Working Together While Apart

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Poster Presentation Abstracts

Identification of Patients on Non-Optimal LDL-Cholesterol Lowering Therapy in the Management of Atherosclerotic Cardiovascular Disease

Erin N. Newkirk, PharmD, BCPS, CDCES, Baylee V. Gorges, 2021 PharmD Candidate, Rachel A Hamilton, 2021 PharmD Candidate

Background: The leading cause of death in patients with diabetes is atherosclerotic cardiovascular disease (ASCVD). The 2018 American Heart Association/American College of Cardiology (AHA/ACC) Management of Blood Cholesterol guidelines recommend the use of moderate or high-intensity statins based on risk stratification to prevent ASCVD. LDL-C targets can also help clinicians decide when it is time to intensify or add non-statin therapy. Endocrinologists refer to the clinical pharmacist for collaborative management of type 2 diabetes; however, the providers within the Endocrine clinic have not historically referred patients to the pharmacist for the management of lipid lowering therapy for patients with diabetes. This study aims to identify the use of moderate and high-intensity statin therapy and other cholesterol-lowering therapies used in patients with type 2 diabetes at Froedtert & the Medical College of Wisconsin's Endocrinology Clinic to help assess if there is a need for additional interventions to lower ASCVD risk.

Methods: This study is a single-center retrospective electronic chart review of patients with type 2 diabetes seen by a physician or advanced practice provider within the Froedtert & the Medical College of Wisconsin's Endocrinology Clinic between July 31, 2019 and October 31, 2020. The study population is comprised of patients between the ages of 40-75 with a diagnosis of type 2 diabetes. A total of 400 of 1332 patients screened were randomly selected using the randomization tool within Microsoft Excel. Patients were excluded if a virtual or in-person follow-up appointment occurred more than one year after their last appointment, they have a diagnosis of type 2 diabetes which is being managed outside the Endocrine Clinic, or a history of other types of diabetes. The primary outcome is the percentage of patients who qualify for intensification of the lipid-lowering regimen based on AHA/ACC guidelines. Secondary outcomes include the percentage of the following: individuals who are taking a moderate or high-intensity clinic, ASCVD primary prevention patients who are taking a moderate or high-intensity statin, ASCVD primary prevention patients who are on a high-intensity statin with a 10-year vascular risk > 20%, patients with known ASCVD who are taking a high-intensity statin, patients with known ASCVD with an LDL >70 mg/dL, patients in the very high-risk category who have achieved the LDL target of <70 mg/dL per the AHA guidelines, patients who have a documented statin intolerance, patients currently taking ezetimibe or a PCSK9 inhibitor, patients who take ezetimibe and/or a PCSK9 inhibitor that have a statin intolerance, and patients who had a lipid panel completed during the study time frame.

Assessing Pharmacists' Barriers to and Confidence in Deprescribing Aspirin for Primary Prevention in an Ambulatory Care Setting

Emma Dreischmeier, PharmD Candidate 2022, Magdalena Siodlak, PharmD, BCACP, Trisha Seys Ranola, PharmD, BCGP, CDE, Lauren Welch, PharmD, BCGP

Background: With a recent American Heart Association/American College of Cardiology guideline update no longer recommending aspirin for primary prevention in patients over 70 years old, deprescribing aspirin is an important intervention to reduce potential harm in elderly patients. The aim of this project was to assess pharmacists' confidence in deprescribing aspirin for primary prevention of atherosclerotic cardiovascular disease in patients over 70 and to identify barriers to deprescribing currently faced by pharmacists in primary care.

Methods: An 8-item survey was designed and developed by a pharmacy intern and distributed to 20 primary care clinical pharmacists via email. Pharmacists working in specialty clinics were excluded. Most items were assessed using a 5-point Likert scale from strongly disagree to strongly agree to evaluate pharmacists' confidence in identifying candidates for aspirin deprescribing, factors contributing to confidence, and barriers faced. No demographic information was collected from the pharmacists. Survey results were then analyzed.

Results: Of the 20 pharmacists contacted, 13 responded to the survey. Five of 13 pharmacists agreed or strongly agreed that they felt confident in their ability to weigh the risks and benefits of aspirin deprescribing and communicate this with a patient. Pharmacists felt least confident deprescribing aspirin when they were unsure of the reason for aspirin initiation (46%) or if aspirin was initiated by a specialist (23%). The most significant barrier to aspirin deprescribing identified by pharmacists surveyed was lack of confidence in the ability to identify appropriate candidates (46%), followed by a lack of time (23%), a concern for patients' perceptions on withholding therapy (16%), and other (15%). Six of the 13 pharmacists who responded provided suggestions for resources to assist in the deprescribing process; half of these suggestions included a pocket card or quick reference guide to identify appropriate candidates.

Conclusion: Pharmacists in primary care are well-positioned to reduce potential harm from inappropriate aspirin use through deprescribing. Lack of confidence is a barrier faced by pharmacists in both weighing the risks and benefits of aspirin deprescribing as well as in identifying appropriate candidates. Additional training, resources, and education may improve confidence and provide needed support to pharmacists in deprescribing potentially inappropriate medications in older adult patients.

Enhancing Discharge Workflows to Increase Prescription Capture and Patient Retention

Devin N. Valpatic, PharmD, Amy Mahlum, PharmD, BCACP, Joel Pietryga, PharmD

Background: Discharge prescription programs exist across select hospital systems in the United States. The main goals of these programs include providing quality medications, information transfer to patients, and improved post-hospital care. Many advancements have been made to the current discharge prescription program at Aurora St. Luke's Medical Center through different avenues. Although there have been many improvements to the discharge prescription program inefficiencies still exist.

Methods: After meetings with stakeholders who are involved in the discharge process, there was a unanimous agreement involving confusion surrounding a patient's preferred pharmacy for their discharge prescriptions. During the discharge process, patients are continually asked what their preferred pharmacy is by multiple teams including outpatient pharmacy, inpatient pharmacy, nursing, and prescribers. In addition to this, there is no designated workflow at the on-site outpatient pharmacy to follow-up with discharge patients regarding their prescription refills. These two inefficiencies can lead to miscommunication between discharge teams and can affect patients' adherence to their medications. In order to combat these barriers, two interventions were developed to enhance the discharge prescription program at Aurora St. Luke's Medical Center.

Patients admitted to specific floors at Aurora St. Luke's Medical Center had their preferred pharmacy automatically selected to the on-site outpatient pharmacy. Discharge medications were either delivered to the patient's room, picked up at the on-site outpatient pharmacy, or transferred to an alternate pharmacy based on the patient's preference. Overall monthly prescription capture was measured after implementation in addition to weekly dispense reports and compared to data prior to implementation. Patients who filled their discharge medications at the on-site outpatient pharmacy were contacted two weeks post-discharge for follow-up. Patients who were eligible for discharge follow-up had at least one refill on their discharge medications. Patients were reminded of their upcoming refills and offered to either fill them at the on-site outpatient pharmacy again or have their prescriptions mailed to their home. Patients' refills were scheduled to be filled on their next fill date or transferred to the health system's mail order pharmacy. Transfer out data was collected to measure the impact of follow-up and compared to data prior to implementation.

Development and Implementation of Polices and Collaborative Practice Agreements (CPA's) for Diabetic Therapeutic Interchange in Froedtert Outpatient Pharmacies

Hemant Jain, PharmD Candidate 2021, Melanie Engels, PharmD, MBA, Jordan Spillane, PharmD

Background: Design a CPA for insulin and diabetic testing supplies alongside a therapeutic interchange policy for insulin vials and pens to speed up the process in which patients receive access to their medications and supplies, including upon discharge from the hospital, when prescriptions are sent without insulin or testing supplies or insurance formulary preferences differ from what is prescribed that lead to additional time needed to fill for patients by eliminating the need of the pharmacist to contact the provider.

Methods: The overall objective is to enhance the patient experience by decreasing turnaround time. Outpatient pharmacies will collect turnaround time on prescriptions that are eligible for interchange between insulin pens/vials. Turnaround time is the time interval between the time of submission for a given process and its completion. Pharmacists will record the time spent calling providers for interchanges for one month before implementation of the interchange policy and follow that up with a one-month post-implementation study. Data will be collected at the Froedtert Pharmacy #075 (92nd Street Pharmacy) since that pharmacy is representative of high prescription volume.

Results: Anticipated results are that turnaround time will be significantly decreased post-implementation of the therapeutic interchange policy.

Improving Transitions of Care Through Optimized Compliance Packaging Services

Kathleen R. Silveira, PharmD, Amy L. Mahlum, PharmD, BCACP, Lauren B. Putterman, PharmD, BCACP

Background: Insufficient communication between prescribers and pharmacy team members can lead to suboptimal transitions of care for compliance package patients. This can cause issues such as delays in initiating therapy or duplicate therapy. The purpose of this project is to improve the timeliness of implementation and communication of medication changes during transitions of care for compliance packaging patients.

