TOGETHER: CANADA'S HOSPITAL PHARMACY CONFERENCE 2022 / ENSEMBLE : CONGRÈS DES PHARMACIENS D'HÔPITAUX DU CANADA 2022

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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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2. A National Survey of Antimicrobial Stewardship Content in Canadian Undergraduate Pharmacy Programs
3. Characterization of Antithrombotic Regimens for Patients with Non-Valvular Atrial Fibrillation Undergoing Percutaneous Coronary Intervention
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ORIGINAL RESEARCH / RECHERCHE ORIGINALE

An Environmental Scan of Patient Safety Reporting and Learning Systems in Community Healthcare for Multi-Disciplinary Teams

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Background: Patient safety reporting and learning systems (RLS) have been increasingly employed globally as a tool for continuous quality improvement in healthcare via collecting, analyzing, and sharing patient safety incidents. Although multi-disciplinary RLSs are widely used in hospital practice, little is known about the current state of adoption and use of similar systems in community and primary care.

Objective(s): We collaborated with the Manitoba Alliance of Regulatory Health Colleges (MARHC) and aimed to identify multi-disciplinary, community based RLSs that have been implemented in other jurisdictions.

Methods: With assistance from a faculty liaison librarian, an environmental scan was conducted via formal and grey literature searches. The formal literature search was performed on OVID MEDLINE and EMBASE databases. Titles and abstracts of journal articles were screened for relevance according to inclusion criteria. The grey literature search involved identifying websites and publications from regulatory authorities and policy institutes with a mission on patient safety, and personal communications with subject matter experts from the Canadian Patient Safety Institute and the International Medication Safety Network.

Results: A total of 629 articles were found between 2005 and 2020, from which RLSs in British Columbia (BC, Canada) and Spain were identified. Based on expert reviews and findings of a previous New Zealand environmental scan, the United Kingdom (UK) National Reporting and Learning System satisfied most of our search criteria. A summary of lessons learned from these multi-disciplinary, community based RLSs was also prepared.

Conclusion(s): Our environmental scan returned promising results of multi-disciplinary, community based RLSs in BC, Spain, and the UK. The MARHC will benefit from further analysis and lessons learned from these RLSs as it explores a central repository for Manitoba healthcare professionals to collect and share learning from patient safety events.

Encore Presentation

A National Survey of Antimicrobial Stewardship Content in Canadian Undergraduate Pharmacy Programs

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Background: Antimicrobial stewardship (AMS) interventions to address antimicrobial resistance (AMR) require knowledgeable and empowered healthcare workers, including pharmacists. However, the degree to which AMS content is covered in Canadian undergraduate pharmacy curricula is unknown.

Objectives: To describe the current landscape of AMS instruction in Canadian undergraduate pharmacy programs, and the perceived barriers and facilitators to enhancing AMS instruction.

Methods: A cross-sectional, electronic survey was distributed to faculty representatives from Canadian undergraduate pharmacy programs. Potential participants were identified through the Association of Faculties of Pharmacy of Canada (AFPC) and included content experts and faculty leaders with intimate knowledge of the curriculum. Curriculum content questions were created using AMS learning objectives developed in the United States and AFPC role statements for pharmacy graduates.

Results: Responses were received from all 10 faculties. All programs reported teaching AMS principles in their core curricula. Content coverage was variable, with programs covering on average 68% of previously published learning objectives, and only one program covering all objectives. Learning objectives within the role statements of "communicator" and "collaborator" were least consistently taught. Three programs also offered AMS content in their elective curricula. Didactic lectures and large group discussions were the most frequently used teaching methods. Multiple choice and written answer questions were the most common student assessment methods. Experiential rotations in AMS were offered by most programs. One program reported that students learned AMS content in an interprofessional setting. Time constraints were identified by all programs as a barrier to enhancing AMS instruction, while a course dedicated to AMS, a curriculum framework, and prioritization by each faculty's curriculum committee were perceived facilitators.

Conclusion: This study highlighted opportunities to advance Canadian AMS pharmacy education. A curriculum with standardized learning objectives and educational outcomes will be essential in preparing new pharmacists to address the challenge of AMR.

Characterization of Antithrombotic Regimens for Patients with Non-Valvular Atrial Fibrillation Undergoing Percutaneous Coronary Intervention

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Background: Antithrombotic medication management in patients with non-valvular atrial fibrillation (NVAF) undergoing percutaneous coronary intervention (PCI) is challenging. While a combination of oral anticoagulant (OAC) and dual antiplatelet therapy (DAPT) is technically indicated, this significantly increases bleed risk. The optimal combination and duration of antithrombotics is an area of ongoing research, and local prescribing patterns are unknown.

