**2019 Poster Presentations**

**Identifying the scope of drug therapy problems in community settings through** **comprehensive medication therapy management strategies***Presented by Corey V. Dinunno, PharmD Candidate 2020, UCOnn School of Pharmacy*

*Co-presenters*: Thomas Buckley MPH, RPH. Associate Clinical Professor of Pharmacy Practice, UConn School of Pharmacy; Marissa Salvo PharmD, BCACP, Associate Clinical Professor of Pharmacy Practice, UConn School of Pharmacy

**Purpose:** This study conducted practice-based research in a state-wide setting to analyze and evaluate the implications of drug therapy problems (DTPs) encountered during comprehensive Medication Therapy Management (MTM) sessions with pharmacists and patients at participating community pharmacies in Connecticut.

**Methods:** MTM certified pharmacists in 30 independently owned community pharmacy chains conducted up to four MTM visits over a 12-month period. Patients targeted for MTM sessions were adults with hypertension and/or diabetes living in urban, low income, or underserved communities with significant health disparities. DTPs were assessed at each patient encounter and classified into four major categories: appropriateness, effectiveness, safety and adherence of therapy. Pharmacists identified DTPs in a systematic manner in which nonadherence is the final DTP identified, ensuring it is a true nonadherence DTP. A variety of methods were implemented by pharmacists to try and resolve DTPs, including contacting prescribers, providing education counseling and patient education, and administering vaccinations.

**Results:** 1,788 DTPs were identified in 354 patients (five per patient); 79.5% of DTPs were health systems issues, while 20.5% were patient-based (adherence) issues. The most common DTPs identified were issues of medication appropriateness (n=744), followed by issues with medication effectiveness (n=352). Pharmacists fully or partially resolved 77% of DTPs: the majority were resolved through pharmacist counseling (40.26%), and the majority unresolved were due to the physician not accepting the pharmacist recommendation (40.46%). Pharmacists’ clinical success in the program is evidenced by 39% and 23% improvement in BP and HbA1c goal attainment, respectively.

**Conclusion:** While the scope of DTPs in the inpatient setting is well documented, these problems transcend institutional care and cross over to the community setting as well. With nearly 80% of DTPs identified as health systems issues, community pharmacists are uniquely positioned to address barriers and solutions in a changing health delivery landscape. With the majority of DTPs out of the patient’s control, pharmacists throughout the community setting play an integral role in optimizing medication safety, efficacy, administration, and adherence. This type of innovative community pharmacy practice-based research will support future reimbursement opportunities in evolving models of health care delivery optimization.

**Impact of a pharmacist-driven stress ulcer prophylaxis discontinuation protocol**

**Presented by Julia Joseph PharmD. Candidate 2020 USJ School of Pharmacy**

*Co-presenter*: Alexander Levine, PharmD, BCPS, USJ School of Pharmacy

**Purpose**: Proton pump inhibitors (PPIs) and histamine 2 receptor antagonists (H2RAs) are frequently prescribed in the intensive care unit (ICU) for stress ulcer prophylaxis (SUP). Many patients are inappropriately initiated on SUP and continue to receive these agents even when risk factors are no longer present. Therefore, this unnecessarily increases patients’ risk of developing side effects associated with acid suppression such as *clostridium difficile* infections, acute interstitial nephritis, and electrolyte abnormalities. The purpose of this study is to assess the impact of a new pharmacist-driven SUP discontinuation protocol on SUP duration of therapy once patients leave the ICU.

**Methods**: A retrospective, single-center, pre- and post-intervention study among patients who presented to Saint Francis Hospital and Medical Center (SFHMC) between January 2019 to July 2019 (pre-implementation cohort) and August 2019 (post-implementation cohort) who were prescribed SUP on two non-ICU floors. The protocol was approved by Saint Francis Hospital and Medical Center Pharmacy & Therapeutics Committee. Patients were excluded if they had received a PPI or H2RA prior to admission; active GI bleed in the past 48 hours as determined by provider documentation; active peptic ulcer disease; or history of solid organ transplant. The primary endpoint was to compare the duration of SUP therapy prescribed on non-ICU hospital floors, pre- and post-implementation of the SUP protocol. The secondary endpoints included the total duration of SUP (duration in the ICU and floor) and percentage of patients discharged home on SUP.