Methods: Three pilot pharmacies were selected within Aurora St. Luke's Medical Center and Aurora Sinai Medical Center to enhance the compliance packaging workflow. A pre-intervention survey was distributed to pharmacy team members to assess the current understanding of the compliance packaging workflow and to better identify what types of interventions may improve the workflow. The questions were assessed using a 5-point Likert scale. Additionally, baseline data was collected to track medication changes for compliance package patients to determine how long after prescribing it took for the changes to be identified and where in the workflow these changes were discovered. A hard-stop flag was implemented into the electronic outpatient pharmacy database in an effort to more quickly identify medication changes and new medications for compliance packaging patients. In addition, to enhance communication between pharmacy team members and provide transparency for other health care providers, note templates were created for documentation in the integrated electronic health record. Support from stakeholders was obtained, and a process for implementation of the project was created. Team members were educated on the best practice workflow and the project interventions were implemented. Data is being collected to determine if the interventions improve timeliness of communication related to compliance package patients.

Results: The response rate to the pre-intervention survey was 75% (n =57). The survey revealed that respondents had confusion when implementing medication changes for hospital discharge patients and how to proceed when patients pick up their compliance packages late. Baseline data assessing the time, in days, to identification of a medication change showed that 35% of changes made by prescribers were not identified by the outpatient pharmacy team that same day. Furthermore, only 52% of the medication changes identified were found during the initial clinical review of the prescription and order entry.

Evaluation of Pharmacist as a Member of Shared Visit Model in an Endocrine Clinic

Sushma Dey, PharmD, Jonathan R. White, PharmD, BCACP, Jeffrey E. Freund, PharmD, BCACP, Erin N. Newkirk, PharmD, CDE, BCPS, Lauren C. Caruso PharmD, BCACP

Background: A workplace analysis conducted in 2014 by the Endocrine Society calculated a shortage by 1,500 full time equivalent adult endocrinologists in relation to the rising rates of diabetes mellitus. At the time of the analysis, there were approximately 21.3 million patients with diabetes. In 2020, that number increased to 34.2 million. With the growing prevalence of obesity, diabetes, and patients aged 65 years and older in the United States, gaps in access to care in the endocrine sector will continue to expand. Previous studies have demonstrated the value of including pharmacists in team-based care within primary and community care settings. Pharmacists receive in-depth training in the proper use of medication, are equipped with the skills to provide patient education related to disease state management, and can individualize therapy to improve patient access and adherence. This study will examine the utilization of pharmacists for disease management within a shared visit model in an endocrine clinic and how they may improve access to care in a population where the incidence of metabolic disease continues to grow.

Methods: This study is a single-center retrospective electronic chart review of patients seen within the shared visit model between January 1, 2020 and December 31, 2020. Patients who are 18 years of age and older, have had at least one shared visit, and one follow-up with a pharmacist for collaborative management of diabetes or weight loss will be included. Patients pregnant or breastfeeding, with gestational diabetes, or did not complete a follow-up visit will be excluded. Primary outcomes are the volume of patients seen in the shared visit model, number and types of follow-up visits, and billing and productivity documented for pharmacist visits. Secondary outcomes include comorbidities, clinical outcomes of change in weight and glycated hemoglobin, and number of referrals to Medication Access Specialists.

The primary objective of this study is to evaluate the impact pharmacists have on patient access and management within a shared visit model. Additionally, the results will be used to characterize the population of patients referred for collaborative management and assess changes in clinical outcomes and utilization of Froedtert outpatient pharmacy services.

Results: Data collection and analysis are ongoing. Between January 1, 2020 and June 30, 2020, 28 participants have been identified to be included in this study. The primary visit diagnosis was diabetes for 5 patients, weight-loss for 10 patients, and diabetes and weight-loss for 13 patients. To date, data analysis reveals a median reduction in body weight of approximately 3 lbs, 2 lbs, and 10 lbs at 1 month, 3 months, and 6 months, respectively, from body weight at initial shared visit. Of the 28 participants who had HbA1c values measured, a median reduction of 0.1%% was observed in 7 participants and a median reduction by 0.9% reduction in HbA1c was seen after 6-month follow-up in 4 patients. Referrals to Froedtert Medication Access Specialists were provided to 6 patients.

Common Continuous Critical Care Infusions in Non-Standard Fluids within a Multihospital, Multistate, Integrated Health System

Killian J. Mielotz, PharmD Candidate 2021, Melissa Dahlgren, PharmD, BCPS, Craig Glienke, PharmD, BCPS, BCCCP

Background: Multiple continuous titratable intravenous infusions are built within the electronic health record (EHR) and orderable in a standard fluid within the Advocate Aurora Health system. Clinical situations may require the infusions to be ordered in a non-standard fluid and the health care team will consult the pharmacist to make the change. There are multiple steps required by the pharmacist before the infusion can be ordered and compounded in the non-standard fluid. The steps include analyzing compatibility/stability data, custom building the infusion in the non-standard fluid, compounding the custom infusion in central pharmacy, and delivering the custom infusion to the appropriate floor. Patient safety issues may arise with the current process when ordering the infusions in a non-standard fluid. The purpose of this project is to develop pharmacist only orderable titratable continuous infusions in non-standard fluids and provide guidance when these non-standard infusions are clinically appropriate.

Methods: All continuous titratable infusions in the Advocate Aurora Health system were examined for eligibility of being built in the EHR in the non-standard fluid. A total of 8 different titratable infusions were determined to be reviewed for eligibility to be built in the EHR as an order in a non-standard fluid. Literature was reviewed to determine compatibility and stability of the 8 infusions in the non-standard fluid. All information was submitted to the Advocate Aurora Health Informatics team to build the 8 infusions in non-standard fluids only orderable by pharmacists.

Results: The 8 titratable infusions included: heparin, dobutamine, dopamine, epinephrine, norepinephrine, nicardipine, phenylephrine, and vasopressin. Compatibility data results suggested each infusion would be stable in the non-standard fluid. The informatics team is currently building these infusions in the EHR to be only orderable by pharmacist. A tip sheet was created to assist the pharmacist when consulted to switch the continuous infusions into a non-standard fluid.

Conclusion: The frequency of continuous infusions needing to be ordered in non-standard fluids is low, yet there are issues that arise when the situation occurs. Several infusions being built in the non-standard fluid reduce chances of medication errors and time spent by pharmacist “ordering” the infusions.

Utilization and Prescribing of Dalbavancin

Rachel Nelson, 2021 PharmD Candidate, Travis Van Ede, PharmD

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Pharmacist Driven Implementation of an Outpatient Pain Medication Prescription Panel in the Emergency Department

Ana Glavas, PharmD, Erik Feltz, PharmD, BCPS

Background: The goal of this project was to assess the efficacy of an outpatient pain medication prescription panel in reducing the total number of opiates prescribed from the emergency department (ED). The panel incorporates guideline recommended non-opioid analgesic alternatives aiming to reduce the quantity of opioids prescribed, promote the use of safe and effective pain management alternatives, and improve the safety of the community.

Methods: A pain medication prescription panel was developed collaboratively by ED pharmacists and providers. It was then built into the electronic health record for use by ED providers upon patient discharge. The panel was created to promote the use of guideline recommended opioid alternatives (i.e. topical analgesics, non-steroidal anti-inflammatory medications, and acetaminophen) as first line therapy, and limit opioid tablet quantities (< 9 tablets). Outcomes were evaluated retrospectively through chart review of patients 18 years and older who were prescribed opioids at ED discharge. The primary outcome measured the change in ED provider's average prescribed opioid quantity pre vs. post panel implementation. Opioid quantity was defined as the number of tablets per opioid prescription.

Evaluation of a Subcutaneous Insulin Diabetic Ketoacidosis Treatment Protocol at an Academic Medical Center

Michael R Beck, PharmD Candidate, Kristin Bialkowski, PharmD, BCCCP, Janelle Juul, PharmD, BCCCP, Linda Guddie, BS-Pharm

Background: At the start of the COVID-19 pandemic, certain areas of the hospital, such as the intensive care units (ICUs), anticipated an increase in patient admissions. While patients requiring advanced care justify the occupancy of an ICU bed, some patients with mild to moderate diabetic ketoacidosis (DKA) only require ICU admission due to the need for continuous intravenous (IV) insulin. With data supporting the use of subcutaneous (SQ) insulin as a safe and effective alternative to continuous IV insulin to treat mild to moderate DKA, the SQ DKA treatment protocol was created for use on general medicine floors at Froedtert Hospital. The intent of this protocol was to increase the availability of ICU beds and to reduce nurse exposure to potential COVID patients through limitation of point-of-care blood glucose testing requirements.

The purpose of this project is to compare the efficacy and safety of the newly implemented SQ insulin DKA protocol to the institution's standard IV insulin treatment protocol. Efficacy outcomes include time to anion gap closure, reopening or recurrence of elevated anion gap, and overall length of hospital stay. Additional secondary outcomes include the number of hypoglycemic events, cost-savings based on treatment setting (ICU versus general medicine floor), and nursing satisfaction with the subcutaneous protocol.

Methods: Retrospective pre/post protocol implementation data will be collected via patient chart review. Eligible participants include adult patients admitted to Froedtert Hospital with a diagnosis of mild to moderate DKA who were treated with the SQ treatment protocol. The comparison group consists of similar participants who were treated with the standard IV treatment protocol prior to the implementation of the SQ protocol. A survey will be administered to nurses with experience treating DKA patients using the SQ insulin workflow to determine comprehension and ease of use of the newly implemented protocol.