Objectives: To characterize antithrombotic regimens prescribed locally for patients with NVAF after a PCI with stent placement.

Methods: A retrospective chart review was completed on patients with NVAF indicated for OAC according to CHADS65 algorithm, who received PCI with stent. Primary outcome was description of OAC and antiplatelet therapies prescribed at discharge. Secondary outcomes included duration of antiplatelet therapy.

Results: A total of 131 patients discharged between December 2015 and November 2020 were included. At discharge, 50 (38.2%) patients received dual therapy, 40 (30.5%) received triple therapy, and 36 (27.5%) received DAPT. Rivaroxaban + Clopidogrel and Warfarin + Clopidogrel + ASA were the most common regimens used for dual therapy and triple therapy respectively, accounting for 42% and 53% each. OAC was not prescribed in 39 (29.8%) patients. The median durations for P2Y12 inhibitors and ASA were 1 year and 1 month respectively for triple therapy. For patients discharged on dual therapy, ASA was used in 68% post-PCI in hospital for a median duration of 2 days.

Conclusion: Local prescribing patterns closely aligned with the Canadian Cardiovascular Society guidelines. Adoption of new literature was evidenced by increasing favor of dual therapy over triple therapy or DAPT, and warfarin over DOACs from 2015 to 2020.

Encore Presentation

Characterization of Secondary Prevention Strategies after Coronary Artery Bypass Graft Surgery

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Background: Coronary artery bypass grafting (CABG) is a durable treatment for ischemic heart disease however, patients remain at risk of cardiovascular events due to progression of underlying coronary artery disease (CAD) and graft occlusion. Fortunately, evidence-based therapies exist to improve graft patency and reduce adverse cardiovascular events following surgery.

Objective: The aim of this study is to characterize the management of patients undergoing CABG surgery at Sunnybrook Health Sciences Centre (SHSC), both at discharge, and upon follow-up with a cardiologist and cardiac surgeon.

Methods: In this retrospective chart review, the charts of 74 patients admitted to SHSC for CABG between January 2017 and August 2020 were analyzed to characterize discharge recommendations and post-discharge follow-up. Descriptive statistics were used to analyze the data.

Results: Discharge summaries followed a standardized format and were complete with most pertinent information, including required follow-up appointments (>95%) and lab work (>70%) with respective timeframes. Prescribing rates of evidence-based therapies were high, with the exception of RAAS blockers and dual antiplatelet therapy, however there was high alignment with SHSC-specific antiplatelet guidelines for type of CABG (on- vs. off-pump). Follow-up data revealed that patients were seen by cardiologists and cardiac surgeons later than anticipated. Cardiologists made medications changes in 63% of patients, with RAAS blockers accounting for most changes. Surgeons made relatively fewer changes (26%) which focused on adjustment of antiplatelet agents.

Conclusion: Overall, discharge summaries for patients undergoing CABG at SHSC are highly standardized. Although prescribing rates of evidence-based therapies were generally high, there is opportunity to reassess the SHSC antiplatelet policy to delineate management of patients undergoing CABG electively or for acute coronary syndromes. Patients were seen by specialists later than the intended timeframe specified on discharge, highlighting a potential role for pharmacist-led virtual medication reconciliations to bridge the gap in care.

Developing a Patient Safety Culture Training Curriculum for Healthcare Professionals

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Background: As part of the World Health Organization (WHO)'s Global Patient Safety Action Plan for 2021–2030, establishing and maintaining a good safety culture is an indispensable prerequisite for the adoption of any safety initiatives. However, there is currently a paucity of ready-to-use, easy-to-translate patient safety culture training materials or guidelines for regulatory or health professional bodies to apply across a diversity of healthcare settings.

Objective(s): Our project is aimed to develop a translatable patient safety culture curriculum to support a multi-disciplinary provincial regulatory authority in Manitoba in advocating patient safety culture and leading province-wide patient safety initiatives.

Methods: A structured grey literature search, with support from a faculty liaison librarian, was performed to find relevant guiding documents from patient safety organizations, including those in the United Kingdom (UK), Canada, United States (U.S.), Australia, and New Zealand. We identified websites of regulatory authorities and policy institutes with a mission on patient safety, then located relevant documents on these sites via targeted Google search. Materials were synthesized through extracting overlapping competencies relevant to patient safety culture.

Results: Four patient safety guiding documents were identified from: UK (National Health Service), Canada (Canadian Patient Safety Institute), U.S. (International Health Institute), and WHO, from which a course syllabus was synthesized with a total of 5 competencies and 21 learning objectives, ranging from Organization Culture to Safety Leadership. We adopted Bloom's taxonomy and segregated the learning outcome domains into knowledge, skills, and attitude in the resulting Patient Safety Culture Training Curriculum for Healthcare Professionals.

