directed pain service showed increased adjunctive medication use and decreased life-threatening events associated with opioids. Additionally, significant reductions in pre-/post-consult pain intensity scores have been identified. Among geriatric patients, a decrease in the number of as-needed doses and pain scores have been identified. One hospital reported cost savings of $97,200 in a year after adding a pain management pharmacist service.

Conclusion: Despite limited published data supporting incorporation of pharmacists into pain stewardship teams and TJC requirements, the global effectiveness of pharmacy-driven pain management services remains heterogenous.

122. Persistent Opioid Use After Acute Pancreatitis.

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Introduction: Opioids are commonly used in management of pain for acute pancreatitis. Little is known about whether the short term use for acute pancreatitis increase risk of iatrogenic persistent opioid use.

Research Question or Hypothesis: We hypothesize that acute pancreatitis patients receiving opioids during acute hospitalization is associated with an increased risk of persistent opioid use after discharge.

Study Design: This study was a retrospective population-based cohort study using Taiwan's National Health Insurance Research Database from 2012 to 2016.

Methods: Patients aged ≥ 20 years with new episodes of acute pancreatitis requiring hospitalization were included. Subjects hospitalized for more than 100 days, with a cancer diagnosis or history of chronic pancreatitis were excluded. Subjects were divided into opioid or non-opioid groups according to the opioid use during hospitalization. Primary outcome was the rates of persistent opioid use. It was defined as the opioid prescription within 3 months and again with 3 months to 1 year after discharge. Covariates for adjustment included age, gender, etiology, comorbidities, hospital type, length of stay, geographic region, insurance premium, history of opioid use and degree of health care utilization. A multivariate logistic regression model was used to identify the risk factors of persistent opioid use.

Results: A total of 2,427 patients with acute pancreatitis were included, with 1,434 patients receiving opioids during hospitalization. The proportion of persistent opioid use was 9% and 5.54% in opioid and non-opioid groups, respectively. In the adjusted model, opioid group was associated with 80% increase in persistent opioid use (adjusted OR 1.80, 95%.CI 1.27-2.55, P value<0.01).

Conclusion: Patients hospitalized for acute pancreatitis with opioid prescription was associated with an increased risk of becoming persistent opioid users within one-year follow-up period. Use of opioids in acute pancreatitis requires careful selection and monitoring to avoid iatrogenic addition.

123. Opioid Sparing Effect of Liposomal Bupivacaine in Total Knee Arthroplasty Patient: A Systematic Analysis of Randomized Controlled Trials.

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Introduction: Liposomal bupivacaine (LB) is a local anesthetic agent used to reduce postoperative pain and opioid consumption in select surgical settings. A number of randomized controlled trials (RCTs) have been published evaluating LB in total knee arthroplasty (TKA).

Research Question or Hypothesis: To determine if LB is associated with a statistically significant reduction in opioid use in patients undergoing TKA.

Study Design: A Medline search using the terms LB, TKA, and RCT identified 24 publications. After review of study design criteria (prospective, randomized, double-blind, and placebo- or active-control), 9 studies were included in this systematic analysis. All RCTs had to compare pain scores and opioid consumption between LB and a comparative treatment.

Methods: A total of 10 treatment groups (3 placebo; 7 active treatment) were compared to LB in 1331 patients. 6 active treatment comparators included immediate-release (IR) local anesthetics and 1 included intrathecal morphine.

Results: Among the 3 placebo comparisons with LB, opioid consumption was significantly less in 1 while pain scores were significantly less in 2. In the 7 active treatment comparisons, opioid consumption was significantly less in 1 and no different in 6. In the 7 active treatment comparisons with LB, pain was significantly less in 1, significantly greater in 2, and no different in 4. Overall, opioid consumption was significantly less with LB in 2 of 10 comparison groups (1 placebo, 1 active IR-bupivacaine). LB was associated with a significant reduction in pain in 3 of 10 treatment comparisons (2 placebo, 1 active IR-bupivacaine).

Conclusion: The ability of LB to produce a statistically significant reduction in opioid consumption and postoperative pain in TKA is not supported by the current published evidence.

124. Implementation of Inpatient Opioid Stewardship Initiatives.

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Introduction: A new opioid-alternative pre-built care set (PCS) was created and implemented for providers to use at an 800-bed teaching hospital in January 2020.

Research Question or Hypothesis: The use of an opioid-alternative PCS will decrease the number of opioid doses administered and morphine milligram equivalents (MME)/day per patient.

Study Design: This study was a single-center retrospective chart review comparing opioid usage before and after implementation.

Methods: Patients were included if they had medications ordered from the opioid-alternative PCS or a similar pre-implementation PCS that includes both opioids and non-opioids and were matched by both provider and floor. Patients were excluded if they had outpatient opioid prescriptions of ≥ 80 morphine milligram equivalents (MME)/day due to Ohio's regulations of needing referral to pain management. Comparison was made pre- (n=50) and post (n=50) implementation of the opioid-alternative PCS. The primary outcomes were to determine if the opioid-alternative PCS with education would decrease the amount of opioid doses administered and MME/day. The secondary outcome was to determine if the PCS would increase the use of opioid-alternatives on general medical floors.

Results: Data was analyzed with the Mann-Whitney U test within SPSS Statistics. There was no difference in number of opioid doses (1 vs 2.5 (St. dev. 8.43, 7.68), p = 0.477) or MME/day (2.28 vs. 8.67 (23.03, 20.67), p = 0.395) in the select population of this study. Scheduled opioid-alternative medications increased from 20% of patients in the pre-initiation group to 76% of patients in the post-initiation group.

Conclusion: The availability of an opioid-alternative PCS increased the use of scheduled opioid-alternatives in appropriate patients. However, the use of the PCS did not decrease the overall opioid doses or MME/day in the pilot group evaluated. The small sample size may have limited results.

125. Efficacy of liposomal bupivacaine for post-operative pain management in gynecologic surgery.

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Introduction: Recently, government agencies have made efforts to educate patients and prescribers about the importance of balancing pain management with the risks of initiating opioid therapy. With increasing awareness of potential negative adverse effects due to opioids, physicians are looking for non-opioid methods of controlling pain. In 2017, gynecology oncology at Winnie Palmer Hospital began using liposomal bupivacaine for gynecologic surgeries.

Research Question or Hypothesis: To evaluate if use of liposomal bupivacaine for gynecologic surgeries will reduce post-operative opioid consumption.

Study Design: An IRB-approved retrospective chart review that compared narcotic use between surgical patients post-liposomal bupivacaine implementation and surgical patients the year prior to implementation.

Methods: Data was collected on a total of 400 gynecologic surgery patients without documented allergy to analgesics or intraoperative

complications, with 200 patients in each group. The primary outcome was total opioid consumption, in milligram morphine equivalents (MME), up to 72 hours post-operatively. Secondary outcomes included post-operative pain scores, average length of stay, and percent of patients who experienced an adverse event. Statistical analysis was performed using IBM SPSS Version 22.0 (IBM, Armonk, New York). Mann Whitney U and Student's t-test were used for continuous data and Chi-square for categorical data with a statistically significant p-value of < 0.05.

Results: Patients who received liposomal bupivacaine received significantly less opioids than the pre-implementation group (1818.5 MME vs. 2659 MME, p < 0.0001) as well as significantly improved post-operative pain scores (2.28 vs. 3.01, p 0.003). There were no differences in incidence of post-operative nausea and vomiting, ileus, or adverse drug reactions. Patients who did not receive liposomal bupivacaine had a shorter length of stay (29.72 hours vs. 35.13 hours, p 0.038).

Conclusion: Use of liposomal bupivacaine in gynecology oncology surgical patients resulted in decreased opioid use and improved pain management up to 72 hours post-operatively without an increased risk of adverse surgical or drug events.

126. Evaluation of Multimodal versus Opioid Only Pain Management for Acute Pancreatitis.

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Introduction: Current guidelines for the management of acute pancreatitis fail to provide clear recommendations for pain management and available literature is insufficient.

Research Question or Hypothesis: What is the effect of multimodal versus opioid only pain management on length of stay for patients with acute pancreatitis? What is the effect of these pain management regimens on 30-day readmission rate, opioid prescribing at discharge, and daily pain scores? What is the relationship between pain scores and length of stay?

Study Design: Retrospective chart review.

Methods: From September 1, 2017 to September 1, 2019, 150 patients met criteria for inclusion and were assigned to one of two study groups. The multimodal group included patients who received at least two pain medications with different mechanisms of action within the first 48 hours of hospital admission, while the opioid only group included patients who received only opioids during the first 48 hours of hospital admission.

Results: The mean length of stay for the opioid only group was 3.9 ± 1.96 days while the multimodal group had a mean length of stay of 4.0 ± 1.66 days (p=0.703). There were no significant differences in secondary outcomes between groups. There was a significant improvement in pain score from day one to the day of discharge, –1.7 ± 2.24 (p<0.001) for the opioid only group and –1.4 ± 2.56 (p<0.001) for the multimodal group.

Conclusion: As no significant differences were found for any outcome, the data indicates a multimodal regimen may be as effective as an opioid only regimen for acute pancreatitis pain while providing the benefit of an opioid sparing strategy.

127. Impact of an interprofessional standardized acute pain management approach in a small teaching hospital.

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Introduction: A standardized acute pain management protocol was implemented at our 171 bed teaching hospital in July 2019. The stepwise protocol promotes preferential use of non-opioid analgesics over opioids, and oral analgesics over parenteral analgesics. Specific pain scale ranges on all "as needed" orders for treatment of pain were made mandatory.

Research Question or Hypothesis: Does a collaborative pain management approach change the percentage of total opioid usage that is parenteral?

Study Design: Single-center, pre-post observational study.

Methods: The pre-intervention group consisted of all patients admitted to hospitalist service between October 1, 2018 and January 31, 2019 with orders for "PRN" pain medications. The post-intervention group included all patients admitted to hospitalist service between October 1, 2019 and January 31, 2020 with orders for "PRN" pain medications. Patients were excluded if they were mechanically ventilated, hospice patients, or receiving opioid infusions. The primary outcome was change in the percentage of total opioid usage that is parenteral. Secondary outcomes included percentage of analgesic doses that were opioids, percentage of analgesic orders associated with pain scales, percentage of documented responses to analgesic administration, and difference in morphine milligram equivalents between groups.

Results: Among the 937 patients included, 428 were in the pre-intervention cohort, and 509 were in the post-intervention cohort. There was no statistically significant difference in the percentage of total opioid use that was parenteral between the pre and post intervention groups (53% vs. 52%, p=0.53). However, there was a relative 87.6% increase in the percentage of non-opioid medications administered as needed for pain (p < 0.00001).

Conclusion: This study shows that a standardized, inter-professional, multi-modal pain management model has the potential to limit opioid use for the treatment of acute pain. These results will be used as a

basis for further collaboration and ongoing education in regard to pain management.

PEDIATRICS

128. Dangers of Diazoxide Use in Premature Infants: A Case Series.

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Introduction: Diazoxide is first line for treating neonatal hyperinsulinemic hypoglycemia when blood glucose cannot be stabilized with enteral feeds or intravenous fluids. Recent reports document severe adverse events associated with diazoxide, specifically relating to respiratory decompensation and pulmonary hypertension, although risk factors and timing for developing these adverse effects is not clearly defined.

Research Question or Hypothesis: Is diazoxide use in neonates with hyperinsulinemic hypoglycemia associated with severe respiratory adverse events?

Study Design: Retrospective electronic medical record review.

Methods: All infants that received diazoxide from 2013 to 2019 were included in this study. Data from each subject was evaluated prior to initiation of diazoxide, throughout therapy and after discontinuation for the purpose of evaluating the effect of diazoxide on resolution of hypoglycemia and development of respiratory side effects secondary to its use.

Results: Fifteen neonates were included in this study. Eight developed complications – six of which required intubation subsequently after diazoxide initiation. Of those eight, three experienced severe pulmonary hypertension that required higher level of care. Variables that appear to be associated with increased complications include gestational size, gestational age, and birth weight. Each of the subjects with complications were small for gestational age (SGA) ($p<0.0046$). No subjects considered appropriate for gestational age (AGA) or large for gestational age (LGA) experienced complications. Lower birth weight was also associated with complications from diazoxide use. For those with complications, average birth weight was 1310 grams versus 2229 grams for those without complications ($p<0.02$). There were no significant correlations noted with regard to diazoxide dose, average length of therapy, and day of life diazoxide initiated.

Conclusion: The results of this study demonstrate a similar trend, particularly with regard to gestational size, gestational age and birth weight. Further studies are needed to establish more definitive links between diazoxide use and those at increased risk of developing severe complications.

129. Evaluating neonatal enoxaparin dosing in an academic medical center.

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Introduction: Our institution utilizes initial enoxaparin dosing of 1.8mg/kg every 12 hours in patients less than 3 months old for neonatal thrombosis based on literature supporting higher doses. This differs from guidelines which recommend an initial dose of 1.5mg/kg every 12 hours in infants less than 2 months. This study aims to evaluate current enoxaparin prescribing patterns in neonates at Albany Medical Center (AMC).

Research Question or Hypothesis: Is enoxaparin 1.8mg/kg every 12 hours initial dosing and subsequent prescriber monitoring at AMC in neonatal patients appropriate?

Study Design: This is a quantitative, retrospective chart-review of neonates who received at least one dose of therapeutic enoxaparin and one corresponding anti-Xa level over 5 years.

Methods: Data collection included patient demographics, initial and subsequent doses of enoxaparin, and anti-Xa levels. Data was excluded if anti-Xa levels were drawn outside of the 3-5 hours post-administration period. Efficacy and safety was reviewed via radiologic imaging or provider records. Results were analyzed utilizing descriptive statistics. The primary endpoints were average enoxaparin dose for therapeutic anti-Xa, average number of anti-Xa levels drawn, and percentage of levels that prompted a dose change. Secondary endpoints included adverse effects.

Results: The final analysis included 15 patients. The average enoxaparin starting dose was 1.45 mg/kg. The average enoxaparin dose was 1.84 mg/kg to achieve the first therapeutic anti-Xa. Patients had an average of 4.6 anti-Xa levels drawn and 33% prompted a dose change. The only adverse effect noted was a hematocrit of 22 requiring PRBC transfusion in one patient.

Conclusion: Enoxaparin dosed at 1.8mg/kg q12h for neonates may consistently achieve goal anti-Xa levels. Further evaluation of AMC's anti-Xa monitoring in this population is needed.

PERI-OPERATIVE CARE

130. Antimicrobial stewardship in major elective orthopedic surgery: results of a comprehensive program implementation.

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Introduction: While antimicrobial stewardship has been cited as a crucial component of orthopedic surgical care, limited high-quality data exists to guide practice, creating need for comprehensive antimicrobial stewardship program (ASP) implementation and evaluation.

Research Question or Hypothesis: How can an ASP impact perioperative antibiotic use and institutional outcomes for the elective total joint arthroplasty (TJA) population?

Study Design: Prospective qualitative analysis in a major orthopedic surgery population at a large urban hospital.

Methods: An interprofessional Orthopedic Surgery ASP was formed in late 2017 at the study institution. A workgroup of content experts generated evidence-based recommendations for perioperative antibiotic use to the orthopedic quality committee for approval before implementation. Postoperative surgical site infection (SSI) rates and acute kidney injury (AKI) rates were prospectively assessed for primary, elective TJA patients through available quality program data. A rolling case series of SSI events was prospectively maintained to continuously inform ASP recommendations. Compliance with the new protocol for preoperative antibiotic selection was prospectively supported by clinical pharmacist interventions and assessed retrospectively. A cost-benefit estimation of the Orthopedic ASP was pursued from the institutional perspective.

Results: A total of 12 recommendations were issued with 11 ultimately implemented across 3 project phases spanning March 2018 - December 2019. Total SSI rate for elective TJA decreased throughout the affected fiscal years (1.38% FY18 vs. 0.69% FY19 vs. 0.63% FYTD20, very low event rates precluded meaningful statistical analysis). AKI rate was unchanged. Rate of optimal preoperative antibiotic selection increased from 66.67% in the pre-implementation sample to an average 95.76% post-implementation ($p<0.05$, $n=1584$), supported by an average 24 clinical pharmacist interventions/month. The ASP was estimated to save the institution >$180,000 annually.

Conclusion: A comprehensive ASP for TJA was associated with improved antibiotic use and estimated institutional cost-savings without apparent adverse effects. Clinical pharmacists were key drivers in this initiative.

PHARMACOECONOMICS/OUTCOMES

131. A Retrospective Claims Analysis of Calcitonin Gene-Related Peptides (CGRP): Utilization, Adherence, and Impact on Acute Migraine Therapy among 4 Million Commercial Lives.

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Introduction: Migraine affects about 20% of women and 6-10% of men in the United States. CGRP (erenumab, galcanezumab, and fremanezumab) are recently approved migraine prophylaxis agents. Due to the lack of real-world CGRP data, there is a need for retrospective claims analyses to assess their utilization patterns and effectiveness.

Research Question or Hypothesis: What is the real-world CGRP utilization pattern and triptan utilization post CGRP initiation?

Study Design: Retrospective descriptive pharmacy claims analysis of target CGRP from June 2018 to August 2019.

