TOGETHER: CANADA'S HOSPITAL PHARMACY CONFERENCE 2023 / ENSEMBLE : CONGRÈS DES PHARMACIENS D'HÔPITAUX DU CANADA 2023

https://doi.org/10.4212/cjhp.3448

Facilitated Poster Sessions: Discussions of original research, pharmacy practice projects, and case reports.

Séance animée de présentations par affiches : Discussions sur des projets de recherche originale des projets dans le domaine de la pratique pharmaceutique et les observations cliniques.

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ORIGINAL RESEARCH / RECHERCHE ORIGINALE

What Types of Clinical Pharmacy Key Performance Indicators (cpKPI) Care Are Patients Receiving Across Canada? A 4-Year National cpKPI Patient Care Registry Trending with Clinical Specialty Analysis

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Background: Clinical pharmacy key performance indicator (cpKPI) care delivery is associated with improved patient outcomes. In 2018, the Canadian National cpKPI Patient Registry was created with an inaugural 1-year pilot. Since then, multi-year comparative trending and clinical specialty specific data analysis have not been conducted.

Objective: To expand cpKPI registry by generating pooled national summaries and comparative trending for 2018-2021 (including COVID impact), and enhance the registry by focusing on comparisons across pharmacy clinical specialties.

Methods: In this prospective, national, multi-center, multi-year, quality improvement study, participating hospitals submitted annual aggregate and clinical specialty cpKPI care data for 2018-2021. The patient-level cpKPI data were analyzed to generate multi-year trends and clinical specialty comparisons.

Results: Overall, the cpKPI Registry enrolled 43 unique hospitals and 1,027,701 patients from 2018-2021. Core analysis included 25 unique acute care institutions (that measured cpKPI patient proportion data continuously). Trending revealed that the three most delivered cpKPIs remained as admission medication reconciliation, interprofessional rounding, and pharmaceutical care plans. Discharge medication reconciliation and patient education (hospital stay/ discharge) remained the most common national cpKPI care gaps. The top cpKPI care types delivered varied among pharmacy cpKPI practice profiles generated for each clinical specialty, including: Adult General Internal Medicine, Adult Medical Surgical Intensive Care Unit, Adult Surgery, Adult Inpatient Oncology, Rehabilitation, and General Pediatrics (for 11 hospitals, n=162,849). There appeared to be a slight decrease (6%) in cpKPI care delivery during COVID-impacted years (2020-2021) compared to pre-COVID years (2018-2019) for hospitals that submitted for all 4 years.

Conclusions: National cpKPI registry data were trended for 2018-2021. The registry data was enhanced with aggregate data from clinical specialty areas to enable more meaningful comparisons. The study results track national progress, benchmark cpKPI practice profiles across hospitals, and can inform pharmacy practice advancement to improve patient outcomes.

A Cross-Sectional Analysis of Equity, Diversity, Inclusion and Accessibility within Pharmacy Residency Programs in Canada

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Background: Equity, Diversity, Inclusion and Accessibility (EDIA) is a broad concept encompassing the principles, ideologies and practices related to fostering cultures that aim to minimize bias, address systemic inequities, and promote belonging and inclusion, particularly for members of equity-deserving groups.

Objective(s): To determine if and how EDIA has been incorporated into pharmacy residency programs in Canada and to identify challenges and opportunities.

Methods: A cross-sectional survey was created and electronically distributed to 44 pharmacy residency programs in Canada over a 4-week period (August 12 to September 9, 2022). The survey was to be anonymously completed by either a program director or program coordinator and included 28 questions that used a 4-point Likert scale to measure how EDIA was considered or incorporated into various aspects of the program. Additional open-ended questions were included to capture response details and identify challenges.

Results: Surveys were completed for 28 of 44 (63.6%) pharmacy residency programs in Canada; the majority by a program coordinator (21/28, 75%). Participants agreed (12/28, 42.9%) or strongly agreed (16/28, 57.1%) that EDIA is important to incorporate into residency programs and 6 (6/28, 21.4%) had or were developing formal policies. Some responded that their programs currently do or are developing ways to incorporate EDIA into applicant screening (8/25, 32%), resident education and training (16/25, 64%), and preceptor education and training (11/25, 44%). A diverse team of applicant reviewers and residency preceptors was reported in 52% (13/25) and 80% (20/25) of programs, respectively. Challenges with incorporation of EDIA were identified and included knowledge and training gaps, staffing and resource challenges, and limitations of the applicant matching system.

Conclusion(s): Incorporating EDIA into pharmacy residency programs in Canada is perceived to be important however, only a few programs are developing or currently have EDIA policies in place. Challenges to incorporating EDIA should be addressed.

Telepharmacist-Led Opioid Stewardship Program for Patients With Chronic Non-cancer Pain in a Remote and Rural Family Health Team

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Background: In Canada, opioid-related hospitalizations increased by 27% in 2017, and 4034 lost their lives in 2019. Pharmacists can lead opioid stewardship programs (OSP) to coordinate interventions designed to improve, monitor, and evaluate the use of opioids to support and protect human health. Specialized clinicians in non-cancer chronic pain (NCCP) management in rural communities is often non-existent, including the care of a pharmacist.

Objective: To evaluate the feasibility and effect of a pharmacist-led OSP for CNNP, utilizing videoconference in a rural community family health team.

Methods: A mixed method pilot study including surveys and/or semi-structured interviews conducted with patients, clinicians, pharmacists and administrative staff involved in the OSP to understand their experiences

and/or satisfaction with the program. Retrospective chart review was undertaken to collect data on patient's opioid dose changes, and pharmacist recommendations. Adults with CCNP taking at least 50 morphine equivalent dose (MED) for at least 30 days, or less than 50 MED with persistent problematic pain and/or adverse effects were scheduled to attend 5 video-conference sessions over 10 weeks. Patient, physician and pharmacist surveys were web-based and semi-structured interviews with clinicians and family health team staff conducted by telephone. Descriptive statistics were generated from numeric variables, and change in patient's daily MED will be analyzed with either paired t-test or non-parametric testing.

Results: Nineteen participants were enrolled, most with upper body (53%) or back pain (29%). The OSP pharmacist made 35 recommendations, 63% accepted and implemented. Interviews conducted with service providers and program surveys showed the OSP had a positive impact and an interest in continuing to implement elements of the program into existing patient care practices.

Conclusions: Results generated from this study may add new evidence on the feasibility and effectiveness of clinical model in this kind on managing high dose opioid prescriptions in remote communities.

Adherence to Recommendations from Antimicrobial Stewardship Audit and Feedback Rounds in Academic Intensive Care Units

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Background: Antimicrobial stewardship programs (ASPs) can improve patient outcomes and decrease emergence of antimicrobial resistance. ASP guidelines recommend prospective audit and feedback (PAF) as it has been shown to reduce inappropriate antimicrobial use.

Objective: Factors associated with variable PAF acceptance rates are not well studied. Identifying predictors of successful recommendations may help optimize PAF processes.

Methods: The setting was a large, academic teaching hospital in Toronto, Canada. Data were recorded from verbal recommendations made during selected ASP rounds conducted in 3 intensive care units (ICUs) between April 2013 and September 2022. ASP recommendations were categorized using standardized definitions (Table 1). The primary outcome was acceptance of ASP recommendations.

Results: Overall, 85.7% of ASP recommendations were accepted. Interventions aimed at promoting appropriate antimicrobial coverage were less likely to be accepted in comparison to all other recommendations combined (OR 0.47, 95% CI 0.27-0.82). Recommendations within the "promote appropriate coverage" category were further classified to demonstrate that recommendations to expand antimicrobial coverage were more likely to be accepted than recommendations to narrow coverage (OR 2.37, 95% CI 1.08 - 5.19). There were no statistically significant differences in acceptance rates between ICUs or other intervention categories.

Conclusions: Most of the recommendations made during ASP rounds were accepted by the ICU teams. Recommendations that suggested expanding antimicrobial coverage were more likely to be accepted than those that suggested de-escalation. This finding is consistent with studies that looked at predictors of ASP intervention success in similar institutions. These results highlight important considerations for optimizing PAF process measures within institutional ASPs.

Encore Presentation

For the table that goes with this abstract, please see Abstract Appendix, available at https://www.cjhp-online.ca/index.php/cjhp/issue/view/214

An Analysis of Imipenem-Cilastatin Usage and the Potential for Carbapenem De-escalation at London Health Sciences Centre

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Background: London Health Sciences Centre currently uses imipenem-cilastatin as the primary formulary carbapenem agent. Carbapenem de-escalation studies have shown ertapenem can provide reliable activity against extended spectrum beta-lactamase (ESBL) organisms while alleviating selective pressure off drug resistant pathogens such as *Pseudomonas spp.* and *Acinetobacter spp*.

Objectives: The primary objective was to quantify empiric versus targeted use and how much could have been de-escalated to ertapenem. The secondary objectives were to characterize prescribing services, sources of infection, and pathogens detected.

Methods: This study was a retrospective chart review of adult inpatient imipenem-cilastatin orders from January 2021 to December 2021. 1298 orders were included, and 501 random orders were analyzed in the interim analysis and assessed for eligibility of de-escalation to ertapenem. Empiric therapy was defined as a culture negative infection, and was not eligible for de-escalation. Targeted therapy was defined as the presence of a positive culture with an isolated pathogen. Pathogens not eligible for de-escalation were *Acinetobacter spp.*, *Pseudomonas spp.*, and *Enterococcus spp*.

Results: Among the 501 orders included in the interim analysis, 53.5% (n=268) were identified as empiric therapy and 46.5% (n=233) were targeted therapy. Among the targeted therapy, 72.9% (n=170) were eligible for de-escalation to ertapenem based on study criteria. The most common prescribing services were Medicine (30.5%), Oncology (28.3%), Critical Care (15.6%) and General Surgery (7%). The most common sources of infection were urinary (19.5%), bloodstream (18.6%), respiratory (18%), and febrile neutropenia (17.6%). The most commonly isolated pathogens were *Enterobacter spp*. (n=57), *E. coli* (n=41*) Pseudomonas spp.* (n= 37), *E. coli* ESBL (n= 34) and *Klebsiella spp*. (n= 34).

Conclusion: This study demonstrates approximately 73% of targeted imipenem-cilastatin usage was eligible for de-escalation to ertapenem. These findings suggest an opportunity for optimization of carbapenem use and de-escalation to ertapenem for certain commonly isolated pathogens.

Antibiotic Stewardship and Route of Administration – Evolution of the Share of Oral and Parenteral Days of Therapy in a Teaching Hospital

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Background: Antimicrobial stewardship ensures monitoring of the proper use of antimicrobials. The conversion from intravenous to oral route is encouraged rapidly because it reduces some inherent risks and facilitates patient discharge.

Objectives: To evaluate the share of parenteral days of therapy (DOT) in a teaching hospital from 2005-2006 to 2021-2022.

Methods: Descriptive study. The study was taking place in a mother-child university hospital center with 500 beds. Using antimicrobial consumption data, the total number of DOT/1000 patient days for all oral and parenteral drugs was calculated by fiscal year from 2005-2006 to 2021-2022. The proportion of the number of parenteral DOTs to the total number of DOTs per fiscal year was calculated. In addition, the number of DOT/1000 patient days for pairs of antimicrobials available for the oral and parenteral routes was also calculated by fiscal year.

Results: The total number of DOT/patient days was reduced from 710 (2005-2006) to 609 (2021-2022). The proportion of DOT/1000 patient days for the parenteral route fell from 77% in 2005-2006 to 62% in 2021-2022. The proportion of DOT/1000 patient days for the parenteral route also decreased from 2005-2006 to 2021-2022 for the following antimicrobial pairs: acyclovir (97% c. 32%), azythromycin (12% c. 5%), ciprofloxacin (58% c. 31%), fluconazole (69% c.64%), levofloxacin (49% c.24%), metronidazole (71% c.16%), voriconazole (68% c.43%). However, this proportion increased for linezolid (0% c.38%). Other pairs of different pharmaceutical ingredient were also explored.

Conclusion: We observed a global reduction in the share of DOT by parenteral route in favor of the enteral route from 2005-2006 to 2021-2022. This reduction may be linked to the increased availability of some oral forms of antimicrobials overtime and to the interventions of our antibiotic stewardship program that contributes to the good use of antimicrobials within our hospital.

Assessing the Use of IV Fosfomycin in the Setting of Multi-Drug Resistant (MDR) Infections: Real World Experience

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Background: Intravenous (IV) fosfomycin is approved for the treatment of a variety of conditions including nosocomial lower respiratory tract infections (nLRTI) and complicated urinary tract infections (cUTI). IV fosfomycin has moderate activity against certain strains of *Pseudomonas aeruginosa* (*P.aeroginosa)* and *Klebsiella pneumoniae (K.pneumoniae)* which makes it a unique alternative when facing the increasing rates of antimicrobial resistance.

Objectives: The purpose of this study is to describe a real-world experience of IV fosfomycin treatment as adjunct salvage therapy for multi-drug resistant (MDR) infections and evaluate the incidence of clinical cure and microbiologic eradication at a tertiary care hospital.

Methods: A retrospective chart review was completed on patients who received IV fosfomycin in the setting of MDR infections from July 2021 until November 2022. A systematic data collection sheet was used to gather patient characteristics, clinical information, and outcomes. MDR was defined as resistance to at least one antibiotic in two or more antimicrobial classes. Descriptive statistics were used to analyze the collected data. Clinical cure was defined as resolution of signs or symptoms of infection.

Results: Over the study period, 4 patients received IV fosfomycin. Most patients (75%) were male with a mean age of 57.25. The most commonly isolated pathogens were MDR *P.aeroginosa* (75%) and *K.pneumoniae* (50%). Among the 2 nLRTI patients, both achieved short-term clinical cure but not microbiologic eradication. One later died from unrelated complications during a stay in critical care. Among the 2 cUTI patients, both accomplished clinical cure and microbiologic eradication. The adverse effects experienced were hypernatremia (50%) and hypokalemia (75%).