Conclusion(s): Our syllabus, which was presented to key stakeholders of patient safety in Manitoba, serves as a primer for subsequent application and evaluation of educational content. The area of patient safety culture education is one that calls for further concerted efforts and innovations from all health professions and global jurisdictions.

Defining Optimal Pharmacist Activities in Ambulatory Heart Failure Clinics Using a Modified Delphi Approach

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Background: Heart failure (HF) is a major cause of morbidity and mortality. Pharmacist involvement in ambulatory HF management reduces morbidity, however strategies described in the literature vary widely. As such, attention must be given to defining optimal activities for pharmacists in this setting in order to optimize outpatient HF care.

Objective: To define optimal activities of pharmacists in ambulatory HF clinics.

Methods: Twenty-nine Canadian ambulatory HF clinic pharmacists participated in a modified Delphi approach, consisting of 3 iterative surveys. Participants were asked to rank a list of 44 candidate activities on 2 selection criteria, each on a 9-point Likert scale. Between survey rounds, participants were provided with aggregate group results alongside their respective individual responses. Consensus was defined as ≥75% of participants ranking both selection criteria ≥7 on the 9-point Likert scale. Descriptive statistics, including frequencies and percentages, were used to describe the Likert scale data.

Results: Of the 29 participants, 27 and 23 were retained on rounds 2 and 3 of the Delphi surveys, respectively. Of the 44 candidate activities for pharmacists in ambulatory HF clinics, 33 were included based on consensus. Consensus activities spanned a range of domains including patient assessment, medication management, patient education, and operations and administration.

Conclusion: A consensus list of 33 optimal activities for pharmacists in ambulatory HF clinics was defined. These results should be used to direct future involvement of pharmacists in ambulatory HF clinics as well as expand pharmacist scope of 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/208

Evaluating the Impact of a Clinical Pharmacist on an Acute Mental Health Unit

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Background: Clinical pharmacists have a significant role in optimizing pharmacotherapy for patients admitted to acute care settings. Patients with mental health disorders are especially vulnerable to polypharmacy, adverse drug effects, medication non-adherence, and misconceptions about medication use. The Royal University Hospital currently lacks resources to provide optimal clinical pharmacy coverage for mental health inpatients.

Objectives: To evaluate the impact of a clinical pharmacist providing specialized care to patients on the Mental Health Short Stay Unit (MHSSU) at the Royal University Hospital in Saskatoon, SK.

Methods: A pharmacist with five years of mental health related pharmacy practice experience was temporarily assigned to MHSSU as a practical component of a pharmacy Master's program. Clinical activities to be completed by the pharmacist were defined based on available evidence, existing performance and quality assurance indicators, and prior experience. The pharmacist's activities and recommendations were tracked during each shift and the results are reported.

Results: Ninety-four patients were seen in 88 hours. There were a total of 61 recommendations made with a 90% psychiatrist acceptance rate and 42 medication changes initiated by the pharmacist. Forty-one patients (44%) received a thorough medication assessment, and 41% of patients were provided with individualized, and often specialized, education. The pharmacist was consulted by the psychiatrist 19 times.

Conclusion: Pharmacists have an important role in medication management and patient education for psychiatric inpatients, and the health care team relies on pharmacists' unique expertise. Additional resources dedicated to expanding and defining clinical pharmacy services on inpatient psychiatry units could further optimize patient care.

Encore Presentation

Evaluation of Rasburicase Use at Vancouver General Hospital: A Retrospective Review

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Background: Rasburicase is used to prevent and treat acute tumor lysis syndrome (TLS), a onco-metabolic emergency syndrome. Due to previous non-formulary status at Vancouver General Hospital (VGH), use criteria for rasburicase was implemented in 2010 by the Leukemia/Bone Marrow Transplant program (L/BMT). Rasburicase was since added to the provincial hospital formulary as unrestricted and the change in resulted in inconsistencies in prescribing practice and dispensing by pharmacy. A standardized evidence-based approach for rasburicase prescribing is needed.

Objective: The primary objective of this study was to determine the adherence of rasburicase utilization in relation to the pre-established use criteria. The secondary objectives included characterization of patient factors associated with non-adherence.

Methods: This was a retrospective chart review at VGH, using a convenience sample of 100 patients. Inclusion criteria included patients 17 year of age or older who received one or more doses of rasburicase at VGH from June 1, 2018 to November 30, 2020. Descriptive statistics and statistical analysis were conducted using Chi-squared and Student's t-test, where appropriate to compare patient factors.

