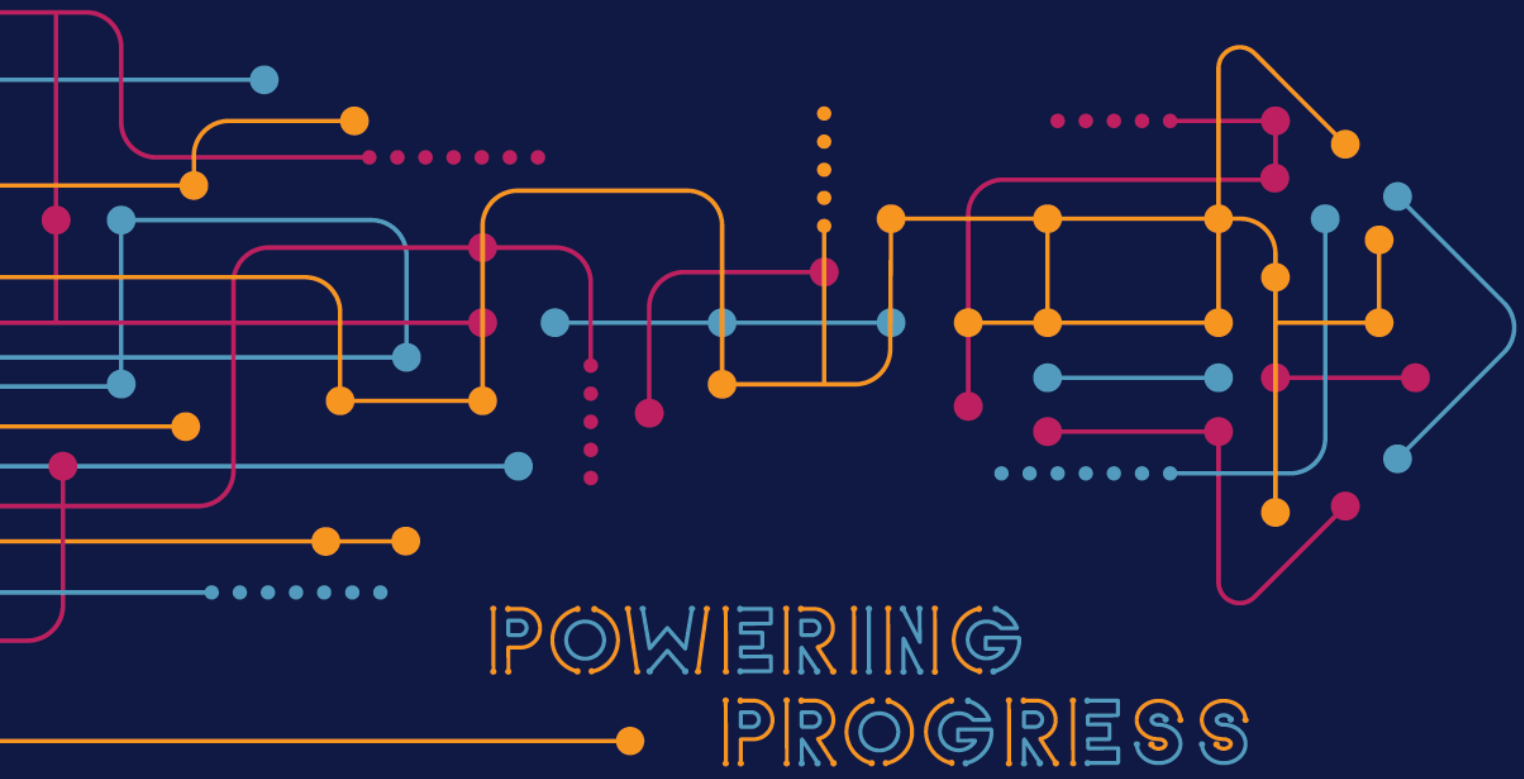
2024

PSW Annual Meeting

August 22-24, 2024
Kalahari Resort & Convention Center
Wisconsin Dells



POSTER PRESENTATION ABSTRACTS

Parental Beliefs That Influence a Parent's Decision to Vaccinate Their Child: A Systematic Review

Meghan R. Wendling, 2025 PharmD Candidate

Background: Recent childhood vaccination rates have been suboptimal, leaving individuals susceptible to disease. This research aimed to review current literature to identify the most common parental beliefs of adults in the United States across all vaccines that impact their decision to vaccinate their children.