Evaluating the Inappropriateness of Stress Ulcer Prophylaxis in Hospitalized Patients

So Jo (Alice) Bae, PharmD, Steven Lai, PharmD, Yan Mao, PharmD, BCPS

Background: Acid suppressive therapy (AST), including proton pump inhibitors and H2 receptor antagonists, are among the most commonly prescribed medications. The increased usage of AST has raised concerns for overutilization, adverse effects, and association with increased hospital-related expenditures. AST is indicated for the treatment of gastroesophageal reflux disease (GERD), gastritis, peptic ulcer bleeding, and the eradication of H.pylori infection in combination with antibiotics. Additionally, AST is approved for the prophylaxis treatment of nonsteroidal anti-inflammatory drugs (NSAIDs) -and aspirin- induced ulcers, along with stress ulcer prophylaxis (SUP) in Intensive Care Unit (ICU) patients with a high risk of bleeding. The American Society of Health-System Pharmacists (ASHP) published a guideline in 1999 which indicates possible risk factors and patient populations that may benefit from SUP in the ICU setting. Recent publications, however, suggest not only the increased use of SUP within the ICU settings, but also the extrapolation of these guidelines to non-ICU patients. This may lead to inappropriate SUP administration and overuse of ASTs. Although ASTs are generally well-tolerated when used for a short duration of time, the risk for possible complications such as C.difficile infection, pneumonia, bone fractures, reduced serum magnesium, kidney disease, and vitamin B12 deficiency can arise when used chronically. Pharmacists play a unique role in improving the appropriate use and management of AST within the hospital setting. This retrospective study will determine the inappropriateness of AST prescribing in patients admitted to the medical ICU and the general medicine floor based on the indication and patient-specific risk factors.

Methods: The electronic medical record system will be used to identify adult patients admitted between 03/01/2020 – 09/30/2020 to the medical ICU and general medicine floor at St. Mary's Hospital and who received AST. Retrospective chart review will be performed on these patients and data will be analyzed to assess the appropriateness of AST based on indication and risk factors. The primary outcome of this study will be to determine the number of patient days that AST was utilized inappropriately. Additionally, the secondary outcomes will be to determine the number of patients who were prescribed inappropriate AST upon discharge and to identify any patterns associated with the inappropriate usages. Patient identifier and all protected health information will be stored and maintained in a separate file within an encrypted computer database housed within the hospital network system. All patient identifiers will be removed in the database during data analysis.

Implementation and Patient Follow-Up of Inpatient Pharmacist Direct Oral Anticoagulant (DOAC) Education

Margaret Daleen, 2021 PharmD Candidate, Landon Neese, PharmD, BCPS

Background: Design and implement a standardized process and educational materials for DOAC education to all patients discharging on a new DOAC with patient follow-up to better satisfy the Joint Commission National Patient Safety Goal (NPSG) for Anticoagulant Therapy EP 6.

Methods: A pamphlet for DOAC education was created at a sixth-grade reading level to address the importance of adherence and follow-up testing, potential drug-drug interactions, drug-food interactions, and adverse events. The pamphlet was reviewed by UPH-Meriter's Thrombosis and Antithrombotic Committee. Patients eligible for the new DOAC education process were all adult patients (age greater than or equal to 18 years old) discharging from the hospital or emergency department with a new prescription for a DOAC. Patients were excluded if they were discharging to a different inpatient facility, a skilled nursing facility, an assisted living facility (if the facility manages the patient's medications), or any other facility where the patient has their medications administered by staff. Patients were also excluded from secondary outcome analysis if they lived in any of the aforementioned facilities at the time of their follow-up phone call. Education was provided to eligible patients by inpatient pharmacists or fourth-year pharmacy students utilizing the DOAC pamphlet. The primary outcome was the proportion of patients who actually received education compared to the overall population of patients who were eligible to receive education; assessed through a report in the electronic health record maintained of all patients eligible for education. Follow-up phone calls to patients were made 4-5 weeks after the education was provided using a set of standardized questions. Secondary outcomes of patient understanding, affordability, and adverse events were assessed with the findings from the follow-up patient calls.

Creation of Pharmacist Clinical Outcome Metric Scorecard for Specialty Ambulatory Clinics

Alex Harlan, PharmD, Rachel Drury, PharmD, BCACP, Nick Olson, PharmD, BCACP, AAHIVP

Background: To develop, implement, and track clinical metrics for the specialty ambulatory clinical pharmacists which will be reported in the Froedtert Ambulatory Pharmacy Department scorecard as well as measure pharmacist's change in perception of developing clinical outcome metrics as a valuable practice tool.

Methods: In collaboration with specialty ambulatory clinical pharmacists, analytics, and leadership, clinical quality metrics will be scoped, developed, and implemented within six ambulatory specialty clinics at Froedtert Health. The resulting data will then be incorporated into the Ambulatory Pharmacy Scorecard for the purposes of continuous quality improvement, improved patient care, and reporting of value to leadership. Additionally, the change in pharmacist perceptions of the value in the use of clinical metrics within the ambulatory specialty clinics will be measured by survey response prior to and following the implementation of the clinical quality metrics.

Results: All six ambulatory specialty clinics have determined the clinical outcome to measure in their clinic. Currently, the tools for data collection and data reporting are being built into the electronic health record system. Reports will be generated on a monthly basis and analyzed by both leadership and the pharmacists within each respective clinic. The pre-survey responses have determined that 54% of specialty ambulatory care pharmacists feel they do not have access to data that demonstrates their clinical contributions to patient care, 63% feel they do not have access to data to make continuous quality improvements, and 72% are not satisfied with the current process of collecting clinical data within their practice. Post-survey data will be collected in April 2021.

Conclusion: The implementation of clinical quality metrics within the specialty ambulatory care clinics will help demonstrate the clinical value ambulatory care pharmacists bring to the care teams and patients at Froedtert Health. This will aid in the development of continuous quality improvement projects, assist with service development, and lay the foundation for expansion of additional clinical metrics utilizing similar methodology. Furthermore, measuring the change in pharmacist's perceptions of clinical outcome metrics as a valuable practice tool will aid leadership in tailoring the rollout of future clinical metrics.

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Evaluation of the Use and Value of an Electronic Health Record Mobile Dispense Tracking System

Edward J Conlin, PharmD, MBA, Ellen N Revak, PharmD, MBA, BCPS, Barry McClain, PharmD, MS

Background: Missing medication messages from caregivers continues to be problem at all Advocate Aurora Health (AAH) facilities. Between October 7th and November 7th, 2019, precisely 6142 medication request messages were sent to the Pharmacy Department at Advocate Good Shephard Medical Center and Advocate Condell Medical Center Epic Rover. Using AAH's electronic health record (EHR) and mobile barcode scanning technology, an effecting method of tracking patient-specific medications can be deployed to decrease missing medications. Using barcode scanning, pharmacy can develop a system for dispense tracking from the time the medication is electronically verified, prepared, checked by a pharmacist and delivered to the floor. The information on where a medication is in the dispensing process is displayed to nursing helping to decrease missing medication messages. The project looks to provide an evidence-based recommendation on the value of dispense tracking at AAH, identify and overcome barriers to the implementation of dispense tracking, and provide a toolkit for implementation at other AAH hospital sites.

Methods: To understand the use and value, dispense tracking is being piloted by the inpatient pharmacy at Aurora St. Luke's Medical Center. Pharmacy staff were instructed to scan all EHR-generated barcodes when checking medications for accuracy and delivering medications to the floor using mobile devices. When medications are brought to the patient floor, the technician can document the delivery location of each medication using mobile scanning. Scanning information is visible to nursing and pharmacy staff on the medication administration record (MAR) informing them of the medication's location. Throughout the pilot, scanning compliance and missing medications messages were monitored to understand impacts on workload.

During the pilot, several issues and limitations were identified. Overcoming the different barriers such as connection, user, and automation barcode limitations required partnering with internal and external partners.

Results: Based on preliminary results, dispense tracking compliance continues to be >50% for products with EHR-generated barcodes. Data collection will continue on scanning compliance and missing medication messages to understand the impact of dispense tracking on missing medications.

Implementation of Inpatient Skin and Soft Tissue Infections Evidence-Based Algorithm

Kayla M. Marchese, PharmD, Evan R. Hurley, PharmD, BCIDP

Background: For the initial management of skin and soft tissue infections (SSTIs) without systemic signs of infection the Infectious Diseases Society of America (IDSA) recommends patients receive an antimicrobial agent active against either Staphylococcus spp or Streptococcus spp for purulent or non-purulent SSTIs, respectively. Despite these recommendations, there are large variations in practice as antimicrobial therapy remains broad and duplicative at many institutions. The implementation of an evidence-based care pathway helps minimize this variation. Evidence-based care pathways demonstrate both positive cost and clinical outcomes, including, but not limited to, a reduction in broad spectrum antibiotics, hospital length of stay, and facility costs. The purpose of this project is to implement an inpatient SSTIs algorithm in a community hospital to guide initial infectious work-up, standardize antibiotic prescribing patterns, and reduce broad spectrum antibiotics.