Conclusions: This real-world experience demonstrated the potential role of IV fosfomycin as add-on salvage therapy in MDR respiratory and urinary infections. Randomized controlled trials are required to further clarify the role of IV fosfomycin as monotherapy versus add-on therapy for MDR infections.

Assessment of the Compliance of Our Drug Circuit Audit Process with a Selection of 42 Effectiveness Criteria

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Background: A new theory for the design, implementation and evaluation of feedback in healthcare has been published. It includes a selection of high-confidence hypotheses that influence the effectiveness of feedback cycle.

Objectives: To assess the compliance of our drug circuit audit process with a selection of 42 effectiveness criteria.

Methods: This is a descriptive study. In our mother-child university hospital center, we conduct an annual audit on drug circuit targeting drug preparation and administration by nursing staff. Using the Clinical Performance Feedback Intervention Theory and its 42 hypotheses (compliance criteria), we assessed the compliance of that annual audit process. The hypotheses are categorised in three group of variables (feedback, recipient, and context) and 10 sub-group (goals, data collection and analysis method, feedback display, feedback delivery, health professional characteristics, behavioural response, organisation or team characteristics, patient population, co-interventions, implementation process). Two research assistants rated each criterion, along with supporting comments. Each criterion was rated as conform, not conform or not applicable. Two pharmacists independently reviewed the grid to confirm the ratings. Differences were resolved by consensus.

Results: The compliance of our drug circuit audit process was 70.7% (29/41) and one criteria were non applicable. Per sub-group of variables, it was: 100% (3/3) for goals, 75.0% (3/4) for data collection and analysis method, 71.4% (5/7) for feedback display, 75.0% (3/4) for feedback delivery, 66.7% (2/3) for health professional characteristics, 0% (0/1) for behavioural response, 100% (2/2) for patient population, 62.5% (5/8) for organisation or team characteristics, 75% (3/4) for co-interventions and 60.0% (3/5) for implementation process. Areas for improvement have been identified: computerize the collection of information in real time, increase data sharing with other hospitals.

Conclusion: Our drug circuit audit process complies with most of the criteria of an external standard. This evaluation made it possible to identify areas for improvement.

Calgary Acute Care Pharmacists: Changes in Prescribing and Lab Ordering Over Time

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Background: In Alberta, pharmacists can obtain Advanced Prescribing Authority and laboratory test ordering authority. While independent prescribing was mandated for Calgary inpatient pharmacists by 2018, lab ordering has been available since 2009.

Objectives: To describe the annual changes in frequencies and types of inpatient pharmacist prescribing and lab ordering from 2018 to 2021 in order to detect increased use of expanded scope of practice across Calgary, sites, and clinical pharmacy teams. Proportions of verbal orders were compared as indirect indicators of independent prescribing use.

Methods: A retrospective, descriptive review of pharmacist orders was completed using data from a computerized order entry system used across Calgary hospitals. Chi-square tests were used to determine differences in prescribing and lab ordering rates in 2018 compared to 2021. Z-scores were determined to identify differences in proportional outcomes between 2018 and 2021. For secondary outcomes, the study adjusted for multiple comparisons using Bonferroni tests.

Results: From 2018 to 2021, pharmacist prescribing and lab ordering rates rose by 67% and 5.5% respectively. All hospitals increased their prescribing rates (7%-176%). *Cardiology, ICU, and Mental Health* teams increased most in prescribing, while *Mental Health, Hospitalist, and ICU* teams increased most in lab ordering. The top ordered medication and lab test each year was vancomycin and vancomycin pre level. Verbal orders decreased from 60.0% to 47.4%.

Conclusions: Calgary acute care pharmacists have increased their use of expanded scope of practice over time with a greater change in prescribing than lab ordering. Pharmacist prescribing and lab ordering are complementary activities because the medications and labs they order support each other. Pharmacy leadership could address the high proportion of verbal orders and the minority of pharmacists who do not prescribe. These results can fuel individual change, practice review, or further research.

Comparing Outcomes and Characteristics Associated with Treatment Strategies in Critically Ill COVID-19 Patients

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Background: A Fraser Health study identified a similar mortality rate with the use of interleukin-6 receptor antagonists (IL-6 RAs) in critically ill patients with COVID-19 to what was reported early in the pandemic before IL-6 RAs were standard of care.

Objectives: The primary objective was to compare in-hospital mortality for critically ill COVID-19 patients at Surrey Memorial Hospital (SMH) in the following groups: oxygen only, dexamethasone only, and IL-6 RAs. The key secondary objectives were to compare hospital length of stay (LOS), presence of secondary microbial infection and patient characteristics.

Methods: This retrospective, cohort study evaluated consecutive patients with COVID-19 in the critical care unit between March 2020 to May 2021 who received 1 of the 3 treatments described above. Descriptive statistics were used for baseline characteristics. For group differences, chi-squared and ANOVA analyses were used for nominal and continuous data respectively. Logistic regression was performed to analyze the relationship between mortality and treatment arms.

Results: Of the 379 included patients, 65.4% were males and median age was 63 years (IQR 52,72). Ten percent (N=38) received oxygen, 31.7% (N=120) received dexamethasone, and 58.3% (N=221) received IL-6 RAs. The respective mortality was: 10.5% vs 27.5% vs 21.3% (P=0.079). Compared to the IL-6 RAs and after controlling for baseline differences, the odds of mortality were lower in the oxygen group (OR= 0.10, P=0.001); however, there was no significant association with dexamethasone. The dexamethasone group had a shorter hospital LOS compared to IL-6 RAs (P=0.005). There was no difference in microbial infections (P=0.740).

Conclusion: Although a lower mortality rate was observed in the oxygen only group, the small sample size may be a limitation to these results. Despite administration of immunomodulators, no difference in infections was observed. Future studies may consider using a larger patient database to better elucidate mortality differences between treatments.

Demand for Exceptional Access Drugs and Projected Impact of Exceptional Access Drug Applications on Pharmacy Workload at the Odette Cancer Centre

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Background: The Exceptional Access Program (EAP) facilitates access to high-cost drugs which are not funded under the provincial drug formulary. Preparing EAP applications is a laborious process which takes time away from prescribers' clinical duties. As such, medical oncologists at the Odette Cancer Centre (OCC) have requested the Pharmacy team assume this task as medication experts.

Objective: To quantify the demand for EAP submissions and estimate the number of staffing hours required to completely take over EAP management for all eligible patients of the OCC Pharmacy.

Methods: OCC Pharmacy records were used to identify active and pending EAP cases, which were organized and described as frequency counts by drug and prescriber. To estimate the anticipated workload associated with the EAP cases identified, an initial application was assigned a workload of 0.5h to complete, renewals were assigned a workload of 0.25h to complete, and 2 EAP renewals were assumed per year. Total projected workload for EAP submissions was reported in terms of FTE equivalents.

Results: A total of 910 active/pending EAP cases were identified for 42 unique drugs requested by 45 different prescribers. The 5 most commonly requested drugs were osimertinib (n=99), enzalutamide (n=91), abiraterone (n=76), palbociclib (n=74), and ibrutinib (n=53). One genitourinary (GU) oncologist was identified as an EAP super-user with 117 active/pending EAP submissions. The second, third, and fourth highest EAP users were another GU oncologist (68 submissions), a lung oncologist (61 submissions), and a hematologist (57 submissions). It would require 24.3 weeks of an FTE(37.5hrs/week) to prepare and submit 910 initial EAP applications and two renewals. Using these estimations, 0.5FTE would be required to meet the administrative workload demand.

Conclusion: This data demonstrates the time intensive nature of EAP applications and the need for a 0.5 FTE equivalent to completely assume the administrative burden for OCC Pharmacy patrons.

Effect of Clozapine Treatment on Relapse to Methamphetamine Use among Inpatients with Co-occurring Treatment-Resistant Schizophrenia Spectrum and Methamphetamine Use Disorders: A Retrospective Cohort Study

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Background: There are high rates of concurrent substance use disorders (SUD) in patients with schizophrenia spectrum disorders (SSD). Substance use relapse results in poorer outcomes in SSD and may be a risk factor for developing treatment-resistance. According to some preliminary evidence, clozapine may have a favorable impact on SUD outcomes versus other antipsychotics. However, there is paucity of evidence on its impact on concurrent methamphetamine use disorder (MAUD) outcomes.

Objective(s): We hypothesized that clozapine treatment would be associated with significantly lower rates of relapse to methamphetamine use and a higher likelihood of remaining abstinent compared to other antipsychotics.

Methods: A retrospective review of electronic health records was conducted on inpatients at the Burnaby Centre for Mental Health and Addiction between December 8, 2019 to October 8, 2021. Included patients had

concurrent treatment-resistant SSD and MAUD. Medication exposure was categorized as "on clozapine" or "on other antipsychotic(s)". Data extracted included demographics, diagnoses, substance use history, medications on admission/discharge, and urine drug screen results (methamphetamines/amphetamines, opiates, fentanyl, THC) during stay. Relapse rates were calculated as relapse-to-length of stay ratio; and were confirmed by positive urine drug screens and as-needed confirmatory testing. The Mann-Whitney U test and binomial logistic regression were utilized for hypothesis testing.

Results: Majority of 87 included patients were male. Indigenous ancestry had the highest prevalence in both cohorts. Methamphetamine use relapse rates were 71% higher in the other antipsychotic cohort compared to the clozapine users cohort (p=0.008). The odds ratio for complete abstinence for 'clozapine' versus 'other antipsychotic(s)' was 2.80 (1.03-7.63, p=0.04).

Conclusion(s): Clozapine treatment was associated with significant reduction in relapse rates to methamphetamine use and higher odds of remaining abstinent in treatment-resistant SSD-SUD versus other antipsychotic medications.

Evaluating the Incidence of Hypoglycemia among Hyperkalemic Patients Treated with Insulin in the Emergency Department at Trillium Health Partners (THP)

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Background: Management of hyperkalemia with IV insulin is associated with a 5-28% risk of hypoglycemia (blood glucose (BG) < 4 mmol/L) in admitted patients and 17-19% risk in Emergency Department (ED) patients. Untreated hypoglycemia can extend a patient's hospital stay and increase morbidity and mortality.

Objectives: We aimed to determine the incidence of hypoglycemia in hyperkalemic patients receiving 10 units IV insulin using the THP Adult ED Hyperkalemia Order Set (OS), as well as evaluate factors associated with hypoglycemia, and assess the 3-hour BG monitoring requirements from the OS.

Methods: A retrospective chart review of eligible patients administered insulin via the OS from January 1 to December 31, 2021 were identified through an electronic medical record report. Administrations were categorized into three cohorts (none, moderate (BG 2.8 to 3.9 mmol/L) or severe (BG < 2.8 mmol/L) hypoglycemia) to allow for comparison of outcomes by group.

Results: 197 insulin administrations in 181 adult patients were evaluated. The overall incidence of hypoglycemia was 24% (48/197) with 15 administrations (7.6%) resulting in a severe event. The proportion of hypoglycemic events that occurred more than 3 hours after insulin administration was 31%. Factors associated with hypoglycemia identified for future study included female sex, lower body weight, chronic kidney disease and lack of pre-existing diabetes.

Conclusions: Hypoglycemia incidence in THP ED was slightly higher than literature expectations. These findings will inform OS improvements such as extended BG monitoring. Future studies may identify high-risk patients who would benefit from alternative dosing and perform subgroup analysis to determine the statistical relationship between specific variables and hypoglycemia.

For the table that goes with this abstract, please see Abstract Appendix, available at https://www.cjhp-online.ca/index.php/cjhp/issue/view/214

Evaluation of Guideline Directed Medical Therapy Use in Outpatients Living with Heart Failure with Reduced Ejection Fraction

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Background: Pharmacotherapy is the cornerstone of treatment of heart failure with reduced ejection fraction (HFrEF) and major cardiac societies define guideline directed medical therapy (GDMT) as four foundational medications: renin angiotensin inhibitor (RASi), a beta blocker (BB), a mineralocorticoid receptor antagonist (MRA), and a sodium glucose transport 2 inhibitor (SGLT2i). Despite strong recommendations for use of GDMT in HFrEF, current practice alignment is unknown.

Objectives: Determine the proportion of patients prescribed GDMT for HFrEF, describe doses achieved, documented rationale limiting the optimization of GDMT, documented pharmacist activities between multidisciplinary heart function clinic (HFC) visits, and heart failure hospitalizations and emergency department(ED) visits in 2021.

Methods: Retrospective review of medical records for 270 patients of the Regina HFC with HFrEF as of December 31, 2021.

Results: Of the 129 patients included, 61 (47.3%) were on optimized GDMT, accounting for documentation of appropriate utilization of foundational therapies at target or maximally tolerated doses. Specifically, 82.2% (106/129), 80.6% (104/29), 79.1% (102/129), 74.4% (96/129) were optimized on RASi, MRA, BB, and SGLT2i, respectively. Documented rationale was not available in 35% (38/106) of instances of suboptimal utilization and 42% (60/144) of instances of suboptimal dosing. When documented, the most common rationale included intolerance to medication (33%, 35/106) and dose increases (56.6%, 83/144). A total of 553 pharmacist activities outside multidisciplinary clinic visits were documented in 58.9% (76/129) of patients. In total, 16 patients (12.4%, 16/129) were admitted to hospital and/or ED 31 times for HFrEF-related events in 2021.

Conclusion: Although many patients are receiving the benefits of multidisciplinary care at the Regina HFC, there remains a treatment gap in the utilization of GDMT for HFrEF. These findings inform strategies to improve clinic processes, including efficient identification of patients requiring optimization of GDMT, who would benefit the most from multidisciplinary care.