Methods: All CGRP pharmacy claims were identified from June 2018 to August 2019 and a monthly count of CGRP utilizers were reported. Adherence was measured using the proportion of days covered (PDC) calculation, and reported as the percent of members who had a PDC of ≥ 0.80. Members included in the pre- and post- triptan analysis had a CGRP index claim between June 2018 to Feb 2019 and ≥ 1 triptan claim between Jan 2018 to Aug 2019. Triptan utilization was measured in total days supply, number of claims, and triptan cost in the pre- and post-period.

Results: CGRP utilization increased 5-fold from 340 to 1,700 utilizers over a 15-month period. 68.1% had a PDC of ≥ 0.80. Total cost of triptans in the pre-period was $52,838 and post-period was $39,589 (a 25.1% decrease). Total number of claims in the pre-period was 853 claims and post-period was 665 claims (a 22.0% decrease). Total days supply in the pre-period was 14,309 days and post-period was 11,694 days (an 18.3% decrease). All measures relating to triptans had a significant decrease (p value <0.05).

Conclusion: Our real-world data showed over 30% of CGRP members were nonadherent (PDC < 0.8). Insurers may consider implementing clinical programs to improve CGRP adherence and patient outcomes. CGRP agents demonstrate the ability to reduce triptan utilization. More study is needed to further support these observations.

132. Cost Effectiveness Study of Hyperkalemia Management.

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Introduction: Patiromer (PAT) is a sodium-free, non-absorbed potassium (K^+) binder approved for the treatment of hyperkalemia (HK). There is limited real-world evidence on the cost implications associated with PAT treatment of HK.

Research Question or Hypothesis: To assess the cost-effectiveness of treating HK with PAT vs. no K^+ binder in a Medicare Advantage population.

Study Design: Retrospective, matched cohort study using the de-identified Optum Clinformatics® Data Mart Database from 1/1/16–12/31/18.

Methods: Two HK cohorts were identified: PAT exposed/unexposed (NoPAT). Patient inclusion criteria: pre-index serum K^+≥5.0 mEq/L

and HK diagnosis (ICD-10 code) and ≥6 months insurance enrollment post-index. Propensity score matching and coarsened exact matching with baseline variables were used to identify the complete set of matching unexposed and exposed HK episodes. Follow-up began on index date and ended at the first censoring event (insurance disenrollment, death, 12/31/18, SPS or SZC initiation, PAT discontinuation [exposed only], PAT initiation [unexposed only]). Cost outcomes measured at 6 months post-index: total, inpatient, ED, outpatient services and outpatient pharmacy (mean US$ [CI 95%]).

Results: The study population was 2004 patients (1002 matched pairs). Overall, mean age was 74 years and 60% were male. Patients had a mean of 5 comorbidities. Comorbidities included: DM (73%), CHF (35%), and ESRD (10%). At 6 months post-index, 300 (150 matched pairs) PAT and NoPAT patients remained uncensored. Total PAT mean cost difference (savings) of $7220 ($2211,$9584) was observed at 6 months post-index ($P<0.01$). This cost difference included a pharmacy increase of $3094 ($3964,$2224) and a decrease in medical costs, specifically, inpatient $4718 ($2222,$7215), outpatient $4781 ($2274,$7288), and ED $815 ($488,$1142).

Conclusion: At 6 months post-index, PAT cohort observed a 27% reduction in cost compared with the unexposed cohort for HK management. Further study is warranted to replicate these findings in a large cohort.

PHARMACOEPIDEMIOLOGY

133. Development of Prediction Models for Drug Therapeutic Outcome in Osteoporosis Patients by Different Machine Learning Algorithms.

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Introduction: Treating osteoporosis requires long term pharmacotherapy to ensure its efficacy. Using machine learning model to forecast future therapeutic outcome can help physicians to customize current medication options.

Research Question or Hypothesis: Can machine learning algorithms be used to predict therapeutic effects in osteoporosis?

Study Design: This was a single-site study retrospectively collecting data from 2011 to 2018.

Methods: Osteoporosis patients diagnosed with bone mineral density measurement via dual-energy X-ray absorptiometry at two different time points were included. Patients were randomly assigned to training set and testing set in 4:1 ratio. Electronic health record data of patients were retrospectively collected and used as variables in the predictive models. The improvement in bond mineral density was used as the study outcome. Machine learning algorithms with artificial neural network, random forest, and support vector machine were compared with logistic linear regression. Five index, including area under the receiver operating characteristic curve, accuracy, precision, sensitivity and F1 score were used as predictive values by Standards for the Reporting of Diagnostic Accuracy checklist.

Results: Four models were created with 7 clinical data and 17 risk factors. Among 197 patients included, 76 cases had outcome improvement in second measurement. The best-performing model was artificial neural network, reaching an area under the receiver operating characteristic curve of 0.98 ± 0.06 in the testing set with an accuracy of 96.8%, a precision of 95.6%, a sensitivity of 92.7% and a F1 score of 94%. All models had area under the receiver operating characteristic curve over 0.65 (LR = 0.71 ± 0.08, RF = 0.68 ± 0.08, SVM = 0.67 ± 0.06)

Conclusion: Our results suggest that artificial neural network model was the best model among the algorithms tested in forecasting therapeutic outcomes for osteoporosis patients.

134. Utilization of the Cancer Medications Enquiry Database (CanMED) National Drug Codes (NDC): Assessment of Systemic Breast Cancer Treatment Patterns.

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Introduction: Cancer Medications Enquiry Database (CanMED) is composed of two interactive, nomenclature-specific databases: CanMED-National Drug Code (NDC) and CanMED-Healthcare Common Procedure Coding System (HCPCS) within the Observational Research in Oncology Toolbox. This study demonstrates the development and use of CanMED-NDC individually and with CanMED HCPCS for treatment research.

Research Question or Hypothesis: The use of observational data to assess oncology treatment is expanding and tools can be developed that facilitate standardized treatment-related cancer research.

Study Design: New Clinical Epidemiology Database Development with Data Case Example.

Methods: CanMED includes oncologic medications that a) have a US Food and Drug Administration (FDA) approved indication for cancer treatment or treatment-related symptom management, b) are present in National Comprehensive Cancer Network (NCCN) guidelines, or c) carry an orphan drug designation for treatment or management of cancer. The NDCs included were identified through the US FDA NDC Directory and NDC Structured Product Labelling [SPL] Data Elements (NSDE). To demonstrate the use of CanMED, all relevant NDC and HCPCS codes associated with systemic treatment of female breast cancer (BC) were identified and then BC treatment patterns were assessed within the Surveillance Epidemiology and End Results

(SEER)-Medicare data among patients diagnosed between 2010-2013 by stage and molecular subtype.

Results: CanMED-NDC (11_2018 v.1.2.4) includes 6,860 NDC codes for medications: chemotherapy (1,870), immunotherapy (164), hormonal therapy (3,074), and ancillary therapy (1,752) and is acessible at https://seer.cancer.gov/oncologytoolbox/canmed/ndconc/. The BC case example used a SEER-Medicare cohort of 20,701 patients diagnosed with Stage I-IIIA and 2,381 diagnosed with Stage IIIB-IV. Treatment patterns were in accordance with guideline recommended treatment by stage and the four relevant BC molecular subtypes: luminal A, luminal B, HER enriched, and triple negative.

Conclusion: CanMED-NDC is a comprehensive resource that can facilitate and standardize the identification of medications from observational data (e.g., claims and electronic health records) to conduct treatment-related oncology research.

PHARMACOGENOMICS/ PHARMACOGENETICS

135. Potential Impact of CYP2D6 Genotyping on Post-Operative Analgesia with Tramadol in Patients Submitted to Hip or Knee Arthroplasty Surgery.

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Introduction: Tramadol is an opioid analgesic, being widely used as rescue analgesia in postoperative. Its metabolism occurs mainly mediated by CYP2D6 and CYP3A4. It's known that *CYP2D6* gene has a large number of described variations that condition the enzyme's activity.

Research Question or Hypothesis: If a significant relationship were found between CYP2D6 phenotype and tramadol efficacy and/or safety, the inclusion of genotyping as a pre-surgical exam could be recommended.

Study Design: This was a clinical, observational, longitudinal, prospective and analytical study, at *Hospital General Universitario Gregorio Marañón*, in Madrid.

Methods: Patients admitted to the trauma unit for knee or hip surgery were included. Demographic, clinical, pharmacotherapeutic and surgery-related data were collected. Based on the detection of *CYP2D6* polymorphisms, patients were classified according to their predicted phenotype.

Results: 178 patients were included, subdivided into: 52 who received tramadol and 126 who didn't. The two groups were considered homogeneous with each other. The mean of the Visual Analogue Scale in the 72 postoperative hours was less than 3 in both groups. Adverse effects were monitored within 72 hours following the tramadol use and the mainly observed were nausea and dizziness. 14 alleles were evaluated and the phenotype most associated with tramadol adverse effects was the efficient metabolizer. Only one of the poor metabolizers required a total dose of 300mg of tramadol.

Conclusion: CYP2D6 poor metabolizers were expected to have a reduced efficacy of tramadol, requiring higher doses, however this wasn't observed. Although none of the adverse effects that occurred were of high severity, the frequency found (21.15% of 52 patients) indicates that genotyping of *CYP2D6* is indeed important as pre-surgical exam for these patients.

136. Comparison of MTHFR C677T, A1298C, and G1793A genotypes and variant allele frequencies between Caucasians and Koreans.

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Introduction: Methylenetetrahydrofolate reductase (MTHFR) is an enzyme known to activate dietary folate and also break down the amino acid homocysteine. Increased levels of this homocysteine have been associated with the incidence of depression, coronary artery disease, stroke, and myocardial infarction. Ethnic differences in MTHFR polymorphisms could be one factor that results in different incidences of these disease states among ethnic groups.

Research Question or Hypothesis: The study was designed to compare the MTHFR genotype and variant allele frequencies between Koreans and Caucasians.

Study Design: This is a cross-sectional study utilized DNA samples of self-identified Caucasians and Korean subjects.

Methods: This study was approved by the Shenandoah University Institutional Review Board. Existing DNA samples were analyzed for the three most common MTHFR variant alleles: C677T (rs1801133), A1298C (rs1801131), and G1793A (rs2274976) using Taqman genotyping assays on an Applied Biosystems QuantStudio 6 Flex Real-time PCR. Pearson's chi-squared tests were used to compare genotype and allele frequencies between groups with a p-value of less than 0.05 considered statistically significant.

Results: The genotype analysis found significant differences between the Korean subjects (n=173) and Caucasian subjects (n=193) for both C667T (P=0.028) and A1298C (P<0.001). There was no significant difference between the two groups for G1793A (P=0.173). In the variant allele analysis, Korean subjects had a higher frequency of the C667T variant allele (P=0.029), Caucasian subjects had a higher frequency of the A1298C variant allele (P<0.001), and there was no significant difference in the G1798A (P=0.164).

Conclusion: While both Caucasians and Koreans have MTHFR polymorphisms, the frequency of the individual variant alleles differs between the two groups. Therefore, a patient's ethnicity should be taken into account when considering MTHFR genetic testing. Areas for further study include testing additional ethnic groups and comparing frequencies of variant alleles to MTHFR associated disease states.

PHARMACOKINETICS/ PHARMACODYNAMICS/DRUG METABOLISM/DRUG DELIVERY

137. Estimated versus measured creatinine clearance in determining augmented renal clearance in critically ill cancer patients..

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Introduction: Augmented renal clearance (ARC) in critically ill patients is characterized by high creatinine clearance (CC), excessive excretion of renally eliminated drugs, and potentially sub-therapeutic medication concentrations. Though measured CC using urine collection is the recommended method to screen for ARC, it is impractical due to the time required for sample collection.

Research Question or Hypothesis: The aim of this study to evaluate the sensitivity of the following CC formulas in identifying ARC in critically ill cancer patients: Cockroft-Gault (CG), modified-CG (m-CG), modification of Diet in Renal Disease (MDRD) and Chronic Kidney Disease-Epidemiology Collaboration (CKD-EPI).

Study Design: A post-hoc analysis of prospectively collected data at an oncology intensive care unit (ICU).

Methods: Patients admitted to the ICU aged ≥18 years, with serum creatinine ≤1.0mg/dL and good urine output ≥ 0.5ml/kg/hour were included. CC was estimated using the CC formulas and measured using 24-hour urine collection starting upon admission, for a total of five days or until the patient was discharged from the ICU or developed acute renal failure. The area under the receiver operator (AUROC) curve for each CC formula was determined, as well as the sensitivity and specificity for the formula with the highest AUROC curve

Results: Over the study period, 840 samples were obtained from 234 patients. Mean age was 53±16 (SD) years, and the majority had solid tumors (69%). The AUROC curve was 0.72 (95%CI 0.69-0.76) for CG, 0.65 (95%CI 0.60-0.69) for m-CG, 0.65 (95%CI 0.62-0.70) for MDRD, and 0.68 (95%CI 0.64-0.72) for CKD-EPI. For CG with the highest AUROC, sensitivity was 70.87 (95% CI 70.8-70.9) and specificity of 63.45 (95% CI 63.4-63.5).

Conclusion: Though the CG equation had the highest sensitivity among the studied CC formulas, all were found to be generally imprecise in assessing ARC. Future research should identify additional factors to combine with CC formulas to enhance their sensitivity in predicting ARC.

138. Population pharmacokinetic modeling of free phenytoin in adult patients: clinical factors affecting protein binding.

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Introduction: Phenytoin (PHT) is a highly protein-bound anticonvulsant with a narrow therapeutic window. A comprehensive population model describing the pharmacokinetics and non-linear protein binding properties of free PHT in non-cancerous adult patients is not yet available.

Research Question or Hypothesis: To characterize the population pharmacokinetics and clinical co-variates of free PHT in adults.

Study Design: Retrospective study enrolling subjects from year 2014 to 2018 in a tertiary hospital in Vancouver, Canada.

Methods: Paired total and free steady-state PHT concentrations from 37 adult patients receiving oral or intravenous PHT therapy were analyzed. Modeling was conducted using stochastic approximation expectation-maximization algorithm in Monolix. The best structural, error, and co-variate models were selected based on objective function values, relative standard errors (RSEs), and biological plausibility. Model validation was conducted by bootstrapping and visual predictive checks.

Results: Patient demographics (i.e. the tested co-variates) were: age (61.1±17.9,mean±SD years), critical-care(43%), sex(27% female), weight(68.5±15.6 kg), albumin(2.6±0.5 g/dL), serum creatinine(1.1 ±1.0 mg/dL), alanine aminotransferase(71.6±116.2 U/L), aspartate aminotransferase(42.8±37.1 U/L), international normalized ratio(INR) (1.1±0.1) and co-medications(e.g. carbamazepine, phenobarbital, or valproic acid). Total and free PHT concentrations were 11.4±5.3 and 1.4±0.7 μg/mL, respectively. A one-compartment, intravenous injection/first-order absorption, and first-order elimination model with proportional errors best described the pharmacokinetics of free PHT. Protein binding was characterized by "bound PHT=binding constant*free PHT/(dissociation constant+free PHT)" (Toutain, J vet. Pharmacol. Therap, 2002). The key final population estimates for free PHT were: volume of distribution (102 L [11.5%][RSE%]), elimination rate (0.0267 h^{-1}[9.0%]), and dissociation constant (9.2 μg/mL[5.3%]). Bioavailability (0.86) and absorption rate (0.23 h^{-1}) were fixed. Albumin(positive effect) and INR(negative effect) increased the binding constant from 91.3 μg/mL[14.9%] in the base model to 153.6 μg/mL[26.7%] in the final model.

Conclusion: A novel and comprehensive population pharmacokinetic model with mechanistic descriptions of non-linear protein binding for free PHT was developed. This model is being utilized to construct Bayesian forecasting engines for therapeutic drug monitoring.

139. Efficacy and safety of vancomycin therapy is similar after the transition to AUC/MIC monitoring in a primary facility.

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Introduction: New guidance recommends AUC/MIC monitoring instead of trough-based monitoring for vancomycin therapy. While this transition has demonstrated improved safety and efficacy in large, tertiary centers, this has not been reported from primary hospitals. The study facility transitioned to AUC/MIC monitoring in April 2019.

Research Question or Hypothesis: Will transition from trough-based monitoring to AUC/MIC based monitoring of vancomycin impact safety and efficacy of treatment?

Study Design: This was a retrospective, quasi-experimental study over two five-month study periods; April to August 2018 and April to August 2019.

Methods: The primary objectives were to evaluate efficacy and safety of AUC/MIC monitoring in inpatient veterans treated with intravenous vancomycin for ≥72 hours compared to a historical cohort of trough-based monitoring. Efficacy was evaluated by comparing clinical failure rates as defined by persistent fever, clinical deterioration, or escalation of gram-positive therapy. Safety was determined by the incidence of acute kidney injury (AKI) as defined by an acute change in serum creatinine ≥0.3 mg/dL over 48 hours. Secondary analysis compared vancomycin exposures between monitoring approaches. Nominal variables were compared using a X^2 test or Fisher's Exact. Continuous variables were compared with a Student's T test or Mann Whitney U, for non-normally distributed data, in R Studio.