Methods: Eligible participants were selected based on 2019 ICD-10 billing codes consistent with SSTIs. Participants were 18 years and older who required hospitalization for SSTIs expected to be caused by Staphylococcus spp or Streptococcus spp. Participants were excluded who met SIRs criteria or had an alternative diagnosis of facial cellulitis, osteomyelitis, diabetic foot infections, septic arthritis, or prosthetic joint infections. An evidence-based algorithm was developed and implemented addressing the management of purulent and non-purulent SSTIs. Participants were split into two groups: pre-algorithm implementation and post-algorithm implementation. The primary outcome of this trial was a reduction in vancomycin patient days of therapy. Secondary outcomes evaluated the use of Gram-negative coverage, defined as the use of third generation cephalosporins or greater, total duration of antimicrobial therapy, and hospital length of stay.

Catherization Lab Medication Standard Gap Analysis

Kayla M. Marchese, PharmD, Evan R. Hurley, PharmD, BCIDP

Background: Following the system merger of two large multihospital health systems, there was no longer a standard for medications across the systems' 18 cardiac catherization labs. Furthermore, there was a lack of knowledge of what medications and strengths were being stocked at each site. A standard across the system would help ensure that best practices are followed and to enhance safety and efficacy throughout the large system. Standardized medication practices would also ensure consistency in patient treatment not only between the separate institutions, but also between practitioners.

Purpose: Identify variance in cardiac catheterization lab medication standards across a multihospital, multistate, integrated health system and propose a unified standard for system review.

Methods: A gap analysis was conducted at a multihospital, multistate, integrated health system in order to identify variance. All available medications at each hospital's catherization lab were documented and differences were highlighted. Results were brought to a systemwide best practice group to bring awareness to discrepancies between sites and provide suggestions on how to reconcile the medications into unified practice.

Pharmacist-supported Culture Review Pilot for Treatment of Urinary Tract Infection Post Emergency Department Discharge

Cameron Cole, PharmD, Garrett Fouth, PharmD, BCCCP

Background: Literature has shown that pharmacist-supported interventions lead to positive outcomes in numerous health settings. A pharmacist-supported culture review service was piloted to assess empiric antibiotic treatment for patients with urinary tract infections discharged from a tertiary hospital's emergency department.

Purpose: Identify variance in cardiac catheterization lab medication standards across a multihospital, multistate, integrated health system and propose a unified standard for system review.

Methods: A pharmacist-supported culture review pilot was implemented to display the impact pharmacists have on missed interventions. Eligible participants included those that were discharged from the emergency department with a positive urine culture. Two months of urine cultures were analyzed prior to and post intervention for missed interventions. Missed interventions were defined as bug-drug mismatches, inappropriate drug regimen (including dose, interval, and duration), and prescriptions for contamination. The hypothesis of this pilot is that pharmacist support will result in a lower incidence of missed interventions. Additionally, incidence of readmission within 96 hours, prevented fluoroquinolone use, and accepted pharmacist recommendations were also captured.

Implementation of Pain Algorithms and Order Panels in Acute Medical Patients

Alex M. Glodowski, PharmD, Mike Nyffeler, PharmD

Background: According to cross-sectional surveys, 52-71% of hospitalized patients experience pain, and 51% received opioid analgesics during admission.[1-4] Presently, there is an absence of guidelines to assist the hospital practitioner in developing a multi-modal pain management plan. Too often, this leads to a dependence on opioids to address a patient's analgesia. Among opioid naïve hospitalized patients, 15% meet criteria for long-term opioid use one year after hospitalization.[5] These studies indicate that analgesic prescribing during admission and at discharge may contribute to long-term opioid use. Implementation of standardized analgesic prescribing algorithms and order panels, in adult medical patients, may lead to a reduction in opioid prescribing during admission.

Methods: Pain algorithms were created to guide analgesic prescribing and pharmacist recommendations, on admission, for adult medical patients. Algorithms were created for patients with superficial somatic pain, deep somatic pain, visceral pain, and neuropathic pain. Medication order panels were created in the electronic medical record to support each algorithm. A retrospective chart review of analgesic prescribing was performed pre-/post-implementation. The primary outcome was the morphine equivalent dose prescribed on admission.

References:

1. Melotti RM, Samolsky-Dekel BG, Ricchi E, et al. Pain prevalence and predictors among inpatients in a major Italian teaching hospital. A baseline survey towards a pain free hospital. *Eur J Pain*. 2005;9(5):485-495.
2. Sawyer J, Haslam L, Robinson S, Daines P, Stilos K. Pain prevalence study in a large Canadian teaching hospital. *Pain Manag Nurs*. 2008;9(3):104-112.
3. Strohbuecker B, Mayer H, Evers GC, Sabatowski R. Pain prevalence in hospitalized patients in a German university teaching hospital. *J Pain Symptom Manage*. 2005;29(5):498-506.
4. Herzig SJ, Rothberg MB, Cheung M, Ngo LH, Marcantonio ER. Opioid utilization and opioid-related adverse events in nonsurgical patients in US hospitals. *J Hosp Med*. 2014;9(2):73-81.
5. Mosher HJ, Hofmeyer B, Hadlandsmyth K, Richardson KK, Lund BC. Predictors of long-term opioid use after opioid initiation at discharge from medical and surgical hospitalizations. *JHM*. Accepted for Publication November 11, 2017.

Implementation of a Fixed Dose Four-Factor Prothrombin Complex (4F-PCC) Protocol for Urgent Warfarin Reversal

Stephanie Londre, PharmD, Jessica Benjamin, PharmD, Melissa Fung, PharmD

Background: The traditional dosing strategy of 4F-PCC is calculated according to patient weight (in kilograms) and initial INR. This calculation is complex and has the potential to produce errors. Additionally, the process of having to wait for an INR to result can lead to dosing delays. The ideal dosing strategy of 4F-PCC for warfarin reversal is unknown. However, recent studies suggest that a fixed dosing strategy is similar, in terms of efficacy, to a variable dosing strategy and would result in decreased costs.

The purpose of this study is to ensure that the implementation of a new fixed dosed 4F-PCC protocol at SSM Health St. Mary's Hospital is safe and effective for urgent warfarin reversal.

Methods: A retrospective chart review will be completed on adult patients admitted to SSM Health St. Mary's Hospital between January 2019 and December 2019 who required urgent warfarin reversal using variable-dose 4F-PCC prior to the implementation of the new protocol. The patient's weight, indication, baseline INR, INR post 4F-PCC dose, and any adverse reactions will be collected. A prospective chart review of adult patients requiring urgent warfarin reversal using fixed-dose 4F-PCC after the new protocol implementation will also be completed. The patient's weight, indication, baseline INR, INR post initial 4F-PCC dose, INR post second 4F-PCC dose (if given), any adverse reactions, and time from order to administration of 4F-PCC will be collected. Additionally, the variable-dose will be calculated in patients who received a fixed-dose to determine cost savings. Patients who present with an intracranial hemorrhage, intentional warfarin overdose, or whom required a massive transfusion will be excluded.

Population-Based Pharmacist-Led Interventions within a Medical Home

Jessica A. Barazowski, 2021 PharmD Candidate, Nicole C. Lentz PharmD, BCACP, AAHIVP

Background: The ability to intervene in the presence of drug-drug interactions that can lead to undesirable/unsafe clinical outcomes is one of the major aspects of the pharmacist profession. A pharmacist working within a medical home is in an exceptional position to be able to have access to comprehensive patient records, making the ability to intervene on these types of interactions on a population-based level feasible. For this evaluation, patients who were on concomitant clopidogrel and boosted antiretroviral (ARV) regimens, a drug-drug interaction that may lead to subtherapeutic platelet inhibition, were identified. Subsequent interventions were completed to mitigate the undesirable clinical outcome.

Methods: A query of pharmacy software for a 6-month window (May-November 2020) generated a list of patients on concomitant clopidogrel and boosted ARV regimens. Patients were further confirmed to be using the combination of therapies using electronic medical records (EMR). Information was collected on infectious disease providers, cardiology providers (if applicable), indication for platelet inhibition therapy, and assessment of complexity of ARV regimen. An intervention was then attempted via the following recommendation options: therapeutic interchange in ARV regimen, therapeutic interchange between clopidogrel and prasugrel, or monitoring of platelet inhibition using a specific laboratory test, VerifyNowTM. These interventions were done via EMR messaging, faxing and telephone conversations with providers' offices.

Results: Eleven patients were identified to be on concomitant clopidogrel and a boosted ARV regimen. At the time of data review, two patients were found to no longer be on clopidogrel prior to the intervention attempt. One patient was in an area that was out of the medical home's direct care, and an attempt to intervene was made via the clinical pharmacists that work directly with that patient. At the time of this submission, the completed eight interventions have the following results: therapeutic interchange (completed or planned) in ARV for two patients, therapeutic interchange from clopidogrel and prasugrel for one patient, discontinuation of clopidogrel for one patient, awaiting provider response for two patients, and no changes to therapy (clinical monitoring but not with VerifyNowTM test) for two patients.