**Results**: 100 patients were included in this study, 79 patients in the pre-implementation cohort and 21 patients in the post-implementation cohort. Seventy-five percent of patients in the pre-group and 62% of patients in the post-group were initiated on SUP therapy in the ICU and remained on these agents when they were transferred to the floor. The duration of SUP therapy on the floor prior to the intervention was 4.24 ± 4.38 days and 3.33 ± 5.31 days after the protocol was implemented (p=0.016). The total duration of SUP was 6.57 ± 8.07 days in the pre-group vs. 4.29 ± 5.63 days in the post-group (p=0.226). The percentage of patients discharged home on SUP was 16.5% in the pre-group and 14.3% in the post-group (p=0.809).

**Conclusions**: Implementation of the SUP protocol in patients initiated on a PPI or H2RA was associated with a decrease in duration of therapy on the floor. Pharmacists’ intervention in discontinuing SUP therapy when no longer clinically indicated can potentially prevent serious side effects associated with these agents.

**Can Virtual Assistants Counsel Patients?**

*Presented by Yasir Aziz PharmD Candidate 2020 USJ School of Pharmacy and Physician Assistant*

*Co-presenters*: Zouhal Ahmadi PharmD Candidate 2020 USJ School of Pharmacy and Physician Assistant; Aaron Burton PharmD, BCPS, USJ School of Pharmacy and Physician Assistant Studies

**Purpose**: Smartphones have undoubtedly become the most common tool utilized in today’s climate. By extension, virtual assistants have augmented themselves as an integral part of modern society. It has become common practice to consult a virtual assistant before reaching out to an expert. In terms of healthcare this can mean a potential patient may be consulting these assistants rather than a medical professional. The purpose of this study is to determine the integrity, reliability, and overall safety of healthcare advisement provisioned by these virtual assistants. To evaluate the safety and accuracy of medical advice provided by the various assistants that exist today.

**Methods**: In this study Google Assistant, Siri, and Cortana were verbally prompted to inform the researcher on the indications and side effects from a list of the top one hundred commonly prescribed drugs. The three voice assistants studied were selected based on relative level of advancement, how commonly the assistant is being used, and propensity to produce different search results. A standardized phrase was used to input the search to ensure consistency. The primary objective was to evaluate whether each assistant was able to recognize a medication via voice command. Secondarily the assistant's performance was evaluated for the source of information provided and accuracy in informing patients on potential side effects. Each assistant was given a maximum of three attempts to recognize the standardized phrase and medication. The accuracy of the side effects listed by the assistants were verified by a comparison with Lexicomp’s side effect list. In order to eliminate hardware related bias, the experiment was conducted on only two devices. The drug list utilized was also randomized per each completion to account for the possibility of machine learning creating bias in data collection.

**Results**: Google Assistant was found to be more competent and reliable than Siri and Cortana in ascertaining medical information. Google Assistant was able to recognize medication names more consistently and reliably. Cortana and Siri were found to have nearly equivalent voice recognition capability. Cortana produced results that were a compilation of two drug resources and always provided a backup resource.

**Conclusion**: Patients should be cautioned in using virtual assistants for medical information, particularly adverse effects. Reliance on these assisting devices could pose a safety risk. However, they may be useful as a quick reference when access to a medical provider is not possible.