Methods: This systematic review utilized three separate searches of five databases to gather relevant literature. Inclusion criteria included English language, childhood vaccines, set in the United States, observational design, parental perspective and/or beliefs, and publication date in or after 2010. Included studies were then reviewed by the independent researcher to identify any parental perspectives or beliefs cited as a reason for delaying or refusing childhood vaccines.

Results: Fifteen studies were included in this systematic review. Five studies were qualitative, and ten studies were quantitative. After analysis and summarization of the data, several common beliefs and barriers emerged. The most prevalent perception noted was safety concerns, with nine of the fifteen studies citing this as a reason for delaying or refusing vaccination. Low perceived susceptibility of disease and lack of provider communication were other commonly cited perceptions and barriers.

Conclusion: These results revealed several perceptions and beliefs that contribute to the recent low rates of vaccination in children. Educational programs and targeted interventions are needed to combat misconceptions and remove the barriers to childhood vaccination.

Expansion of a Pharmacist-Led Glucose Management Service in a Community Hospital

Elisha Buchberger, PharmD, Katie Reinke, MHA, BCPS, Sonia Bhardwaj, PharmD, Karissa Faubel, PharmD

Background: In hospitalized patients, poor blood glucose management is associated with prolonged hospital stays, increased risk of morbidity and mortality, and increased healthcare costs. Optimal glycemic management may be difficult to achieve given the extensive complexities in the acute care setting. Not many inpatient facilities have access to an endocrinologist to manage the intricacies of blood glucose abnormalities, and the burden falls to the attending provider.

Pharmacists have a vast understanding of pharmacology, pharmacokinetics, and overall management of complex disease states. This ability places pharmacists in a position to oversee glucose management in the acute care setting. A Pharmacist-Led Glucose Management Consult Service (PLGMCS) was developed to initiate an insulin dosing service for select patients in the acute care setting. The goal of the service was to align inpatient glycemic management with current guideline recommendations, improve glycemic control, reduce provider burden, and assist in transitions of care. Opportunity exists to expand the service to additional patient populations.

Methods: In the spring of 2022, the PLGMCS pilot was implemented on one inpatient medical-surgical floor at St. Agnes Hospital. A policy was established in accordance with the ADA guidelines and literature best practices. Pharmacists were provided ongoing educational opportunities for diabetes management. Data was collected comparing the hospitalist-managed patients to pharmacist-managed patients. After roughly 6 months, with approval from the GFDL CPC in May of 2023, the service was expanded to all medical-surgical units at St. Agnes Hospital. Ongoing data collection included volume of consultations and number of severe hypoglycemic events.

Results: Pilot data from 2022 was reviewed and showed no statistically significant differences in hypoglycemic events nor effectiveness in controlling hyperglycemia between the two groups, demonstrating that pharmacist-led glucose management was clinically comparable to providers. After expansion of the service in 2023, there was a 66.3% increase in consults for this service. Thus far in 2024, 11 severe hypoglycemic events occurred. Of the 11 events, 1 patient was managed by the inpatient pharmacists. Chart reviews revealed common patient factors that likely contributed to hypoglycemia: patients with Type 1 Diabetes (T1DM) and patients with acute renal dysfunction and/or chronic kidney disease. This presented an opportunity for pharmacists to further assist in reducing hypoglycemia by expanding the service to additional patient populations. In September of 2024, the PLGMCS will be expanded to include patients with T1DM, end-stage renal disease, patients in the intensive care unit, and/or patients on concentrated insulins. With these added high acuity patients, the dosing guidance in the PLGMCS policy was expanded. The expansion of the consult service was approved at the June 2024 CPC meeting pending approval from subject matter experts.