Evolution of the Conformity of the Drug Use Circuit on Healthcare Units and Outpatient Clinics of a Mother-Child University Healthcare Center

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Background: The drug use circuit is complex and encompasses many steps. Pharmacy departments are responsible for maintaining a safe drug use circuit that allows for quality patient care.

Objectives: To assess the conformity of the drug use circuit on patient care units and outpatient clinics and to compare it for 2019 and 2022.

Methods: This descriptive, observational, and cross-sectional study was conducted in a mother-child university healthcare center from 07/15/2019-07/24/2019 and 09/09/2022-10/13/2022. A standardized electronic tool comprising 8 themes and 25 criteria was used for patient care units and 7 themes and 19 criteria for outpatient clinics. Two pharmacy residents scored criteria by direct observation as: conform with/without recommendations, not conform or non-applicable. A Chi-2 was used to compare both years.

Results: Respectively, in 2019 and 2022, 17 and 21 patient care units and 30 and 33 clinics were audited. The conformity varied from 23.5%-100% per criteria. The overall conformity was respectively 82.5±17.4 in 2019 and 74.0±18.5% in 2022 on patient care units and 84.3±14.2 and 82.6±19.6% in outpatient care units. On patient care units and in outpatient clinics, respectively, 76.0% (19/25) and 85.7% (12/14) of criteria had a conformity rate superior to 75% in 2019, compared with 52.0% (13/25) and 72.2% (13/18) in 2022. The conformity was significantly reduced between 2019 and 2022 for two criteria: 88.9% (16/18) of patient care units did not have expired drugs in 2019, versus 52.6% (5/11) in 2022 (p=0.029); 75.0% (18/24) of outpatient clinics had a container for pharmaceutical waste in 2019 compared with 35.7% (9/24) in 2022 (p=0.019).

Conclusion: A reduction in conformity of the drug use circuit was observed between 2019 and 2022. The results of this repeated audit was used as an opportunity to provide feedback to the teams in order to maintain a safe drug circuit.

Evolution of the Speed of Reading and Summarizing Articles on the Roles and Impacts of Pharmacists

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Background: Healthcare professionals are exposed to a steady stream of new knowledge and articles. Good fast and efficient reading skills can help to better process this information. We hypothesized that reading time decreases with exposure to an article type.

Objectives: Evaluate the speed of reading and summarizing articles on the roles and impacts of pharmacists.

Methods: Descriptive and prospective study. Four research assistants updated the Impactpharmacie platform which summarizes articles describing the role and impact of pharmacists. In addition, they noted the number of pages and the time for reading and entering each article in the platform. We calculated the average reading time (h:min:sec) by page per type of article (i.e. article vs systematic reviews/meta-analysis), the average reading time per page per quartile and the slope describing the evolution of reading and typing speed over the articles read.

Results: A total of 186 articles were read and entered; only 164 had exploitable data for reading time (159 articles, 25 meta-analyses or systematic reviews) in the summer of 2022. The average reading time was 1h27±24min per article (min 30 min, max 3h30). The reading time per page was lower for systematic reviews/meta-analysis (10min58±4min42 vs 4min22±1min58). For studies, the average reading time per page per quartile decreased from 12min37±5min39 (1st quartile) to 11min56±4min42 (2nd quartile) at 10min9±3min55 (3rd quartile) to 9min19±3min20 (4th quartile). A plot of all reading times per page in reading order demonstrates a progressive reduction in reading time for studies (y = -9E-05x + 0.0094) and for systematic reviews/meta-analysis (y = -9E-05x + 0.0072).

Conclusion: Approximately 1h30 per article needs to be planned to maintain the impactpharmacy platform. Other factors such as ease of finding information and the clarity of the study design influenced the reading speed. Our study demonstrates a reduction in reading/summarizing time associated with experience.

Exploring Key Elements of User Experience in Gamification of Health Profession Education: What We Learned from the Literature

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Background: Serious games (or gamification) in health profession education aims to improve knowledge retention in a more engaging format than traditional teaching and learning methods. Elements of user experience (UX) in game design impact the effectiveness and satisfaction of educational games.

Objective(s): The goal of this project is to identify key UX elements in health education gamification to help design educational games related to patient or medication safety topics for pharmacy students and pharmacy professionals.

Methods: We completed the first 3 steps of Kern's six-step approach to curriculum development of a patient safety curriculum for health professionals in a previous study. This project is Step 4 of Kern's: Educational Strategies. A structured search on MEDLINE, Science Direct, JSTOR, Web of Science, and IEEE Xplore was performed to locate relevant papers discussing UX elements of games and applications in medical and health profession education. Article titles and abstracts were screened and cross-analyzed by two independent analysts, followed by a thematic and content analysis.

Results: We identified 76 articles. Upon screening, 9 articles were included in our subsequent thematic analysis. Key elements of UX in gamification that enhanced game effectiveness and satisfaction included ease of use, clarity, and affordance; realism and authenticity; feedback mechanism; competition and points system; and complexity and challenge.

Conclusion(s): Our study identified a series of UX elements that must be considered by educators to design engaging games for health profession students and health practitioners. Patient safety education is an aspect of health education that deserves further interprofessional collaboration and innovations from all health professions, and gamification can be an effective education strategy.

How Patient-Centred Are Inhaler Device Choices? A Survey of Canadian Prescribers

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Background: The choice of inhaler device type is an important consideration in the management of asthma and chronic obstructive pulmonary disease (COPD). There are various devices available in Canada, with differences in how each device needs to be used which may lead to confusion for both prescribers and patients.

Objectives: The primary objective was to identify the factors prescribers consider when selecting an inhaler device for patients with asthma and COPD. The secondary objective was to evaluate the ranking of these factors.

Methods: An online 10-question survey was developed and distributed to prescribers through email and online platforms. This study included prescribers in a primary care or outpatient setting within Western Canada. Prescribers were free to use their own words when describing the factors they considered important in the two scenarios provided in the survey. The first scenario included an 83-year-old woman with COPD. Whereas the second scenario included a 21-year-old male with asthma. Results were examined in a qualitative and quantitative manner.

Results: 148 participants interacted with the survey link. Of these, 82 respondents completed the survey and met the eligibility criteria (estimated response rate was 55%). The most frequently mentioned factor was prescriber experience (51%), cost (41%), ease of use (36%) and patient considerations (30%). In scenario 1, the factor most frequently mentioned was prescriber experience and ease of use. Whereas, in scenario 2, the factor most frequently mentioned was cost. In both scenarios, prescriber experience was ranked highest.

Conclusion: Prescriber experience was mentioned most frequently within both scenarios and ranked first by many prescribers. There was less emphasis on patient considerations which may indicate that device choices are not entirely driven by patient-centred factors.

Improving Precision of Vancomycin Dosing in Neonates Based on Clinical Outcome Evaluation and Population Pharmacokinetics

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Background: Neonatal sepsis is commonly treated with vancomycin in the neonatal intensive care unit (NICU). Vancomycin dosing remains a challenge due to significant pharmacokinetic variability and unclear vancomycin target range in neonates.

Objectives: The main objectives were to determine vancomycin target range associated with clinical outcomes and develop a better dosing strategy to increase probability to reach study-derived target range in the NICU.

Methods: This retrospective cohort study included neonates admitted to NICU receiving intravenous vancomycin. A population pharmacokinetic (popPK) model was derived and validated using nonlinear mixed effects modelling. The associations between vancomycin trough concentrations and persistent/recurrent infections and mortality or acute kidney injury were assessed using logistic regression and classification and regression tree (CART) analyses. Monte Carlo simulations (MCS) were performed to derive optimal dosing regimens.

Results: A one-compartment popPK model best described the observed data from 655 vancomycin courses in 448 neonates. A strong association between time to reach target range and composite outcomes was demonstrated (p=0.005). A vancomycin trough concentration of >10 mg/L was associated with lower odds of persistent/recurrent infections (adjusted odds ratio: 0.3, 95% confidence interval (CI): 0.09-0.86, p=0.023) and >15 mg/L was associated with increased risk of acute kidney injury (adjusted hazard ratio of 2.94, 95% CI: 1.10-7.90, p=0.003). A linear relationship between trough and area under the concentration-time curve over 24 hours (AUC_{24h}) was observed (p<0.0001). CART-derived AUC_{24h} of 420-650 mg*h/L appeared to be associated with lowest risk of outcomes (p=0.025). MCS-derived vancomycin doses showed significant improvement in target attainment.

Conclusion: A vancomycin trough target range of 10-15 mg/L was associated with most optimal outcomes in treating neonatal sepsis, which supports using vancomycin trough concentrations for therapeutic drug monitoring in neonates. A vancomycin dosing guideline using loading dose was derived to increase probability of target attainment and time at target in neonates.

Encore Presentation

In-Use Variability of Tacrolimus Concentration in Compounded Suspension for Transplanted Pediatric Patients

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Background: Variations of drug concentrations of oral compounded preparations may affect drug safety and efficacy. This is especially significant with drugs known to have a narrow therapeutic index like tacrolimus, an immunosuppressive agent widely used in solid organ transplantation. Stability studies provide guidance on the storage condition of drugs. We suspect that real life use may affect the quality of the formulation.

Objectives: To measure tacrolimus concentrations in bottles of compounded suspension stored and handled according to various scenarios mimicking real-world use, and to compare with the expected concentration (0,5 mg/mL ± 10%). To evaluate presence of microbial contamination over time.

Methods: Nine bottles of tacrolimus suspension (150 mL – 0,5 mg/mL) were prepared by the hospital pharmacy and subjected to the conditions and analyses shown in Table 1. We simulated patient use and measured some aliquots using a validated ultraviolet high-performance liquid chromatography assay. Samples for microbial analysis were inoculated on agar allowing bacterial and fungal growth for 14 days.

Results: Two (22%) of the 9 bottles prepared had concentration less than 0,45 mg/mL. Of the 6 bottles sampled twice daily over 28 days, 4 (67%) were below 0,45 mg/mL on day 7 and 5 (83%) on days 14, 21 and 28. No microbial growth was detected up to day 56.

Conclusion: Oral drug compounding has many limitations over commercially available products. The concentration of a compounded formulation of tacrolimus can be further affected by real life use. This should be considered by clinicians in their evaluation of patients with a suboptimal response to a compounded medication.

For the table that goes with this abstract, please see Abstract Appendix, available at https://www.cjhp-online.ca/index.php/cjhp/issue/view/214

Patients' Beliefs About Their Cardiovascular Medications After Acute Coronary Syndrome

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Background: Adherence to secondary preventive pharmacotherapy after an acute coronary syndrome (ACS) is generally poor and associated with increased risk of recurrent cardiovascular events and mortality. Patients' beliefs about their medications are a strong predictor of intentional medication nonadherence. The Beliefs About Medicines Questionnaire (BMQ) is a validated tool that has been correlated with adherence.

Objective: To assess patients' beliefs about their cardiovascular prevention medications post-ACS using the BMQ and self-reported adherence using the Medication Adherence Report Scale-5 (MARS-5) during their hospitalization and 4 weeks after discharge.

Methods: This was a prospective observational study of adult patients admitted with ACS to St. Paul's Hospital in Vancouver, BC from May-August 2022. The BMQ and MARS-5 were administered in hospital and 4 weeks after discharge. Patients with a type II myocardial infarction or

those unable to communicate in English were excluded. The primary outcome was change in BMQ post-discharge compared to in-hospital.

Results: In total, 43 participants completed the in-hospital questionnaires and 25 completed the 4-week follow-up. Mean age was 66 years, 74% were male, and 74% were white. Most presented with a non-ST-segment elevation ACS (67%) and reported taking all five post-ACS medications at 4 weeks (76%). There was no significant difference in the BMQ Necessity-Concerns Differential (5.5 vs 4.5, p=0.27) or MARS-5 (23.3 vs 23.7, p=0.17) from discharge to 4 weeks, or the BMQ General-Harm, General-Overuse, and Specific-Concern subscales. However, the BMQ Specific-Necessity subscale decreased significantly from discharge to 4 weeks (19.3 vs 18.1, p=0.02).

Conclusions: Participants held favourable beliefs about their post-ACS medications with high self-reported adherence, which were largely unchanged from hospitalization to 1 month after discharge; however, beliefs about the necessity of these medications declined significantly. Follow-up education about the benefits of secondary prevention medications may be necessary to reduce the risk of nonadherence in ACS patients.

Phenobarbital Alone or as Adjunct vs Benzodiazepine Therapy for Alcohol Withdrawal Syndrome in Critical Care – A Retrospective Cohort Study

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Background: Benzodiazepines based protocols have long been the mainstay of managing alcohol withdrawal (AWS). There has been increased interest in using phenobarbital in AWS given its unique pharmacological properties.

Objectives: The objectives of this study were to evaluate efficacy and safety of phenobarbital use for AWS compared to standard benzodiazepine therapy and to characterize the prescribing pattern for phenobarbital at Surrey Memorial Hospital.

Methods: This is a retrospective cohort study of adult patients admitted to Critical Care Units with a primary diagnosis of AWS, between January 1st, 2017 and January 31st, 2022. The exposure group included patients who received at least one dose of phenobarbital as monotherapy or adjunct therapy and the controlled group included patients who received benzodiazepine therapy. The primary outcome was Critical Care length of stay (LOS). The secondary outcomes were hospital LOS, mechanical ventilation, adverse events, and characterization of phenobarbital prescribing pattern.

Results: A total of 36 patients were included in the phenobarbital group and 59 patients in the benzodiazepine group. No statistically significant difference was found for Critical Care LOS (2.5 vs. 2.0 days, p=0.73). No difference was found in secondary outcomes of hospital LOS (7.7 vs. 7.0 days, p=0.65) or mechanical ventilation (6% vs. 14%, p=0.22). No statistically significant difference was observed in safety parameters, albeit more patients in the benzodiazepine group experienced at least one episode of reduced heart rate (34% vs. 19%) and decreased respiratory rate (20% vs. 8%). In the phenobarbital group, cumulative dose was 573mg, 25% of patients received only one dose, and 39% of patients received a loading dose ranging from 240 to 260mg.