Conclusion: Individual drug interaction identification in a community pharmacy setting can successfully identify population-focused, pharmacist-led interventions. The comprehensive medical record access available in a medical home setting makes this process more efficient and achievable. Pharmacists performing these interventions can successfully impact clinical outcomes using these methods.

Creation and Implementation of a Vitamin D Supplement Workflow for COPD Patients

Laura Case, PharmD, BCPS, Stephanie Kuehn, 2021 PharmD Candidate, Dominic Cheung, 2021 PharmD Candidate, Jessica Luzi, PharmD, BCPS, Megan Fleischman, PharmD, BCACP, Brooke Foster, PharmD, Laurie Dworak, PharmD, BCPS, Alison Glienke, PharmD

Background: New research has found that vitamin D supplementation resulted in a reduction of moderate/severe COPD exacerbations in patients who were severely deficient. A recent update in the 2021 GOLD guidelines recommended all patients hospitalized for COPD exacerbations be assessed for severe vitamin D deficiency (<10 ng/mL) followed by supplementation if deficient. The objective of this study was to implement a workflow for vitamin D supplementation in patients admitted with COPD exacerbations, with the ultimate goal of decreasing exacerbations.

Methods: Eligible participants are those >18 years old who were admitted to Froedtert Hospital for a COPD exacerbation. If eligible, the pharmacist ordered a vitamin D level. If 25(OH)D level was below 10 ng/mL, the pharmacist contacted the prescribed and recommended vitamin D2 50,000 IU weekly for 8 weeks followed by vitamin D3 800 IU daily. When patient was discharged, the inpatient pharmacist educated the patient on new vitamin D prescription and sent Epic In Basket message to pertinent ambulatory care pharmacists for outpatient follow up.

Advocate Aurora Health 2020s Medication History Playbook

Matthew J. Olson, PharmD, Kristin Cannon, RPh, Landon Kortman, PharmD

Background: Many differences exist in medication history practices across AAH hospital, ambulatory, and retail practice settings. Standardizing and improving medication history practices across a large, multi-site, heath care system can present multiple challenges. Each site has a different level of medication history experience, resources, and barriers to change. With multiple sites and pharmacy practice settings involved, these changes will likely occur over the course of multiple years and require a plan and timeline to prevent implementation failure. In addition, pharmacy leaders will need to endorse changes and have supportive resources for implementation of medication history changes. Seven pharmacy medication history directional statements have been identified by pharmacy leadership to standardize and improve current medication history practices. The goal of this project is to collaborate with AAH medication history experts and key stakeholders to determine how our pharmacy teams can advance based on our seven new directional statements.

Methods: Pharmacy medication history experts were identified across AAH hospitals, clinics, and retail practice sites. A survey was sent to the pharmacy medication history experts to identify current medication history practices, training procedures, barriers, and improvements. Stakeholders were then introduced to the medication history directional statements and participated in seven focus group sessions to discuss directional statements and determine action steps for each directional statement. Feedback collected from each focus group session was then compiled and discussed with pharmacy leadership to determine the estimated timeline for implementation of each action step associated with the seven directional statements.

Serum Piperacillin Concentration Observed Using an Empiric Dosing Strategy in Critically Ill Adults

Sydney L Whitaker, PharmD, Brian Moilien, PharmD, BCCCP

Background: Beta-lactam antibiotics, such as piperacillin/tazobactam (Zosyn®), are frequently cited as under-dosed in critically ill patients during the early stages of sepsis. This is due to dynamic changes in tissue penetration, volume status and drug clearance in the setting of severe illness. Initiation of empiric and standardized high-dose Zosyn in this population is supported in various bodies of literature to overcome these physiological changes while providing broad treatment coverage for multi-drug resistant organisms. This dosing strategy involves starting all patients on the same dose of Zosyn for the first 24 hours of treatment regardless of renal function. The dose is then adjusted according to patient specific renal function. However, there is little to no evidence suggesting this practice achieves adequate concentrations of antibiotic in the blood. This study will assess the appropriateness of an empiric dosing strategy of Zosyn in critically ill patients by quantifying the percent of patients reaching target serum blood concentrations of piperacillin.

Methods: Adult patients that are admitted to the Meriter intensive care unit (ICU) and initiated on treatment with Zosyn will be considered for this study. Patients will be enrolled if treatment is initiated at the accepted standardized dose for Zosyn in sepsis for a minimum of 24 hours. Trough concentrations of piperacillin will then be collected and sent to an off-site lab for evaluation. Results of trough concentrations will be compared to pre-specified targets based on antibiotic treatment markers such as the minimum inhibitory concentration (MIC) for known pathogens and the piperacillin breakpoint for pseudomonas. The percentage of trough concentrations reaching the accepted targets will then be quantified to assess the appropriateness of current dosing practices.

Evaluating the Effectiveness of a Non-Severe Community Acquired Pneumonia (CAP) Pharmacy Pathway

Jennifer A. Polenska, PharmD, Kelly C. Sylvain, PharmD, Ariel M. Thurmer, PharmD, James M. Levin, MD, AAHIVS

Background: One of the main roles of an antimicrobial stewardship (AMS) committee is to create infection treatment pathways based on the Infectious Diseases Society of America (IDSA) guidelines. These treatment pathways are then used to guide provider prescribing of antimicrobials. In September of 2020, a regional non-severe community acquired pneumonia pharmacy driven pathway was implemented at SSM Health St. Mary's Hospital-Madison. Through approval from the SSM Health WI Regional AMS and Pharmacy and Therapeutics (P&T) committees, pharmacists will automatically adjust medication regimens for non-severe CAP patients using defined protocol criteria for the following: antibiotic de-escalation, transition from intravenous (IV) to oral (PO) antibiotics, and duration of therapy. The purpose of this study is to evaluate the effectiveness of the non-severe CAP pharmacy driven pathway.

Methods: A retrospective chart review was performed utilizing the electronic medical record (EMR) system to identify all adult patients 18 years of age or older and admitted to St. Mary's Hospital from September of 2020 through February of 2021 with a primary diagnosis of CAP. Patients placed on the CAP pharmacy pathway were also identified. Patients who initially started on the pathway would no longer qualify if they met any of the following criteria: antibiotics were broadened or otherwise changed, antibiotics for CAP were being used to treat an additional infectious indication, a positive blood culture or legionella urine antigen, or an infectious disease/pulmonary consultation was placed. The primary outcome was respiratory-related readmission rate 30 days post hospital discharge. Secondary outcomes included average total length of antibiotic therapy, timing from admission to when the patient was started on the CAP pathway, pharmacist interventions (IV to PO, antibiotic de-escalation, and duration of therapy), and all cause readmission rate 30 days post hospital discharge. Patient identifiers and all protected health information (PHI) was maintained in an encrypted computer database housed within the hospital network system. All PHI identifiers were removed from the database during data analysis.

Implementation of a Research Certificate Program and Initial Recruitment Patterns Among Pharmacy Residents at a Large Academic Medical Center

Mary Frances Picone, PharmD, BCPS, Kristin H. Busse, PharmD, BCPS, Joel T. Feih, PharmD, BCCCP, William J. Peppard, PharmD, BCPS, FCCM

Background: Though many pharmacists are interested in research, literature suggests there is limited involvement in practice due to barriers, including lack of knowledge and awareness of available resources. The Pharmacy Department at Froedtert & the Medical College of Wisconsin (MCW), in partnership with MCW School of Pharmacy, developed and implemented a research certificate program available to first- (PGY1) and second-year (PGY2) pharmacy residents. The purpose of this report is to evaluate initial recruitment patterns and baseline attitudes, confidence, comfort, and self-perceived knowledge for participants in the program versus nonparticipants.

Methods: Curriculum development started February 2020 for implementation July 2020. The elective, 1-year curriculum was advertised to all PGY1 and PGY2 residents during their orientation. Authors designed the certificate as 14 active-learning sessions (13.5 hours) distributed from July 2020 to March 2021, with 11 sessions concentrated in July through September; completion of certain residency project milestones (eg, poster, manuscript) was required concurrently with the certificate. Available PGY1 didactic time was reallocated to minimize impact to residents' clinical responsibilities and support widespread participation. Prior to the first session (mid-July), a voluntary baseline questionnaire was administered to all PGY1 and PGY2 residents across the enterprise, regardless of participation in the program. The 5-point, Likert-scale questionnaire evaluated attitudes (6 items), confidence (16 items), comfort (5 items), and knowledge (14 items). Previously validated tools were used to develop the attitude and confidence questions; investigators developed comfort and subjective knowledge questions to capture intended goals of the curriculum. The primary outcome of this report is to describe trends in demographics and baseline questionnaire data for participants versus nonparticipants.

Results: Thirty-five (90%) residents completed the baseline questionnaire. PGY1s were more likely to be participants (81% of class) versus PGY2s (47% of class). Participants had higher reported levels of previous formal training (82%, 50%) and past research experience (89%, 75%); they were also more likely to see themselves practicing in academia (59%, 38%) and participating in scholarly activities (96%, 75%) after graduation. A larger proportion of PGY2s were interested in participating in scholarly activities regardless of participant (100%) or nonparticipant (83%) status. Attitudes toward research were generally positive and similar between groups. Confidence and knowledge were slightly lower in the participant group, but similar; comfort was low across both groups. PGY2s reported more confidence and knowledge compared with PGY1s, but similarly low comfort. A fair number of nonparticipants reported positive attitudes and low confidence, knowledge, and comfort, particularly in the areas of project design and statistical analysis, and yet elected not to participate.