**Hungry bone syndrome after parathyroidectomy: a case report**

*Presented by Elefterios Hamilakis, PharmD Candidate, 2020 UConn School of Pharmacy
Co-presenter*: Bryan McGill, PharmD, BCPS, BCCP

Hyperparathyroidism is a potential complication of end stage renal disease (ESRD). It is normally managed with pharmacologic treatments such as phosphate binders, vitamin D analogs, and calcimimetics. Parathyroidectomy is indicated when a patient is symptomatic and their parathyroid hormone (PTH) level is greater than 800pg/mL despite appropriate pharmacologic therapy. Hungry bone syndrome is a potential complication after parathyroidectomy in which hypocalcemia is considered severe and prolonged. Hungry bone syndrome often occurs in patients because of a chronic increase in bone resorption correlated to high PTH levels. A sudden withdrawal of PTH, such as occurs after parathyroidectomy, leads to an increase in bone uptake of calcium and a corresponding decrease in serum calcium levels. Treatment after surgery normally consists of oral calcium and vitamin D therapy, however sometimes intravenous calcium supplementation is required.

In the following case, we describe a 51-year-old African American male with ESRD, on hemodialysis. The patient had an elevated PTH level greater than 2,500pg/mL despite being prescribed appropriate pharmacologic treatment. The decision was made to undergo a parathyroidectomy after which his PTH was reduced to 343.7pg/mL. After surgery the patient experienced severe hungry bone syndrome, ultimately requiring 185 grams of intravenously calcium gluconate along with calcium carbonate 2 grams orally every eight hours and calcitriol 1 mcg orally twice daily. A review of the patient’s refill history indicated he was not compliant with therapy for the twelve months prior to surgery. Non-compliance to pharmacologic therapy puts patients at risk of severe hungry bone syndrome. We outline our treatment regimen for this patient and discuss the importance of appropriate mitigation strategies for severe hungry bone syndrome.

**Improving 30-Day readmissions for high-risk patients: a pharmacy-assisted discharge medication reconciliation pilot**

*Presented by Bailey Thayer PharmD Candidate 2021, URI School of Pharmacy*

*Co-presenters*: Lawrence + Memorial Hospital (L+M) All Cause Readmissions Performance Improvement Team - Michael Liu, PharmD, BCCCP, BCNSP, BCPS; Oliver Mayorga, MD, MHCM, FACEP; Ken Donovan, MD; Mary Solomon, MSN, RN, CMSRN, CPHQ, CNL; Kate Roccon, RN, BSN; Christopher Song, MD; Mark Rogers, Pharm.D., MBA, CDOE, CVDOE; Joanne Rubano, RN, BSN, MBA, ACM; Kevin Torres, DO

Hospital readmission currently places significant burden on the healthcare system. Medicare reports all-cause 30-day readmission rates at 19%, with an estimated 47% preventable. Patients with a primary diagnosis of chronic heart failure (CHF), chronic obstructive pulmonary disease (COPD), pneumonia (PNA), and acute myocardial infarctions (AMI) are at the highest risk for readmissions. Three common risk factors for readmissions are medication, behavioral, and social factors. Discharge medication reconciliation are not assisted by pharmacists at L+M. The primary outcome of this project aims to determine if pharmacist-assisted discharge medication reconciliation lowers 30-day readmission for high-risk patients over fiscal year quarter 3 (FYQ3).

During the pilot, a pharmacist attended discharge rounds to review medications for errors or omissions, and resolve any medication barriers to discharge. Interventions included but were not limited to restarting held medications, ensuring formulary equivalence, and determining the need and proper duration of antimicrobial therapy. Primary outcome is 30-day readmission for high-risk patients on the unit. Secondary outcomes include all-cause hospital-wide readmission rates, medication error reporting, and documentation of marked interventions. Absolute risk reduction (ARR) and number needed-to-treat (NNT) to prevent 30 day readmission were calculated, with historical FYQ1 and 2 on the same unit of patients with the high-risk diagnosis as comparators.

 Over the pilot period, 66 high-risk patients were discharged from the pilot unit, of which 42 had COPD, 23 had PNA, 21 had CHF, and 0 had AMI as their primary diagnosis; patients may have concurrent primary diagnoses. The 30-day readmission on the pilot unit decreased from 53.8% and 62.8% to 46% when comparing FY19Q1 and Q2 compared to FY19Q3, respectively. The ARR have decreased from 5.6% and -8.7% to 16.8% during the aforementioned quarters, with corresponding NNTs of 18, N/A, and 6, respectively. Hospital-wide all-cause readmission rates were decreased from 10.6% and 11.2% to 9.7%, respectively. During the pilot, interventions and preventable medication errors were performed in 94% of patients (n=62).