Conclusions: Phenobarbital adjunctive therapy in the management of AWS in Critical Care was not associated with a reduction of Critical Care LOS. No significant difference was observed in adverse events compared to benzodiazepine treatment.

Podcast on Quality Improvement and Leadership for Early Career Healthcare Professionals

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Background: Podcasts have grown rapidly as a platform for providing engaging and entertaining educational content to healthcare professionals and health profession learners. They can be considered as a resource to complement traditional didactic-based continuing professional development (CPD) on quality improvement and leadership.

Objective(s): The objective of the "Leading with Quality" Podcast was to create a virtual resource for early career healthcare practitioners to learn about quality improvement (QI), medication safety, leadership, and business management.

Methods: We developed 6 podcast episodes where 7 guest speakers, ranging from faculty members to clinical directors, shared their QI and leadership experiences in higher education, hospital administration, pharmaceutical industry, provincial regulatory authority, and experiential learning. An interview format, along with a 30-minute podcast episode, was maintained to optimize audience engagement. The podcast content included real-life examples and lived experiences from the presenters. We released the episodes on SoundCloud and administered a 10-item online questionnaire to obtain feedback from listeners.

Results: A total of 20 responses were collected within a month of dissemination of the online questionnaire. Respondents perceived the podcast episodes to be valuable and relevant and they improved their knowledge about leadership and QI. They would listen to more episodes and recommend existing episodes to other healthcare professionals and learners. A few respondents mentioned that concepts and jargon should be explained at the beginning of the episode to improve clarity, and that some episodes might benefit from dividing into two sessions to allow for more elaboration on the subject matter.

Conclusion(s): The "Leading with Quality" Podcast is an accessible educational resource for healthcare professionals who wish to learn more about QI and leadership. The "Leading with Quality" Podcast will serve as a self-directed and easy-to-access CPD resource to support early career healthcare professionals in learning about QI and lived experiences from healthcare leaders.

Postsurgical Discharge Prescriptions for Opioid-Naïve Patients in University Teaching Hospitals in Quebec: A Descriptive Analysis

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Background: Opioid overprescription at discharge from surgery could predispose to misuse, addiction and mortality. In some situations, naloxone co-prescription could help reduce mortality. The PGTM performed an assessment of opioid prescriptions provided to patient at discharge after four selected surgeries in Québec's university hospitals.

Objectives: Describe prescriptions characteristics (quantity to be issued, nonopioid coanalgesics, partial-fill orders with dispensing interval and

naloxone prescription), assess oral morphine equivalents (OME) to be dispensed and compare it to opioid use during hospital stay.

Methods: Retrospective analysis of prescriptions in opioid-naive adults following one of four selected surgeries (cholecystectomy, pulmonary lobectomy, total knee replacement or intestinal resection) between July 1st and December 31st, 2019.

Results: There was a wide variation of prescribing patterns based on the surgery performed in the 689 identified prescriptions. Quantity to be dispensed was indicated on 98% of prescriptions. Only 34% of prescriptions for more than 30 tablets were divided into partial-fills; 43% of those had a specified dispensing interval between refills. At least one nonopioid co-analgesic was present on most prescriptions (89%) and 34% had two. OME per 24 hours (OME/24h) was 50 mg or more in 39% of prescriptions; none included naloxone. More than one third of prescriptions at discharge was for opioids exceeding 200 OME. Many patients hospitalized for more than two days received a prescription where OME/24h did not correlate with OME from the last 24 hours prior to discharge. For some, it exceeded by two to three-fold what was received in the last 24-hours of hospitalization.

Conclusions: Some prescribing characteristics do correspond to good practice principles while others need to be optimized: many patients could have had fewer opioid prescribed, the excess of 200 OME was too frequent and naloxone is not routinely prescribed. Recommendations to improve opioid prescriptions were shared with the surgical units involved.

Prescribing Patterns and Cardioversion Before and After the Introduction of Vernakalant for Recent-Onset Atrial Fibrillation in an Emergency Room

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Background: Atrial fibrillation (AF) is an arrhythmia frequently encountered in the emergency department (ED). Vernakalant, an antiarrhythmic with preferential action on the atria and shorter cardioversion time compared to other pharmacological agents, was introduced at our ED in autumn 2019.

Objective(s): The objective of this study was to describe the prescribing patterns and cardioversion of recent-onset AF in the ED before and after the introduction of vernakalant as a pharmacological option.

Methods: This descriptive, retrospective study was conducted using the electronic records of patients who consulted with recent-onset AF in the ED of the Institut universitaire de cardiologie et de pneumologie de Québec-Université Laval (IUCPQ-UL). Rates of successful cardioversion, defined as the return to sinus rhythm within 90 minutes of the start of drug administration, were compared between time periods before (n=110) and after (n=99) the introduction of vernakalant.

Results: Of 209 patients overall, 159 had electrical cardioversion (conversion rate: 96%), 26 received intravenous (IV) procainamide (conversion rate: 35%), 1 received propafenone orally successfully, 6 received flecainide orally (conversion rate: 17%), 21 received amiodarone IV (conversion rate: 24%) and 26 received vernakalant IV (conversion rate: 69%). With the introduction of vernakalant, there was a drop in the prescription of procainamide (19% vs 5%) and a decrease in electrical cardioversion (66% vs 57%). Of all drugs, vernakalant had the shortest time to cardioversion (median: 9 minutes vs. 46-129 minutes) and its use was associated with shorter stay in the ED (7 hours vs. 11-17 hours), both $p<0.05$.

Conclusions: This study has demonstrated different cardioversion prescription patterns following the introduction of vernakalant in this ED. The superior conversion rate as well as the reduction in both cardioversion time and length of stay with vernakalant support its clinical use.

Prescribing Trends for Antiestrogens, Bicalutamide, Traditional Oral Cytotoxic Agents, and Oral Immunosuppressants at the Odette Cancer Centre between 2018 to 2022

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Background: Our initial report found a decrease in the number of patients started on traditional oral anticancer medications (OAMs) and immunosuppressants each quarter.

Objective: This retrospective study describes prescribing rates for traditional OAMs and immunosuppressants, including anastrozole, exemestane, letrozole, tamoxifen, bicalutamide, capecitabine, chlorambucil, cyclophosphamide, cyclosporine, etoposide, fludarabine, hydroxyurea, isotretinoin, lomustine, mercaptopurine, methotrexate, midostaurin, mycophenolate, procarbazine, tacrolimus, temozolomide, and tretinoin.

Methods: Data for prescriptions dispensed between 01 January 2018 and 31 March 2022 were extracted from the Odette Pharmacy's Kroll database. Data was organized to identify new starts (patients starting a new OAM), unique prescriptions, and total prescriptions for antiestrogen agents, bicalutamide, traditional cytotoxics and immunosuppressants. Descriptive statistics and quarterly trends ($p<0.05$) were calculated for the total sample and each OAM subgroup.

Results: Findings are summarized in Table 1. Cytotoxics and/or immunosuppressants were the most frequently started (52%, 2132/4132) and prescribed (63%, 14961/22119). Although a decrease in the number of new starts was found for these agents over time (-1.4 new starts/quarter, $p=0.04$), the total number of prescriptions processed continued to increase (+7.9 prescriptions/quarter, $p=0.03$). Bicalutamide was the most frequently started single agent across all OAMs, but the total number of bicalutamide prescriptions and new starts decreased across the study period (-2.3 new starts/quarter, $p=0.01$; -2.7 prescriptions/quarter, $p=0.01$). No statistically significant changes in total or new antiestrogen prescriptions were found.

Conclusion: All traditional OAMs exhibited a decrease in new starts per quarter, but only bicalutamide and cytotoxics/immunosuppressants trends were statistically significant. Total number of bicalutamide prescriptions processed per quarter decreased over time, whereas other traditional OAMs exhibited static or increasing trends.

For the table that goes with this abstract, please see Abstract Appendix, available at https://www.cjhp-online.ca/index.php/cjhp/issue/view/214

Prevalence and Patterns of Cannabis Use in Cancer Patients Receiving Systemic Anticancer Treatment: A Prospective Survey Study

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Background: Cannabis is commonly used by cancer patients. There is a need for healthcare providers (HCPs) to engage patients and have open dialogue to ensure safe and effective use of cannabis for medical purposes.

Objective(s): Determine the prevalence and patterns of medical cannabis (MC) use among cancer patients.

Methods: Participants were adults ≥18, able to speak, read and understand English and currently receiving systemic anticancer treatment (SAT) at the Sunnybrook Odette Cancer Centre. There were 2 survey versions, one for patients who had used MC since their cancer diagnosis, and one for those who had not. Survey themes included: demographics/clinical characteristics, attitudes (assessed through a validated survey), prevalence/dosage forms, reasons for use, efficacy, concerns/side effects, access/availability, support, and MC information. Statistical analysis was completed using descriptive statistics, bivariate analyses, and multivariable models.

Results: The survey was completed by 234 patients (61% were female). Mean age was 60.2 (SD+/-13.3; range 22 – 89). The rate of MC use was 19% (95%CI 14%-24%). Of patients who had not used MC (n=190), 35% were interested in trying MC and 72% would consider using MC if recommended by their oncologist/family doctor. Of patients who had used MC (n=44), only 18% were being followed by a clinic/consult service. Eighty percent of patients who had used MC believed it should be more readily available to cancer patients compared to 60% of patients who had not used. Age and sex were not statistically significant predictors of MC use. Patients treated for advanced/metastatic disease were significantly more likely to use MC than patients treated for early/non-metastatic disease (p=0.0007).

Conclusion(s): Most cancer patients would trial MC. Disease status may predict decision to use. Few patients who use MC are followed by HCPs. We highlight the need for open dialogue between cancer patients and HCPs regarding MC use.

Prioritizing Quality Over Quantity: Defining Optimal Pharmacist to Patient Ratios to Ensure Comprehensive Direct Patient Care in a Medical or Surgical Unit

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Background: The expanding scope of hospital pharmacists has led to improvements in patient care at the expense of increased workloads. Currently, pharmacist staffing ratios for medical and surgical units have not yet been established in Canada.

Objectives: To determine the pharmacist to patient ratio which allows pharmacists to provide comprehensive care to each patient on a medical or surgical unit. To determine which comprehensive care tasks are deliverable in settings where staffing resources are limited.

Methods: A multi-phase study was conducted within six hospitals in British Columbia. First, a modified Delphi study was conducted to define and prioritize the elements of comprehensive pharmaceutical care. Next, a work sampling study was conducted to characterize the pharmacist workflow and to establish the time required and frequency associated with completing each task. Lastly, a validated workforce calculator was used to determine pharmacist to patient ratios.

Results: Ten pharmacists participated in the modified Delphi study, finalizing a list of 15 comprehensive pharmaceutical care tasks. Thirty-one pharmacists participated in the work sampling study. The optimal patient care ratio was found to be 1 pharmacist to 13 patients within Internal Medicine Clinical Teaching Units (CTU), 1 pharmacist to 26 patients in Hospitalist or non-CTU units, and 1 pharmacist to 14 patients in surgical units.

Conclusions: Ratios of 1 pharmacist to13 patients in CTU units, 26 patients in Hospitalist or non-CTU units, and 14 patients in surgical units would enable pharmacists to provide comprehensive pharmaceutical care to each patient. Implementing these staffing ratios will serve to increase the consistency of hospital pharmacy services, improve patient outcomes, and improve pharmacist job satisfaction, but could increase healthcare system costs. Further research is needed to validate these staffing ratios in subspecialty units.

Profile of Antimicrobial Use in a Teaching Hospital

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Background: In its Required Organizational Practices, Accreditation Canada requires the presence of an antimicrobial stewardship program to ensure the optimal use of medications. Testing for compliance includes the need to periodically verify usage and share this data with clinicians.

Objectives: Describe the profile of antimicrobial use in a teaching hospital.

Methods: This is a descriptive study. All antimicrobial consumption data from April 1st, 2021 to March 31st, 2022 were extracted from the electronic health record. From these data, the number of days of therapy (DOT) was calculated globally and by antimicrobial (n=95). Subsequently, ratios of DOT/1000 patient days were calculated globally, by class (i.e. antibiotics, antivirals, antifungals, others) and by care unit. Were also calculated the share of DOT according to the three groups of the World Health Organization AWaRe classification.

Results: A total of 70527.0 DOT and 672.5 DOT/1000 patient days were calculated in 2021-2022, compared to 67578.0 DOT and 696.6 DOT/1000 patient days in 2020-2021. The number of DOT/1000 patient days was 550.8 for all antibiotics, 46.5 for all antivirals, 67.9 for all antifungals and 7.3 for all others. The ratio varied by antimicrobial used (e.g., 0.02 as minimum value (ribavirine) to 77.5 as maximum value (piperacillin-tazobactam)). It also varied by care unit (e.g. 2.30 as minimum value in psychiatry and 336.9 as maximum value in oncology). According to the AWaRe classification applicable to 52 of our antimicrobials, 34.6% (18/52) of the DOTs referred to Access group, 53.8% (28/52) to Watch group and 11.5% (6/52) to Reserve group.

Conclusion: There are relatively few pediatric published data from hospitals on the use of antimicrobials. Antimicrobial stewardship is based on an individual activity targeted by prescription as part of the care provided to the patient as well as global surveillance to comment on the evolution of practices within a setting.

Profile of the Data Available on Impactpharmacie Relating to the Roles and Impacts of Pharmacists

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Background: There are a growing number of published studies on the roles and impacts of community and hospital pharmacists in the literature. Our research team has been maintaining a platform that showcases these studies for a decade.