Results: Overall, 13 of the 100 patients met the rasburicase use criteria. Majority of the non-adherence prescribing were for prevention (53%), TLS (22%), and non-criteria-based use (12%). Patients who met criteria were more like to be from L/BMT service, while preventative use was likely related to high tumor burden and ability to start chemotherapy within 72 hours. There were no differences in outcomes of renal replacement therapy within 7 days, seizures, arrhythmia, or ICU admissions across any of the subgroups. Patients with TLS were associated with a higher mortality rate.

Conclusion: The majority of the rasburicase used at VGH did not meet pre-established L/BMT use criteria. Most prescribers used rasburicase for preventative purposes. An updated use criteria has been proposed to promote optimal drug use and prescribing.

Evaluation of Voriconazole Therapeutic Drug Monitoring in Malignant Hematology Patients

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Background: Malignant hematology (MH) patients are susceptible to invasive fungal infections due to prolonged neutropenia and may require voriconazole therapy. Although voriconazole therapeutic drug monitoring (TDM) is common, evidence describing this practice is limited.

Objective: To describe the current practice of voriconazole TDM in MH patients at Princess Margaret Cancer Centre (PM).

Methods: A retrospective chart review was conducted for MH inpatients started on voriconazole at PM between November 1st, 2019 and November 13th, 2020. Voriconazole doses, levels, dose changes, and adverse effects were collected. The primary endpoint was the proportion of patients with initial voriconazole levels within therapeutic range (1-5 mg/L).

Results: Fifty-six patients were included in the study. The most common reason for starting voriconazole was possible invasive fungal infection, which included 44 (78.6%) patients. Fifty-one patients (91.1%) received a loading dose of voriconazole, averaging 386.5 ± 78.5 mg. The average maintenance dose was 242.1 ± 45.7 mg. An average of 2.6 ± 2.9 levels were drawn per patient with an average level of 3.2 ± 2.4 mg/L. Forty-one patients (73.2%) had an initial voriconazole level within therapeutic range. Fifty-five of 145 total levels (37.9%) were outside therapeutic range and 51 (92.7%) of them resulted in an intervention. Of these, 31 (60.8%) had a dose adjustment, 12 (23.5%) were held, and 8 (15.7%) were discontinued. For the 31 dose adjustments, 26 (83.9%) had a level redrawn and 17 (65.4%) of those levels were within therapeutic range. Twenty-three (41.1%) patients developed adverse effects, 8 (34.8%) of which had supratherapeutic levels. Nineteen (33.9%) patients experienced transaminitis, 3 (5.4%) experienced transaminitis and neurotoxicity, and 1 (1.8%) experienced photopsia.

Conclusion: Overall, 73.2% of patients achieved an initial voriconazole level within therapeutic range and 62.1% of total levels drawn were within therapeutic range, suggesting opportunities to optimize current approaches to voriconazole TDM.

Declarations: Jacqueline Flank received speaker/consulting fees from Jazz Pharmaceuticals. Samantha Polito received speaker fees from Novartis for a prior presentation. Karen Yee received research funding from Astex Pharmaceuticals, Forma Therapeutics, F. Hoffmann La-Roche, Genentech, Geron, Janssen Pharmaceuticals, Jazz Pharmaceuticals, MedImmune, Novartis, Onconova Therapeutics, and Tolero Pharmaceuticals. She is a consultant for Astex Pharmaceuticals, Bristol-Myers Squibb/Celgene, F. Hoffmann La-Roche, Novartis, Otsuka, Paladin, Pfizer, Shattuck Labs, Taiho Pharmaceutical and Takeda. She also received an honorarium from AbbVie and Novartis.

Exploring the Facilitators and Barriers toward the Use of Clinical Decision Support Tools by Healthcare Providers

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Background: Clinical decision-support (CDS) tools are systems that provide healthcare professionals (HCPs) with recommendations based on knowledge and patient-specific factors to facilitate informed judgments.

Objectives: To identify the key components of a CDS tool that are most important to HCPs in caring for older adults with a renal diagnosis, and to understand the facilitators and barriers toward using CDS tools in daily clinical practice.

Methods: An anonymous, online, cross-sectional survey of Canadian HCPs who were affiliated with a provincial college, nephrology organization, or advocacy body was conducted in September 2021. A 12-question (59-items) questionnaire was composed of a mix of question types to cover the main themes of the study.