Our pilot demonstrated that pharmacist-assisted discharge medication reconciliation results in reduction in 30-day readmission in high-risk patients. Next steps include expanding this pilot process hospital and health-system wide.

**Evaluation of concurrent use of sucralfate and proton pump inhibitors during hospital admission and at discharge**

*Presented by Chelsey Quinlan, PharmD Candidate 2020 USJ School of Pharmacy
Co-presenter:* Tera R. Falcetti, PharmD, BCPS, BCACP, Clinical Pharmacy Manager, PGY1 Pharmacy Residency Program Director, Saint Francis Hospital and Medical Center

**Purpose:** Proton pump inhibitors are a class of medications that inhibit gastric acid secretion by irreversibly binding to H+/K+/ATPase pumps on gastric parietal cells. Comparatively, sucralfate is a gastrointestinal protective agent that creates a paste by binding with positively charged proteins located on the gastric lining. Sucralfate requires an acidic environment in order to form this protective coating, therefore concomitant use with proton pump inhibitors can be counterproductive and less effective. We have identified that many providers order both medications during hospitalizations and continue patients on this regimen at discharge. The purpose of this study was to identify the frequency of sucralfate co-administration with a proton pump inhibitor during hospitalization and whether this combination was continued at discharge.

**Methods:** A report was run from February 1, 2019 to July 31, 2019 to identify patients who received sucralfate during admission at a large community teaching hospital. Each order was evaluated to see whether sucralfate was co-administered with a proton pump inhibitor at any time during hospitalization. Charts were also reviewed to identify the frequency of combination use at discharge. Descriptive statistics were used to evaluate the results.

**Results:** In the 6 month time frame, sucralfate administration was identified in 425 encounters. During 307 of these patient encounters (72.2 %) sucralfate and proton pump inhibitors were co-administered. The average length of co-administration was 5.5 days. At discharge, 197 patients (64.2 %) were continued on both medications. A total of 80 patients were discharged with only one of the medications, 21 were discharged with neither medication, and 9 patients expired during admission.

**Conclusion:** More than half of patients who were prescribed sucralfate were also co-administered with a proton pump inhibitor during their hospitalization. Of those on concomitant therapy, more than half were continued on both therapies upon discharge. These results show the need for improved provider education related to the mechanisms of these two medications. Decreasing combination therapy can help reduce potential side effects from additional inappropriate medication. As a result, hospitals can save resources and improve stewardship efforts by using sucralfate or proton pump inhibitor monotherapy, and ensuring discontinuation one of the medications if both are ordered.

**Do online-sold unregulated male enhancement nutraceuticals stimulate inflammation?**

Presented by Natalia Echeverry, Pharm D Candidate 2021, USJ School of Pharmacy

*Co-presenters:* Mark Mikhail, Mohamed I. Nounou & Doreen Szollosi of the USJ School of Pharmacy & Physician Assistant Studies; Heba Eass, Department of Pharmaceutics, Faculty of Pharmacy (Girls), Al-Azher University, Cairo, Egypt

As we enter an era where people rely on Complementary Alternative Medicine (CAM) therapy, the inclination to purchase health products increases and the FDA has little involvement on the regulation of nutraceuticals and food supplements. The unproven claims that manufacturers have promoted their products with, to be safe and all natural, have led to approximately 23 thousand emergency department visits per year in the United States which are due to adverse reactions to dietary supplements1. One of these many products, and the principle target for this study is male enhancement products for erectile dysfunction (ED).