Objectives: Describe the profile of the data available on Impactpharmacie relating to the roles and impacts of pharmacists.

Methods: Descriptive study. Based on the data from the platform and the injection of 186 new articles in the summer of 2022, we extracted a profile of the summary sheets available. These articles were categorized according to 40 pharmaceutical activities, 29 diseases/clinical conditions and 28 patient care programs.

Results: As of November 2022, the Impact Pharmacy platform included 3,250 study summaries describing the roles and impacts of pharmacists, published from 1990 to the present day. The studies were cross-sectional (44%,1443/3250 studies), retrospective (38%,1248/3250), prospective (17%,543/3250). These studies came from work conducted in the United States (44%, 1436/3250), in more than one country (9%, 306/3250), Canada (7%,222/3250), France (6%,184/3250), and in several other countries. The studies were conducted in a hospital setting (43%,1398/3250), a community pharmacy (19%,611/3250), an outpatient clinic (17%,561/3250) or in a mixed setting or otherwise (21%,680/3250). A minority of studies had a control group (35%,1130/3250), randomized (18%,587/3250) or blinding (8%,249/3250). The top-3 pharmaceutical activities were: evaluating pharmacotherapy, individual patient counseling, therapeutic education; the top-3 diseases/clinical conditions were: diabetes, infections, hypertension; the top-3 patient care programs were: cardiology, infectious diseases and diabetes/endocrinology. The studies assessed outcome/impact indicators (54%,8392/15580 indicators) and descriptive indicators (46%,7188/15580 indicators).

Conclusion: In 30 years, more than 3200 studies have been published describing the roles and impacts of pharmacists. There is a need for more controlled studies to better demonstrate their impact. Updating a platform like Impactpharmacie.org makes it possible to share this data in an educational or professional setting.

SGLT2 Inhibitors, the Blockbuster Drug of the Early 21st Century

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Background: Sodium Glucose Cotransporter 2 inhibitor (SGLT2i) is a class of drug which were originally intended for decreasing blood glucose in patients with diabetes. However, SGLT2i have recently been shown to offer other impressive clinical benefits.

Objective(s): The objective of this review is to summarize the results and clinical benefits from recent diabetes, heart failure, and kidney disease SGLT2i trials.

Methods: Major clinical trials involving SGLT2i medications from 2015 to 2022 were reviewed.

Results: Recent major SGLT2i landmark trial have demonstrated cardiorenal benefits regardless of diabetes.

Conclusion(s): The consistent cardiorenal benefits observed in major landmark trials have led to the rapid adoption of SGLT2i therapy in not only diabetes guidelines but also cardiovascular and renal guidelines.

Encore Presentation

For the tables that go with this abstract, please see Abstract Appendix, available at https://www.cjhp-online.ca/index.php/cjhp/issue/view/214

Stability and Compatibility of Bupivacaine and Hydromorphone in PVC and Non-DEHP Bags for 30 Days at 4°C and 25°C

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Background: Studies have demonstrated stability and compatibility of hydromorphone and bupivacaine, but none at hydromorphone concentrations ≤20mcg/mL or in non-DEHP bags.

Objective: The objective was to evaluate the stability and compatibility of bupivacaine and hydromorphone diluted in 0.9% sodium chloride (NS) and stored in PVC bags and non-DEHP bags for 30 days at 4°C and 25°C.

Methods: On day 0, eight PVC and eight non-DEHP bags were prepared with hydromorphone and bupivacaine diluted in NS: bupivacaine 0.5mg/mL and hydromorphone 1.5mcg/mL; bupivacaine 0.5mg/mL and hydromorphone 30mcg/mL; bupivacaine 2.5mg/mL and hydromorphone 1.5mcg/mL; bupivacaine 2.5mg/mL and hydromorphone 30mcg/mL. Four bags of each were stored at 4°C and 25°C. Concentration and physical inspection were completed on days 0,2,7,9,14,21,30. Drug concentrations were determined using a validated stability-indicating liquid chromatographic method with UV detection. Chemical stability was calculated from lower limit of the 95% confidence interval of the degradation rate and time to achieve 90% of the initial concentration.

Results: The analytical method measured bupivacaine and hydromorphone specifically, accurately (deviations from known averaged 1.03% and 2.72%), and reproducibly (replicate error within days averaged 0.21% and 0.28%, and between days averaged 0.67% and 1.22%). Bupivacaine and hydromorphone retained ≥96% of their initial concentrations for all concentration combinations, temperatures and container. The calculated chemical stability exceeded the 30 day study duration for all concentration combinations. Analysis of variation revealed day ($p<0.01$), temperature ($p=0.02$), and initial concentration ($p<0.01$) affected percent remaining of bupivacaine but container did not ($p=0.91$). For hydromorphone, day ($p<0.01$) and initial concentration ($p<0.01$) affected percent remaining while temperature ($p=0.19$) and container ($p=0.12$) did not. The study was capable of detecting a 1.05% difference in percent remaining due to the variables.

Conclusion: The concentration combinations of bupivacaine and hydromorphone were stable and compatible for 30 days when stored in PVC or non-DEHP bags at 4°C and 25°C.

Stability of 5-Fluorouracil at 4°C, 25°C and 33°C Stored in Nipro SureFuser+ Ambulatory Balloon Infusers

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Background: Elastomeric infusion devices can facilitate home infusions but require stability studies to ensure the stability of the drug during storage and administration.

Objective: To evaluate the stability of 5-fluorouracil undiluted (50mg/mL) or prepared with 5% dextrose (D5W) to concentrations of 5 and 30mg/mL and stored in Nipro SureFuser+ Ambulatory Balloon Infusers for 60 days at 4°C and 25°C and 7 days at 33°C.

Methods: On day 0, 250mL infusers were each filled with undiluted 5-fluorouracil, 5mg/mL 5-fluorouracil in D5W, or 30mg/mL 5-fluorouracil in D5W. Four infusers of each concentration were stored at 4°C, 25°C, and 33°C. Physical inspection and concentration analysis were completed on days 0,2,4,7,14,21,28,42,49,60 for infusers stored at 4°C and 25°C; and days 0,1,2,3,4,7 for infusers stored at 33°C. 5-fluorouracil concentrations were determined using a validated, stability-indicating liquid chromatographic method with UV detection. Chemical stability was determined using the intersection of the lower limit of the 95% confidence interval of the observed degradation rate and time to achieve 90% of the initial concentration.

Results: The analytic method separated degradation products from 5-fluorouracil such that the concentration was measured specifically, accurately (deviations from known averaged 1.15%), and reproducibly (within day replicate error averaged 0.34%, between day error averaged 0.88%). Solutions retained ≥97% of their initial concentration for all concentrations and temperatures and no degradation products were seen. Infusers with undiluted 5-fluorouracil stored at 4C had precipitation on day 60, but were resolubilized after storage at room temperature. Multiple linear regression identified differences in percent remaining due to day ($p<0.01$), concentration ($p=0.01$) but not temperature ($p=0.35$). The study was capable of detecting a <1% difference in percent remaining due to the variables.

Conclusion: 5-fluorouracil stored in Nipro SureFuser+ Ambulatory Balloon Infusers is stable for ≥60 days when stored at 4°C and 25°C, and ≥7 days when stored at 33°C.

Status of Reporting of Adverse Events Occurring in a Tertiary Cardiopulmonary and Metabolic Healthcare Center: Preliminary Results

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Background: Drug-related adverse events (AEs) reporting is essential to ensure continuous commercialized drug safety assessment. For Health Canada to assess the risk-benefit ratio of drugs available to the population, AEs potentially associated with a drug must be reported to health authorities. The proportion of AEs is currently reported to Health Canada remains unknown. However, since December 2019, Vanessa's Law requires the declaration of all serious AEs occurring in hospitals.

Objective: Quantify serious AEs that have been or should have been reported to Health Canada.

Methods: A descriptive cohort study is underway at the Quebec Heart and Lung Institute, a tertiary academic cardiopulmonary and metabolic healthcare center. The study includes 1,000 randomly selected patients (250 patients/year) who have been hospitalized between January 1, 2018 and December 31, 2021. Descriptive analyzes (median [minimum-maximum]; proportions) were used to characterize the sample (sex, age, etc.) and the drug-related AEs that occurred.

Results: Among the 301 files identified (125: 2018, 139: 2019 and 27: 2020), the median age of patients is 70 years old [minimum: 21-maximum: 93] and 44% were female. During their hospitalization, the patients consumed between 1 and 48 different drugs (median: 13). In addition, the median number of AEs per patient is 5 [0-40]. Among the 2,043 AEs identified, 86 are considered serious. During the studied period, no AEs (serious or not) (0%) have been reported to Health Canada.

Conclusion: According to our preliminary data, AEs that occurred in our academic healthcare center mainly from 2018 to 2019 were largely underreported. Data extraction continues for the following cohorts. If the Vanessa's Law is not an effective solution for improving AE reporting in our jurisdiction, other possible solutions will have to be thought and developed to improve commercialized drug safety for the Canadian population.

Surgical Antimicrobial Prophylaxis (SAP) Decision-Making and Disagreement in the Operating Room: A Thematic Analysis

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Background: Antimicrobial prophylaxis decision-making in the operating room relies on joint decision-making by anesthesiologists and surgeons. Although team-based decisions are common in medical care, joint responsibility for the same decision shared concurrently between disciplines is fairly unique and may lead to areas of indecision or conflict and ultimately less appropriate prophylaxis.

Objective: The purpose of this study was to evaluate drivers of decision-making and conflict around SAP between surgeons and anesthesiologists.

Methods: Semi-structured interviews were conducted with anesthesiologists and surgeons practicing at Mount Sinai Hospital in Toronto, Ontario. Thematic analysis was applied in an effort to reach saturation.

Results: Three themes were extracted from the six semi-structured interviews conducted. ***Theme 1:*** There is frequent conflict in terms of the assessment and management of penicillin allergies prior to surgery. The conversation surrounding the cross-reactivity of penicillin and cefazolin persistently results in antimicrobial prophylaxis discussions between both clinicians. ***Theme 2:*** There is a lack of awareness of local resources and guidelines surrounding emergent surgeries, SAP weight-based dosing and redosing intervals, resulting in uncertainty and heterogeneity in practice. ***Theme 3:*** There is variability in SAP recommendations across institutions and between clinicians. Discussions show that although policies and guidelines are situated in the operating rooms, unique experiences and preferences result in poor adherence to SAP policy.

Conclusion: Surgical antimicrobial prophylaxis decision-making is more than following the algorithm. Understanding the multiple unique and complex drivers of prophylaxis decision-making behaviour is vital to improving the delivery of optimal patient care.

Survey of CHEO Staff on the Use of Epinephrine and the End-User Experience with Removal of Ratios from Epinephrine Products: A Quality Improvement Pilot

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Background: In 2016, Pharmaceutical companies have removed ratios from the labelling of single-entity injection drug products like epinephrine. This follows reports of multiple incidents report related to the potential confusion with ratios expression by ISMP. However, hospital pharmacies have been requested by clinical staff to add ratios back on labelling.

Objective: The objective of this survey conducted from November 16TH 2021 to December 6th 2021 was to find out how healthcare professionals at CHEO who are front-line users of epinephrine feel with respect to their current habits when they need to use epinephrine.

Methods: Healthcare workers who work in any area of the hospital were surveyed anonymously via REDCap on their use of epinephrine in emergency settings. Questions assessed the training received on epinephrine use, the issues encountered when administering epinephrine, and the overall acceptance of the current standard of no-ratio epinephrine use.

Results: 67 employees responded to the survey (28% physicians, 52% nurses, 18% pharmacists, and 2% respiratory therapists). 36% of respondents indicated they had PALS/ACLS training with ratios (74% of physicians, 27% of nurses, and 8% of pharmacists). There were 22.4% of respondents who did not have training on ratios. A total of 28.4% of respondents indicated they would like ratios adding back to labelling (17.2% did not want ratios added back and 22.3% did not have an opinion). Physicians were the most likely to want ratios added back (50%), followed by nurses (36%), then pharmacists (14%). A total of 12% of respondents indicated they have had at least 1 medication administration problem with current labelling (75% physicians, 13% care facilitators, and 12% pharmacists).

Conclusion(s): This survey highlights the challenges of implementing new regulations without a global strategy to engage all key stakeholders in enacting changes and safe practices in a sustainable way.

Sustainability in Hospital Pharmacy: A Quality Improvement Pilot to Assess Awareness to "Go Green"

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Background: A new strategy titled 'Kick the Carbon' was initiated in the 2021 Children's Hospital of Eastern Ontario (CHEO) organizational strategy plan with a goal of reducing greenhouse gas (GHG) emissions by 30% from 2019 to 2025.

Objectives: Determine awareness of and describe Eco-initiatives that the department of pharmacy can implement to aim to reduce the carbon footprint in hospital pharmacy and contribute to CHEO's organizational strategy.

Methods: In a quality improvement initiative, CHEO pharmacy employees (*i.e.* pharmacists and pharmacy technicians) were invited to complete a cross-sectional survey which was designed to gauge willingness to 'go green' at work, to identify actionable areas of waste, and to assess commuting practices.

Results: A total of 15 respondents completed the internal pharmacy survey conducted between March 14th –April 7th, 2022. Most respondents (73%) were willing to engage in more sustainable practices at work. Approximately 25% indicated they have biked at least once to work and 1 respondent (~5%) indicated biking as a primary commuting method. Respondents indicated the main barriers to implementing green practices at work were cost (26%), complexity (33%), and time (33%). The three largest areas of waste in hospital pharmacy cited by respondents were single use plastic (36%), lack of awareness of green practices (15%), and lights left on in empty rooms (12%).

Conclusions: There was a very high willingness to be part of more sustainable 'go green' practices in hospital pharmacy. There is a need to describe and measure how hospitals can contribute in measurable ways to strategically implement Eco-initiatives.