Conclusions: A pharmacist-led glucose management service was successfully piloted, expanded, and subsequently scaled up further at a community hospital. Provider consults for the service increased over time.

Prescribing Practices of Antipsychotics for Treatment of Delirium in the MICU

Harley Anderson, 2025 PharmD Candidate, Sarah Peppard, PharmD, BCPS, BCCCP, Mike Brown, PharmD

Background: Prevalence of delirium ranges from 45%-87% depending on the specific intensive care unit's patient population.[1] Delirium has been shown to lead to a 2.5-fold increase in short term mortality and a 3.2-fold increase in 6-month mortality.[1] Previous studies have found antipsychotic use for delirium to be associated with increased length of stay with no reduction in mortality.[2,3] However, observation shows that they are still being prescribed frequently for delirium in the ICU setting. This study sought to quantify and describe prescribing practices and compare the outcomes associated with various antipsychotic medications.

Methods: Patients were included in the analysis if they were 18+ years old, admitted to the MICU when antipsychotics were prescribed, and if they were given haloperidol, aripiprazole, olanzapine, quetiapine, ziprasidone, or risperidone for delirium while in the MICU. They were excluded if antipsychotics were initiated prior to MICU admission or if they were prescribed antipsychotics at home prior to admission. 98 patients were screened and 21 were included in the final analysis. Basic demographic information, prior medical history, length of stay, length of delirium, and safety parameters were collected. CAM-ICU score and prescribed antipsychotic information were also collected for each day of their ICU stay.

Results: Olanzapine was the most commonly prescribed antipsychotic in the MICU (n=19). Most patients (n=17) received 2 or more antipsychotics during their MICU stay. Median duration of delirium was 4 days, 4 days, and 5 days for olanzapine, haloperidol, and quetiapine respectively. Median length of ICU stay was 5 days, 5 days, and 6 days for olanzapine, haloperidol, and quetiapine respectively. Median duration of hospital stay was 16 days, 13 days, and 13 days for olanzapine, haloperidol, and quetiapine respectively.

Conclusions: This study showed that providers in the MICU prescribe olanzapine more often than other antipsychotics. It also showed that they are usually using multiple antipsychotics for the treatment of ICU delirium. Due to overlap, it's not valid to conclude whether there is a significant difference in delirium duration, length of ICU stay, or length of hospital stay between groups. Future studies should evaluate the impact of different antipsychotics in mutually exclusive groups alongside a control group.

References

1. Cavallazzi R, Saad M, Marik PE. Delirium in the ICU: an overview. *Ann Intensive Care.* 2012;2:49. doi:10.1186/2110-5820-2-49
2. Weaver CB, Kane-Gill SL, Gunn SR, Kirisci L, Smithburger PL. A retrospective analysis of the effectiveness of antipsychotics in the treatment of ICU delirium. *J Crit Care*. 2017;41:234-239. doi:10.1016/j.jcrc.2017.05.034
3. Daniels LM, Nelson SB, Frank RD, Park JG. Pharmacologic Treatment of Intensive Care Unit Delirium and the Impact on Duration of Delirium, Length of Intensive Care Unit Stay, Length of Hospitalization, and 28-Day Mortality. *Mayo Clin Proc.* 2018;93(12):1739-1748. doi:10.1016/j.mayocp.2018.06.022

Mind the Gap: Pharmacists' Opportunity in Migraine Care

Michelle L. Maynard, PharmD, BCPS, David Perez, PharmD, Travis W. Suss, PharmD, BCGP, Sarah A. Endrizzi MD, Amit Singh, DO , Timothy J. Hartman, PharmD, BCPS, CPHIMS, William J. Peppard, PharmD, BCPS, FCCM

Background: Migraines affect a significant proportion of adults worldwide and rank second in the overall cause of years lived with disability. Not all patients seek a physician's care and instead choose to self-treat, which may result in under or over treatment. The overall impact on quality of life, absenteeism, and disability can be substantial. Use of individual and combination analgesics on more than 10 to 15 days per month can lead to medication overuse headaches, which are more refractory to treatment and can lead to increasingly frequent headache occurrence. In the last 6 years, several new medications have been approved for the treatment and prevention of migraine. As our ability to positively impact outcomes has improved, performing a needs assessment at the health system level to understand the current impact migraine has on the patient lives we care for is critical to understand potential gaps and implement pharmacist-led services to address them.