Results: Of 268 patients screened, 25 met criteria in the before group, 19 in the after group. Efficacy was equivalent between groups, with no patients in either group exhibiting clinical failure of vancomycin therapy. In the before group, 2 patients (8%) met defined criteria for AKI, while no patients in the after group experienced AKI (P=0.21). Total vancomycin exposure was similar between groups averaging 1918 mg per day in the before group and 1803 mg per day in the after group (P=0.56).

Conclusion: AUC-based monitoring was equally efficacious as trough-based monitoring with similarly low rates of AKI.

140. Vancomycin Therapeutic Monitoring by Bayesian-Derived Area Under the Curve Versus Measured Trough Concentrations in Critically-Ill Cancer patients.

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Introduction: The updated vancomycin guideline and recent studies have suggested that trough concentrations may result in underestimation of the actual area-under-the-curve (AUC), leading to excessive dosing and nephrotoxicity. With limited data available on critically-ill adult patients with cancer, we retrospectively compared the two methods in a 5-year study in cancer patients treated at the adult intensive care unit (ICU).

Research Question or Hypothesis: Bayesian AUC/MIC is a more appropriate measure for therapeutic monitoring in Critically-ill cancer patients

Study Design: Retrospective Cohort Study.

Methods: The measured trough concentration was compared to a Bayesian-derived AUC/MIC. A trough concentration of 15–20 mg/L and an AUC/minimum-inhibitory-concentration (MIC, assuming 1 mg/L) of 400-600 were considered therapeutic. Multivariate analysis was done to identify risk factors associated with sub-therapeutic AUC. During the study period, 316 patients met the eligibility criteria.

Results: The mean ± SD age was 54 years ± 16; most patients had solid tumor (75%) and only (11%) had neutropenia. A therapeutic AUC/MIC was recorded in 121 (38%) and a therapeutic trough, 72 (23%) patients. Of the 121 patients with therapeutic AUC/MIC, 27 (22%) patients had therapeutic trough concentrations and 67 (55%) patients had trough concentrations between 10-15 mg/L. Furthermore, of the 72 patients with therapeutic trough concentration, 45 (63%) patients had higher than recommended AUC/MIC. Vasopressors use while on vancomycin and augmented renal clearance were identified as factors associated with sub-therapeutic AUC.

Conclusion: Our findings that more than half of the patients with a therapeutic vancomycin AUC/MIC had lower than therapeutic trough concentration suggests that a Bayesian AUC/MIC is a more appropriate measure for therapeutic monitoring. Future studies should be directed toward assessing the clinical impact of targeting AUC/MIC.

141. Bayesian Estimates of Vancomycin Area-Under-the-Curve (AUC) in Obese Patients using a Single Measured Concentration: a Comparison of Nine Models.

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Introduction: For obese patients, the 2020 consensus guideline on vancomycin monitoring states that evidence is insufficient to support using a single concentration to estimate the vancomycin area-under-the-curve (AUC). Initially, peak and trough concentrations are recommended to estimate AUC in obese patients.

Research Question or Hypothesis: The purpose of this study was to determine how well single-level, Bayesian AUC estimates produced by eight common vancomycin models in obese and morbidly obese patients compared to the estimates from the model by Crass et al.

Study Design: Modeling AUC estimates using retrospective vancomycin dosing and concentration data in obese patients.

Methods: Using nine different pharmacokinetic models as the Bayesian prior, the AUC was estimated using Bayesian analysis for 138 unique dosing encounters in 120 different patients with BMI ≥ 30 kg/m^2. Using the first measured concentration, the non-linear

solver function in Excel performed the minimization procedure required for the maximum *a posteriori* probability (MAP) Bayesian analysis. The primary outcome was the average ratio of the AUC estimate of each model to the AUC estimate of the two-compartment model developed by Crass et al. The Crass model was selected as the main comparator due to its prominence in the consensus guidelines.

Results: The 95% confidence interval for only one model contained unity (AUC_{Neely}/AUC_{Crass} = 1.02; 95% CI 0.99 – 1.04). For concentrations measured later in the dosing interval (> 0.3 * tau), no models achieved unity. Within the weight-based subgroups, PrecisePK's model produced the highest percentage of AUC estimates (range 87-97%) that fell within 20% of the Crass model estimate.

Conclusion: Substantial variability was observed in the AUCs estimated from a single concentration. Further investigations are required to determine if using peak and trough concentrations in the Bayesian analysis would result in closer alignment of the AUCs estimated by the nine models.

142. Effects of cannabidiol oil on in vitro metabolism of standard antidepressant medications.

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Introduction: Purported health benefits of cannabidiol (CBD) oil include reduction of anxiety, depression, and pain, so the potential exists for its concomitant use with antidepressant medications prescribed for similar indications. CBD can inhibit various cytochrome P450 enzymes, which could affect the metabolism of antidepressant medications. There is currently limited information regarding the effects of CBD on the metabolism of antidepressant medications.

Research Question or Hypothesis: CBD oil will slow the rate of in vitro metabolism of antidepressant medications.

Study Design: in vitro experiment.

Methods: in vitro metabolism of 6 representative antidepressants was determined using human liver microsomes at physiologically relevant concentrations. Each antidepressant was individually incubated with CBD oil concentrations of 0 (control), 0.5, 1, 5, and 10 μM cannabidiol. Each reaction was conducted in triplicate and the remaining substrate and corresponding metabolite concentrations were measured after 0, 30, and 60 minutes of incubation time using high-performance liquid chromatography-tandem mass spectrometry. The degree of metabolic inhibition was determined by comparing the change in concentrations of parent and metabolites at 60 minutes for each CBD oil concentration versus the control.

Results: Bupropion was inhibited the most by CBD oil ranging from 22% at 0.5 μM to almost 90% at 10 μM CBD. The metabolism of venlafaxine, fluoxetine and trazodone were each inhibited by 15% at 5 μM CBD and by 32%, 30%, and 27%, respectively at 10 μM. However, venlafaxine also showed 11% inhibition at 1 μM. Mirtazapine had a measured inhibition of 17% at 5 μM and 20% at 10 μM. No significant inhibition (<5%) was observed for amitriptyline at any of the CBD concentrations.

Conclusion: CBD affected the in vitro metabolism of all antidepressants except for amitriptyline, but particularly that of bupropion. It is possible that concomitant use of CBD oil and antidepressants could lead to increased adverse effects and toxicity.

PSYCHIATRY

143. Evaluation of valproic acid levels and dose adjustments in hypoalbuminemia.

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Introduction: Valproic acid (VPA) is a highly protein bound antiepileptic drug, leaving a minimal amount of drug remaining unbound in patients with normal serum albumin levels. There are currently two assays available for measuring VPA levels; one assay measuring the total VPA levels and the other assay measuring free VPA levels. In patients with hypoalbuminemia, the free VPA level can raise considerably, which may increase the risk for drug toxicities. At EMCP, VPA levels are monitored via a total level. If levels are not within a therapeutic range, VPA dosing might be adjusted even though the normalized total VPA level might be therapeutic or supratherapeutic.

Research Question or Hypothesis: This project will evaluate VPA levels and dose adjustments in relation to hypoalbuminemia, comparing measured to normalized total VPA levels.

Study Design: This is an IRB exempt, single-center, retrospective chart review conducted at EMCP from October 2017 until October 2019.

Methods: Included patients were ≥18 years old and received at least one dose of any VPA formulation, had a documented VPA level and a recently reported serum albumin of ≤ 3.5 g/dL during hospitalization. The primary outcome evaluated rate of discordance in therapeutic level of measured to normalized total VPA levels in hypoalbuminemic patients. The normalized formula used for predicting total normalized VPA levels was $C_N = \alpha_H C_H/6.5$.

Results: 16 (80%) patients had discordance in therapeutic level of measured to normalized total VPA levels, with the median magnitude of difference being 158.5%.

Conclusion: Significant disparities exist between measured total VPA levels as compared to normalized total levels via the correction equation. Therefore, reporting total measured VPA levels without normalizing for hypoalbuminemia can lead to inaccurate assessment and overcorrection of levels.

144. Assessment of Student Pharmacist Sleep Habits.

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Introduction: Studies examining the effect of sleep on academic performance are few in the student pharmacist population. In studies with medical students; poor sleep habits have been correlated with weaker academic performance.

Research Question or Hypothesis: This study aims to assess sleep habits and academic performance amongst student pharmacists.

Study Design: This was a multi-site study conducted at three schools of pharmacy via surveys.

Methods: Participants were recruited through emails sent to the entire student body at three schools of pharmacy, with a minimum target response rate of 30%. The electronic survey included the Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS), and demographic questions such as year in school, caffeine intake, approximate GPA, age, and identified gender. PSQI and ESS scores were calculated and analyzed for statistical significance. Demographic information was also analyzed to identify any correlation with PSQI and ESS scores.

Results: A total of 509 student pharmacists completed the survey, 133 students from Loma Linda University, 183 students from the University of Missouri Kansas City, and 193 students from the University of South Carolina. The majority of the students surveyed were female, worked part-time, and had 0-2 caffeinated drinks per day. The mean ESS was statistically significantly different between the female and male group (8.7, 7.5, $p<0.008$) as well as statistically significantly higher in those with a GPA <2.5 and statistically lower in those with a GPA >3.5 (10.3, 7.7, $p<0.008$). Mean ESS and PSQI scores were not statistically different between the schools.

Conclusion: The ESS was found to be statistically significantly higher in students with a GPA <2.0 and significantly lower in those with a GPA >3.5. Focus on good sleep habits should be a part of student wellness initiatives, especially in relation to strong academic performance.

145. Implications of Healthcare Providers HEDIS-compliant Use of PHQ-9 to Monitor Depression.

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Introduction: Among patients with major depressive disorder (MDD), measurement-based care improves outcomes. HEDIS recommends a depression quality care measure to monitor for treatment response within 4-8 months of an elevated score (DRR) using the 9-item Patient Health Questionnaire (PHQ-9).[i]

Research Question or Hypothesis: To compare the health and health care resource utilization of patients with providers who do and do not administer the PHQ-9 and among those who were compliant with the DRR quality measure.

Study Design: Retrospective cohort study.

Methods: Integrated claims and EHR data (Decision Resources Group [ii]) from 1/01/14 to 12/31/17 identified providers who administered the PHQ-9 and their MDD patients. Providers were categorized by PHQ-9 use and their patient populations were compared on demographics, comorbidities, service utilization, and medication use in the twelve months following the initial MDD diagnosis.

Results: 97,899 physicians provided care to 300,955 MDD patients. Of these, 94,462 (96.5%) did not administer the PHQ-9 (No PHQ); 3,105 (3.2%) administered the PHQ but were not compliant with the HEDIS DRR measure (PHQ), providing care to 32,627 patients with MDD; and 332 (0.3%) used the PHQ with evidence of HEDIS compliance (HEDIS), providing care to 13,285 MDD patients.

Patients of HEDIS providers had significantly higher mean annual psychiatric care office visits (1.2) compared to PHQ and No PHQ (0.9 and 1.0) and lower mean annual psychiatric emergency department (ED) visits (0.01, compared to 0.02 and 0.03) and psychiatric outpatient hospital encounters (0.06, compared to 0.1 and 0.2).

Conclusion: PHQ-9 administration is uncommon and even when administered, it is not often repeated in compliance with HEDIS recommendations to monitor depression response or remission . Patients of providers who administer the PHQ in compliance with HEDIS have higher mean annual psychiatric care office visits, and lower mean annual psychiatric ED visits and hospital-based care service utilization.

[i] https://www.ncqa.org/hedis/measures/depression-remission-or-response-for-adolescents-and-adults/

[ii] www.decisionresourcesgroup.com

PULMONARY

146. Consistency of Prescribing Patterns of Ambulatory Patients Visiting Community Pharmacies with COPD and GOLD guidelines..

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Introduction: Despite evidence-based Global Initiative for Obstructive Lung Disease (GOLD) recommendations, studies indicate appropriate treatment is low. GOLD recommends validated symptom assessment by COPD Assessment Test (CAT) or dyspnea questionnaire (modified Medical Research Council (mMRC). Initial therapy recommendations are linked to ABCD categories based on symptom scores plus exacerbation history.

Research Question or Hypothesis: What is the agreement between COPD prescribing and GOLD (2016 version) recommended maintenance therapy in Missouri?

Study Design: Cross-sectional, non-randomized design using written questionnaire, and validated symptom scores (CAT and mMRC).

Methods: Dispensing data from 35 community pharmacies across Missouri initially identified subjects ≥40 years with ≥ 1 COPD maintenance medication dispensed in the past year. Those self-reporting COPD and agreeing, completed a survey of demographics, current medications, exacerbation history, and symptom scores. Proportion of days covered (PDC) was calculated for any COPD maintenance medication dispensed over the last year. Available pulmonary function tests to confirm COPD diagnosis were obtained. Data was used to categorize subjects' COPD into ABCD grouping. Reported medications were compared to GOLD recommendations for their ABCD group.

Results: A total of 709 subjects participated (group A: 5%, B: 35%, C: 4%, and D: 55%). Only 20% of regimens were consistent with either 1st-line or alternate GOLD recommendations. Another 33% were escalated from initial therapy. However, 25% were less than initial therapy. Of those prescribed less therapy, 96% were category B or D. Average PDC was 0.43 ± 0.37; only 28.7% were adherent (PDC ≥ 0.80). Subgroup analysis based on spirometry will be presented.

Conclusion: Subjects with self-reported COPD visiting Missouri community pharmacies were highly symptomatic (B or D); many were undertreated and non-adherent to ≥1 maintenance medicine. Community pharmacists are positioned to improve COPD management by identifying undertreatment based on CAT/exacerbation history and non-adherence from PDCs.

147. Steroid Dosing Leads Guideline Discordance in Chronic Obstructive Pulmonary Disease (COPD) Exacerbations in the Intensive Care Unit (ICU).

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Introduction: The Global Initiative for Chronic Obstructive Lung Disease (GOLD) provides evidence-based recommendations for treating COPD exacerbations, with mainstays of therapy including short-acting bronchodilators, systemic corticosteroids, and antibiotics (if indicated). Research indicates guideline discordance is common and leads to suboptimal outcomes, however, less is known about ICU populations.

Research Question or Hypothesis: Will adherence to treatment guidelines improve outcomes when treating COPD exacerbation in the ICU?

Study Design: This study was a retrospective chart review of Veterans treated for COPD exacerbation in the ICU between July 1, 2016 and July 1, 2019.

Methods: The primary outcome was the proportion of patients admitted to the ICU treated with guideline-adherent regimens as defined by administration of short-acting bronchodilators, prednisone 40mg equivalents per day ≤ 7 days, and if antibiotics started, duration of ≤ 7 days. Secondary aims were to compare clinical outcomes in guideline-adherent vs non-adherent cases to include hospital length of stay (LOS), ICU LOS, mechanical ventilation (MV), one-month follow-up, 30-day readmissions, and ICU hyperglycemia (serum glucose ≥180mg/dL). Categorical outcomes were to be compared with a X^2 test, continuous outcomes were to be analyzed with a student's T test (or Mann Whitney U where appropriate) in R Studio.

Results: Of 161 charts screened, 58 patients met inclusion criteria. Of these, only one patient (1.72%) was prescribed a fully guideline-adherent regimen leaving inadequate data for clinical comparison. In the total cohort, 55 (94.83%) patients received guideline-adherent bronchodilator regimens, 36 (62.07%) adherent antibiotic regimens, and 1 (1.72%) adherent steroid regimen. Secondary endpoints: mean hospital LOS 6.59 days, ICU LOS 3.27 days, MV 68.97%, one month follow up 82.76%, readmissions 27.59%, and ICU hyperglycemia 50%.

Conclusion: Corticosteroid prescribing was the leading cause for guideline-nonadherence when treating COPD exacerbations in the ICU in a single center, leaving a focused area for quality improvement.

RHEUMATOLOGY

148. Application of Exploratory Factor Analysis and Item Response Theory to validate NHANES ADL scale in patients reporting Rheumatoid Arthritis.

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Introduction: Rheumatoid Arthritis (RA) affects about 1.5 million people in the United States and leads to significant limitations on activities of daily living (ADL). Instruments used for measuring ADL are incongruously assessed for their psychometric properties.

Research Question or Hypothesis: To evaluate psychometric properties of the National Health and Nutrition Examination Surveys (NHANES) ADL scale especially in patients reporting RA.

Study Design: Cross sectional study.

Methods: We used NHANES data from the 2011 – 2018, where ADL was measured using 20-item scale among participants who self-reported of having RA. We analyzed this scale for its internal consistency, factor structure and item response theory (IRT). The internal reliability of the scale was assessed using the Cronbach's alpha and factor structure was obtained via principal component analysis. Fit indices for this structure were calculated using confirmatory factory analysis. Subsequently, the item discrimination, difficulty, and test

nformation were estimated via the graded response model. Data analysis was conducted using SPSS 25 and STATA 14. A p-value of <0.05 was considered statistically significant.

Results: The mean age of the participants was 58.2 ±0.57 years; 58.6% were females; majority were Caucasians (62%) and had college education (31.6%). Factor analyses with promax rotation of the 20-item NHANES ADL scale yielded a one factor solution (activities) accounting for 31% of the variance. The Cronbach alpha for the single scale was 0.92. IRT analysis showed that the NHANES ADL discriminates well between patients with high and low levels of functional limitations and offers information about a broad range of patients' ability.