Conclusion: The certificate program was targeted appropriately to improve areas of low confidence, comfort, or knowledge. Most residents were interested in completion; though, enrollment was higher among PGY1s. Many residents were interested in participating in scholarly activities regardless of whether they intended to practice in academia; PGY2s tended to be interested in these activities regardless of participant status, despite not reporting a higher level of comfort. These results will help to adjust curriculum for future years and suggest that a different advertising approach is needed to recruit PGY2s.

Enhancing Support of the Second Shift Decentralized Clinical Pharmacist Through Activities Completed by Intern IIs in a Large Tertiary Care Medical Center

Emily A Winkler, 2021 PharmD Candidate, Ellen N Revak, PharmD, MBA, BCPS, Angela L Volquardsen, PharmD, BCPS

Background: Intern's have traditionally assisted the second shift decentralized clinical pharmacist by performing discharge educations. Second shift decentralized pharmacists take on the responsibility of the acute care floors at 1700 and are left with numerous tasks to complete throughout the night. This project is being conducted to determine how interns can further assist the second shift decentral pharmacist so they are not overwhelmed with the number of tasks they need to complete during their shift. It is also being conducted to determine if there is an opportunity to balance and distribute the intern workload and tasks more evenly between the central and decentral pharmacy.

Methods: Pharmacists were surveyed to determine tasks that would be appropriate for interns to complete. A draft intern workflow was created along with training documents and reference materials. Four interns trialed the workflow for nine weeks and after the trial period the workflow was reassessed to determine if the workflow would be implemented to all intern IIs.

Results: After assessing the results from the pharmacist surveys, the task deemed most appropriate for interns to assist with was answering the second shift decentral pharmacist phone and triaging calls appropriately. The four interns answered and triaged over 150 calls during the nine-week trial period and the collective 51 hours they staffed during this period. Out of 153 calls, the interns were able to independently answer 11% of these calls. The most common calls interns received during this time included medication verification (12%), dosing related questions (12%), medication time adjustment calls (27%), and other (35%).

Conclusion: We determined the new workflow allowed the pharmacy department to utilize the interns' time more appropriately. The workflow helped the second shift decentral pharmacist stay focused on tasks instead of being interrupted or distracted by phone calls. There is potential to expand the workflow even further in the future including training interns appropriately so they can independently answer more clinical questions like drug compatibilities.

Enhancing Tools to Aid in Antimicrobial Stewardship Services in a Multi-State Health System

Ann D Vo, PharmD, BCPS

Background: Infectious disease (ID) pharmacists at Advocate Aurora Health are a part of an antimicrobial stewardship (AMS) program where clinicians monitor antibiotic usage and resistance patterns to facilitate appropriate use. Currently, a third-party clinical surveillance program outside of the electronic health record (EHR) is used to identify patients who would benefit from surveillance. Because this program does not interface seamlessly with the EHR, ID pharmacists must constantly shift between platforms to do a comprehensive workup of the patient. Additionally, the third-party surveillance program is also used for antimicrobial consumption reporting. More tools are being enabled within the EHR to improve antimicrobial consumption reporting. Therefore, there is a need to develop a more efficient means of identifying patients and enhance AMS reporting. The purpose of this project is to optimize tools to perform antimicrobial- and culture-based surveillance and to report antimicrobial consumption within an electronic health record to improve the efficiency of AMS services.

Methods: Infectious disease pharmacists within the health system were consulted to discuss current workflows and to align system-wide initiatives with workflow changes related to this project. Based on these discussions, a patient list-based workflow was determined to be the preferred method for identifying and reviewing patients within the EHR, and a workgroup was assembled to assess the preliminary EHR build. Additionally, a one-week time study was conducted to establish a baseline of the number of patients reviewed using the third-party clinical surveillance program. The patient list-based workflow will be implemented in February 2021, and post-implementation data will be collected over one week using an ID-focused documentation tool integrated with the EHR. Simultaneously, current antimicrobial consumption reports that can be optimized with newly-enabled EHR functionality will be identified. These reports will be developed in the second quarter of 2021.

Standardization of Automated Dispensing Cabinet Training Materials for Pharmacy Team Members

Claire E. Emmerich, PharmD, Matthew Carleton, PharmD, BCPS, Emma Hews, PharmD, MBA

Background: To develop and implement a standardized automated dispensing cabinet toolkit for training pharmacy team members across AdvocateAurora Health.

Methods: A survey was disseminated to all pharmacy team members to detect common knowledge gaps, problematic issues, and the accessibility of automated dispensing cabinet training materials. The survey also assessed how often pharmacy team members would reference these materials when an automation process was unknown or in question. Additionally, an internal review of the currently available automated dispensing cabinet training materials across AdvocateAurora Health was performed. The survey answers were compared to the currently available automated dispensing cabinet training materials to identify areas to be updated and further developed.

Results: Updates that were identified to enhance the current automated dispensing cabinet training materials included step-by-step instructions of the proper automated dispensing workflow, troubleshooting issues, optimizing automation technology, and explanations of safe medication practices. Additionally, providing learning competencies were identified as being beneficial to solidify training objectives.

Conclusion: A comprehensive automated dispensing cabinet user reference guide that adheres to systemwide automation policies and a learning competency was developed. These training materials are available on the AdvocateAurora Health's intranet and are embedded into both pharmacists' and pharmacy technicians' orientation manuals

Cost Savings with Transition to Pre-Made Arterial (Art) Line Solution

Jacob A Voyles, 2021 PharmD Candidate, Brianne K. Bakken, PharmD, MHA, Megan Ose, PharmD, MHA

Background: An arterial (art) line is a catheter that is placed into an artery to measure blood pressure more accurately than a blood pressure cuff. The fluid to keep the line open is run continually and is usually made up of different concentrations of normal saline and heparin depending on what patient population it is being used for. The CDC recommends that administration sets for continuous infusions be changed no more frequently than every 4 days, but at least every 7 days. It is also recommended that closed lines be maintained with minimal opening of the line. Currently, Children's Wisconsin utilizes art line solutions compounded in syringes by the pharmacy that must be changed every three days. Commercially available solutions that could be used for art line infusion are available in bags. In order to reduce waste, provide ready access to needed solutions, potentially reduce unnecessary heparin exposure, and reduce frequent syringe and line changes for art line solutions, we explored the possibility of converting from a compounded syringe-based art line system to one that would accept large volume parenteral bags.

Methods: Data was collected using direct observation of the compounding workflow in the PICU satellite pharmacy at Children's Wisconsin between July 14, 2020 and August 6, 2020. The number of art line syringes wasted, the number of art line syringes compounded, and the amount of technician time required for compounding were recorded each day during the observation period. This was further broken down into the two areas where they are commonly used, the neonatal intensive care unit (NICU) and pediatric intensive care unit (PICU). The NICU and PICU were separated as they use different formulations for their art lines. The average cost of each syringe was calculated using the cost of the syringe, tubing, medications, and the average technician hourly wage with benefits. Data collected was used to estimate the cost associated with wasted syringes and the potential cost savings for converting from compounded syringes to a commercially available product.

Results: During the research period an average of 60 syringes were compounded per day and 33 of the previously prepared art lines were wasted. Approximately 45% of the art line syringes compounded were used compared to 55% that were ultimately wasted due to expiration. The average cost per art line was $1.54. The cost of the premixed product, Heparin 2 units/mL NS 500 mL bag, was $0.22 in cost per syringe equivalent. The estimated cost associated with wasted art line syringes was approximately $1,566.90 per month and $19,061.59 per year. By switching to the premade product, the estimated annual cost savings for Children's Wisconsin would be $31,527.68.

Conclusion: The current practice of compounding arterial line solutions results in a substantial amount of waste, including financial, time, and physical waste. Converting to a commercially available product or modifying the compounding procedure could save the hospital a significant amount of time and money. A trial of other methods will be needed to see which is most effective from a time and cost perspective.

Implementation of a Camera Checking Process for Compounded Sterile Preparations Across a Multistate Health System

Kari M. Ford, PharmD, Chad Smith, PharmD, MBA, BCPS, BCSCP

Background: In 2016, the Institute for Safe Medication Practices (ISMP) updated the previously published Guidelines for Safe Preparations of Compounded Sterile Preparations. This updated guideline focuses on improving processes related to the preparation and dispensing of compounded sterile preparations (CSPs) as barcoding and other IV admixture associated technologies have become accessible for use at a reasonable cost but are not widely implemented.

In accordance with the 2016 ISMP recommendations, Advocate Aurora Health (AAH) has pivoted towards the utilization of camera checking for CSPs within the electronic health record (EHR) instead of the previously utilized pull-back method which is formally no longer recommended by ISMP. The camera checking workflows were in use across a few pilot sites within AAH. Technicians can capture photographs of each step in the compounding process that a pharmacist will then review upon order verification in the EHR. This photographic record will allow for a retrievable log of the images taken in the compounding process for future auditing of CSPs. Camera checking will improve patient safety and allow pharmacists to have more insight into the compounding process before the product leaves the pharmacy.