Methods: A 12 month retrospective review of inpatient and ambulatory encounters in the electronic health record database was conducted to characterize patient characteristics and resource utilization. Specifically, the goal was to identify the prevalence of migraine by age, race, ethnicity, payer type, most prevalent comorbidities, and distribution of medications by class. Deidentified data were summarized using descriptive statistics.

Results: A total of 94,335 patients were identified with a diagnosis of migraine, of whom 80.8% were female. The median age was 47 and 79% self-identified as white. Frequently encountered comorbidities included chronic pain, hypertension and anxiety.

Approximately 55% of patients had no prescription for migraine-related treatment or prevention. The majority of migraine medications were prescribed in the outpatient (36,514) compared to inpatient (2,109) setting. The top 10 most frequently encountered outpatient migraine-related medications were acetaminophen, gabapentin, sumatriptan, oxycodone, metoprolol, hydrocodone-acetaminophen, aspirin, topiramate, tramadol and rizatriptan. Opioid-analgesic combinations were prescribed almost three times as often in the inpatient setting (125,046) compared to the outpatient setting (46,423).

Conclusions: Significant opportunities exist to improve the overall management of migraines and reduce the risk of medication overuse. Pharmacists can partner with physicians and other providers to create standardized workflows, encourage evidence-based prescribing and provide education to patients on the optimal use of the medications to manage migraine.

Incidence and Factors Associated with Co-prescribing Benzodiazepines and Opioids at Discharge: A Retrospective Quality Improvement Project

Paul Rademacher, 2025 PharmD Candidate, Mazen Samadi, PharmD, Dustin Carneal, PharmD

Background: The co-prescribing of benzodiazepines and opioids poses significant clinical risks including respiratory depression, accidental overdose, and dependence. Despite known dangers, patients continue to be discharged with both medications. This project examines the incidence of co-prescribing and identifies contributing patient factors and circumstances, with an additional review of diversity and socio-economic indicators.

Methods: A retrospective review of discharge data from March 2024 to May 2024 was conducted at a small hospital within a regional academic health system. Each case involving the co-prescribing of benzodiazepines and opioids was scrutinized for criteria such as prior prescriptions, post-operative status, indications, and presence of a pain agreement. Data collected included demographics, daily morphine milligram equivalents (MME), lorazepam milligram equivalents (LME), overdose risk scores (ORS), and number of prescribers. A PDMP report was run on each patient to assess MME, LME, and ORS. Additionally, diversity indicators such as zip code diversity index, poverty rate, and median income were considered to understand the socio-economic context of the patient population.

Results: The average oral MME/day at the time of prescription was 147.04 (Range: 3.3 - 1078.89, n=21), with an average increase of 447% from the previous year MME/day baseline (Range: 0% - 1714%, n=18). For benzodiazepines, the average oral LME/day was 3.73 (Range: 1 – 14, n=18), with an average increase of 108% (Range: 0% - 275%, n=15). The average Overdose Risk Score (ORS) was 209.04 (Range: 10 – 460, n=21). Substantial variability was observed in patient demographics and clinical data, including age, BMI, number of home medications, and comorbidities. Diversity indicators for the zip codes involved showed that some areas had higher poverty rates and lower median incomes compared to state and national averages.