Conclusion: NHANES ADL scale demonstrated good reliability, unidimensionality and validity. Majority of the scale items showed strong discrimination across the entire spectrum of functional severity. The scale appears to be a useful instrument in measurement ADL in patients reporting RA. Future studies should explore its test-retest reliability and responsiveness.

SUBSTANCE ABUSE/TOXICOLOGY

149. Medication-Assisted Treatment and Associated Outcomes in Patients with Drug Use-Associated Infective Endocarditis.

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Introduction: Medication-assisted treatment (MAT) can reduce the risk of overdose and opioid-related readmissions in patients with substance use disorder. However, barriers such as high-copayments, prior authorization requirements, stigma, lack of follow-up, and access to physicians with a MAT waiver often prevents therapy from reaching patients.

Research Question or Hypothesis: Does treatment of substance-use disorder with MAT decrease readmission and mortality in patients with drug-use associated infective endocarditis?

Study Design: Single-center, retrospective cohort study.

Methods: This was a single system retrospective cohort study of adult patients at Wake Forest Baptist Health from January 1, 2012 to May 1, 2018. Patients aged ≥ 18 years with active intravenous drug use and possible or definite infective endocarditis, according to the modified Duke criteria, were included. Baseline demographics, consulting services, addiction resources, MAT provided before, during, and after index hospitalization, antibiotic course, discharge destination, 1-year readmission, and mortality were collected for eligible patients. Descriptive statistics were used to describe the population and resources, while a stepwise logistic regression was performed to identify risk factors associated with 1-year readmission. This study was approved by the Wake Forest University Institutional Review Board.

Results: A total of 113 patients met inclusion criteria. Nearly half (n= 49, 44%) received care coordination services, 11 (10%) received addiction services, and 12 (11%) received psychiatric services. While 12 (13%) patients received MAT during admission, only 9 (8%) received MAT at discharge. Readmission occurred in 52 (46%) total patients, but only 3 (33% of the subgroup) of those received MAT. A total of 25 (22%) patients experienced 1-year mortality. None of those patients received MAT at discharge. A regression analysis did not identify any statistically significant predictors on 1-year readmission rates.

Conclusion: Few patients received MAT therapy, revealing a need for increased provider awareness and education on substance use disorder management.

TRANSPLANT/IMMUNOLOGY

150. Methenamine for Prevention of Recurrent Urinary Tract Infections in Adult Solid Organ Transplant Recipients.

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Introduction: Evaluation of efficacy of non-antibiotic agents, such as methenamine, for prevention of recurrent urinary tract infections (rUTI) in solid organ transplant recipients (SOT) is needed.

Research Question or Hypothesis: What is the efficacy of methenamine in prevention of rUTI in SOT?

Study Design: Retrospective review at University Transplant Center from 1/2009 to 10/2019.

Methods: Abdominal transplant recipients 18 years of age or older who received an abdominal transplant during the study time period with diagnosis of rUTI were screened. rUTI were defined as greater than or equal to 2 UTI within 6 months or 3 UTI within a year documented by cultures with greater than 10,000 Colony Forming Units. Patients who met rUTI diagnostic criteria were divided into the following groups: (1) *Methenamine Therapy Initation (MTI)*: received methenamine for at least 90 days or (2) *No Prophylaxis*: did not receive rUTI prophylaxis. Patients on concomitant bacterial suppression therapy for rUTI were excluded. Rate of rUTI, treatment failure, bacteremia, hospitalization, and isolation of multi-drug resistant organism (MDRO) were assessed per 90 patient-days follow-up. A matched pair analysis compared 90-days pre-MTI to post-MTI. Results were

reported per 90 patient-days follow-up. Median of average duration of antibiotic days was collected in all groups.

Results: A total of 62 patients were included. Rate of rUTI per 90 patient-days follow-up was significantly reduced in MTI vs. no prophylaxis (0.5 vs. 1.7, P<0.001). All other outcomes were significantly reduced in MTI group (P<0.001). Matched pair analysis (pre-MTI vs post MTI) revealed a significant reduction in rUTI, hospitalizations, and antibiotic days in post-MTI group (P<0.005).

Conclusion: This is the first study evaluating efficacy of methenamine to no prophylaxis for rUTI in SOT. This study supports MTI for rUTI in SOT to reduce rate of rUTI, treatment failure, bacteremia, hospitalization, and MDRO isolated. Significant reduction in rUTI was also evident when evaluating cohorts pre- and post-MTI.

151. Treatment Of BK Viremia In Kidney Transplant Recipients: A Single-center Experience.

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Introduction: Our center has utilized various strategies in managing BK viremia in our kidney transplant recipients. Reducing immunosuppression (IMS) in a step-wise manner has been the primary strategy, and when insufficient, adjunctive therapies, such as cidofovir, leflunomide, and/or intravenous immunoglobulin (IVIG) have also been utilized.

Research Question or Hypothesis: Evaluate the clearance of BK viremia in kidney transplant recipients following IMS reduction alone or in conjunction with cidofovir, leflunomide, or IVIG.

Study Design: This is a single center, retrospective study at a large academic medical center.

Methods: Kidney transplant recipients transplanted between September 1, 2009 and December 31, 2018 and developed BK viremia were included. Patients less than 18 years old at time of transplant were excluded. The primary outcome is clearance of BK viremia and secondary outcome is development of BK nephropathy.

Results: One hundred and sixteen patients were screened for inclusion and 81 patients were included: 41 patients with reduction in IMS only and 40 patients requiring adjunctive therapies. Clearance of BK viremia occurred in 90% (37/41) of patients with IMS reduction alone. Clearance of BK viremia in patients requiring adjunctive therapy after IMS reduction occurred in 29% (2/7) who received cidofovir, 92% (24/26) who received leflunomide, 50% (1/2) who received IVIG, and 60% (3/5) who received 2 adjunctive treatment strategies. BK nephropathy occurred in 2.4% (1/41) of patients with IMS reduction alone and in 38% (15/40) of those requiring adjunctive therapy (28.6% in the cidofovir group, 31% in the leflunomide group, 50% in the IVIG group, and 80% in patients who received more than 1 adjunctive treatment).

Conclusion: Reducing IMS in a step-wise manner as the primary strategy for managing BK viremia was effective in clearing BK viremia. Utilization of alternative strategies demonstrate some effectiveness in the clearance of BK viremia in situations where reduction in IMS alone was not effective.

152. Pharmacist impact on hepatitis C treatment post transplantation and patient outcomes.

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Introduction: Transplantation is the definitive treatment for patients with end stage liver and kidney disease. In October 2018, Geisinger began transplanting hepatitis C virus (HCV) nucleic acid positive livers and kidneys. As part of a collaborative practice agreement, pharmacists manage many aspects of patient care.

Research Question or Hypothesis: What impact did pharmacists have on HCV treatment post-transplantation and associated patient outcomes?

Study Design: Single center, IRB approved, observational cohort review of patients requiring treatment for HCV after receiving a viremic liver or kidney transplant between 10/31/2018-12/10/2019.

Methods: Data was collected through chart review of the electronic health record for 39 patients included. Data analysis was completed using intention to treat descriptive statistics.

Results: Thirty-nine patients were included in analysis with an average age of 57 years, 82.7% male, 92.3% white, and 84.6 % kidney transplants. Patients had an average BMI 32.3 kg/m^2, 71.8 % received thymoglobulin induction, and median kidney donor profile index (KDPI) of 49. The most common HCV genotype was 1a and FibroScan score of F0-F1. All patients received treatment with a median time to initiation of 12 days and completed treatment with a negative viral load. Two deaths occurred prior to sustained virologic response 12 weeks post-treatment (SVR) leading to an SVR12 rate of 94.9%. Treatment of these patients involved the following groups within the integrated pharmacy department at Geisinger: inpatient, outpatient, health plan and specialty. These groups focused on education, medication reconciliation, transitions of care, and used an agreement between the health plan and specialty pharmacy to expedite the prior authorization and delivery processes.

Conclusion: The coordination of these groups of pharmacists allowed for successful treatment in a shorter time period than previously published. Patients were able to successfully achieve SVR12 with graft survival. We believe that utilizing this template can be helpful to other transplant programs.

153. Comparison of pre-emptive versus universal prophylaxis in hepatitis B core antibody positive kidney transplant recipients.

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Introduction: Renal transplant recipients with a history of hepatitis B are at increased risk of reactivation post-transplant. Hepatitis B surface antigen (HBsAg) is a marker of active infection, while hepatitis B core antibody (HBcAb) indicates prior or chronic infection. Guideline recommendations conflict on prophylactic strategies to use for these patients; some suggest pre-emptive prophylaxis, monitoring for reactivation before starting pharmacotherapy, others recommend providing universal prophylaxis. Recently, Medstar Georgetown University Hospital converted from universal to pre-emptive prophylaxis in HBcAb+ kidney transplant recipients.

Research Question or Hypothesis: Transitioning from universal to pre-emptive prophylaxis in hepatitis B core antibody positive kidney transplant recipients will not result in increased hepatitis B reactivation rates or virus specific adverse effects.

Study Design: Single center, retrospective, cohort study of HBcAb +/HBsAg- kidney transplant recipients at MedStar Georgetown University Hospital between September 1, 2015 and June 30, 2019.

Methods: Retrospective chart review and collection of pertinent patient data, including recipient baseline hepatitis B serologies (HBcAb, HBsAg), prophylactic strategy and agent used, and markers of viral reactivation at predefined time points.

Results: Sixty-six patients were enrolled and included in study analysis. Forty-three patients received universal prophylaxis and twenty-three had pre-emptive prophylaxis. No patients in either group had reactivation of hepatitis B in the one year follow up period. Of the 66 patients enrolled, 23 (35%) had no hepatitis B monitoring after transplant. Additionally, in the pre-emptive monitoring group, only 11 of 23 (48%) patients had HBV PCR or HBV Ag testing at any time during the follow up period with a total of 16 of 184 (8.7%) possible tests performed.

Conclusion: No patients in either comparator group had reactivation of hepatitis B. These results are significantly biased due to lack of routine and consistent monitoring. Data from this analysis will be used to standardize monitoring in our renal transplant population.

154. Rejection rates with the use of non-traditional belatacept dosing in de novo kidney transplant recipients.

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Introduction: Acute rejection is a major complication post-transplant that can influence graft survival. Belatacept immunosuppression was studied with basiliximab induction at de novo doses of 10 mg/kg to prevent rejection. Since Albany Medical Center (AMC) uses thymoglobulin for induction, belatacept is initiated, de novo at a monthly dose of 5 mg/kg. To date, the only literature to support initiation at 5 mg/kg is in conversion from calcineurin inhibitors to belatacept.

Research Question or Hypothesis: Rejection rates in de novo kidney transplant recipients treated with monthly 5 mg/kg belatacept, tacrolimus and mycophenoalte will be similar to historic rejection rates at AMC in recipients treated with tacrolimus, sirolimus and mycophenolate.

Study Design: A quantitative, retrospective chart review of kidney transplant recipients at AMC who received belatacept de novo between 1/1/15 and 11/1/18.

Methods: The primary outcome was to compare rejection rates in de novo kidney transplant recipients treated with monthly 5 mg/kg belatacept, tacrolimus and mycophenoalte to historic rejection rates at AMC in recipients treated with tacrolimus, sirolimus and mycophenolate. Descriptive statistics were used to analyze demographic data. At 6 and 12-months rejection rates were compared to the historic control using a chi-square test.

Results: Forty patients were included in the belatacept group and 84 patients were included in the historic control group. The rejection rate in the belatacept group was 7.5% (n = 3) at 6 months and at 12 months. There was no difference in rejection between the two groups at 6 months (7.5% vs. 10%, p = 0.14) or 12 months (7.5% vs. 11%, p = 0.32).

Conclusion: The incidence of acute rejection in kidney transplant recipients treated with thymoglobulin and low dose belatacept is comparable to historic AMC rejection rates at 6 and 12 months.

155. Impact of Kidney Donor Profile Index on Transplant Outcomes in High Risk Kidney Transplant Recipients.

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Introduction: Since the new Kidney Allocation System was implemented in 2014, there have been a few registry based analyses evaluating the impact of low vs. high KDPI kidneys on transplant outcomes. Limited data exist regarding outcomes in those with high immunologic risk.

Research Question or Hypothesis: This study investigated the association between KDPI and transplant outcomes in a largely African American (AA), highly sensitized, kidney transplant cohort.

Study Design: Single-center, retrospective, chart review of adult kidney transplant (KT) recipients transplanted at our institution from 1/1/2016- 12/31/2018.

Methods: All patients who received a deceased donor KT during the study period were included and divided in to 3 KDPI groups: KDPI 0-20%; KDPI ≥ 21-50% and KDPI ≥51-100%. These categories were chosen since the graft survival curve begins to slope once KDPI >50%. The incidence of delayed graft function (DGF), acute rejection, graft and patient survival were compared among the groups at 12 months post-transplant. ANOVA and nonparametric analyses were utilized as appropriate.

Results:

	KDPI 0-20%; n=20	KDPI≥21-50%; n=60	KDPI ≥51-100%; n=35
Mean age, years ± SD*	47.9 ± 14	54.9 ± 12	60.6 ± 10
Male gender, n (%)	8 (40)	41 (68)	21 (60)
African American ethnicity, n (%)	13 (65)	36 (60)	21 (60)
Previous transplant, n (%)	1 (5)	9 (15)	5 (14)
Mean %cPRA (panel reactive antibody) ± SD	37 ± 41	26 ± 36	30 ± 39
DGF, n (%)	6 (30)	21 (35)	17 (49)
Biopsy proven rejection, n (%)	3 (15)	11 (18)	4 (11)
Graft survival, n (%)	20 (100)	59 (98)	35 (100)
Patient survival, n (%)	20 (100)	59 (98)	34 (97)

*P <0.05

Maintenance immunosuppression consisted of tacrolimus and mycophenolic acid ± prednisone.

Conclusion: Our findings suggest similar transplant outcomes across KDPI categories in high risk KT recipients, early post-transplant. Longer follow is warranted to fully validate these results.

WOMEN'S HEALTH

156. Quantification of progesterone and 17-β estradiol in mouse serum by liquid chromatography-tandem mass spectrometry.

Benjamin Kennard, BS, Pharm.D. Candidate[1], Allison Cobble, Pharm.D. Candidate[1], Amy Gravitte, BS, PhD Candidate[2], Keleigh Galloway, Undergraduate Researcher[2], Jen Kintner, BS, MS[2], Jennifer Hall, PhD[2] and Stacy Brown, PhD[1]; (1)Pharmaceutical Sciences, East Tennessee State University, Johnson City, TN (2)Biomedical Sciences, East Tennessee State University, Johnson City, TN

Introduction: *Chlamydia trachomatis* is a common sexually transmitted infection that can lead to severe secondary complications in women. A female's levels of estrogen and progesterone may play a role in the risk of chlamydial infection. This study aims to develop and evaluate an LC-MS/MS method for quantification of estrogen and progesterone in a mouse model for chlamydial infection (*Chlamydia muridarum).*

Research Question or Hypothesis: How accurate and reproducible is our LC-MS/MS method for quantifying estrogen and progesterone?

Study Design: The LC-MS/MS method was investigated for precision and accuracy of estradiol and progesterone quantification over three days. Several assay aspects were optimized for maximum analyte recovery and analytical sensitivity.

Methods: Progesterone samples were prepared using solid-liquid extraction (SLE+) and estradiol samples using liquid-liquid extraction (LLE) with subsequent derivatization. Hormones were quantified using LC-MS/MS with a gradient elution (C18 column) and direct ion channels for molecular ions for progesterone (m/z 315.0910) and derivatized estradiol (m/z 431.1835). Quantification was facilitated by deuterium-labeled internal standards and their corresponding molecular ions (d_9-progesterone; m/z 324.1230 and d_5-estradiol; m/z 436.2922).

Results: The dynamic range of the progesterone assay was 5–100 ng/mL, with a limit of detection of 1 ng/mL. The estradiol assay linear range was 5–100 ng/mL, with a limit of detection of 0.5 ng/mL. The average precision was 0.74–8.5%RSD and 6.3–13.4%RSD for progesterone and estradiol, respectively. The accuracy of the method was 1.6–14.4%Error and 4.0–10.5%Error for progesterone and estradiol, respectively. Successful validation was defined as <15% RSD and error (<20% at the limit of quantification), per current FDA Guidelines.

Conclusion: The developed LC-MS/MS method is specific for progesterone and estradiol, and the extraction suitable for preparation of mouse serum samples. This assay could be successfully applied to hormone quantification for investigating the link between chlamydia infection and hormone levels in female animals.

VPS CLINICAL PHARMACY FORUM

AMBULATORY CARE

157. Utilization of a population health registry to identify patients in the population of focus for comprehensive medication management services.

Molly Rockstad, Pharm.D., BCPS, BCACP; Department of Pharmacy, John H. Stroger, Jr. Hospital of Cook County, Chicago, IL

Service or Program: A population health registry was added to the electronic health record of an urban, safety-net health system. This tool was used to generate a list of patients not meeting HEDIS measure criteria for hemoglobin A1c (HbA1c) less than 9 within the panel of one patient-centered medical home (PCMH) with existing comprehensive medication management (CMM) services. Over the next 2 years, pharmacy students assisted with tracking patients within the

CMM population of focus, HbA1c greater than 9, to establish a baseline for A1c changes over time, better understand barriers to HbA1c improvement, and identify patients for CMM enrollment. Students then used this information to attempt outreach.