Trends in New and Total Prescriptions for Oral Anticancer Medications at the Odette Cancer Centre: A 51-Month Retrospective Study

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Background: The Odette Cancer Centre is the second largest cancer centre in Canada. Although various publications discuss trends in intravenous chemotherapy use, little data describing use of oral anticancer medications (OAMs) is available.

Objective: Describe use of OAMs at the Odette Cancer Centre from the first quarter of 2018 to the first quarter of 2022.

Methods: Data for dispensing events between 01 January 2018 and 31 March 2022 were extracted from the Odette Pharmacy's Kroll database. Data was organized to identify new starts (patients starting a new OAM), unique prescriptions, and total prescriptions for all OAMs, traditional OAMs (anti-estrogens, bicalutamide, traditional cytotoxic agents, and immunosuppressants), and modern OAMs (non-traditional OAMs). Descriptive statistics and quarterly trends (significance level of <0.05) were generated for each OAM group.

Results: Findings are summarized in Table 1. Over 60 thousand OAM prescriptions were processed across the study period. Although the majority of prescriptions dispensed were for modern OAMs (63%), the majority of new starts were for traditional agents (59%). The number of OAM prescriptions processed increased by 79.6 each quarter ($p<0.001$), driven by prescriptions for modern OAM agents (+76.4 prescriptions/quarter, $p<0.001$). The number of new OAM starts decreased by 5.2 each quarter ($p=0.03$), driven by a reduction in traditional OAM starts (-5.3 new starts/quarter, $p=0.02$). No change in the number of new starts per quarter was found for modern OAMs.

Conclusion: Although fewer patients are started on OAMs each quarter, the total number of OAM prescriptions dispensed each quarter is on the rise and driven by modern OAMs.

For the table that goes with this abstract, please see Abstract Appendix, available at https://www.cjhp-online.ca/index.php/cjhp/issue/view/214

Use of Podcasts in Healthcare: A Literature Review

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Background: There are different dissemination tools used in academic or continuing education. The podcast can be used as a broadcasting tool.

Objectives: To describe the use of podcasts in healthcare.

Methods: Literature review. From Pubmed, the following strategies were used: term "podcast" alone, the combination "podcast AND medicine", "podcast AND healthcare" as well as "podcast AND pharmacy". From Embase, the following strategies have been used: term "podcast" alone, the combination "podcast.mp. or podcast/ AND medicine.mp. or medicine/", the combination "podcast.mp. or podcast/ AND healthcare.mp. or

healthcare/" and the combination "podcast.mp. or podcast/ AND pharmacy.mp. ". Were included articles published in English or French, dealing with the design and/or use of podcasting in the field of health. Articles citing podcasts without describing or evaluating their impact were excluded.

Results: Of the 19 articles retained, 12 came from the United States, two from Australia and one respectively from Canada, the United Kingdom, Ireland, Germany or several countries. Types of studies included surveys (n=3), literature reviews (n=7), and studies involving an intervention or evaluation (n=9). Six articles related to drug-related content or target pharmacy students or pharmacists. Podcasts were used as training tools but also as an evaluation tool (e.g. the format of the work to be submitted by students is a podcast). Several studies commented on the quality indicators surrounding the design, choice of content, credibility and dissemination of podcasts. Some studies offered a list of relevant podcasts (eg Cursiders, Flip the script, the clinical problem solvers, 2 Docs talk). The included studies described the use of podcasts in oncology, obstetrics-gynecology, dermatology and rheumatology.

Conclusion: There is little data on the use of podcasts in the field of health including pharmacy. Further work is needed to confirm the usefulness and impact of health podcasts.

Venous Thromboembolism Prophylaxis Across the Prairie Provinces: Description of Definitions and Unique Populations

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Background: Venous thromboembolism (VTE) is the most common preventable cause of hospitalization death, and requires institutional accreditation. Despite this, practices vary related to order sets, unique populations, and clinical bias.

Objective(s): To describe VTE prophylactic strategies across varying patient demographics (weights/renal function) and awareness of institutional policies used across prairie provinces.

Methods: Electronic survey of pharmacists having general/family medicine institutional practices within Alberta, Saskatchewan and Manitoba in late 2017.

Results: Amongst 88 (24.2%) respondents, the majority (60.2%) had practiced >5 years, were working in full time positions (81.8%) as staff pharmacists (94.3%). Most (77.1%) reported that prophylaxis was provided for >75% of patients, with therapy being discontinued at discharge (58.0%) or once mobile (37.5%). The majority (55.7%) lacked a definition for mobility, while activities at home (20.5%) and up to bathroom with walking a defined distance (13.6%) was defined. For normal weight and renal function, agents used were: dalteparin (36.4%), enoxaparin (31.1%), unfractionated heparin (UFH) (15.4%) and tinzaparin (11.3%). For upper body weight cut offs, 50% used kilograms (median 100Kg [range 100-150]), 29.5% used BMIs (median 40 [30-40]) with 86.7% escalating doses with obesity. For lower weight cut offs, 63.6% used Kgs (median 40Kg [30-50]) with 72.3% lowering the dose. For those with CrCl <30mL/min or hemodialysis, most common agents were UFH (55.7% and 65.2%) and enoxaparin (23.5% and 26.3%). The majority (80.7%) used institutional order sets with 56.8% aware of an institutional audit. Medicine and surgery units were most commonly audited with pharmacists most often responsible for the audit.

Conclusion(s): Most patients were prophylaxed with enoxaparin or dalteparin unless CrCl <30mL/min or undergoing hemodialysis wherein UFH was used. Despite 80.7% having institutional order sets, mobility was not defined for the majority and some pharmacists identified not having weight cut offs for obese (29.5%) or emaciated (35.2%) patients.

PHARMACY PRACTICE / PRATIQUE PHARMACEUTIQUE

A Virtual Interactive Case System Innovation to Support Pharmacist Prescribing for Minor Ailments

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Background: Virtual interactive cases (VICs) have been used as an educational resource for differential diagnosis training in medical students, but they have not been explored in pharmacist prescribing for minor ailments.

Description: We aimed to share our experience in the development of 3 VICs to support pharmacist prescribing for minor ailments.

Action: We created VICs on minor ailment prescribing for allergic rhinitis, conjunctivitis, and cold sores. Through iterative case writing, reviewing, transcribing, and standard setting to the VIC online environment, we recognized the benefits and challenges when attempting to fully utilize the built-in functionalities of the platform, assuming that a patient may not always be able to explicitly inform the pharmacist the type of minor ailment consultation that is being sought.

Evaluation: When developing the patient assessment component of VICs, we embedded 10% relevant or essential questions that a VIC user should ask to rule in or out a differential diagnosis. We included one correct and 6-10 incorrect diagnosis statements to challenge the user on differential diagnosis of the minor ailment. When managing the minor ailment, the user was presented with only 30% appropriate interventions, including pharmacologic and self-care options. A user would be able to solve the case scenario with the correct minor ailment diagnosis if all statements and questions were inspected during patient assessment, but costs and time associated with irrelevant actions taken would be reflected in the VIC final debriefing, informing the user that such clinical encounter was not practically and logistically feasible.

Implications: We recognized the core benefits of the VICs are to support and challenge pharmacist knowledge and skills in providing minor ailment prescribing service. The VICs are not meant for educating nor training pharmacists in minor ailment prescribing. VIC is a safe and user-friendly platform to support pharmacist prescribing for minor ailments.

Encore Presentation

Assessment of Sedative-Hypnotic Drug Use to Reduce Risk of Falls in Selected Inpatient Areas of Nova Scotia Health: Results of a Pilot Project

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Background: Sedative-hypnotic drugs (SHDs) are commonly prescribed in hospitalized patients to manage sleep disturbances and anxiety. Older adults are particularly vulnerable to adverse effects of SHDs such as impaired coordination, increasing their risk for falls and fractures.

Description of Service: The objective of this project was to assess the feasibility of conducting a structured medication assessment in hospitalized patients to reduce SHD use, and thus falls risk.

Action: A standardized medication assessment form evaluating SHD use and fall risk was developed and incorporated into clinical pharmacy practice on 4 pilot units within Nova Scotia Health. For patients prescribed SHDs, the assessment form was completed by a pharmacy student or pharmacist, which gathered patient demographics, fall history and risk factors, SHD use and other fall risk increasing drugs (FRIDs). For each assessment, recommendations were made to the care team and discussed with the patient when possible.

Evaluation: Acceptance of recommendations were documented on the assessment form for data collection. A total of 32 patients (mean age 77.5 years) were assessed during the pilot period of August 4 to September 28, 2022. Each pilot unit completed 6 to 10 assessments. Excluding SHDs, patients were prescribed a mean 4.9 concurrent FRIDs, and 59.4% had a history of falls. Twenty-four assessments (75%) resulted in recommendations to stop or reduce the dose of an SHD, of which 20 (83.3%) were accepted. Nineteen of 32 patients (59.4%) had SHDs initiated during their hospital stay. After assessment, 14 recommendations to stop or reduce the dose of the SHD were made and 13 were accepted.

Implications: Results indicate that incorporating a structured medication assessment to reduce SHD use and fall risk was feasible and acceptable to inpatient care teams. Pharmacists' attitudes toward the tool and ability to incorporate into clinical practice will be assessed.

Encore Presentation

Developing a Non-formulary Drug Usage Report for the Pharmaceuticals and Therapeutics (P&T) Committee

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Background: An often-overlooked tool in formulary management is monitoring and reporting on patterns of non-formulary drug (NFD) usage to the Pharmaceuticals and Therapeutics (P&T) committee, allowing for evaluation of appropriate NFD use and identification of potential targets for formulary review or assessment of best practices. In an environmental scan of hospitals within the Greater Toronto Area, 1 out of 6 hospitals reports NFD usage metrics to the P&T committee, indicating that NFD usage is an area with challenges and opportunity for standardization.

Description: As supported by literature, metrics such as the number of NFD therapy initiations or instances of overridden therapeutic-interchange alerts can be reported semi-annually or annually at P&T committee meetings. Additionally, the recent implementation of computerized provider order entry (CPOE) at Trillium Health Partners (THP) improves access to data surrounding medication orders and NFD usage.

Action: A report corresponding with metrics from the literature was designed for orders placed from May 1-31, 2022 using data extracted from the CPOE. Successes and challenges were noted for the future implementation of an NFD report relevant to the P&T committee.

Evaluation: NFDs comprised 0.54% (1624/303,385) of all orders in the evaluation period. The therapeutic classes with the most NFD orders were blood products and skin preparations. Across THP sites, the emergency departments ordered the greatest number of NFDs, which is expected. We experienced challenges in data quality that required correction, such as the misclassification of formulary status and confusing therapeutic class labeling. Data corrections and further analysis are required to report on the metrics we sought as supported by literature.

Implications: This project provides a starting point and lessons learned for THP as well as other CPOE-enabled institutions in developing an evidence-based NFD usage report, which will ultimately aid P&T committees in optimizing safe and effective care.

Development and Evaluation of an Online Pocket Guide to Quality Improvement

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Background: Continuous quality improvement empowers healthcare professionals to optimize patient safety and quality care. A virtual community of practice will facilitate knowledge exchange of quality improvement (QI) initiatives among pharmacy professionals.

Objective(s): Our project is aimed to develop and evaluate an infographic-based online Pocket Guide to Quality Improvement (PGQI), which will serve as a preliminary step to build a QI community of practice for pharmacy professionals.

Methods: We consulted national and international resources for training healthcare professionals on QI and consolidated into an infographic-based online pocket guide. We pilot tested the PGQI to a convenience sample of pharmacists and pharmacy students in Canada and administered a 14-item online survey to gather their user experience in October 2021.

Results: We developed an infographic-based online PGQI, which outlines key concepts in QI. The PGQI is a resource to educate pharmacists and pharmacy students on QI. A total of 20 responses were collected from our user experience online survey. The respondents' primary practice was diversely located in community, hospital, administrative, and regulatory authorities, with representation from six provinces. The length of time to review the PGQI ranged from 5-15 minutes. Users found the materials relevant and easy to understand. Notably, 70% respondents perceived a significant increase in their QI knowledge; 90% would recommend the PGQI to other healthcare professionals; and 65% were interested in planning a QI project in the next 12 months. Many respondents appreciated the effective use of graphics, charts, and visuals to explain and illustrate QI concepts.

Conclusion(s): The online PGQI presented QI concepts in an easy-to-read format. It can be easily accessible by pharmacists and pharmacy students who wish to learn more about defining, planning, and conducting a QI project. The PGQI serves as a foundational resource to support a virtual QI community of practice for pharmacy professionals.

Encore Presentation

Health Care Workers' Perceptions of a Pharmacist-Led Collaborative Practice Agreement for the Prescribing of Nirmatrelvir/Ritonavir to Eligible COVID-19 Patients

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Background: Health Canada approved nirmatrelvir/ritonavir in January 2022 as the first oral treatment of mild-to-moderate COVID-19. Due to

an initial limited supply and the complex nature of prescribing, an innovative approach was required to ensure safe and efficient prescribing, patient access, and reduced healthcare burden. The New Brunswick Pharmacy Assessment Clinic (PAC) was subsequently developed.

Description: Sixteen hospital pharmacists joined the PAC utilizing a pharmacist-led collaborative practice agreement (CPA). This entirely virtually-run clinic allowed for remote care provision from any location. Referrals were submitted electronically by government-designated sources and processed entirely by PAC pharmacists, the initial sole prescribers of nirmatrelvir/ritonavir in the province.

Action: An online survey study was designed to determine how health care workers involved with PAC perceived the implementation and impact of the innovative care model. Surveys were distributed to PAC pharmacists, CPA physicians, initial community pharmacists eligible to dispense nirmatrelvir/ritonavir, and the Public Health pre-screeners.