Conclusions: This project displays the persistent practice of co-prescribing benzodiazepines and opioids despite known risks, with significant increases in daily MME/day and LME/day without much standardization or consideration of patients' baseline utilization prior to prescribing. Identifying patient factors and circumstances associated with this practice can inform strategies to mitigate adverse outcomes and improve prescribing practices. Additionally, understanding the socio-economic context through diversity indicators can help tailor interventions to address disparities in healthcare access and outcomes. The sample size in this analysis is too small to show any meaningful trend. However, we have developed a framework so if done over a longer period of time or with a larger patient group, an analysis of this could be beneficial. Our small population showed higher diversity index and poverty areas correlating with greater increases in MME. It would be beneficial to track this over a longer period of time to identify if unconscious bias of prescribers is impacting prescribing patterns.

Ordering Process Results in Excess Antibiotic Doses for Rule Out Sepsis Evaluation in Neonates

Sarah A. Graham, 2025 PharmD Candidate, Rachael A. Jaszczenski, PharmD

Background: Perform a duration use evaluation of ampicillin and gentamicin in presumed early onset neonatal sepsis. The avoidance of excessive antibiotic exposure is important to limit adverse drug reactions and reduce the risk of antimicrobial resistance. This project was designed to determine if neonatal intensive care unit (NICU) patients at Children's Wisconsin are receiving an exact 48 hour sepsis rule out or if excess antibiotic doses are being administered.

Methods: Informed consent was not required as this study was retrospective in nature and was deemed exempt through the Medical College of Wisconsin Institutional Review Board. Neonates admitted to the NICU were included if they were less than 72 hours from birth at the time of initial antibiotic order who were administered both ampicillin and gentamicin, therefore limiting to presumed early onset sepsis. Children's Wisconsin NICU data was retrospectively collected from January 2023 to February 2023. Data was collected via the Electronic Health Record.

Results: A total of 50 patients were included in this review. The average time from first to last antibiotic dose for ampicillin was 39.9 hours (range 11.17-167.23) and 28.22 hours (range 0-162.37) for gentamicin. An average of 4.6 doses of ampicillin and 2.08 doses of gentamicin were administered within the sepsis rule out period. Five patients received antibiotics for more than 48 hours. Seven patients received antibiotics for longer than 48 hours beyond initial negative cultures. The most common indication for patients receiving antibiotics for greater than 72 hours was "Sepsis/ bacteremia – suspected or confirmed." Likely attributed to culture negative sepsis.

Conclusions: A substantial number of patients received antibiotics beyond cultures being negative for 48 hours, which is longer than the recommended early onset sepsis rule out period as outlined in guidelines. Because of this we believe there is an opportunity to improve EPIC ordering processes within Children's Wisconsin by adjusting the current practice of ordering antibiotics based on "number of doses" rather than duration to ensure antibiotics are only administered for 48 hours from negative cultures.

Development and Implementation of a Dedicated Emergency Medicine Pharmacist Position at a Community Hospital

Natalie Weber, PharmD, BCPS, BCCCP, Katie Reinke, PharmD, MHA, BCPS, Mitchell Adams, PharmD, Elisha Buchberger, PharmD, Julia Condon, PharmD, BCPS, Mike Faber, PharmD, BCPS, Dwight Groshek, PharmD, Paul Schwalbach, PharmD

Background: The American College of Emergency Physicians (ACEP) published a policy statement supporting the critical role of well-integrated pharmacists in the emergency department to ensure safe and effective medication use. As of 2021, only 39% of hospitals in the United States have a dedicated emergency medicine (EM) pharmacist despite the statement from ACEP. Our purpose was to develop and implement a dedicated EM pharmacist position at SSM Health St. Agnes Hospital, a medium-sized community hospital, to improve patient outcomes.

Methods: The development of a dedicated EM pharmacist position began as a post-graduate year-1 (PGY1) residency program project in 2021. The PGY1 resident conducted a survey of EM pharmacist services across SSM Health and developed a business case for local position approval. With the support of the director of pharmacy, hospital administration approved the position. In 2023, an EM pharmacist workgroup was created with four pharmacists to develop an A3, position requirements and responsibilities, standard workflows, and measurable outcomes. Outcomes include time to antibiotic administration in sepsis and time to tenecteplase administration for stroke. Additionally, the monthly number of documented interventions will be tracked as a surrogate for improved medication safety and efficacy. The EM pharmacist position was implemented in September 2023.