Justification/Documentation: This project was designed to increase enrollment in CMM services and explore other quality improvement needs to address diabetes quality measures. Overall, only 41% of the 277 patients in the population of focus had an improvement in HbA1c of at least half a point. Those that had not improved after 1 year were contacted by pharmacy students and educated on the benefits of CMM. All 20 patients that spoke to a pharmacy student agreed to an appointment. An additional 21 patients were already enrolled in CMM services. This project demonstrated a significant need for improved HbA1c capture and a high rate of loss to follow-up.

Adaptability: Utilizing a registry to inform population health services is adaptable to systems with a similar tool. The project served as a valuable introduction to both research and population health services for rotating students.

Significance: Overall, the project proved cumbersome for use as a recruitment technique, with the same number of patients recruited from the project as from the existing screening practices. However, it provided a number of insights that will help to shape CMM and other pharmacy services in the PCMH with the goal of improving HEDIS measures.

158. Starting a new pharmacist-led teleophthalmology service to provide diabetic retinal exams for patients with diabetes in an ambulatory care practice setting.

Rebecca Leon, Pharm.D.; College of Pharmacy, California Health Sciences University, Clovis, CA

Service or Program: Development of a new pharmacist-led teleophthalmology service to provide diabetic retinal exams (DRE) for patients with diabetes in an ambulatory care practice setting at a federally qualified health center (FQHC).

Justification/Documentation: Diabetic retinopathy (DR) remains the most common complication of diabetes and a leading cause of blindness. 40-50% of patients with diabetes do not receive DRE as recommended, with noncompliance rates even higher in underserved and racial/ethnic minority populations.

Retinal photography (RP) has emerged as a possible alternative to in-person examinations that may facilitate compliance with evidence-based recommendations and reduce barriers to specialized eye care. Using an advanced handheld retinal camera, an ambulatory care pharmacist can capture retinal digital images (RDI) that are securely transmitted electronically to a specialized reading center, where photographs are graded by ophthalmologists. Patients with signs of DR, or when retinal photos are unacceptable, and/or if abnormalities are detected will be referred for in-person ophthalmologist exams for comprehensive assessment.

An IRB application is pending to evaluate patient compliance rates with DRE before and after the implementation of this new pharmacist-led teleophthalmology service at a FQHC.

Adaptability: Ambulatory care pharmacists can provide DRE during patients' diabetes clinical visits. It takes 15-20 minutes per patient to capture RDI of both eyes. Turnaround time for the ophthalmologist report of the photographs is 24-48 hours, after which the pharmacist will upload the report to the patient's EHR and notify the PCP for appropriate follow-up and/or referral.

Significance: While RP is not a substitute for a dilated fundus examination, it may serve as a screening tool for DR, and it can also enhance efficiency and reduce costs when the expertise of ophthalmologists can be used for more complex examinations and for therapy. Additionally, this new pharmacist-led teleophthalmology service may increase patient access to care and improve patient compliance with DRE, especially in underserved populations.

159. Implementation of a deprescribing tool in an interdisciplinary primary care patient aligned care team.

Makayla Wiles, Pharm.D., Tara Downs, Pharm.D., BCACP, Gina Puglisi, Pharm.D., BCACP, BC-ADM, Brent Simpkins, Pharm.D., BCACP and Amy Schmelzer Collier, DO, MS, MPH; Lexington VA Health Care System, Lexington, KY

Service or Program: This project pilots the VIONE approach to deprescribing in a single primary care Patient Aligned Care Team (PACT) at a Veterans Affairs Health Care System (VAHCS). VIONE, a mnemonic for Vital, Important, Optional, Not indicated, and Every medication has an indication/diagnosis, is a tool that assists providers in identifying medications for consolidation and/or discontinuation. The VIONE Risk Scorecard was utilized to identify the PACT with the most veterans at high risk for polypharmacy. The Clinical Pharmacy Specialists (CPS) provided education to the pilot provider regarding VIONE and performed medication reviews. When deprescribing was warranted, VIONE discontinuation reasons were selected in the Computerized Patient Record System (CPRS) and data was stored in a national dashboard.

Justification/Documentation: Polypharmacy puts veterans at risk for adverse drug events, falls, hospitalizations, and death. Deprescribing can combat polypharmacy and reduce unfavorable outcomes. We identified 231 high risk veterans in the pilot PACT. The provider and CPS reached 99 veterans and made 136 medication discontinuations between September 1, 2019 and March 1, 2020, resulting in a sum annualized cost avoidance of $21,904.80. The CPS met goal of completing 20 medication reviews and made 90 recommendations for deprescribing, 38 of which were accepted.

Adaptability: This project involved older veterans receiving general primary care, as the geriatric population is rapidly expanding. Tools such as VIONE may assist providers with deprescribing thought processes in and outside the VAHCS. With a motivated team and minimal education, physicians and pharmacists without geriatric focused

training can successfully integrate the VIONE methodology into their practice.

Significance: Utilization of the CPS was associated with an increased average medication discontinuations per veteran and accepted recommendations contributed to 85.99% of the sum annualized cost avoidance. Through the medication review process, pharmacists can quickly identify areas for medication consolidation and potentially inappropriate medications for deprescribing.

160. Increasing Primary Medication Adherence in the UF Health Care One Clinic.

Joyanna Wright, *Pharm.D.*[1], Allison Cone, Pharm D. Candidate 2020[2], Nila Radhakrishnan, MD[3], Tiffany Phillips, MSW[4] and Kiran Lukose, MD[3]; (1)Department of Pharmacy, UF Health, Gainesville, FL (2)College of Pharmacy, UF Health Shands Hospital, Gainesville, FL (3)College of Medicine, Division of Hospital Medicine, UF Health Shands Hospital, Gainesville, FL (4)Department of Social Work Services, UF Health Shands, Gainesville, FL

Service or Program: Care One clinic is a transitional clinic for multivisit patients (≥4 visits in past 6 months) or at high risk due to lack of insurance, lack of primary care and/or new catastrophic health diagnosis. The goal of Care One is to decrease ED and hospital admissions and help improve coordination of care. By focusing on primary nonadherence, defined as not picking up a new prescription, likelihood of improvement in health outcomes should ensue. Pharmacists and pharmacy students provided an adherence questionnaire and then from results, using motivational interviewing and teach-back methods, focus on the identified patient-specific areas to improve primary adherence.

Justification/Documentation: After a cost-focused initiative, the clinic improved pick-up rates from 60% to 66%. Instituting a new process for identifying three areas of concern, our goal was to improve pick-up rates by 10% to align with rates identified in the literature. Adherence estimator results and new prescriptions were documented in EHR. Pharmacy students called the receiving pharmacy after day 14 to determine if prescriptions were picked up.

Adaptability: Once the patient completed the physician and social work visit and the team had determined the best plan, student(s) returned to provide patient-specific education using motivational interviewing and teach-back. Student(s) gave education related to the concerns identified through the adherence estimator, disease state(s), medication side effects, and cost while making sure the patient knew the what, where, and cost, if known, of their prescriptions.

Significance: The results of the intervention were determined to be: 81% pick-up rate (20 patients included, 49 prescriptions tracked). The Realm-SF score of the patients was: 14 adequate, 3 non-adequate and 3 not scored. The most common prescription not picked up was lisinopril at Publix, which was on their free medication list indicating there may be other barriers we need to address.

CRITICAL CARE

161. Sevelamer Pretreatment of Continuous Enteral Nutrition to Reduce Phosphate.

Caren Wi, *B.S. in Biochemistry*, Jingshi Chen, B.S. in Chemistry and Ryan Hobbs, BS Pharm; Department of Pharmaceutical Care, University of Iowa Hospitals and Clinics, Iowa City, IA

Service or Program: Pretreated continuous enteral nutrition with sevelamer is a potential strategy which may reduce the amount of phosphate administered to patients with renal failure on hemodialysis to help maintain desired phosphorus levels. Three patients in the Cardiovascular Intensive Care Unit (CVICU) were identified who were receiving intermittent hemodialysis while receiving continuous enteral nutrition. Nurses were instructed to pretreat the enteral nutrition with sevelamer with a total daily dose of 2-10 g. Pretreatment consisted of combining sevelamer with a designated amount of tube feeds depending on brand and administration rate. The tube feed-sevelamer combination was refrigerated for 2 hours after thorough mixing. The top portion of the tube feeds were decanted and administered to the patients and the bottom portion containing sevelamer-phosphate complex was discarded.

Justification/Documentation: Patients with renal failure on intermittent hemodialysis and continuous enteral nutrition are at increased risk for hyperphosphatemia. This is because intermittent administration of sevelamer does not adequately bind to the high phosphate content in continuous tube feeds. Patients receiving pretreated tube feeds with sevelamer, with a total daily dose of 4 g or greater, showed reduced or relatively stable phosphorus levels.

Adaptability: This service is intended for hospitalized adult patients requiring intermittent hemodialysis and continuous enteral nutrition. Nurses with proper training were able to successfully implement the pretreatment strategy.

Significance: The role of the clinical pharmacist included providing pretreatment instructions, recommending proper dosing of sevelamer, and clinical response monitoring. This method reduced phosphate burden from continuous tube feeds. Additional advantages include avoiding systemic sevelamer administration, thus, decreasing the risk of the gastrointestinal adverse reactions, and decreasing the risk of gastric tube obstruction. To our knowledge, this is the first case series evaluating pretreatment of enteral nutrition with sevelamer in an adult patient population.

EMERGENCY MEDICINE

162. Management of hyperglycemia in absence of hyperglycemia crisis in patients who are being admitted from an emergency department.

Meissane Benbrahim, *Pharm.D.*; Boston Medical Center, Boston, MA

Service or Program: Hyperglycemia in emergency department (ED) patients has been associated with poor outcomes including

increased mortality and hospital length of stay (LOS). There is currently no consensus on the management of hyperglycemia in patients who are being admitted from the ED and are not being managed for a hyperglycemia crisis. A workgroup comprised of ED physicians, pharmacy, and endocrine are collaborating to standardize the management of hyperglycemia in the XXX ED. The aim of this quality improvement project is to decrease the percentage of ED patients being admitted with a BG >250 mg/dL to <20% in order to improve patient outcomes. Outcome measures for this project include average BG reduction, hospital and ED length of stay, in-hospital mortality, and in-hospital DKA/HHS. The process measure is the percentage of times a pharmacist or pharmacy student intervenes. The balancing measure is hypoglycemia defined by a BG <70 mg/dL.

Justification/Documentation: Prior to the release of the EHR report in March 2019 to June 2019, the average reduction in BG was 93.8 mg/dL (initial mean BG 379 mg/dL). As a result of the QI initiative, the average BG reduction was 169.62 mg/dL (initial mean BG 425 mg/dL) during months July 2019 to November 2019. Of the patients with an initial BG >250 mg/dL, 54% of patients were admitted with BG above goal which is down from the baseline of 72%.

Adaptability: Multiple Plan-Do-Study-Act cycles were implemented including education, development of an EHR report to identify and monitor patients with BG >200 mg/dL, and development of an ED-specific insulin order and protocol. Protocols were adjusted based on feedback from ED staff and education was tailored to the staff.

Significance: Introducing pharmacy hyperglycemia monitoring and a hyperglycemia treatment algorithm reduced average BG by 75.82 mg/dL and reduced the percentage of patients admitted with a BG above goal by 18%.

163. Optimization of Antibiotic Prescribing for Cellulitis at Discharge from the Emergency Department.

Danielle Burton, Pharm.D.; Department of Pharmacy, Boston Medical Center, Boston, MA

Service or Program: Available literature shows high inter-provider variability in cellulitis management in Emergency Departments (ED) nationwide. Known practice variability and internal data from a review of patients with cellulitis treated in the ED of a large, urban academic teaching hospital exposed the opportunity for a pharmacy-driven Quality Improvement initiative focused on development of a cellulitis pathway in the ED.

Justification/Documentation: Cellulitis is a common infectious process responsible for many ED visits annually. There is a growing body of literature supporting clinical pharmacy services in the ED increasing the percentage of patients receiving guideline adherent antibiotics which is tied to positive clinical and financial outcomes. Emergency Medicine pharmacists aid in antibiotic selection and dosing, provision of drug information to patients, and improved cost effectiveness, especially surrounding antimicrobial stewardship. At this institution, pharmacists prospectively review all antibiotic orders for all indications prior to administration. Review of antibiotics prescribed at discharge was a process that was not built into pharmacist prospective audit and approval workflow. It was determined that by focusing on antibiotics at discharge, pharmacists could have the biggest impact increasing guideline-adherent management.

Adaptability: A pharmacy-led work group of key emergency medicine, infectious diseases, and nursing stakeholders developed a treatment algorithm based on The Infectious Diseases Society of America guidelines and local susceptibility data. ED providers would stratify patients based on presentation and treat according to the algorithm. Pharmacists would prospectively intervene to make treatment recommendations, focusing primarily on discharge antibiotic orders. Prospective recommendations, recurrent pharmacist-led education sessions, and electronic antibiotic ordering standardization increased appropriateness of antibiotic prescribing for cellulitis at discharge to over 90%.

Significance: A pharmacy-initiated cellulitis treatment algorithm was created with multidisciplinary agreement on algorithm recommendations. Since implementation there has been an increase in the percentage of patients receiving appropriate antimicrobials due to algorithm compliance and pharmacist intervention.

HEALTH SERVICES RESEARCH

164. Health system pharmacists collaborating to secure medication access at discharge.

John Stine, Pharm.D.[1], Laura Hencken, Pharm.D.[1], Nisha Patel, Pharm.D.[1], Jessica Efta, Pharm.D.[1], Caren El-Khoury, B.S. Pharmacy[1], Kristin Griebe, Pharm.D.[1], Brandon Bott, Pharm.D. (pending)[1], Lance Podsiad, RN, BSN[2], Sandeep Sabharwal, RN, BSN[2], Chris McCauley, B.S. in HR[2] and Nancy C. MacDonald, Pharm.D., BCPS[1]; (1)Department of Pharmacy Services, Henry Ford Hospital, Detroit, MI (2)Henry Ford Hospital, Detroit, MI

Service or Program: Inpatient clinical pharmacy (IP), ambulatory pharmacy (AP), and information technology (IT) staff collaborated to create an electronic means to evaluate and communicate patient access to discharge medications as part of transition of care (TOC) planning. Clinicians place a consult order for a discharge medication cost inquiry (DMCI) in the electronic medical record (EMR). The AP determines coverage and cost of the medication and if necessary, initiates prior authorization. The DMCI result is communicated to inpatient clinicians via a note in the EMR. This TOC service is provided to patients admitted to Henry Ford Hospital in Detroit, Michigan.

Justification/Documentation: Prior to the DMCI, inpatient clinical pharmacists and providers checked access to discharge medications via a phone call to AP or by sending prescriptions to AP via the EMR. Because the result of the test claim was not documented in the EMR, there was no standard way to communicate access to discharge medications to other clinicians, or to document the pharmacist's role in medication access. Since inception in June 2018, clinical pharmacists and providers sent more than 14,000 DMCI to evaluate discharge medication access. The DMCI standardizes communication, provides

discrete data to document the clinical pharmacist's role in TOC planning, and helps to secure discharge medication access and improve therapeutic outcomes.

Adaptability: The DMCI is a simple, user-friendly consult order placed in the EMR for patients being discharged at a hospital where the IP and AP have access to the EMR. A similar service could be adopted by hospitals where IP is able to collaborate with AP and EMR IT staff.

Significance: The DMCI is an efficient electronic tool that communicates discharge medication access information and documents the clinical pharmacist's role in TOC planning. To date, there are no publications documenting such an EMR tool or process.

INFECTIOUS DISEASES

165. How Effective is Antimicrobial Stewardship Program in a Rural Community Hospital with the Absence of Infectious Diseases Physician on Staff and only *part time* availability of Pharm.D. clinical pharmacist with training in Infectious Diseases.

Yanina Magram, Pharm.D.; Pharmacy Department, Eastern Niagara Healthcare, Lockport, NY

Service or Program: Implementation and effectiveness of Antimicrobial Stewardship Program in a rural community hospital with limited resources, absence of Infectious Diseases Physician on staff and only *part time* pharmacist with training in Infectious Diseases was evaluated.

Justification/Documentation: Centers for Disease Control and Prevention, Centers for Medicare and Medicaid, among various other entities, recommend hospitals in United States implement antimicrobial stewardship program: it decreases adverse events, toxicities, inappropriate dosing, duplicate therapies, tackles antibiotic resistance and improves healthcare expenditures. However, based on hospital size/resources, there are inconsistencies in program implementation and viability.

Adaptability: This program was implemented in rural community hospital with 100 medical and 9 ICU beds, Lockport, NY. A hospitalist was designated for support, due to absence of Infectious Diseases Physician on staff. Stewardship Pharm.D. was available only on part time basis. We received support from intensivist, physician chief of staff.