Results: Sixty-three participants completed the questionnaire. Physicians (60%) and pharmacists (22%) composed the majority of the participants, most of them were specialized in nephrology (65%), family medicine (16%) and geriatrics (11%). The most important components in a CDS tool were the safety and efficacy of the medication (89%), the goal of therapy (89%), and patient's quality of life (87%). Forty percent agreed that time was not a barrier to use CDS tools in daily practice, as 90% were willing to use them and 57% are already using some CDS tools for prescribing. The majority of participants agreed that the value of CDS tools is their ability to assist in making decisions based on evidence-based medicine (91%) and agreed that they help in discussing decisions with patients (81%). The majority of the participants agreed that the validation of CDS tools (95%), accompanying the recommendations by the supporting evidence (84%), and the affiliation of the tools with known organizations (84%), were factors that facilitate the use of CDS tools.

Conclusion: CDS tools are being used and accepted by HCPs and are valued for their assistance in engaging patients in making well-informed decisions.

Declaration: Sherilyn Houle is on the advisory board/speaker bureau for AstraZeneca, Seqirus, and GlaxoSmithKline.

Expression of Burnout Symptoms in Pharmacists Who Provide Telepharmacy Services in Canada

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Background: Burnout is a syndrome based on the concept that chronic stress experienced by a person in their workplace remains unmanaged. The high prevalence of burnout reported in health care professionals can have negative consequences that affect individuals, patients, health teams, and institutions.

Objectives: The primary objective was to describe burnout symptom expression in Canadian pharmacists who work from home to provide Telepharmacy services using the Maslach Burnout Inventory-Human Services (MBI-HSS) tool encompassing 3 domains: emotional exhaustion (EE), depersonalization (DP) and personal accomplishment (PA). The secondary objective was to compare each domain's total score between work-related pharmacy practice and sociodemographic characteristic groups.

Methods: A cross-sectional study was conducted using a convenience sample of responses from pharmacists who had provided Telepharmacy services in Canada for at least 4 weeks prior to study initiation. We invited 120 pharmacists to take an anonymous electronically deployed survey comprised of the MBI-HSS and questions on work-related pharmacy practice and sociodemographic characteristics. Descriptive and inferential analyses were performed.

Results: The survey achieved a 63% (75/120) participation rate, representing full-time, part-time and casual tele-pharmacy employment from their home offices. Overall, EE (range 0-60, 60 the highest expression of burnout) had a median total score of 17 (IQR 7.5-26), DP (range 0-16, 16 the highest expression of burnout), median total score of 2 (IQR 1-4.5), and PA (range 0-50, with 0 being the highest expression of burnout), median total score of 39 (IQR 32.5-43.5). Significant associations with burnout symptom expression, positive and negative, in each of the 3 domains were found with work-related pharmacy practice and sociodemographic characteristics.

Conclusions: Compared to reported literature across various areas of pharmacy practice, burnout symptoms in Tele-pharmacists who work from home are lower. Both professional work-related and sociodemographic factors may have a positive or negative impact on burnout in Tele-pharmacists.

Declaration: Paula Newman is employed by Northwest Telepharmacy Solutions.

Hospital Pharmacists' Experience with Medical Assistance in Dying

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Background: Pharmacists have been involved in medical assistance in dying (MAiD) practice in Canada since 2016 and in various international jurisdictions for over two decades. Despite their involvement, little is known about pharmacists' actual experiences with MAiD. The experiences of pharmacists whose practice already encompasses MAiD will contribute to understanding pharmacists' roles and supporting others in adopting this practice in other countries.

Objective: To investigate pharmacists' experiences with MAiD practice in the hospital setting.

Methods: Semi-structured interviews were conducted with pharmacists that had cared for patients seeking MAiD. The interviews were digitally recorded and transcribed verbatim. A framework analysis approach was used to analyze data. Analysis included coding of data and identification of themes through an iterative process involving constant comparison. Data were managed and stored using Quirkos and Microsoft Excel software.

Results: A total of 19 hospital pharmacists representing a range of practice experience and settings in Alberta participated in the study between June 2019 and October 2020. Three themes illuminated participants' experiences with MAiD: 1) finding a place, 2) serving in a patient-centred role, and 3) bearing emotional burdens. Several considerations influenced pharmacists' decisions to participate in MAiD. The role focused on medication supply and documentation, yet it was experienced as a caring, patient-centred role. Opportunities to expand involvement beyond the medication-related responsibilities were welcomed by some participants. The experiences were associated with a range of emotions, both positive and negative. Participants described supports and actions taken to ease emotional burdens.

Conclusions: The results of this study will inform pharmacists, including those who are contemplating participation in MAiD practice, about the range of experiences associated with assisted dying practice. Pharmacy leaders may apply these results to further support pharmacists and expand pharmacists' roles in MAiD.