Combination Penicillin and Ceftriaxone Therapy for Enterococcal Infective Endocarditis

Tyler J. Philipps, 2025 PharmD Candidate, Allison Gibble, PharmD, BCIDP

Background: Infective endocarditis (IE) is a serious bacterial infection that affects the heart endocardium. Enterococci are the third most common genus of bacteria that cause IE.[1] Standard treatment is 6 weeks of intravenous ampicillin (AMP) and ceftriaxone (CTX), which are used in combination for a synergistic effect.[2,3] AMP typically requires administration every 4 hours, making outpatient use challenging. In vitro data has demonstrated synergistic activity of penicillin (PCN) and CTX that is similar to AMP/CTX.[4] Additionally, PCN is typically more feasible for outpatient use as it is administered as a 24-hour continuous infusion. With this in mind, physicians at Froedtert & the Medical College of Wisconsin have been using the PCN/CTX regimen. This project aims to analyze outcomes of the PCN/CTX treatment for enterococcal IE.

Methods: This is a case series using an Epic® generated report of enterococcal IE patients at Froedtert Hospital from 1/1/2021 to 12/31/2023. Patients with enterococcal IE who received PCN/CTX upon discharge from Froedtert Hospital were included. Exclusion criteria included positive blood culture with non-enterococcal organisms or treatment with other regimens. A chart review was conducted to gather data. The primary outcome was readmission for IE treatment while on or within 60 days of PCN/CTX completion. Secondary outcomes include mortality while on or within 60 days of PCN/CTX completion, modification to the antimicrobial regimen during therapy, and collection of any tolerance or safety issues during therapy.

Results: Of the identified 74 patients, 16 met inclusion criteria for the study. The median age was 69 years (ranging from 30 to 86 years) and 75% were male. The median treatment duration was 43 days (ranging from 28 to 59 days). The primary outcome of IE readmission occurred in 3 of 16 patients. Of these 3, one patient transitioned to hospice, and another switched from IV to oral therapy 10 days earlier than the anticipated completion date. For secondary outcomes, 2 patients died within 60 days of therapy completion, 3 patients required therapy modifications, and 3 patients developed tolerance issues to therapy. Therapy modifications included extending the treatment duration, changing the PCN formulation, and changing to oral linezolid. Tolerance issues were hyperkalemia, rash, and eosinophilia.

Conclusion: This project has provided useful information to consider when prescribing PCN/CTX for enterococcal IE. Most patients did not require modifications or additional treatment. Future work could focus on comparing PCN/CTX to other regimens to analyze efficacy and safety. Since there are not many alternative regimens currently, it appears that PCN/CTX is an appropriate choice for enterococcal IE.

References:

1. Baddour LM, Wilson WR, Bayer AS, et al. Infective Endocarditis in Adults: Diagnosis, Antimicrobial Therapy, and Management of Complications: A Scientific Statement for Healthcare Professionals From the American Heart Association. *Circulation*. 2015;132(15):1435–1486. doi:10.1161/CIR.0000000000000296
2. Herrera-Hidalgo L, de Alarcón A, López-Cortes LE, et al. Is Once-Daily High-Dose Ceftriaxone plus Ampicillin an Alternative for Enterococcus faecalis Infective Endocarditis in Outpatient Parenteral Antibiotic Therapy Programs? *ASM Journals*. 2020;65(1):6. doi:10.1128/AAC.02099-20
3. Fernández-Hidalgo N, Almirante B, Gavaldà J, et al. Ampicillin Plus Ceftriaxone Is as Effective as Ampicillin Plus Gentamicin for Treating Enterococcus faecalis Infective Endocarditis. *Clinical Infectious Diseases*. 2013;56(9):1261-1268. doi:10.1093/cid/cit052
4. Thieme L, Briggs S, Duffy E, Makarewicz O, Pletz MW. In Vitro Synergism of Penicillin and Ceftriaxone against Enterococcus faecalis. *Microorganisms.* 2021;9(10):2150. doi:10.3390/microorganisms9102150