Infection control nurse, laboratory supervisor, nursing supervisor, pharmacy director, IT support, medical residents, hospitalists and private physicians were educated regarding the program. Antimicrobial Stewardship formal policy was approved and a number of antibiotic policies were instituted (in addition to the existing limited pharmacokinetic monitoring) including: pharmacy-driven automatic renal dosing for all antimicrobials, empiric antibiotic drug recommendations, de-escalation and intravenous to oral antibiotic recommendations. Certain medications were restricted to certain criteria (Linezolid, Carbepenems) or to ICU intensivist (Tigecycline, Caspofungin), or removed from the formulary alltogether (Ertapenem, Oritavancin).

Significance: Significant impact on hospital antimicrobial usage was demonstrated even without presence of infectious diseases physician / stewardship pharmacist available part time.

Besides impact on MRSA, VRE, C. Difficile rates, direct drug cost savings over 3 years of the program: $149,865.29

Total number of interventions made was 648.

52% of recommendations made were to discontinue or streamline down antibiotics including Vancomycin 165 (26% of all interventions), Linezolid 41 (6%), Meropenem 48 (8%), Zosyn 57 (9%), Gentamicin 23 (4%).

166. Early optimization of Antibiotic Therapy in Critically Ill Patients with Pneumonia Through Implementation of a Multiplexed Nucleic Acid Test-Based Assay.

Shyam Patel, Pharm.D., Karrine Brade, Pharm.D. and Kimberly Ackerbauer, Pharm.D.; Boston Medical Center, Boston, MA

Service or Program: Pharmacists are evaluating the utility of a PCR based rapid pneumonia diagnostic test at Boston Medical Center by screening patients that meet criteria for testing, evaluating BioFire results, and then communicating with the medical team to better optimize patient antibiotics. Sputum culture analysis for lower respiratory tract infections by standard microbiological methods is slow and may lead to prolonged periods of over or underexposure of antibiotics. Rapid identification of pathogens leads to early targeted antimicrobial therapy and improves clinical outcomes while decreasing the risk of antimicrobial resistance. The BioFire FilmArray Pneumonia Panel identifies 26 clinically relevant pathogens from sputum or bronchoalveolar lavage samples and is able to provide culture speciation and identify 7 resistance genes within 1 hour. The assay underwent a validation phase and is currently being used on patients that meet criteria for testing.

Justification/Documentation: Preliminary data shows that the median time to BioFire result was 2.86 hours compared to median time to finalized culture result of 43.13 hours. The assay is also extremely sensitive and specific and identified either the same or more pathogens when compared to the standard culture in 95% (19/20) of samples during the validation phase. In respect to antibiotic use, median time to regimen optimization was 22.75 hours after implementation of BioFire.

Adaptability: While the assay holds promise, the clinical impact is unclear. This service aims to provide an algorithm, supported with clinical outcomes data, that is generalizable and adaptable to any institution looking to employ the assay.

Significance: This service aims to decrease time to appropriate antibiotic therapy by 25%. Decreasing time to appropriate antibiotic therapy would allow for optimal bug-drug treatment, decrease overall antibiotic exposure, decrease risk of *Clostridioides difficile* infections and potentially blunt local resistance patterns.

167. Pharmacist-led initiative to optimize antibiotic prescribing upon hospital discharge.

Luke Jennings, Pharm.D.; Boston Medical Center, Boston, MA

Service or Program: Boston Medical Center (BMC) is an urban, academic, tertiary medical center with extensive pharmacy transitions-of-care (TOC) services, including admission and discharge medication reconciliations, patient counseling, and post-discharge phone call services. This was a quality-improvement project focused on optimizing appropriate antibiotic prescribing at hospital discharge as a new component to the traditional TOC services. Teams selected for interventions were chosen by a pharmacy workgroup based on their volume of discharge prescriptions and predicted impact of pharmacist involvement.

Justification/Documentation: The antimicrobial stewardship program at BMC is well-established, providing a wide-range of services, but focuses interventions on inpatient prescribing. Therefore, opportunities for improvement and expansion of services remain in the transition of a patient at hospital discharge. Appropriate antibiotics and duration were established for specific infections within an established workgroup, with appropriateness defined as the correct drug, dose, and duration of therapy. Data on antimicrobials prescribed at discharge and pharmacist electronic interventions were collected weekly. Outcome metrics included percentage of appropriate antibiotics per weekly discharge sample and average excess duration of antibiotics per weekly sample.

Adaptability: Interventions were implemented between October 2019 through January 2020 and focused on Hospitalist and Family Medicine services. Interventions included structured stewardship reviews with providers before discharge, creation of a pre-discharge patient list, pending orders for discharge, and placing a stewardship pharmacist within provider work rooms. The project further included medicine pharmacists in identifying and tracking patients who were close to discharge for review from the stewardship pharmacists.

Significance: After implementation of the project, overall antibiotic appropriateness increased from 38% to 80%, excess days of therapy decreased from a median of 3.5 to 0.5 days, and pharmacists were able to assist in medication optimization at discharge more effectively. The results of this QI project demonstrated the positive impact that AST pharmacists have in optimizing antibiotic therapies at hospital discharge.

ONCOLOGY

168. Implementation of a specialty pharmacy-driven telehealth symptom and risk assessment program for myelofibrosis patients.

Kristyn Yemm, Pharm.D., BCOP[1], *Justin Arnall, Pharm.D.*[2] and Nicole Cowgill, Pharm.D.[3]; (1)Hematology/Oncology, Atrium Health, Charlotte, NC (2)Department of Pharmacy, CHS Specialty Pharmacy Services, Charlotte, NC (3)Department of Pharmacy, CHS Specialty Pharmacy Services, Atrium Health, Charlotte, NC

Service or Program: A non-prescription based telemedicine service whereby pharmacists at the Specialty Pharmacy Service at Atrium Health (SPS) perform symptom and risk assessments for Myelofibrosis (MF) patients prior to their appointments (in-person or virtual) and upload via the electronic medical record. The goals of this consult service are to optimize workflow and to increase the number assessments completed to improve adherence to our internal care pathway corresponding with guideline-driven treatment algorithms.

Justification/Documentation: The Myeloid Malignancies Division (MMD) at our institution developed an internal electronic care pathway for MF to guide diagnosis and treatment, recommending serial use of the symptom and risk assessments throughout the course of care. Historically, these assessments were performed at on-site clinic appointments, this process was noted as inefficient and resulted in a perceived non-adherence to the pathway. SPS partnered with the MMD to assist in completion of these assessments due to the integrated telehealth model of SPS allowing pharmacists two weeks to contact the patient to gain this patient information prior to their appointment.

Adaptability: Patients are enrolled by a consult order sent directly to the specialty pharmacy and then patients are followed at three-month intervals, corresponding to internal and guideline driven recommendations. The SPS telehealth consult model developed for MF could be easily applied across all the disease states serviced by SPS and similar consult services could be initiated at other institutions.

Significance: A pre-implementation survey completed by providers demonstrated high interest for pharmacist collaboration in non-prescription based care. We hope this program encourages the utilization of pharmacist telemedicine as part of a multidisciplinary approach to virtual care. The implementation of a telehealth consult service is increasingly relevant after the necessity for virtual care due to the COVID-19 pandemic and has allowed our pharmacists to have an active/leading role in virtual-based care during this time.

169. Assessing Patient Satisfaction (Prescribed Oral Chemotherapeutic Agents) of a Brown Bag and Medication Adherence Visit with an Oncology Pharmacist at the Southcoast Center for Cancer Care.

Patrick Skeffington, Pharm.D., MHA, MSRA[1], Laura Haynes, BS, RPh, MACI[2], Donna Raymond, BS, RPh[3] and Heather McCarthy, Pharm.D., BCOP[1]; (1)Oncology Pharmacy, Southcoast Center for Cancer Care, Fairhaven, MA (2)Oncology Pharmacy, Southcoast Center for Cancer Care, Fall River, MA (3)oncology pharmacy, Southcoast Center for Cancer Care, Fall River, MA

Service or Program: A program was designed at the Southcoast Center for Cancer Care (SCCC) whereby all patients to begin on oral chemotherapy are scheduled for an appointment with a clinical oncology pharmacist to update the patients' med lists, evaluate adherence, and conduct a "brown bag" visit where patients are allowed to voice concerns and ask questions. After each appointment, patients are asked to fill out a short survey to evaluate the pharmacist and the process.

Justification/Documentation: Use of oral chemotherapy has increased dramatically over the past few years. Patients often are required to obtain their oral chemotherapy from a third party specialty pharmacy while continuing to receive their other medications from a second or third source. Many pharmacists lack knowledge about oral chemotherapy, safe practices, or effective counseling of these medications.

Adaptability: From October 2016 to June 2019, 174 patients had appointments with pharmacists and 55 returned their surveys yielding a 30% response rate. The abbreviated, previously validated, Patient Satisfaction with Pharmacist Services Questionnaire (PSPSQ 2.0) uses a Likert scale with 1 being strongly agree and 4 being strongly disagree. Average scores hovered around 1 (strongly agree) for each question except question 11 (the only negatively worded item; "There are some things about my visit with the pharmacist that can be improved"). Question 11 averaged 3.1; Disagree

Significance: Because oral chemotherapy use and complexity has grown over the past few years, and because patient care can be fragmented as to where to obtain one's chemotherapy, a pharmacist visit where adherence is assessed and potential drug/drug interactions addressed will add satisfaction for patients at the SCCC. Patients who were seen by an oncology clinical pharmacist to evaluate adherence, participate in a brown bag clinic and open discussion, found the appointment worthy of their time

OTHER

170. Impact of the clinical pharmacist on discharge medication reconciliation for bariatric surgery patients.

Amanda Van Prooyen, Pharm.D.[1], Jessica Hicks, Pharm.D.[1], Ed Lin, DO[2], Scott Davis Jr., MD[2], Arvinpal Singh, MD[2], DeAngelo Harris, MD, MS[2], Elissa Falconer, MD[2] and Elizabeth Hechenbleikner, MD[2]; (1)Department of Pharmacy, Emory Healthcare, Atlanta, GA (2)Emory Healthcare, Atlanta, GA

Service or Program: The inpatient bariatric surgery pharmacy consult service was created to prevent discharge medication reconciliation errors in patients after bariatric surgery. The pharmacist completes and documents a medication history, identifies necessary home medication adjustments following surgery, creates and documents a post-surgery medication plan for providers, and provides patient education on the discharge medication plan. Pharmacists operate under a protocol, which provides guidelines for adjusting medication formulations and/or doses, providing therapeutic alternatives, and discontinuing medications.

Justification/Documentation: Bariatric surgery leads to anatomical changes that alter the pharmacokinetic and pharmacodynamic profiles of medications. Furthermore, decreases in blood pressure and blood glucose levels are expected post-surgery. Data was collected from June 2019 to December 2019. Of the 85 patients included, pharmacists made 135 recommendations with an 85.2% provider acceptance rate. The prescription of a modified-release medication at discharge in the intervention group was reduced by 19.3% when compared to a pre-intervention group (n=167). Antihypertensive medications at discharge were appropriately adjusted in 77.0% of patients in the intervention group vs. 37.5% in the pre-intervention group. Insulin dose reductions were made in 87.5% of patients in the intervention group vs. 66.7% of patients in the pre-intervention group. No patients in the intervention group were inappropriately discharged with oral antihyperglycemics or non-insulin injectables vs. 33.3% and 20.0%, respectively, in the pre-intervention group.

Adaptability: This pharmacy consult service can be implemented in health systems with a bariatric surgery center and a decentralized pharmacy model. Protocol education to involved pharmacy staff will be needed to ensure consistent practice.

Significance: Clinical pharmacist involvement within the medication reconciliation process for inpatient bariatric surgery patients helps prevent inappropriate prescribing of modified-release or non-crushable medications, ensuring medication safety and efficacy after surgery. Additionally, proactive intervention by pharmacists on certain high-risk medication classes may prevent potentially life-threatening adverse effects and readmissions.

171. Development and implementation of transitions of care pharmacy services for acute care surgery patients at high risk for hospital readmission.

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Service or Program: The goal of this project is to improve transitions of care (TOC) services for surgical patients at-risk for readmission by increasing discharge medication reconciliations (DMR) to 80% by May 30th, 2020. Utilizing the Institute for Healthcare Improvement Model for improvement, the first Plan-Do-Study-Act (PDSA) cycle began in August 2019 with a workflow change to have pharmacists attend multi-disciplinary discharge rounds to identify potential discharges and TOC interventions for all high-risk readmission surgical patients.

Justification/Documentation: The Joint Commission released a call to action in 2012 addressing the need for more attention to be placed specifically on TOC from inpatient to outpatient services. TOC services such as DMR and counseling have become increasingly important to ensure continuation of appropriate therapy upon discharge. In 2018, the Agency for Healthcare Research and Quality (AHRQ) cited pharmacist-involved DMR and counseling as key components for reducing hospital readmission rates. TOC services have been successful in medical patients; however, there is still a lack of TOC for surgical patients.

Adaptability: The second PDSA cycle implemented in October 2019 included pharmacist-specific documentation regarding new start high-risk medications and barriers to discharge. This provided better pharmacist-to-pharmacist hand-off with anticipating discharges and facilitating follow-ups for evening pharmacists who would be

responsible for assisting with DMR. From August to October 2019, the median percent of patients with pharmacist-assisted DMR shifted from 33 to 77.6%. The specific aim of the project was then met in November 2019 and sustained through January 2020. Additional interventions initiated in January 2020 include high-risk medication discharge counseling and post-discharge phone calls.

Significance: Increased pharmacy communication with surgical teams during discharge rounds can effectively increase accurate DMR. Further investigation is needed to identify if there is a correlating reduction in readmission rates when pharmacist-driven TOC services are provided for surgical patients at high risk for readmission.

PAIN MANAGEMENT/ANALGESIA

172. Evaluation and implementation of an opioid reduction program to guide discharge prescribing for opioid naïve postoperative patients.

Olivia Lemanski, Pharm.D., Ashley Hellermann Rankin, Pharm.D. and Jessica Marshall, Pharm.D.; Inpatient Pharmacy, Aspirus Wausau Hospital, Wausau, WI

Service or Program: The opioid reduction program was developed after a gap analysis identified potential for improvement in pain management practices. The program was designed to reduce the quantity of opioids prescribed postoperatively to opioid naïve patients. Surgical providers were given recommendations on dispense quantity based on current guidelines from Johns Hopkins Opioid-Prescribing Guidelines for Common Surgical Procedures, Michigan Opioid Prescribing Engagement Network (OPEN), and recent clinical trials.

Justification/Documentation: Opioids are the standard of care for acute postoperative pain management and continue to be overprescribed despite the impact of the opioid epidemic. The program identified surgical providers who would benefit from modifying their current prescribing practices through education, resources, and prescribing recommendations provided by a pharmacist. Baseline data was collected from April 1, 2019 to June 30, 2019 via the electronic medical record which identified opioid prescriptions at discharge for opioid naïve postoperative patients. Surgical procedures targeted for pharmacist intervention included cholecystectomy, herniorrhaphy, and thyroidectomy. Prescribing recommendations were made for oxycodone, hydrocodone/acetaminophen, and tramadol, utilizing Johns Hopkins Opioid-Prescribing Guidelines for Common Surgical Procedures, Michigan OPEN, and recent clinical trials.

Adaptability: The program can be implemented and adapted to a variety of surgical settings for patients who are opioid naïve. Recommendations were effectively implemented by educating providers and utilizing electronic order sets. Comparison of baseline data with post-implementation data provides evidence that recommendations were successfully utilized and can be incorporated into other settings.

Significance: The opioid reduction program works to advance the position of clinical pharmacists by providing resources to make appropriate postoperative opioid prescribing recommendations for opioid naïve patients. The program has increased prescriber and pharmacy responsibility to surgical patients and contributed to reduced amounts of opioids in the community. No current program or opioid stewardship position currently exists at our facility.

TRANSPLANT/IMMUNOLOGY

173. Targeted Transplant Education: Leveraging the EMR, Telehealth, and Teachback.

Christina Rivera, Pharm.D.[1], Ryan Stevens, Pharm.D.[2], Stacy Bernard, Pharm.D.[2] and Raymund Razonable, MD[2]; (1)Department of Pharmacy, Mayo Clinic Rochester, Rochester, MN (2)Mayo Clinic, Rochester, MN

Service or Program: A pilot service was developed whereby pharmacists re-educate high-risk (D+/R-) heart transplant recipients on cytomegalovirus (CMV) infection risk after planned cessation of valganciclovir prophylaxis. Infectious disease (ID) and solid organ transplant pharmacists partnered with physicians, advanced practice providers, and patient education specialists to develop and deliver targeted written educational material on CMV signs, symptoms and action steps to take if these occur. An electronic medical record message with the education content was sent via patient portal. Within two days, phone consultation completed and 5 teach-back questions discussed with patient.

Justification/Documentation: Project impetus was a transplant patient with severe tissue-invasive CMV disease whose symptoms went unrecognized by the patient and local primary non-transplant provider as being related to CMV. A gap in patient understanding of CMV signs was identified, despite education having taken place prior to, and at the time of transplantation. A templated phone encounter note is placed in the patient's chart, documenting the educational activity performed and demonstration of knowledge by the patient. As per institutional policy, there is no charge/billing to patients for phone-based encounters.