Declaration: Theresa J Schindel received funding from the CSHP Foundation.

Impact of Heparin for Umbilical Arterial Catheter on Patency and Electrolytes

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Background: In the Neonatal Intensive Care unit, umbilical arterial catheters (UACs) with heparin infusion are commonly used. Heparin infused through these lines reduces the risk of occlusion and thrombosis, though can cause electrolyte abnormalities, nutritional compromise and death. Heparin infusion concentrations and diluents currently vary between centers.

Objectives: To determine if the local heparin dosing guidelines provided heparin doses within the target of 10 to 50 units/kg/day, if the dose affected patency duration and if a relationship existed between heparin dose, serum electrolytes, and time to 100 mL/kg of feeds.

Methods: Chart review from January 1, 2015 to December 31, 2020 for neonates that received heparin in 0.45% sodium chloride via UAC, with catheter insertion and removal at the site. Descriptive and correlation statistics were used to summarize the data.

Results: Chart review occurred for 302 neonates and 222 were included. The average rate of heparin was 12.9 units/kg/day (range 3.4 to 30.8 units/kg/day). UACs were electively removed for 91%. Average patency duration was 113.5 hours. There was a moderate positive correlation between heparin dose and patency duration (r=0.44). There was a weak correlation between heparin dose and serum sodium levels (r=0.225), with moderate negative correlation between serum sodium levels and gestational age (r=-0.582) or birthweight (r=-0.557). The heparin dose did not correlate with the serum chloride or bicarbonate levels. There was a weak positive correlation between heparin dose and time to 100 mL/kg of feeds (r=0.305).

Conclusion: The dose of heparin given via UAC impacts the duration of patency and the time to reach 100 mL/kg of enteral feeds. The dose of heparin in 0.45% sodium chloride does not appear to impact the serum chloride or bicarbonate levels. Further research is needed to find the minimum heparin dose for UAC patency while allowing nutrition to be optimized.

Impact of Local Clinical Practice Guidelines for Urinary Tract Infections Treatment in a University Hospital Centre

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Background: Treatment of urinary tract infections (UTI) often leads to use of broad-spectrum antibiotics such as fluoroquinolones (FQ). Many antimicrobial stewardship initiatives aim at reducing prescription rate of this class of antimicrobials.

Objective(s): The primary objective was to assess the impact of local clinical practice guidelines publication on empirical treatments of UTI in adults admitted at the CHU de Québec-Université Laval.

Methods: Pre- and post-intervention evaluative study was conducted. Medical records of patients 18 years old or more admitted for cystitis or acute pyelonephritis (APN) between Jan 1st and Dec 31st, 2016 (pre-intervention) and between Jan 1st and Dec 31st, 2019 (post-intervention) were reviewed. Patients who received less than 24h of antibiotics and those with complex infections (e.g., nephrostomy) were excluded. Wilcoxon Mann-Whitney and Pearson Chi Square tests were used for quantitative and qualitative variables respectively.

Results: Conformity with local recommendations for UTI treatment increased in post-intervention period with 38,6% (64/166) appropriate empirical treatments according to guidelines versus 25,8% (46/178) in pre-intervention period (p = 0,012). FQ prescription rate did not differ between periods: 26,4% (49/178) pre- vs 22.3% (37/166) post-intervention (p = 0,26). However, we observed a reduction in total median treatment duration: 7 days (IQR 5-10) post-intervention versus 8 days (IQR 7-12) pre-intervention (p = 0,019). The reduction in median treatment duration was more significant in patients with APN: 13 (IQR 10-14) vs 10 (IQR 9-13.5) days (p = 0,006). Hospital length of stay remained unchanged between periods.

Conclusion(s): Although the publication of a local guide for the treatment of UTI resulted in improved conformity of empirical treatments and shorter treatment duration, significant reduction in the prescription of FQ was not observed.

Impact of Pharmacist-Led Post-Discharge Medication Reconciliation on Hospital Readmission Rates

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Background: Hospital readmissions in high-risk patient populations are common, costly, and often preventable. Pharmacists play an invaluable role in identifying drug-related problems and may have a significant impact in reducing preventable readmissions.

Objective(s): The aim of this study was to evaluate the impact of pharmacist-led post-discharge medication reconciliation on hospital readmission rates.