Previously, 6 top male enhancement nutraceuticals sold on amazon are surveyed and purchased. The five products are as follows; AlphaMan XL, Leyzene, Golden X, PrimeTest, MACA and Horny Goat Weed. These products were analyzed for their possible adulteration contentvia High Performance Liquid Chromatography (HPLC) and tested for pharmaceutical quality as well as safety using cell viability assays of HepG2 cells.Our study showed variable sildenafil adulteration in all products tested. Pharmaceutical quality was poor as evident by the high inter and intra batch variability. LDH, MTT and XTT showed poor cell viability profile compared to placebo tablets and Sildenafil Citrate positive control (Figure 1).

Based on these results, and the fact that one of the main herbal components of these products is horny goat weed (aka epimedium) which has shown to enhance phagocyte activity *in vitro* *,* we hypothesized that due to the variable nature of the products and batches, that these products might stimulate inflammation. To evaluate the inflammatory response, a stimulation assay will be conducted to test macrophage cell line response to the tested products. J774 macrophages will be stimulated for 24 hours with two products containing epimedium (Horny Goat Weed and AlphaMan XL) and monitored for changes in the pro-inflammatory cytokine production in comparison to lipopolysaccharide (LPS)-activated macrophages. LPS levels of the pro-inflammatory cytokine interleukin 6 (IL-6) produced by macrophages in response to LPS will be measured by enzyme-linked immunosorbent assay (ELISA) 2.



While our previous work showed that the analyzed products were proven to be adulterated, of poor pharmaceutical quality and unsafe, products that also stimulate the inflammatory response would represent a major risk for individuals with autoimmune diseases, of which the overactivation of inflammatory response can lead to tissue damage.

**A comparative analysis of the timeliness of medication administration and the**

**prevention of medication errors associated with and without auto-verification in the emergency**

**department (ED)**

*Presented by Cedric White, BS PharmD Candidate 2020 UConn School of Pharmacy*

*Co-presenters:* Colleen Teevan PharmD, BCPS, BCCP, The Hospital of Central CT; from UConn School of Pharmacy Krystal Scinto, PharmD Candidate 2020, Thomas Webb, PharmD Candidate 2020

**Purpose**: Medication errors are common in the Emergency Department (ED). Seventy-one percent of serious medication errors occur during the prescribing phase. This error is partially due to medications not requiring verification by a pharmacist. Pharmacists play a key role in reviewing medications and reducing medication errors. Little research exists examining timeliness of medication administration, medication errors, and auto-verification of orders within the ED. Further research is necessary to accumulate evidence that without auto-verification, medications are still administered in a timely manner and medication error rates are decreased.

**Methods**: This study was a single-center, retrospective comparative analysis of the administration of heparin, enoxaparin, warfarin, and intravenous (IV) vancomycin in the ED. Patients included in the study were >/= 18 years old and identified to have received either heparin, enoxaparin, warfarin, or IV vancomycin between then dates of March 1, 2019 through October 1, 2019. The study was divided into two cohorts: order auto-verification (March 1, 2019 through September 2, 2019, 2019) and pharmacist order verification (September 3, 2019 through present). The electronic charts of patients were reviewed to gather information on the ordering and administration of medication. Researchers noted (1) when medication was ordered, (2) when medication was administered, (3) when medication was verified (in pharmacist verification phase) (4) appropriateness of the therapy (in terms of patient’s weight, allergies, and pharmacist intervention), and (5) specifically for patients who received IV vancomycin, did the patient receive the correct dose.

Results: A total of 120 patients were included in the study; 99 patients in the auto-verification group and 21 patients in the pharmacist verification group. In the auto-verification group, the average time from ordering to administration was 72.81 minutes. In the pharmacist verification group the average time from ordering to administration was 41.27 minutes. The results between these two variables were insignificant (p-value of 0.13). In terms of vancomycin dosing and auto-verification, 25% of patients received an incorrect vancomycin dose based on hospital protocol, while this decreased to 20% with pharmacist verification of orders in the auto-verification group (p value of 0.67).

**Conclusion**: A reduction in medication related errors was observed when auto-verification in the ED was turned off for target medications. Adding the step of pharmacist verification does not delay the time from ordering to the administration of the drug. Turning off the auto-verify option and having a pharmacist review orders in the ED is important to patient safety and risk reduction.