Adaptability: With continued success, this program aims to expand to educate other high-risk transplant patients (kidney, liver, lung) using similar methods. The techniques used could be adapted to provide targeted education of other highly engaged, medically-complex patient populations in ambulatory clinical pharmacist settings. Via a streamlined process, and leveraging the electronic messaging system, a targeted form of patient education can be provided in a time-efficient manner.

Significance: To date, our pilot has completed 7 encounters. Feedback from patients and pharmacists has been positive. Extending beyond drug-focused efforts, this represents a unique model of pharmacist-led education pertaining to a disease state built upon established teaching methods. Further, this highlights the multidisciplinary team collaboration to reinforce patients' understanding of medical risks while aiming to prevent adverse patient outcomes.

Recommendations, patients who are candidates for DOAC therapy still remain on warfarin for nonvalvular atrial fibrillation and treatment or secondary prevention of venous thromboembolism. The purpose of this study was to create a tool with expanded criteria to identify patients on warfarin who are candidates for a DOAC to increase the percent of those on guideline recommended therapy.

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VPS CASE REPORTS

ADR/DRUG INTERACTIONS

391. Lansoprazole for stress ulcer prophylaxis: a case report of profound thrombocytopenia.

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Introduction: Lansoprazole is a proton-pump inhibitor (PPI) that is used for stress ulcer prophylaxis. Drug-induced thrombocytopenia is an important adverse drug reaction where the platelet count can fall more than 50% of its normal value and return to normal after withdrawal of the offending drug.

Case: We describe a case of a 76-year-old male patient with a history of hypertension and coronary artery disease who was admitted with acute decompensated heart failure with possible acute coronary syndrome to our cardiac intensive care unit (CICU). Medications upon admission were aspirin, clopidogrel, valsartan, metoprolol, atorvastatin, indapamide, furosemide infusion, heparin infusion, and lansoprazole 30mg oral daily. On CICU day 2, the patient's platelet count dropped from a baseline admission value of 227 000 to 118 000/μL after one dose of lansoprazole and reached a nadir of 105 000/ μL on day 3. Other causes of thrombocytopenia, including infection, liver injury, heparin-induced thrombocytopenia (HIT), thrombotic thrombocytopenic purpura due to clopidogrel, and disseminated intravascular coagulation (DIC) were excluded. Platelet count gradually returned to normal after discontinuation of lansoprazole and starting ranitidine.

Discussion: The exclusion of other causes of thrombocytopenia, and the resolution of thrombocytopenia after replacing lansoprazole with ranitidine make it most likely to be lansoprazole induced thrombocytopenia. The use of the Naranjo scale also indicated a probable relationship between the administration of lansoprazole and the development of thrombocytopenia (score of 5). There is one case report of lansoprazole induced thrombocytopenia in the medical literature; however, lansoprazole was used at a dose of 60mg oral twice daily for the treatment to a bleeding gastric ulcer.

Conclusion: In cases of unexplained thrombocytopenia, a pharmacological cause must be suspected, including lansoprazole. Other alternatives for stress ulcer prophylaxis should be considered.

CARDIOVASCULAR

392. Symptomatic Hypotension After Initiation of Empagliflozin: A Case Report.

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Introduction: Empagliflozin is a sodium-glucose cotransporter-2 (SGLT2) inhibitor used for the management of type 2 diabetes, and blood pressure lowering may occur after initiation due to diuretic and natriuretic effects. Average blood pressure lowering effects of SGLT2 inhibitors are reported as 4-6 mmHg in systolic blood pressure and 1-2 mmHg in diastolic blood pressure with no significant impact on orthostatic hypotension. Titration schemes for preventing volume depletion and hypotension have been proposed for patients on concomitant diuretics. This report presents a case involving initiation of a SGLT2 inhibitor, which resulted in symptomatic hypotension and necessary medication down-titration in a patient not taking a diuretic.

Case: A 69-year old male with diabetes, hypertension, and coronary arteriosclerosis was started on empagliflozin 10 mg daily and increased to 25 mg daily after one month. Blood pressure at initiation was reported as 131/64 mmHg. Five months later, the patient reported symptomatic hypotension with fluctuating vital signs and low blood pressure after administration of morning medications ranging from 83-144/44-76 mmHg. Antihypertensives included lisinopril 40 mg twice daily, amlodipine 5 mg daily, and metoprolol tartrate 50 mg twice daily. Two antihypertensives required at least a 50% reduction in dose.

Discussion: Blood pressure lowering and volume depletion with SGLT2 inhibitors may occur with concomitant diuretic or renin-angiotensin-aldosterone system inhibitor therapy. Risk factors associated with volume depletion include the elderly, the presence of a diuretic, or chronic kidney disease. This case demonstrates a dramatic effect on blood pressure without the presence of diuretic therapy or renal impairment. Several mechanisms for blood pressure lowering with SGLT2 inhibitors have been hypothesized, including reduced sympathetic nervous system activity.

Conclusion: Frequent blood pressure monitoring throughout therapy with a SGLT2 inhibitor is warranted to prevent associated adverse reactions. Further research on alternative mechanisms associated with SGLT2 inhibitor blood pressure lowering is warranted.

INFECTIOUS DISEASES

393. Resolution of persistent methicillin-resistant *Staphylococcus aureus* bacteremia by adding ceftaroline to daptomycin after vancomycin treatment failure: a case report.

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Introduction: The Infectious Disease Society of America (IDSA) guidelines recommend vancomycin or daptomycin as first-line monotherapies for treatment of methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia. Alternative options are limited in cases of first-line treatment failure. This case report describes successful clearance of persistent MRSA bacteremia using ceftaroline and daptomycin combination therapy.

Case: A sixty-eight year old male presented with chills, fever, hypotension, and hypoxemia. Past medical history included diabetes, end-stage renal disease on hemodialysis, and aortic valve replacement. He was diagnosed with septic shock secondary to aspiration pneumonia and admitted to the medical surgical intensive care unit. On hospital day two, blood cultures were identified as MRSA with a vancomycin minimum inhibitory concentration (MIC) of 1 μg/mL by broth microdilution. The patient was treated with vancomycin for seven days. Despite maintaining vancomycin trough levels greater than 15 μg/mL, repeat blood cultures remained positive for MRSA. On day eight, the antibiotic regimen was changed to daptomycin monotherapy. Subsequent blood cultures remained MRSA positive and the vancomycin MIC increased to 2 μg/mL. Ceftaroline was added to daptomycin on day fourteen. Repeat blood cultures were first negative on hospital day twenty. Source identification was challenging and was presumed due to prosthetic valve endocarditis.

Discussion: This case report is a potential example of the "seesaw effect" and its utility in persistent MRSA bacteremia. The "seesaw effect" describes increased beta-lactam activity against MRSA in cases of reduced glycopeptide or lipopeptide susceptibility. In this case, vancomycin and daptomycin monotherapy were ineffective as indicated by repeated positive blood cultures and rising vancomycin MIC. Initiation of daptomycin plus ceftaroline combination therapy resulted in clearance of the infection. Limitations to this report include retrospective analyses and lack of ceftaroline and daptomycin MIC data.

Conclusion: In patients with persistent MRSA bacteremia, salvage therapy with ceftaroline and daptomycin should be considered after first-line treatment failure.

NUTRITION

394. Multisource Intravenous Lipid Emulsion in Two Patients with Severe Familial Lipodystrophy: Case Report.

Michelle Meyer, Pharm.D.; Pharmacy, Grant Medical Center, Columbus, OH

Introduction: Common practice is to withhold intravenous lipid emulsions in patients receiving parenteral nutrition when triglycerides are elevated. Challenges may arise with meeting calorie goals and concerns for essential fatty acid deficiency when lipid emulsions are restricted.

Case: We present our observations of two patients admitted with triglyceride levels greater than 7000mg/dL who required parenteral nutrition during hospitalization. After triglyceride levels decreased to less than 1000mg/dL a multisource intravenous lipid emulsion was initiated in the patients beginning at restricted dosing and increased after demonstrating tolerance. Both patients were able to receive intravenous lipid emulsion with triglyceride levels maintained near or less than the standard recommended cut-off of 400mg/dL.

Discussion: Recommendations for oral diet in the management of familial lipodystrophy include increasing omega 3 fatty acid intake and substituting medium chain triglyceride oil to supply a portion of dietary fat. While the multisource lipid emulsions would align with these suggestions, information on using parenteral lipids in this condition was not readily accessible.

Conclusion: Parenteral lipid emulsion derived from multiple sources was safely utilized in two patients with lipodystrophy associated with severely elevated triglycerides.

PAIN MANAGEMENT/ANALGESIA

395. Buprenorphine Micro-Dosing in a Patient using High Dose Fentanyl Patch: a Case Report.

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Introduction: Chronic use of full mu-receptor agonists causes tolerance, escalating doses, and hyperalgesia. Buprenorphine is a high affinity, partial mu-opioid receptor agonist that provides analgesia while minimizing opioid side effects. Partial agonism may precipitate withdrawal symptoms in those receiving full opioid agonists.

Micro-dosing involves repetitive administration of small, increasing doses allowing buprenorphine accumulation at the mu receptor without precipitating withdrawal. No guidance exists for buprenorphine micro-dosing in patients on chronic fentanyl.

Case: A 59 year old male with past medical history of chronic pain secondary to avascular necrosis of bilateral hips presented with hyperalgesia, requiring 200mcg fentanyl patch. A modified Bernese method was chosen to convert to sublingual buprenorphine. Intended dosing started at 0.5mg on day 1 and increased to 4mg TID on day 6, with patch discontinuation on day 8. On day 5, the patient experienced an increase in pain score from 4 to 7/10 with reports of temperature fluctuations, night sweats, and restlessness. We elected to increase to 8mg TID immediately on day 6. The patch was discontinued on day 8 with no further complaints of withdrawal and a decrease in pain from 8 to 4/10.

Discussion: Case reports indicate that a 7-day micro-dosing induction of buprenorphine is sufficient in preventing withdrawal symptoms in those with opioid use disorder on methadone or heroin. Conversion to buprenorphine for pain is complicated by fluctuating pain scores. In this case, a rapid dose increase from 12mg to 24mg in 24 hours decreased pain without causing additional withdrawal, and allowed for abrupt cessation of 137mcg fentanyl patch.

Conclusion: Micro-dosing buprenorphine in patients on fentanyl may improve analgesia while increasing patient safety and decreasing withdrawal. Additional studies are needed to establish a consistent way of transitioning patients from fentanyl patch to sublingual buprenorphine.

SUBSTANCE ABUSE/TOXICOLOGY

396. Successful Management of Ethylene Glycol Toxicity and Concurrent Ethanol Use with Early Hemodialysis and Reduced Total Cumulative Dose of Fomepizole.

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Introduction: Ethylene glycol (EG), commonly found in antifreeze, has been ingested in suicide attempts. Historically, intravenous ethanol was utilized for the treatment for EG toxicity. Currently, fomepizole with or without hemodialysis is used for the treatment of EG toxicity. The manufacturer recommends twice-daily dosing of fomepizole, with more frequent dosing with concurrent hemodialysis. Fomepizole is a costly drug with an average wholesale price of $1232 for a one gram vial. We describe a patient with EG and ethanol intoxication who was treated with emergent hemodialysis and a reduced total cumulative fomepizole dose with rapid recovery.

Case: A 51-year-old man was found intoxicated after ingesting antifreeze and ethanol within the previous three hours. Initial laboratory findings include: arterial pH of 7.45, anion gap (AG) of 17, lactate of 6.3 mmol/L, ethanol concentration of 143 mg/dL, and osmolal gap (OG) of 79 mOsm/kg. He was started on 2 L/min nasal cannula, intravenous fluids, and thiamine. Two four-hour hemodialysis sessions were started at five hours and 28 hours after initial presentation. Fomepizole 15 mg/kg IV and 10 mg/kg IV were administered four hours and 34 hours after admission, respectively. The AG resolved within 12 hours, and the OG resolved within 36 hours after admission. The initial EG level was found to be 301.6 mg/dL on the third day of admission. Less than 24 hours of intensive care monitoring was required. Renal and respiratory function remained normal. The total bilirubin was elevated (1.5 mg/dL) at discharge. The patient was discharged home after four days.

Discussion: Combination therapy with emergent hemodialysis and fomepizole resulted in rapid clearance of EG, preventing clinical deterioration. The protective effect of ethanol likely reduced the need for fomepizole.

Conclusion: Early hemodialysis and a reduced total cumulative fomepizole dose led to rapid recovery in a patient with EG and ethanol intoxication.

VPS ENCORE PRESENTATIONS

EDUCATION/TRAINING

397E. Evaluating Student Pharmacist's Didactic and Experiential Preparation to Educate Patients on Proper Drug Disposal.

Kyle Dagen, Associate of Arts[1] and Ashley Franco, MS[2]; (1)Regis University School of Pharmacy, Northglenn, CO (2)Regis University School of Pharmacy, Denver, CO

398E. Enhancing Education of Family Medicine Residents: Survey Results of Interprofessional Psychiatry and Medical Care Conferences Across Two Outpatient Health Systems.

Carolyn O'Donnell, Pharm.D. (as of 5/15/20)[1], Sarah Jackson, Pharmacy Student[1], Jennifer Nelson Albee, MSW, LICSW[2], Ann Yapel, Pharm. D., BCACP[2], Cynthia Nash, RN, BSN[2], Danielle Macdonald, Pharm. D.[2], Amelia King, RN, BSH, PHN[2], Mark Schneiderhan, Pharm.D., BCPP[3] and Keri Hager, Pharm.D., BCAP[4]; (1)University of Minnesota, Duluth, MN (2)Duluth Family Medicine Clinic, Duluth, MN (3)Human Development Center, Duluth, MN (4)Department of Pharmacy Practice and Pharmaceutical Sciences, University of Minnesota College of Pharmacy, Duluth, MN

399E. Impact of Pharmacist Provided Diabetes Education and Social Determinants of Health on Hospital Readmission Rates.

Liseli Mulala, PhD, MPH, BPharm[1], Stephanie Pang, Pharm.D. candidate[2], Shirley Ng, Pharm.D. candidate[3] and Tiffany Guan, Pharm.D. candidate[2]; (1)Discharge Pharmacy, Zuckerberg San Francisco General Hospital, San Francisco, CA (2)School of Pharmacy, University of California San Francisco, San Francisco, CA (3)University of California San Francisco, San Francisco, CA

HEMATOLOGY/ANTICOAGULATION

400E. How Low Can We Go: A Retrospective Observation Study of Low Fixed Dose Rasburicase for the Treatment of Tumor Lysis Syndrome.

Shahrier Hossain, Pharm.D.[1], Joanne Yeung, Doctor of Pharmacy Candidate[1], Allen McClearnen, Doctor of Pharmacy Candidate[1], Martha Naber, Pharm.D.[1] and Matthew Yacobucci, Pharm.D.[2]; (1)Albany Medical Center, Albany, NY (2)Albany College of Pharmacy and Health Sciences, Albany, NY

INFECTIOUS DISEASES

401E. Experience with Liposomal Amphotericin B in Outpatient Parenteral Antimicrobial Therapy (OPAT).

Yvonne Burnett, Pharm.D., BCIDP and Yasir Hamad, MD; Division of Infectious Diseases, Department of Medicine, Washington University School of Medicine in St. Louis, St. Louis, MO

MEDICATION SAFETY

402E. Patient Perspectives on Development of a Mobile Health Application to Improve Dietary Supplement Tracking and Reconciliation.

Elana Post, Pharm.D. Candidate[1], Amanda Corbett, Pharm.D.[2], Gary Asher, MD, MPH[3], Zachary Kadro, ND[4], Jacob Hill, ND, MS[4], Catharine Nguyen, Pharm.D.[1], Susan Gaylord, PhD[4] and Kim Faurot, PhD, MPH, PA[4]; (1)University of North Carolina at Chapel Hill Eshelman School of Pharmacy, Chapel Hill, NC (2)Office of Curricular Innovaton, UNC Eshelman School of Pharmacy, Chapel Hill, NC (3)Department of Family Medicine, Department of Family Medicine, University of North Carolina at Chapel Hill, Chapel Hill, NC (4)Program on Integrative Medicine, Department of Physical Medicine & Rehabilitation, University of North Carolina at Chapel Hill, Chapel Hill, NC

403E. Competitive Market Landscape Analysis - Dietary Supplement Mobile Health Application.

Catharine Nguyen, Pharm.D.[1], Amanda Corbett, Pharm.D., BCPS, FCCP, FAIHM[2], Gary Asher, MD, MPH[3], Zachary Kadro, ND[4], Jacob Hill, ND, MS[4], Elana Post, Pharm.D. Candidate[1] and Kim Faurot, PhD, MPH, PA[4]; (1)University of North Carolina at Chapel Hill Eshelman School of Pharmacy, Chapel Hill, NC (2)University of North Carolina at Chapel Hill Eshelman School of Pharmacy, University of North Carolina at Chapel Hill, Chapel Hill, NC (3)Department of Family Medicine, Department of Family Medicine, University of North Carolina at Chapel Hill, Chapel Hill, NC (4)Program on Integrative Medicine, Department of Physical Medicine & Rehabilitation, University of North Carolina at Chapel Hill, Chapel Hill, NC

NEPHROLOGY

404E. Frequency of Medication Therapy Problems in a High-Risk Chronic Kidney Disease Population.