Methods: A retrospective chart review was conducted in Sunnybrook Academic Family Health Team patients who were admitted to Sunnybrook Health Sciences Centre from January 1, 2016 to December 31, 2019 with an index diagnosis of high-risk conditions including acute myocardial infarction, chronic obstructive pulmonary disease, or heart failure exacerbation; or any index diagnosis with existing co-morbid diabetes mellitus or chronic kidney disease. Patients who received medication reconciliation by a pharmacist within 14 days of discharge were compared to patients who did not receive this service. The main outcomes included 30- and 180-day readmissions, emergency department (ED) visits within 180 days, time to first readmission, and the number and type of discrepancies identified by the pharmacist through medication reconciliation.

Results: A total of 100 patients were included in this study; 38 in the medication reconciliation group compared to 62 in the control group. Among patients who received post-discharge medication reconciliation, there was a nonsignificant reduction in 30-day readmission rates (8% vs. 15%; p=0.53) and 180-day readmission rates (26% vs. 37%; p=0.28). There was no significant difference in ED visits or the time to first readmission between groups. The median number of discrepancies identified per medication reconciliation was 2, and the most common types of discrepancies identified were needs additional therapy and medication adverse event.

Conclusion(s): In conclusion, in this small retrospective study, pharmacist-led post-discharge medication reconciliation did not significantly reduce hospital readmission rates in the studied population.

Implementation of Pharmacist Competency Assessments

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Background: The pharmacist's role in optimizing medication use and patient outcomes requires specific knowledge and skills. Best practices for assessing this competence are uncertain.

Objectives: To determine if a pharmacist competency assessment program is feasible and acceptable.

Methods: The Pharmacist Skill Development Work-With is a competency assessment program within the pharmacy department, where pharmacists present a patient case or complete patient care activities, which a leadership team member evaluates using a competency rubric and provides feedback. Pharmacists could complete up to two assessments – one each of centralized and decentralized clinical services), and evaluators could evaluate multiple assessments. A within-site post-evaluation electronic survey adapted from a validated tool regarding perceptions of program feasibility and acceptability was emailed to the pharmacist following each competency assessment and to evaluators at study conclusion. Feasibility was also measured through reviewing rubrics for completion in the 2-hour assessment timeframe. Descriptive statistical analyses were calculated utilizing Microsoft Excel.

Results: Seventeen pharmacists completed a total of 20 competency assessments and seven evaluators provided feedback. Of the 26 post-evaluation surveys completed (18 [69%] by pharmacists, eight [31%] by assessors), respondents agreed or completely agreed that the competency assessments seem possible (89%), implementable (77%), doable (77%), easy to use (77%), they meet respondents' approval (85%), are welcomed (81%), liked (62%), and were appealing (58%). The time required and resources available were acceptable (69% and 84% agreed or completely agreed, respectively). Ten (50%) assessments were not completed in the allotted timeframe; five rubrics and seven feedback sessions were completed after this timeframe. Participants noted the assessments provided professional development and unique learning opportunities, but challenges included time and rubric convenience (e.g., not electronic).

Conclusion: The competency assessment program was acceptable and feasible; however, barriers regarding time and convenience persist, requiring modification and further study for sustainability.

Encore Presentation

Insights into British Columbian Hospital Pharmacists' Perspectives on the Discharge Process

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Background: Transitions of care represent a vulnerable time for patients. Unintended therapeutic changes are common and inadequate communication of information frequently results in medication errors. Further, more than half of hospital readmissions that occur within 30 days of discharge are avoidable. Pharmacists have a large impact on the success of patients during these care transitions; however, their role and experiences are largely absent from the literature.

Objectives: The purpose of this study was to gain a greater understanding of British Columbian hospital pharmacists' perceptions of the hospital discharge process and their role in it.

Methods: A qualitative study utilizing focus groups and key informant interviews of British Columbian hospital pharmacists was conducted from April to May 2021. Questions asked during interviews were developed following a detailed literature search and includes questions regarding the use of frequently studied interventions. Interview sessions were transcribed and then thematically analyzed using both NVivo software and manual coding.

Results: Three focus groups with a total of 20 participants and 1 key informant interview were conducted. Six themes were identified from the analysis: (1) overall perspectives; (2) important roles of pharmacists in discharges; (3) patient education; (4) barriers to optimal discharges; (5) solutions to current barriers; and (6) prioritization. Patient medication education, communication with other healthcare providers, post-discharge phone calls, and pharmacist led completion of discharge prescriptions and medication reconciliation were felt to be fundamental discharge interventions. Overall, time and resources were seen as the greatest barrier to optimal patient discharges.

Conclusions: Pharmacists play a vital role in patient discharges but due to limited resources and inadequate staffing models they are often unable to be optimally involved. Increased participation of pharmacists in transitions of care has the potential to improve quality of patient care and safety by reducing medication errors and adverse drug event related readmissions.