The purpose of this project is to implement a camera checking process for compounded sterile preparations across a multistate health-system with the ability to maintain a retrievable record for patient-specific CSPs.

Methods: After review of many camera checking programs, it was decided to proceed forward with a program built within the EHR to enhance already established workflows. Once all necessary equipment was identified including carts and arms for the IV rooms, cameras, foot pedals, and more, communication was sent regularly to sites to begin acquiring the items needed to accommodate the workflows.

A list of CSPs identified requiring a Midpoint check by a pharmacist to assess factors like the correct diluent used for reconstitution and the amount of drug injected into the bag was formulated and comprised of hazardous, high-alert, other unique categories and high cost medications. An algorithm was developed for high-cost medications based on cost and complexity in compounding.

Educational and training materials were developed and finalized to include a formal Standard Operating Procedure, condensed PowerPoint version of the Standard Operating Procedure, an image capture guide, and demonstrational video highlighting the workflows for both technicians and pharmacists. An electronic checklist was developed for team members to notate having reviewed all training materials.

Once data and feedback were gathered from the pilot sites, a work group was identified to address time to completion for sterile preparations, camera checking workflow optimization, system camera checking recommendations for standardization, and best practices for implementation strategies across all AAH sites.

Once the workgroup finalized materials and recommendations, implementation of a camera checking process across AAH was started with continual data monitoring to ensure increased utilization overtime with a target of 80%.

Implementation and Evaluation of Placing Select Intravenous Antibiotics in the Automatic Dispensing Cabinets (ADC) to Reduce Cost and Improve Nursing and Pharmacy Workflow

Hannah Hendricks, PharmD, Joshua Rekoske, PharmD, Donna Kieler, PharmD

Background: IV antibiotics are one of the most commonly ordered medications for hospitalized patients. At our institution these antibiotics were previously compounded in the sterile product area or obtained as a premade product from the manufacturer. Re-dispensing of antibiotics often occurs if products are missing or have broken/activated during pneumatic tube transport. Activation and breaking of tubed antibiotics seems to be a more common problem with products using the BBraun addEASE® adapter system, however the cost of compounding or using addEASE® adapters to prepare the antibiotic for administration is substantially lower compared to premade product from the manufacturer.

This project is designed to implement and assess the potential benefits of placing several IV antibiotics in the ADC on the inpatient units as time- and cost-saving measure for both nursing and pharmacy staff.

Methods: The four most commonly used antibiotics across the hospital were identified to be placed in the ADC. Education and roll out was coordinated with Nursing Practice Council and Madison Nurse Educators and training and quick guides on using addEASE® adapters were provided to each unit. Cefazolin 2gm (premade bag), Ceftriaxone 2gm (vials), Cefepime 2gm (vials) and Piperacillin/Tazobactam 3.375mg (vials) were loaded in the ADCs on all inpatient units, with addEASE® adaptors added to the med room stock to be assembled by nursing immediately prior to administration. A cost savings analysis will be performed as primary outcome. Secondary outcomes include the reduction in number of re-dispensed product as well as feedback from surveys sent to nursing and pharmacy staff to assess the impact of this workflow change and staff satisfaction.

Results: Preliminary results indicate that the new process resulted in a substantial product cost saving and reduction in number of re-dispenses of product. Preliminary survey data suggests an overall improvement in workflow for both nursing and pharmacy. Some challenges to the new process that were identified and addressed during the implementation period included adaptor shortages, reconstitution time of certain products and insufficient practical training.

Final data collection and analysis is in process.

Analysis of a Drug Information Database

Kong Vang, PharmD Candidate, Sara Griesbach, PharmD, PCPS, BCACP

Background: A large northcentral rural health system in Wisconsin established a computerized database to capture inquires sent to the drug information team. The purpose of this database is to make drug information available to all physicians and medical support staff. The database is staffed by clinical pharmacists and receives a wide variety of drug therapy questions from multiple provider types, which are documented in a central database. The objective of this study was to characterize the inquiries from the database and provide any inefficiencies to determine where solutions can be provided to make the team more efficient.

Methods: The past five years (January 2015 – October 2020) were extracted from the database and analyzed with the statistical software STATA. STATA was used to compute descriptive statistics (e.g., frequencies, percentages, means, standard deviations) for the following three outcomes: 1) long inquiries (operationalized as equal to or more than 50 minutes or +/- 2 standard deviations from the mean); 2) Specialties; and 3) Categories.

Results: Over the course of five years, a total of 11,869 inquiries were submitted to the database. On average, it took 14.37 (±18.6) minutes to address an inquiry. Long inquiries (N=434) comprised almost four percent all the submitted inquiries. The three Specialties with the most "long inquiries" came from: Internal medicine (26.5%), Pediatrics (9.68%) and Neurology (9.45%). The Category with the highest frequency was Drug Therapy Choices, representing 24.04% of all long inquiries. Anticoagulants, inhaler and migraine medications were the top drug classes that were addressed in the Drug Therapy Choices inquiries. Further analysis is pending.

Implementation of a Central Pharmacy Checklist to Assess Adherence to Accreditation Standards in a Large Tertiary Care Medical Center

Grace L. Dyke, PharmD Candidate, Jennifer Lester, PharmD

Background: Det Norske Veritas – Germanischer Lloyd (DNV) is an independent company that provides risk assessment and safety guidance in numerous sectors, healthcare being one. Accreditation with DNV is assessed annually with emphasis on continual improvement. DNV not only assures hospitals are adhering to set guidelines for operation, but also that hospitals are continually improving on their processes. This gives hospital leadership the confidence behind their services and patients the reassurance in their choice of hospital.

Aurora St. Luke's Medical Center central pharmacy recently had a mock survey done to assess readiness for DNV's annual survey. Areas for improvement within central pharmacy were identified such as infection control with use of tape, expiration dating, and document control. Document control is a process that enforces controlled document handling for creation, modification, distribution, and accessibility of documents. Overall, there are numerous opportunities for Aurora St. Luke's Medical Center's central pharmacy to improve creating an importance for a checklist to help guide and create lasting improvements.

Methods: The first step to creating a useful checklist to use within central pharmacy was to understand opportunities and best practices to ensure a safe and clean central pharmacy environment. DNV standards for hospitals as well as the mock survey results completed prior to this project were reviewed. Once completed, the ASLMC Central Pharmacy DNV Readiness Checklist was created using this research and presented to pharmacy leadership for their review. Lastly, after approval, the checklist was applied to a specific area within the pharmacy. This project focused on the non-sterile compounding area within central pharmacy. The checklist was used to first assess the area prior to any updates/changes being made, keeping a record of the total non-compliances identified. Once that is complete, the area will be appropriately updated with all changes/updates being recorded for analysis. When the area is appropriately updated, the checklist will be used once again to identify and record any other non-compliances identified. After the second walk through with the checklist, changes made will be presented to pharmacy leadership and staff. Education will be provided on use of checklist and compliance with new changes.

Results: The ASLMC Central Pharmacy DNV Readiness Checklist was designed to provide a variety statements to help thoroughly evaluate the non-sterile area of central pharmacy. These statements were divided into the following categories: General Central Pharmacy, Non-Sterile Compounding Area in Central Pharmacy, Medication Counter Check/Crash Carts/Refrigerators, Hazardous Medication Management/Flammable Substance Handling, and Controlled Medications. Each statement provides the individual using the checklist the option to answer "Yes", "No", or "NA" to each statement as well as provide comments regarding their observations.

Future results regarding initial use of the checklist, changes made, and final evaluation of the non-sterile area of central pharmacy with the checklist will be presented.

Patient Own Medication Use Workflow and Clinical Assessment in a Tertiary Medical Center

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Background: The purpose of this project is to conduct a retrospective review of patient specific medication in Advocate Aurora Health (AAH) and assess for opportunities to improve workflow at one site, Aurora St. Luke's Medical Center (ASLMC). Patient supplied medications are allowed in certain circumstances per policy with a provider order. If all criteria are met pharmacy identifies patients' home medications used in the hospital and applies a barcode to the medication. AAH's current policy allows use of patient's own supply if the medication is a non-formulary drug that cannot be obtained in an acceptable time frame, when there is no formulary equivalent, the medication is not available in the US, the medication is an investigational drug being administered in a study protocol in accordance with investigation drugs, or any other exceptional situations as approved by pharmacy.

Methods: Patient own medications were identified using data from June 1st through September 30th. This data was gathered across all AAH hospitals utilizing the current system EHR and includes any patient own medication ordered by a provider and verified by a pharmacist. This data was collected to assess the most common medications that have been ordered as patient supplied and assess for appropriateness against AAH policy.

A data collection sheet was used to identify workflow compliance at ASLMC. 160 verified orders over the aforementioned time period were used to collect information on a medication's formulary status, label, and pharmacist intervention documentation. This information was used to assess ASLMC's current workflow in place and to identify potential opportunities.