Melanie R. Weltman, Pharm.D.[1], Huiwen Chen, MD[2], Khaled Abdel-Kader, MD[3], Manisha Jhamb, MD, MPH[2] and Thomas D. Nolin, Pharm.D., PhD[4]; (1)Department of Pharmacy and Therapeutics, University of Pittsburgh School of Pharmacy, Pittsburgh, PA (2)Renal-Electrolyte Division, University of Pittsburgh School of Medicine, Pittsburgh, PA (3)Division of Nephrology and Hypertension, Vanderbilt University Medical Center, Nashville, TN (4)University of Pittsburgh, Pittsburgh, PA

NEUROLOGY

405E. Indirect Comparison of the Efficacy of Fremanezumab Versus Erenumab in Episodic Migraine Patients who had Failed 2-4 Prior Migraine Preventive Treatments.

Oscar Patterson-Lomba, PhD[1], *Stephen Thompson, BS, MS*[2], Sanjay K. Gandhi, MS, PhD[2], Ronghua Yang, PhD[2], Joshua M. Cohen, MD, MHS, FAHS[2], Fan Mu, MsC, ScD[1] and Joshua Young, BS[1]; (1)Analysis Group, Inc., Boston, MA (2)Teva Branded Pharmaceutical Products R&D, Inc., West Chester, PA

406E. Burden of Co-Morbid Depression and Anxiety on Migraine-Specific Health-Related Quality of Life in Adult Migraine Patients in the United States.

Richard B. Lipton, MD[1], Ravi Iyer, PhD, MBA[2], Joshua M. Cohen, MD, MHS, FAHS[2], James Jackson, BA[3], *Verena Ramirez-Campos, MD*[2], Sarah Cotton, MA[3], Gary Milligan, BS[3] and Dawn C. Buse, PhD[1]; (1) Albert Einstein College of Medicine and Montefiore Medical Center, Bronx, NY (2)Teva Branded Pharmaceutical Products R&D, Inc., West Chester, PA (3)Adelphi Real World, Bollington, Cheshire, United Kingdom

407E. Burden of Comorbid Depression and Anxiety on Work Productivity in Adult Migraine Patients in the United States.

Richard B. Lipton, MD[1], Ravi Iyer, PhD, MBA[2], Joshua M. Cohen, MD, MHS, FAHS[2], James Jackson, BA[3], *Verena Ramirez-Campos, MD*[2], Sarah Cotton, MA[3], Gary Milligan, BS[3] and Dawn C. Buse, PhD[1]; (1) Albert Einstein College of Medicine and Montefiore Medical Center, Bronx, NY (2)Teva Branded Pharmaceutical Products R&D, Inc., West Chester, PA (3)Adelphi Real World, Bollington, Cheshire, United Kingdom

408E. Patient Preference for Dosing Regimen and Perception of Dosing Flexibility With Fremanezumab for Migraine: Results From a Patient Survey Following Completion of a 1-Year Extension Study.

Robert P. Cowan, MD, FAAN[1], Sanjay K. Gandhi, MS, PhD[2], Blaine Cloud, PhD[3], Joshua M. Cohen, MD, MHS, FAHS[2], Dawn C. Buse, PhD[4], *Verena Ramirez-Campos, MD*[2], Andrew H. Ahn, MD, PhD, FAHS[2] and Richard B. Lipton, MD[4]; (1)Stanford University, Stanford, CA (2)Teva Branded Pharmaceutical Products R&D, Inc., West Chester, PA (3)Clinical SCORE, Chadds Ford, PA (4)Albert Einstein College of Medicine and Montefiore Medical Center, Bronx, NY

409E. 10-Year Cost-effectiveness Analyses of Fremanezumab Compared to Erenumab as Preventive Treatment in Episodic Migraine for Patients With Inadequate Response to Prior Preventive Treatments.

Lee Smolen, BSSE[1], Joshua M. Cohen, MD, MHS, FAHS[2], Timothy Klein, BS[1], Sanjay K. Gandhi, MS, PhD[2] and *Stephen Thompson, BS, MS*[2]; (1)Medical Decision Modeling Inc., Indianapolis, IN (2)Teva Branded Pharmaceutical Products R&D, Inc., West Chester, PA

PHARMACOECONOMICS/OUTCOMES

410E. Hospital Encounters of Patients with Concurrent Major Depressive Disorder (MDD) and Suicidal Ideation or Suicide Attempt: Characteristics and Potential Predictors of a Subsequent MDD-related Hospital Encounter.

Cheryl Neslusan, BA, MA, PhD[1], Jennifer Voelker, Pharm.D.[1], Melissa Lingohr-Smith, PhD[2] and Jay Lin, PhD, MBA[2]; (1)Janssen Scientific Affairs, LLC, Titusville, NJ (2)Novosys Health, Green Brook, NJ

411E. The Impact of Major Depressive Disorder and Suicidal Ideation or Suicide Attempts on Caregivers: A Comparison of Direct and Indirect Costs and Absences Using Objectively Measured Real World Data.

Harsh Kuvadia, BPharm, MS[1], Ian A. Beren, BS[2], H. Lynn Starr, BA, MD[3], John J. Sheehan, BS, PhD, MBA[3], Nathan L. Kleinman, PhD[4] and Richard A. Brook, BS, MS, MBA[5]; (1)Integrated Resources Inc., Edison, NJ (2)HCMS Group, Cheyenne, WY (3)Janssen Scientific Affairs, LLC, Titusville, NJ (4)HCMS Group, LLC, Missouri City, TX (5)Better Health Worldwide, Newfoundland, NJ

412E. Patient-reported barriers limiting mental health care among adults with major depressive disorder: A nationwide analysis using National Survey on Drug Use and Health data.

Harsh Kuvadia, BPharm, MS[1], Qian Cai, MSc, MSPH[2], Ella Daly, MB BCh BAO[2], *Jennifer Voelker, Pharm.D.*[2], Nancy Connolly, BS, MPH[2], John J. Sheehan, BS, PhD, MBA[2] and Samuel Wilkinson, MD[3]; (1)Integrated Resources Inc., Edison, NJ (2)Janssen Scientific Affairs, LLC, Titusville, NJ (3)Yale Depression Research Group, New Haven, CT

PHARMACOEPIDEMIOLOGY

413E. Trends in Falls Risk Increasing Drugs (FRIDS) and Rate of Fatal Falls in Older Adults, 1999-2017.

Amy Shaver, Pharm.D., MPH[1], Collin M. Clark, Pharm.D.[2], Mary Hejna, BS[3], Steven Feuerstein, MS[2], Robert Wahler, Pharm.D.[2] and David M. Jacobs, Pharm.D., PhD[2]; (1)Department of Epidemiology and Environmental Health, University at Buffalo School of Public Health and Health Professions, Buffalo, NY (2)Department of Pharmacy Practice, University at Buffalo School of Pharmacy and Pharmaceutical Sciences, Buffalo, NY (3)Pharmacy Practice, University at Buffalo, Buffalo, NY

PHARMACOGENOMICS/ PHARMACOGENETICS

414E. Evaluation of Cardiovascular Outcomes in African-Americans Following Implementation of *CYP2C19* Genotype-Guided Antiplatelet Therapy in a Real-World Setting.

Megan Gower, Pharm.D.[1], Alexis Williams, Pharm.D.[2], Chelsea Gustafson, BS[3], Eric Pauley, MD[3], Karen E. Weck, MD[4], George A. Stouffer, MD[5] and Craig Lee, Pharm.D., PhD[2]; (1)Division of Pharmacotherapy and Experimental Therapeutics, University of North Carolina at Chapel Hill, Chapel Hill, NC (2)Division of Pharmacotherapy and Experimental Therapeutics, UNC Eshelman School of Pharmacy, Chapel Hill, NC (3)Division of Cardiology, UNC School of Medicine, Chapel Hill, NC (4)Department of Pathology and Laboratory Medicine, UNC School of Medicine, Chapel Hill, NC (5)Stouffer, Rick;, Chapel Hill, NC

PSYCHIATRY

415E. Analysis of a Patient-Reported Questionnaire to Determine Medication Preference for Injectable Versus Oral Antipsychotics in Patients with Schizophrenia: Results from a Double-Blind Randomized Controlled Study.

Clifton Blackwood, BS[1], Panna Sanga, MD[2], Isaac Nuamah, PhD[2], Alexander Keenan, MA[2], Arun Singh, DO[2], Maju Mathews, MD[2] and *Srihari Gopal, MD, MHS*[3]; (1)Student, Penn State University, Abington, PA (2)Janssen Research & Development, LLC, Titusville, NJ (3)Neuroscience, Janssen Research & Development, LLC, Titusville, NJ

416E. Discordance between Psychiatrists and their Patients on Disease Severity and Treatment Outcomes in Schizophrenia.

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417E. Economic Burden of Schizophrenia among Young Adults with Medicaid Coverage.

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418E. Care Pathways Preceding Suicidal Ideation or Probable Suicide Attempt in Adult Patients with Major Depressive Disorder.

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419E. What are the Attributes that Psychiatrists Consider in the Decision to Discharge Adults with Major Depressive Disorder who have been Hospitalized with Active Suicidal Ideation with Intent?

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420E. Economic Burden of Medicaid Beneficiaries with Schizophrenia not Adherent to Antipsychotics and with Schizophrenia Relapses.

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VPS SYSTEMATIC REVIEWS/META-ANALYSIS

CARDIOVASCULAR

429. Comparing Apixaban versus Rivaroxaban in Morbidly Obese Patients with Atrial Fibrillation: A Network Meta-analysis.

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Background: Multiple retrospective studies compared direct oral anticoagulants with warfarin in morbidly obese patients with a body mass index (BMI) > 40 kg/m^2 or weight > 120 kg and supported the use of direct oral anticoagulants (DOACs). However, no study evaluated which DOAC is more appropriate in morbidly obese patients with atrial fibrillation (AF). The objective of this network meta-analysis is to compare apixaban with rivaroxaban in morbidly obese patients with AF.

Methods: MEDLINE, Embase, Google Scholar, Web of Science, and Cochrane Library database searches for relevant articles through 3/22/20 were performed. Studies were included if included patients are aged > 18 years old with BMI > 40 kg/m^2 or weight > 120 kg receiving apixaban or rivaroxaban who are diagnosed as AF. Version 2 of the Cochrane risk-of-bias tool for randomized controlled trials and the Newcastle-Ottawa Scale for retrospective cohort studies were used to evaluate the quality of clinical studies. Publication bias was checked by the Egger's regression test. Primary efficacy outcome was the composite outcome of stroke or systemic embolism (SE) and primary safety outcome was major bleeding. Bayesian network meta-analysis with a random effects model was performed.

Results: Five retrospective studies were included. Bayesian network meta-analysis with a random effects model showed that there were no statistical significance in the stroke or SE event rate (OR: 0.35; 95% CI: 0.05, 1.45) and major bleeding rate (OR: 1.00; 95% CI: 0.24, 3.21) between the apixaban and rivaroxaban groups.

Discussion: This is the first study comparing apixaban with rivaroxaban in morbidly obese patients with AF. However, all included studies were retrospective studies. In conclusion, either apixaban or rivaroxaban could be considered as a DOAC option in morbidly obese patients with AF.

Other: This project received the American College of Clinical Pharmacy Cardiology Practice Research Network Seed Grant. This project was not registered.

ONCOLOGY

430. Risk of Peripheral Neuropathy with Trastuzumab Emtansine in Breast Cancer Patients: a Systematic Review and Meta-Analysis.

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Background: Trastuzumab emtansine (T-DM1) is an anti-HER2 antibody-drug conjugate indicated for the treatment of HER2-positive breast cancer. T-DM1 therapy has been associated with the development of sensory peripheral neuropathy. Neurotoxicity with T-DM1 can lead to delays in treatment and decreased quality of life. The objective of our meta-analysis is to investigate the risk of peripheral neuropathy in patients with breast cancer receiving T-DM1 compared to controls.

Methods: We conducted a systematic review and meta-analysis of randomized clinical trials comparing T-DM1 to a control treatment in patients with HER2-positive breast cancer. PubMed and EMBASE databases were searched. Oncology conference proceedings were searched for unpublished trials. Phase II/III trials with available event number or event rate of peripheral neuropathy with an assessable sample size were included. The I^2 statistic was used to evaluate heterogeneity of the results. A fixed-effects model with the Mantel-Haenszel method was used if the I^2 was ≤ 50%; otherwise a random-effects model was utilized. Pooled risk ratios (RR) and 95% confidence intervals (CIs) for all-grade and grade 3/4 peripheral neuropathy were calculated.

Results: Our search identified 1145 records that were screened for relevance. Eleven articles were considered relevant and were assessed for inclusion. Five trials were deemed eligible and were included in the meta-analysis. Two trials used non-taxane controls, two trials used taxane-containing control treatment, and one trial used physician's choice control treatment which could be a taxane. A total of 4544 patients were included, 2580 received T-DM1 and 1964 received control. The RR for all-grade peripheral neuropathy was 1.50 [95% CI 0.64-3.54; p=0.35, I^2=95%]. The RR for grade 3/4 peripheral neuropathy was 11.93 [95% CI 3.90-36.53; p=0.0005, I^2=0%].

Discussion: Our meta-analysis demonstrates that T-DM1-based therapy is associated with an increased risk of grade 3/4 peripheral neuropathy compared to control.

Other: n/a

OTHER

431. Smart Electronic Medication Adherence Products: A Comparison of Features.

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Background: Medication non-adherence is an ongoing global challenge. To address this, there has been a rapid emergence of “smart” electronic medication adherence products (smart eMAPs). A comparison of features of these products is necessary for clinical decision making. Therefore, the objective of this review was to compare features of smart eMAPs available for in-home use.

Methods: Gray and published literature and videos was searched to identify smart eMAPs using Google, YouTube, PubMed, Embase and Scopus. Search terms relating to “medication adherence”, “smart technology” and/or “dispensing” were used. eMAPS were considered “smart” if they had connectivity (ability for collected data to exist outside the physical device) and automaticity (ability for data to be analyzed automatically). Products were excluded if they were standalone-applications, not marketed in English, or not for in-home use.

Two researchers screened for and abstracted data independently; disagreements were resolved by discussion.

Results: Of the 64 products identified, 51 (38 commercially available; 13 prototypes) met the definition of "smart" eMAPs and were classified as automated dispensers (n=20), blister packs (n=5), dossette/pill boxes (n=9), storage boxes (n=4), vials/vial caps (n=7), inhalers (n=5) and injectors (n=1). 75% (n=38) contained alarms, 63% (n=32) were multi-dose, 24% (n=12) were unit-dose, 43% (n=22) had a locking feature, 41% (n=21) were portable, and 88% (n=45) and 47% (n=24) sent notifications to patients and caregivers, respectively. The upfront cost of marketed smart eMAPs ranged from $10–$1500 USD. 45% of products required a monthly (n=16) or yearly (n=1) subscription ranging from $10–100 USD. Real-time medication adherence reporting was available to clinicians, patients and caregivers through mobile or web-based portals.

Discussion: There is a growing market of "smart" eMAPs to address non-adherence for in-home patient use. Clinicians can use features of these eMAPS to recommend the right product according to specific needs of their patients.

Other: Not funded.

PHARMACOECONOMICS/OUTCOMES

432. Utilization of Clinical Trials to Evaluate Mobile Health Applications in the United States: a Systematic Literature Review.

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Background: The use of mobile health applications (MHApps) is gaining popularity and formal evaluation is needed to assess their effectiveness. We sought to determine the extent to which clinical trials are used to evaluate MHApps in the US adult population on clinical, humanistic, and economic outcomes.

Methods: We conducted a systematic literature review of the ClinicalTrials.gov registry to identify studies between January 2010 and December 2019. Initial search terms were "mobile", "application" and "apps". Inclusion criteria were completed studies, US adult population (18+ years), and interventional studies. After removing duplicate studies, each author independently screened the articles for eligibility to mitigate the risk of bias. Primary outcomes were assessed as "clinical" for disease-related medical outcomes, "humanistic" for patient-reported outcomes, "economic" for healthcare resource utilization, and "other" for all other outcomes.

Results: Of the 1035 clinical trials evaluating MHApps initially identified, 154 unique studies met the inclusion criteria. The number of clinical trials increased from 0 in 2010 to a high of 46 in 2018, and 28 in 2019. Average study duration was 18.5 months (± 11.8). Top 3 disease areas were neuroscience (25.3%), cardiovascular (13.0%), and endocrine/metabolic (11.7%). Adults ≤35 years old were the favored group (95.5%), with neuroscience and infectious diseases being their prominent disease groups. The most common primary outcome was clinical (37.0%), followed by humanistic (35.1%), and economic/healthcare utilization (4.6%).

Discussion: Clinical trials assessing MHApps are becoming prominent, a potential signal of increased interest in the use of MHApps in clinical practice. However, while clinical and humanistic outcomes were extensively investigated, economic outcomes were utilized sparingly despite the increased need for assessing value in the modern healthcare landscape. As MHApps become more integral in the care of adult patients, further studies are needed to assess their overarching effectiveness from a clinical, humanistic, and economic standpoints.

Other: No funding/registration

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