Impact of Sulfonamide Drug-Allergy Suppression

David J. Dulak, PharmD, BCPS

Background: Sulfonamide allergies affect approximately 3-6% of the general population and are frequent contributors to drug-allergy alerts due to potential cross-reactivity with nonantibacterial sulfonamides like furosemide and glipizide. Although these nonantibacterial sulfonamides share the sulfonamide moiety, they do not contain the N1 and N4 sub-groups primarily responsible for immunologic reactions in sulfonamide allergies. This project aimed to educate providers about the nature of sulfonamide allergies and assess the impact of suppressing drug-allergy alerts between sulfonamides and nonantibacterial sulfonamides that lack the N1 and N4 sub-groups.

Methods: Education was prepared and presented to the major provider committees, with final approval for alert suppression obtained from all. Following the suppression of drug-allergy alerts between sulfonamides and nonantibacterial sulfonamides, data were collected on the total number of drug-allergy alerts and override percentages for three months post-intervention. This data was compared to three months pre-intervention.

Results: The total number of drug-allergy alerts decreased by 22% post-intervention ($p = 0.032$) without a significant change in the overall override percentage (82.5% compared to 81.1%, $p = 0.455$).

Conclusion: Suppressing alerts for nonantibacterial sulfonamides led to a statistically significant decrease in the overall number of drug-allergy alerts presented to providers without a significant change in the alert override percentage. Targeted alert suppression can help reduce the total number of alerts and alert fatigue, though more data are needed to determine the clinical significance of this type of intervention.

Quality Assurance in Patient Care: Outcomes of PSW's Wisconsin Pharmacy Quality Collaborative

Lauren M. Glaza, 2025 PharmD Candidate, Kate Hartkopf, PharmD, BCACP, Ryan Psyck, BS, Kari Trapskin, PharmD

Background: Created in 2007, the Wisconsin Pharmacy Quality Collaborative (WPQC) is a pharmacy accreditation and pharmacist certification program implemented by the Pharmacy Society of Wisconsin (PSW). The program aims to increase the quality of patient care in Wisconsin by working to reduce prescription cost and medication misuse and involve patients in their care. WPQC-accredited pharmacies adhere to high program standards including implementation of seven quality-based best practice requirements. Pharmacy accreditation provides certified pharmacists the ability to bill for comprehensive medication review and assessment (CMR/A) services through participating third parties to maximize medication therapy management services. Quality assurance surveys are conducted twice annually with participating pharmacies. Survey responses help PSW better understand the benefits and barriers of implementing the WPQC standards, develop supportive training and coaching materials, and gain insight on whether accreditation is advancing pharmacy practice in Wisconsin. A comprehensive evaluation of the WPQC quality assurance survey and participant perception data has not occurred since 2019.

Methods: Between May 2021 and June 2024, a standardized quality assurance survey created via the Survey Monkey™ platform was sent via email to all WPQC-accredited pharmacies each Spring and Fall. The survey included questions regarding engagement with the best practice requirements, including barriers and mitigation strategies used, services offered to patients, including CMR/A services, and pharmacist collaborative practice agreement usage. In addition to the survey responses, PSW received monthly CMR/A data from the Wisconsin Department of Health Services, converted the raw data into a report using internally constructed Microsoft Excel® macros, and built corresponding tables and graphs from the macros report to track the following items over time: (1) number of pharmacies providing CMR/A services each month, (2) unique pharmacies providing CMR/As, and (3) number of CMR/As provided each month. WPQC quality assurance survey responses were compared over time alongside the Medicaid CMR/A data to better understand program trends and evaluate the overall program impact on pharmacy practice in Wisconsin.