Results: There were 10,040 medication orders verified as patient supplied medications across the AAH system. 5,690 of the orders account for 98 medications. 46 of the 98 medications are on Advocate Aurora Formulary. Although these medications can be seen in the hospital they are primarily used in outpatient service settings where different workflows exist. Further analysis would be required to determine if appropriate to utilize in each scenario.

When completing the data collection for ASLMC workflow, 40 of the 160 orders did not have the patient supplied label printed. Those medications tended to be subcutaneous pumps, intrathecal pumps, or outpatient infusions which wouldn't have a patient supplied label on them. However, 24 of the 40 medications should have a label on. Also, during the data collection for ASLMC, 58.1% of the inpatient orders verified contained documentation which is not outlined in the current workflow.

Conclusion: There were no medication trends identified in the system data suggesting further follow up is necessary. However, variances in documentation frequency and contents were identified suggesting the need to include documentation requirements in the current workflow. Results of this project will be presented to site, pharmacist shared governance to move forward with workflow optimizations targeting addition of documentation and potentially, review of label printing process.

Sugammadex; Defining Indications for Use

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Background: To provide a stronger recommendation as to when sugammadex would be most appropriately recommended for use in specific patient populations. Currently the criteria for use within Ascension's formulary is "urgent and emergent reversal of neuromuscular blockade from the use of rocuronium or vecuronium in post-operative patients when neostigmine is not appropriate". As these guidelines are currently being remodeled, we wanted to design a certain set of parameters that would classify a patient as a more appropriate candidate to receive this drug.

Methods: A retrospective cohort study was conducted to analyze the data of 860 patients being treated with sugammadex over the course of Ascension's 2019 fiscal year. Eligible patients were those who received any dose of sugammadex post-operative with notes from the anesthesiologist indicating as to why the drug was given. The data was collected post hoc from the electronic medical records of the patients treated.

Results: Of the data collected we were able to see correlations between the ASA score, train of four paralysis depth, and the percent of the time that neostigmine/glycopyrrolate failed to reverse the paralytic effect. In our patient population around 57 percent of the patients who received sugammadex had been classified with an ASA score of 3 or higher. Also, we found that around 20 percent of the cases, sugammadex was given as a result of neostigmine/glycopyrrolate failure.

Conclusion: We were able to discover some common clinical conditions and surgical circumstances of patients that would benefit from the treatment of sugammadex compared to being treated with neostigmine and glycopyrrolate. Not only do we believe that patients will receive better outcomes being treated with sugammadex, but it would provide patients, as well as the hospital system, with a greater cost savings value. A more precise use of this drug would lead to greater success in post-operative procedures and provide financial benefit to patients by reducing the total procedure length.

Sparking Joy with Accreditation and Tidying Up with Ye Aung

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Background: Advocate Aurora Health partners with the DNV as its hospital accreditation vendor. This partnership ensures patient safety, assists with continuous improvement, and encourages safe and reliable care. Currently, there is an opportunity to better collate, assess, improve and disseminate accreditation opportunities system-wide. The purpose of this project is to develop a strategy to assist pharmacy leaders across Advocate Aurora Health with DNV accreditation compliance.

Methods: To begin this project, the first step was identifying the various sources of DNV accreditation compliance topics. Based on a review, three notable sources were identified. One internal source was DNV survey findings identified at Advocate Aurora Health hospital surveys. These reports were collated by partnering with system accreditation partners. The second internal source were informal DNV accreditation compliance topics, which were discussed with pharmacy leaders by DNV surveyors during their hospital survey, but not necessarily findings. This information was collated using a post-survey collection tool that was sent directly to pharmacy leaders immediately following their hospital DNV survey. Lastly, the most valuable external source of DNV accreditation compliance topics identified were presentations at the ASHP Midyear Clinical Meeting. Slide decks presented at the conference were reviewed for DNV accreditation compliance topics.

Once sources were identified, information from each source was collected, extracted and entered in an assessment tool. Topics relating to medication management from these sources were then assessed to determine if there were any gaps in current pharmacy department policies and procedures. The assessments helped determine if policies and procedures needed updating or if practice didn't comply with existing policies and procedures. Pending on the complexity of the gap, system-wide communication would be pursued or a workgroup would be requested for system support.

Conclusion: Conclusions from preliminary efforts and use of these new strategies have demonstrated utility. Future usage will refine and improve these strategies to improve the impact.

Antenatal Steroid Administration in the Late Preterm Period: A Retrospective Review of Neonatal and Maternal Outcomes (ASAP)

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Background: In 2016, the American College of Obstetricians and Gynecologists (ACOG) recommended the administration of antenatal corticosteroids in pregnant women between 34-0/7 and 36-6/7 weeks gestation who are at risk of preterm birth within 7 days, and have not received a previous course in order to reduce severe respiratory complications, intracranial hemorrhage, necrotizing enterocolitis and death in the neonate.

Prior to publication of this guideline, antenatal corticosteroid administration was recommended for women between 24-0/7 and 33-6/7 weeks gestation at risk for preterm delivery. Multiple courses of antenatal corticosteroid administration is associated with an increased risk of chorioamnionitis and endometritis in the maternal population. Since the implementation of late pre-term steroid administration, institutions are noting a correlation between antenatal betamethasone and neonatal hypoglycemia.

The objective of this study is to determine if antenatal betamethasone administration to pregnant women between 34-0/7 and 36-6/7 weeks gestation will increase the rate of neonatal hypoglycemia, decrease the need for neonatal respiratory support, and increase the rate of maternal infection.

Methods: A retrospective chart review was performed on maternal/ infant dyads who received antenatal betamethasone between 34-0/7 and 36-6/7 weeks from July 1, 2019-June 30, 2020. A control group of mothers who did not receive antenatal corticosteroids at any point in their pregnancy from September 13, 2015- December 22, 2016 were chosen and matched by gestational age with the betamethasone group. Patients were excluded if there was a diagnosis of maternal diabetes, neonatal congenital defects/anomalies, or if delivery occurred at an outside institution.

Results: A total of 314 mothers and 322 neonates were analyzed. 86% of the intervention group completed a full course of antenatal steroids with 73% delivering after the steroid window. The rate of neonatal hypoglycemia was significantly higher (57% vs 22%) in the betamethasone group. There were no hypoglycemia events in neonates who were small for gestational age in the control group. Differences were also noted between neonatal groups for respiratory support but were statistically insignificant. An increase in chorioamnionitis and endometritis was identified in the maternal betamethasone group.

Conclusion: Our institution has seen an increase in neonatal hypoglycemia and maternal infection since ACOG updated the antenatal steroid administration guidelines. Due to the paucity of published literature, this study can contribute to recent literature on outcomes of antenatal corticosteroid administration in late preterm gestational ages.

Development and Implementation of a Bidirectional Therapeutic Interchange Policy in an Inpatient Setting

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Background: Unidirectional therapeutic interchange is a well-established concept in hospital formulary management when transitioning a patient from a non-formulary medication to a preferred formulary medication. However, if the institution is not able to obtain the formulary medication (i.e. drug recall, medication shortage, etc.), transitioning from a formulary medication to a non-formulary medication may be considered. Bidirectional therapeutic interchange is a novel approach to effectively and appropriately transition to a non-formulary medication if these situations arise. The purpose of this project was to reevaluate the current unidirectional therapeutic interchange document to determine when bidirectionality is appropriate for the medications on the current document to help facilitate the ease of response to emerging drug shortages.

Methods: The current institutional unidirectional therapeutic interchange document was reviewed and each agent was assessed for appropriateness of bidirectionality based on the following characteristics: comparative efficacy; safety, adverse effects, tolerability; renal or hepatic adjustment considerations; drug interaction profile; contraindications; patient specific factors; allergy considerations; monitoring, administration; and pharmacokinetics. The agents were then categorized into three separate groups and indicated in the updated therapeutic interchange document: (1) appropriate for bidirectionality, (2) clinically appropriate, but additional considerations or actions required, or (3) not appropriate for bidirectionality. The project was then presented to the Pharmacy and Therapeutics Committee for final approval.

Results: A total of 37 different classes of medications were reviewed, corresponding to 230 individual medications analyzed for appropriateness of bidirectionality. The majority of medications (102 of 230, 44%) were clinically appropriate, but additional considerations were required. These considerations included administration, adverse drug effects, allergies, contraindications, drug interaction profile, indication, monitoring, pharmacogenomics, pregnancy and lactation, and pharmacokinetics. Eighty-eight (38%) of the medications were appropriate for bidirectionality and 40 (17%) were not appropriate. The new Bidirectional therapeutic interchange document was accepted by the Pharmacy and Therapeutics Committee.

Conclusion: The majority of medications considered for bidirectionality were clinically appropriate but required additional consideration. However, a large proportion of medications were appropriate for bidirectionality. Of note, some medications that were not considered appropriate for bidirectionality have been discontinued from the market, which may have skewed the results. Bidirectional therapeutic interchange is a novel concept that will allow ease of transitioning from a preferred formulary medication to a non-formulary medication if the formulary medication is not able to be obtained. This rapid assessment and transition will minimize negative impacts on patient care.