Evaluation: There were a total of 23 survey participants. Using 5-point Likert scales, 87% of participants felt PAC pharmacist contributions to patient care were significantly valuable, with 82.6% perceiving a very positive impact on safe prescribing. Eighty three percent of participants felt either a good or very good satisfaction level with the PAC model. Prescriptions by PAC pharmacists versus primary care providers were identified as taking significantly less time to review by community pharmacists (90%). The majority of participants (66.6%) felt that virtual care improved patient accessibility, with no change (80%) to perceived job satisfaction. Interviews with a subset of participants are currently underway. These qualitative data will be evaluated by means of thematic analysis upon completion.

Implications: The broad pattern of results suggests that PAC was generally well-received and may be a potential model to expand into other areas of clinical pharmacy practice.

Implementation of Neonatal and Paediatric Medication Calculators

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Background: Electronic medication calculating tools are useful in these patient populations and have shown to minimize calculation errors, decrease time to treatment, reduce stress and increase confidence of those involved. With significant process changes to emergency response due to COVID coupled with recommendations from paediatric and neonatal case reviews at Oak Valley Health, an automatic medication calculation tool was needed. Absence of an automatic calculation tool increases the risk for errors and increases the emotional burden of staff involved in resuscitation events.

Action: Calculation tool was created by the Department of Pharmacy in collaboration with the Professional Practice Program and Paediatric Program. The calculator contained information on medication weight based dosing, dose, volume, preparation comments and supplied strength information. Medications in the calculator included those used for resuscitation, seizure, rapid sequence intubation and high-alert medication infusion. Resuscitation and airway equipment specification with Broselow colour coding was integrated into the calculator in collaboration with the Respiratory Therapists. Education and process was implemented quickly once approval of the calculator was completed.

Evaluation: The use of the tool was validated and compliance was audited a year after implementation, showing a compliance rate of 100% in the Paediatric unit and Neonatal Intensive Care Unit. A quality survey was also released with results showing that the tool is useful and valuable for the nurses involving in paediatric emergencies.

Implications: As it is well-established that a calculation tool will reduce dosing errors and increase efficiency, the creation and implementation of the neonatal calculator was deemed necessary at Oak Valley Health. This also opens up future opportunities for interdisciplinary collaboration in quality and safety improvement projects.

Incorporating the Principles of Equity, Diversity, and Inclusion in Canadian Pharmacy Residency Admissions Using a Holistic Review Framework

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Background: Pharmacists are responsible for providing inclusive and affirmative care to underserved populations. Creating diverse learning environments and workforces has been demonstrated to improve health outcomes for these populations, yet there remains a lack of diversity and representation in pharmacy residency training. Despite this knowledge, there is currently no guidance regarding incorporating principles of equity, diversity, and inclusion in pharmacy residency admissions in Canada.

Description: We completed a holistic review with the purpose of revising application screening tools to incorporate the effects of historical and current marginalization of certain groups on their abilities to demonstrate their skills on paper. A review of the current literature guided mathematical adjustments to our scoring rubric to incorporate diversity as a metric to mitigate existing structural bias.

Action: All applicants were given the opportunity to provide confidential self-identification information. Our holistic review yielded the implementation of changes to our application process, which included requiring reviewers and interviewers to take a minimum of one implicit bias test, blinding reviewers to applicants' names, and reweighting our existing scoring rubric to value non-academic skills.

Evaluation: Feedback was collected from reviewers and interviewers and included an overall easier experience and positive reactions to implicit bias test reflections. Logistic challenges included obtaining self-identification information from applicants and blinding reviewers to their demographic information. From 2021 to 2022, there was a 24% increase in applicants who self-identified as belonging to an underrepresented group, and the proportion of interviewed candidates belonging to an underrepresented group increased by 20%.

Implications: Adopting a holistic review of pharmacy residency admissions process will enable programs to create a diversity mission and shift scoring rubrics toward emphasizing valuable non-academic predictors of success in pharmacy residency programs. This has the potential to increase access to residency positions for underrepresented individuals, ultimately improving health outcomes for underserved populations.

Listen to Your Clinicians: Collecting User Input after Smart Pump Implementation to Drive Continuous Quality Improvement

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Background: A robust drug library is crucial to the successful implementation of smart pumps. This initiative sought to collect feedback on the use of the pump drug library from frontline clinicians after pump implementation in a 400-bed hospital in Ontario.

Description: The pump implementation process involves a pharmacy workstream where the drug library build is vetted with a limited number of clinical representatives. After implementation, it becomes challenging to fully understand the end-user experience and the opportunities for improvement of the drug library.

Action: This initiative sought to collect feedback on the drug library in actual clinical practice at the end-user level.

Evaluation: We designed an online survey which was made available within three months of pump go-live to all front-line nurses. A total of 232 respondents completed the survey (26% response rate); the results are presented in the two tables below [for the tables that go with this abstract, please see Abstract Appendix, available at https://www.cjhp-online.ca/index.php/cjhp/issue/view/214].

Implications: The data collected will be leveraged to implement strategies at the pharmacy and clinical levels within the hospital to optimize the clinicians' experience and enhance patient safety. Pump design-related input will be examined by the pump manufacturer to support its efforts in improving the technology.

Pharmacist Led Cardiac Amyloid Clinic

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Background: Cardiac amyloidosis is a progressive disease which is caused by the deposition of misfolded proteins in the myocardium impacting heart function leading to heart failure and functional decline. Recent interest in this field has prompted improved awareness and diagnostic techniques. Therefore, there are an influx of patients identified with disease who require specialized care. To manage these patients' and coordinate novel medication therapies a pharmacist led outpatient clinic structure has been developed.

Description: Extensive multidisciplinary resources are required to facilitate care for cardiac amyloid patients. The Pharmacist Clinical Navigator works closely with the medical secretary to review new referrals and organize diagnostics testing. They also work the cardiologist to triage patient concerns, facilitate medication coverage and conduct in person clinic assessments.

Action: A pharmacist is well suited to serve as a Clinical Navigator with their therapeutic knowledge and understanding of the drug funding system. They act as a liaison by between procedural tasks and clinical decision making.

Evaluation: To date the London Cardiac Amyloid Clinic serves over 100 patients and is growing. Referrals from across the region range from assessment of AL amyloid cardiac involvement and suitability for stem cell transplant to evaluating the risk of being a carrier of a gene linked to cardiac amyloid. The majority of the patients are diagnosed with wild type transthyretin cardiac amyloid and are initiated on tafamidis, a disease stabilizer. Since inception of this role, there has been a notable increase in patients gaining access to therapy and a decrease in time to initiation.

Implications: The deposition of amyloid is progressive and time sensitive. Therefore, by improving clinic workflow through the addition of a Pharmacist Clinical Navigator, it will improve patient outcomes. This model can also be applied to other clinical areas where a pharmacist can help seamlessly navigate complex patient care.

Reconciling Wisely: Pharmacist-Led Medication Reconciliation Quality Improvement Initiative

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Background: Medication Reconciliation (MedRec) is a powerful and provident strategy to reduce medication errors at transition points. From quarterly audits, it was identified that the Inpatient Mental Health (IMH) unit, at Oak Valley Health, required streamlining of processes and improvement in completion of MedRec on admission. IMH Best Possible Medication Histories (BPMHs) are often not reconciled in a timely manner, resulting in confusion and potential for error when pharmacist identified discrepancies are no longer accurate.

Action: In order to create a new process for pharmacist-led MedRec, criteria and process for these low-risk MedRecs were drafted and shared with the stakeholders for approval: Department of Pharmacy and Department of Psychiatry. Mental Health (MH) Pharmacists would reconcile BPMHs when: (1) patients are on no home medications, (2) all patients' home medications have been ordered correctly and (3) patients' home medications are intentionally changed and changes are documented. Trial was implemented and data was collected and analyzed. Feedback from psychiatrists and MH pharmacists were collected.

Evaluation: MH MedRec on admission completion rates has increased substantially since the implementation of pharmacist-led MedRec, with an increase from 57% to 82%. Pharmacists completed 29% of the MedRecs. Feedback from psychiatrists show that there is perceived improvements to efficiency and patient safety and that this service should be continued. Pharmacists reported positive downstream effects: decrease in need for clarification when BPMHs are not signed in a timely manner and this initiative allows complex BPMHs prioritization for psychiatrists to review.

Implications: Pharmacist-led MedRec has been shown to reduce unintended discrepancies and improve medication safety and patient outcomes. The expansion of the pharmacist role in MedRec at Oak Valley Health will open up future opportunities for pharmacists to drive quality and safety improvement initiatives.

Reviewing Medications for Hazardous Classification

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Background: The National Institute for Occupational Safety and Health (NIOSH) published the most recent NIOSH List of Antineoplastic and Other Hazardous Drugs in Healthcare Settings in 2016. Drugs that were marketed as of December 2013 were reviewed at that time. An average of 55 new medications have been approved for market in Canada each year since publication.

Description: To be effective, a hazardous medication list must include medications that are new to market. To accomplish this, an algorithm was developed to align with NIOSH's classification of hazardous medications.

Action: A review of NIOSH "Procedures for Developing the NIOSH List of Hazardous Drugs in Healthcare Settings" (draft) determined how the organization established classification levels. Building on previous work, an algorithm was created that aligns with the criteria that NIOSH now uses (based on the NIOSH 2020 draft list). To be consistent in the approach to classifications, data was collected from multiple sources and an Assessment of Risk (AoR) was developed. Once an AoR is complete, the algorithm was used to classify the medication.

Evaluation: After processing the medication through the algorithm, documentation of the classification and rationale was included on the AoR. The medical director, Workplace Health and Safety (WHS) reviewed the AoR, and then the classification was brought to the overarching committee for approval. If approved, updates were made to the hazardous medication list.

Implications: The algorithm allows our organization to maintain a current list of hazardous medications. We have committed to align with NIOSH. Once they publish again, our organization may have to revise our classifications and algorithm.

The New Brunswick Pharmacy Assessment Clinic: A Novel, Hospital Pharmacist-Led Collaborative Practice Hub

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Background: Collaborative practice agreements (CPA) are effective clinical service arrangements which remain underutilized. The rapid authorization of nirmatrelvir/ritonavir by Health Canada in January 2022 for mild-moderate COVID-19, in combination with a limited supply, required innovative approaches to assessment and distribution. The New Brunswick Pharmacy Assessment Clinic (PAC) was subsequently developed.

Description: Sixteen hospital pharmacists staffed within two regional health authorities in New Brunswick were re-assigned from regular patient care duties or temporarily hired to work in the PAC. This entirely virtual clinic allowed for remote, bilingual, care provision from any location. Referrals were submitted electronically by government-designated sources and processed entirely by pharmacists, with clinic processes outlined in *Figure 1*.

Action: Referrals were triaged based on government criteria and evidence-based factors. Pharmacists obtained consent from patients or substitute decision makers, analyzed detailed patient histories from direct consultation and EHRs, and subsequently made therapeutic decisions regarding the use of nirmatrelvir/ritonavir. Education was provided to patients at the time of assessment, with standardized communications provided to community pharmacies and primary care providers.

Evaluation: From January 24th to April 11th, 2022, over 1,100 referrals were submitted to the PAC for further assessment, resulting in over 400 prescriptions. After April 11th, 2022, all primary care providers were given authority to assess patients and prescribe nirmatrelvir/ritonavir.

Implications: This innovative pharmacist-led model of assessment and prescribing involving a CPA could be replicated in multiple areas of clinical pharmacy practice.

For the figure that goes with this abstract, please see Abstract Appendix, available at https://www.cjhp-online.ca/index.php/cjhp/issue/view/214

Twenty Years of Pharmacy Practice Research: Evaluation of Internship Satisfaction

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Background: Pharmacist-led research is necessary to better understand the impact of pharmacists in diverse areas and to obtain "real-life" data on their practice and activities.

Description: The Pharmacy Practice Research Unit was created in 2002. It includes pharmacists, a research coordinator, local and international students. The research unit facilitated the creation of evaluative projects in the pharmacy department of a mother-child healthcare center.

Action: In addition to contributing to the student's respective internships projects, we hypothesized that their involvement in the research unit would benefit their future careers. The 20-year anniversary of the research unit was used as an opportunity to survey former students.

Evaluations: 275/383 former interns were contacted by email or LinkedIn and were requested to fill an online survey describing their satisfaction and perceived impact of their internship. 186/275 (68%) answered the survey. 145 (78%) did an internship of 1 year or less, 32 (17%) of more than 2 years. 118 (63%) now work in a hospital setting, 20 (11%) in community pharmacy and 18 (10%) in the pharmaceutical industry. 95 (51%) live in Canada, 72 (39%) in France and 19 (10%) in other countries. Interns reported that their internship had a moderate (72, 38%) or determining (108, 58%) impact on their scientific curiosity. They also reported a moderate (64, 34%) or determining (110, 59%) impact on their knowledge transfer competencies. 92 (49%) reported presenting at least one poster after their internship (average 7.3±9.4 poster) and 90 (48%) at least one manuscript (5.3±7.8 articles).

Implications: Although hospital pharmacists spend most of their time providing pharmaceutical services and direct patient care, evaluative research is important to provide an optimal environment, in line with patient needs, regulatory requirements and changing technologies. Former interns reported the usefulness of participating in evaluative research and many used these skills in their careers.

Using Pharmacy Students to Prioritize Inpatient Care

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Background: Patient acuity is increasing and there is an increased demand for clinical pharmacy services in Fredericton area hospitals. At the same time, a significant influx of pharmacy students requiring structured clinical placements is anticipated due to Doctor of Pharmacy programs in Canada. In 2020, a Pharmacy Patient Screening Tool (PPST) was developed and piloted by a pharmacy student. Pilot study results suggested that the PPST had potential to integrate students in clinical pharmacy activities and aid in patient prioritization. Limitations included reliance on chart review; the patient's perspective - an important element to consider when identifying potential medication-related problems was not investigated. Thus, we sought to improve our patient prioritization process by developing and testing the addition of a Medication Experience Interview (MEI) to elicit patient views regarding medication use.

Action: We modified and expanded the previous student-led patient screening project to a second site. Pharmacy students were trained to conduct a Best Possible Medication History and MEI in addition to using the PPST. Our goal was to determine the most effective method for students to identify which patients would benefit most from clinical pharmacy services.

Evaluation: Semi-structured interviews were conducted with the 2 student and 4 pharmacist participants. Facilitators, challenges, impact on pharmacist activities, impact on student learning and overall impression of the process were explored. Thematic analysis was completed, and six themes emerged: Ambivalence Toward MEI, PPST Valued over MEI, Barriers, Facilitators, Positive Pharmacy Student Experience, and Student Impact on Workflow and Patient Care.

Implications: Patient screening using an MEI and PPST was a feasible and valuable learning experience for pharmacy students. Pharmacy students assisted pharmacists with patient care, however, pharmacists did not find the MEI useful for prioritizing pharmacist activities**.** Further study is required to determine the most effective method for prioritizing pharmacist inpatient care.

Utilization of Smart Pump Technology to Effect Practice Change

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Background: Thunder Bay Regional Health Sciences Centre was the first institution worldwide to utilize Baxter's newest Novum IQ large volume intravenous (IV) infusion pumps. This represented a large practice change for the users. Programming was performed using the new Dose IQ software, while it's monitoring software, Enterprise IQ, was used to compile data on pump usage. Being the first to utilize this technology, we explored the options to utilize the data collected to identify usage trends and develop strategies to promote compliance with the pump drug safety programming.

Description: To develop a strategy to communicate requested adjustments and new medications to the pump programmer. To develop a strategy to utilize the data from the IV pump usage to improve compliance.

Action: A communication form was developed to inform the pump programmer of adjustments required for pump programming, as well as new medications to add to the pump library. Each month, utilizing Enterprise IQ, usage data is compiled, including areas of non compliance with the pump drug error reduction software (DERS), as well as reported hard and soft limit trends with medications. Data is collected and reported monthly at the hospital's Medication Safety Committee. The Oncology area was the pilot unit to evaluate the efficacy of the process.

Evaluation: From November 2021 until July 2022, DERS compliance for the Oncology area was 95.2%. Utilizing the results of the communication form as well as hard and soft limit data from the Enterprise IQ software, adjustments were made to the pump drug library. Compliance with DERS increased in September 2022 to 98.2% (3.15% increase in compliance).

Implications: Compliance with DERS increases patient safety. The process implemented has allowed improved compliance with DERS for the IV pumps. We plan to utilize the same process with other care areas in order to improve safety compliance.

We're in This Together: How Our Outpatient Pain Clinic's Fluoroscopy Suite Survived the Global Iohexol Shortage Without Limiting Patient Care Services

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Background: A global shortage of the iodinated contrast media (ICM) iohexol commenced in May 2022 after the main manufacturing site in China experienced reduced production and distribution capabilities related to COVID-19 lockdowns. On May 31, Ontario Health asked all healthcare facilities to immediately institute ICM conservation strategies and patient triage.

Description: Interventionalists in the fluoroscopy suite at our outpatient pain clinic administer iohexol 240 via the epidural, perineural, and intra-articular routes to guide select injections. Prior to this shortage, iohexol supply management was only through our hospital's general healthcare materials department; the pharmacy department was not involved.

Action: Our inpatient pharmacy technicians began repackaging, in a sterile compounding environment, iohexol 240 from a single-use container (either a 20 mL vial or 100 mL bottle) into 4mL aliquots and storing it in a glass vial with a beyond-use-date (BUD) of 9 days refrigerated or 30 hours room temperature. A standard operating procedure was created to delineate roles of the pain clinic nurses, medical radiation technologists, and interventionists in obtaining the aliquot supply from a medication fridge, administering the aliquot, and recording administration on a traceability log. The pain clinic pharmacist coordinated the day-to-day aliquot supply management by factoring in the BUDs with anticipated demand based on the interventionalists' procedure schedules.

Evaluation: Between June 13 and October 20, 9 x 100mL bottles and 15 x 20mL vials of iohexol 240 were repackaged to give a total of 305 aliquot vials for which 235 aliquot vials were administered; facilitating completion of 226 procedures. Seventy aliquot vials were wasted when the BUD was reached.

Implications: An iohexol 240 supply that would normally have provided for 102 procedures has been/will be repackaged to facilitate completion of approximately 700 procedures. The need to cancel any procedures due to the global ICM shortage was averted.

Workflow Analysis of Daily Tasks Performed by Pharmacy Technicians at CHEO: A Pilot Project Using the Lean Six Sigma Approach

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Background: Quality improvement methodologies, including Six Sigma Lean, are used across workplaces with the goals of improving efficency, quality and reducing costs. Originally developed by car manufacturers, Six Sigma Lean is used in healthcare settings to improve workflow efficency.

Objective(s): The primary objectives of this pilot project at CHEO pharmacy were to operationalize pharmacy technician workflow and track interruptions by frequency and time. The secondary objectives were to assess differences of interruptions related to technician experience.

Methods: A modified Six Sigma Lean methodology was employed to describe, measure, and analyze workflow of pharmacy technicians by assessing interruptions in a typical shift. The main dispensary technician workflow was assessed over the course of 12 shifts.

Results: Communication interruptions occurred in the highest frequency, accounting for 40% of all interruptions, while sending Rx interruptions had the highest mean interruption time (126 seconds). Pareto charts for subcategories of interruptions revealed that communicating with other technicians was responsible for 67% of communication interruptions and that technicians personally delivering was responsible for 79% of Sending Rx interruptions. Analyzing differences between SR and JR technicians, SR technicians experienced more interruptions in 75% of categories.

Conclusion(s): Modified Six Sigma Lean methodology revealed that communication and Sending Rx were the main causes of interruption in the dispensary. The Pareto principle revealed that communicating with other technicians (communication) and personally delivering (sending Rx) were the most common interruptions. Overall, interruptions are targetable and future studies should address the "improve" and "control" stages of the Six Sigma Lean process to implement and measure the impact of future changes.

CASE REPORTS / OBSERVATIONS CLINIQUES

Appearance of Lanthanum Tablets on Abdominal X-Ray

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Background: Lanthanum is a phosphate binder indicated for the treatment of hyperphosphatemia in chronic kidney disease. Lanthanum tablets should be chewed or crushed to maximize phosphate binding and reduce gastrointestinal complications. As a rare earth metal, lanthanum can also appear radiopaque on x-ray imaging, potentially contributing to inappropriate diagnoses, investigations and treatments.

Case Description: An 80-year-old female with end-stage renal disease was hospitalized with shortness of breath and delirium. During investigations, an abdominal x-ray was completed showing multiple circular radiopaque densities throughout the abdomen. Differential diagnoses for the densities included renal obstruction, constipation and foreign object ingestion. This led to further imaging, as well as a urology consultation and initiation of laxatives. The densities were later concluded to be lanthanum tablets, with the patient confirming she was swallowing the tablets whole instead of chewing them.

Assessment of Causality: An abdominal x-ray taken prior to the patient starting lanthanum did not show circular radiopacities. The radiopacities were the same relative shape and size of lanthanum tablets. Imaging from previous case reports looks almost identical to that of this patient. This case received a score of 4 on the Naranjo Probability Scale, indicating a possible adverse drug reaction.

Literature Review: Several case reports have documented lanthanum radiopacities on x-ray imaging. Attempts to identify the radiopacities have led to increased utilization of healthcare resources, including additional imaging, endoscopy, pharmacotherapy and consultations. Guidelines do not discuss approaches to lanthanum radiopacities, leaving the ideal management unclear.

Importance to Practitioners: Lanthanum precipitates may lead to incorrect interpretations of x-ray findings, which can impede diagnostic and therapeutic decision making. Awareness of this phenomenon can mitigate healthcare resource utilization and improve appropriate medication use.

Elexacaftor/Tezacaftor/Ivacaftor Induced Rash and Subsequent Desensitization in a Paediatric Patient with Cystic Fibrosis

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Background: Elexacaftor/tezacaftor/ivacaftor (ELX/TEZ/IVA) is a cystic fibrosis (CF) transmembrane conductance regulator (CFTR) modulator approved for CF patients carrying the F508del mutation. CFTR modulators are the first class of CF medications that target the underlying genetic mutation and have shown promising benefits. Unfortunately, a documented adverse effect of ELX/TEZ/IVA is wide spread skin rash.

Case Description: A 16-year-old male with pancreatic insufficient CF was admitted to hospital for a CF exacerbation. A complex course of antibiotics was completed including 6 days IV piperacillin/tazobactam, 7 days IV tobramycin, 8 days IV cefazolin, and was discharged on IV meropenem and oral sulfamethoxazole/trimethoprim to complete treatment. ELX/TEZ/IVA was started on discharge. Four days after initiating ELX/TEZ/IVA, the patient developed a fever of 40°C and a maculopapular rash tending toward confluence with reticular pattern and blotchy areas. The sulfamethoxazole/trimethoprim was stopped with some improvement, but the rash returned shortly after and persisted until ELX/TEZ/IVA was discontinued. A desensitization protocol with slow dose titration over 2 months was initiated, allowing for successful resumption of ELX/TEZ/IVA without recurrence of skin rash.

Assessment of Causality: This case of ELX/TEZ/IVA-induced drug reaction received a 4 on the Naranjo scale indicating a possible association. The patient received multiple antibiotics concomitantly throughout his admission and while he had documented tolerance to many, they cannot be definitively ruled out as possible contributors.

Literature Review: ELX/TEZ/IVA is reported to cause dermatologic adverse events including diffuse skin rash in approximately 10% of users. Available case reports document desensitization protocols with reported success in resuming the medication without inducing a rash.

Importance to Practitioners: ELX/TEZ/IVA is a promising new CF medication which is being used with increasing frequency. With a known risk of rash, it is encouraging to see results of successful desensitization protocols to promote effective CF treatment for those who would derive benefit.

Piperacillin-Tazobactam Induced Thrombocytopenia in the Setting of Diabetic Foot Infection and End-Stage Renal Disease in Peritoneal Dialysis: A Case Report

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Background: Piperacillin-tazobactam is an ureidopenicillin combined with a beta-lactamase inhibitor. Its broad spectrum of activity makes it a regularly utilized agent in the hospital setting. However, use of piperacillin-tazobactam is not without risk; adverse effects include risk of *Clostridioides difficile* infection, nephrotoxicity and hematologic effects. Rarely, drug-induced immune thrombocytopenia can occur which is believed to occur through the production of drug-dependent antibodies that bind to platelets and lead to their depletion.

Case Description: A 71-year-old male was treated with piperacillin-tazobactam for a diabetic foot ulcer and possible osteomyelitis. He had a complex medical history that included end-stage renal disease secondary to diabetic nephropathy and was undergoing nightly peritoneal dialysis. After 11 days of therapy, he presented with generalised petechial rash, mucosal bleeding, melena, bruising, and bright red blood per rectum He was found to be thrombocytopenic with platelets measured to be 17 x 10^9/L. Approximately 1 week after stopping piperacillin-tazobactam, his platelets returned to normal.

Assessment of Causality: The patient's thrombocytopenia occurred after administration of piperacillin-tazobactam and resolved after drug withdrawal. It also occurred within a similar timeframe as other reported cases within the literature. The Naranjo score was 5, indicating a probable adverse drug reaction.

Literature Review: Many medications have been reported to cause drug-induced thrombocytopenia. Case reports of thrombocytopenia associated with beta-lactams, including piperacillin-tazobactam, have been published; however, the frequency has not been well defined.

Importance to Practitioners: Though thrombocytopenia is a rare side effect of piperacillin-tazobactam, its outcomes can be severe. Piperacillin-tazobactam is a frequently used anti-infective agent and practitioners must be diligent in monitoring patients to ensure that adverse drug reactions are detected quickly and appropriately managed.

Vascular Mycobacterium Infection 3 Years Following Intravesical Live Attenuated *Mycobacterium bovis* Therapy

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Background: Therapy with intravesical live attenuated Mycobacterium bovis (BCG) irrigation to prevent recurrence of non-muscle invasive urothelial bladder cancer is a generally well-tolerated treatment. This case describes a rare infectious complication of treatment.

Case Description: A 68-year-old man presented to a tertiary academic hospital following treatment for bladder cancer. He received intravesical BCG to prevent recurrence. On his last course in 2018, there was difficulty with instrumentation. In July 2021, he presented to hospital with hip pain and infectious signs. A CT found a perforated abdominal aorta with concern for mycotic infection. It was noted that he drank unpasteurized dairy products as a child. Initial cultures were negative. In August 2021, the culture returned positive for *Mycobacterium bovis*. He started rifampin, isoniazid, ethambutol, and moxifloxacin therapy for 2 months, followed by triple therapy for 11 months and dual therapy for 9 months. He is being considered for lifelong rifampin due to chronic leukocytosis.

Assessment of Causality: BCG may have entered systemic circulation through a cut in the urethra during the patient's last treatment, where instrumentation was difficult. The consumption of unpasteurized dairy products as a child is also a plausible cause; however, unlikely given the mycobacterium would have remained dormant for 60 or more years in this scenario.

Literature Review: Three case studies involving 3 patients from 1988 to 2000 depict ruptured abdominal aortic repairs 1-3 years after intravesical BCG. All tissue cultures returned positive for *Mycobacterium bovis*. Outcomes following 12-20 months of antimycobacterial therapy consisted of complete remission, graft infection and removal and death.

Importance to Practitioners: Infectious complications of intravesical BCG can lead to significant morbidity and mortality. This case demonstrates the importance of considering mycotic infection as a part of the differential diagnosis years after receipt of intravesical BCG.