Intrapartum *Group B Streptococcus* Prophylaxis in Beta-Lactam Allergic Patients: An Interrupted Time Series Analysis

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Background: Pregnant women colonized with *Group B streptococcus* (GBS) are treated with penicillin G during delivery to reduce the risk of early-onset GBS disease in newborns. Growing evidence suggests that cefazolin can be safely given in those with IgE-mediated hypersensitivity reaction to penicillin due to a structurally dissimilar side chain. Despite this evidence, non-beta-lactam antibiotics (i.e., clindamycin and vancomycin) continue to be commonly prescribed for those with reported penicillin allergy.

Objective: The objective of this study is to evaluate the impact of revised order sets with antibiotic selection guidance (implemented on July 22, 2020) on appropriate antibiotic use in individuals with a reported beta-lactam allergy requiring GBS prophylaxis.

Methods: This is an interrupted time series analysis which included obstetric patients with beta-lactam allergies requiring GBS prophylaxis between April 2019 and July 2021 at Sunnybrook Health Sciences Centre. Patients were divided into pre-intervention (April 1, 2019–July 21, 2020) and post-intervention (July 22, 2020–July 31, 2021) groups. Data were collected retrospectively. Appropriateness was determined based on allergy history (type of beta-lactam and reaction) and the established side chain cross-reactivity risk. Monthly proportion of appropriate antibiotic use was analyzed using a Statistical Process Chart (p-chart).

Results: The study included 140 patients; 88 patients in the pre-intervention period and 52 patients in the post-intervention period. The proportion of patients receiving appropriate antibiotics was above the baseline median (53%) in 11 of the 12 post-intervention months, signifying special cause variation for improvement. Beta-lactam use significantly increased from 61% (54/88) in the pre-intervention period to 87% (45/52) in the post-intervention period (p=0.002). Drug-related hypersensitivity reactions were reported for one individual during the pre-intervention period and none in the post-intervention period.

Conclusions: Implementation of revised order sets significantly improved appropriate antibiotic prescribing and beta-lactam use in obstetric patients with beta-lactam allergies requiring GBS prophylaxis.

Meds to Beds: The Neonatal Intensive Care Unit Parent Perspective

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Background: Current literature describes medication concierge programs focused on patient outcomes. However, the impact of such programs on parents of infants in the Neonatal Intensive Care Unit (NICU) during transition home is lacking.

Objective: To describe the NICU parent experience related to discharge medication use, following implementation of a Meds to Beds program.

Methods: A qualitative descriptive study was utilized to explore parent experiences around medication use during the transition home. Eleven parents whose infants required prescription medications at time of transition home from a Level III NICU consented to participate in a semi-structured telephone interview post-discharge. The data was transcribed verbatim then coded line-by-line by study investigators with assistance from qualitative analysis software QSR NVivo. Data was analyzed using qualitative inductive content analysis to derive themes.

Results: Major themes nested within key stages of medication use in preparation for transition home from the NICU were identified: in-hospital preparation (practice early and often, Meds to Beds, and relationship with NICU clinical pharmacist), transition home (schedule and routine, strategies for medication administration) and post-discharge (refills and long-term medication management). Parents expressed that the Meds to Beds program increased confidence and knowledge around medications and reduced stress. Areas of improvement based on parent experiences include: empowering parents to prepare and administer medications prior to discharge, strategizing with parents around new home routines, incorporating medication therapy for fragile infants, post-discharge communication with parents to strategize concerns, and NICU pharmacist coordination of community compounding services and refills at community pharmacies, amongst others.

Conclusions: We provide a summary of parent experiences and insights, and based on this insight, suggest opportunities for system-level improvement. Great opportunities remain, from a medication perspective, to refine the transition home. Implementing any of these strategies could provide significant impact on patient care and parental stress during this crucial transition.

Encore Presentation

Monitoring Program of Surface Contamination with 11 Antineoplastic Drugs in 122 Canadian Hospitals

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Background: Occupational exposure to antineoplastic drugs can lead to long-term adverse effects on workers' health. Environmental monitoring is conducted once a year, as part of a Canadian monitoring program.

Objectives: To describe contamination with 11 antineoplastic drugs measured on surfaces in a monitoring program.

Methods: Twelve standardized sites were sampled in each hospital, six in oncology pharmacy and six in outpatient clinic. Samples were analyzed by high performance mass coupled liquid chromatography. The limits of detection (in ng/cm²) were: 0.0006 for cyclophosphamide; 0.001 for docetaxel; 0.04 for 5-fluorouracil; 0.0004 for gemcitabine; 0.0007 for irinotecan; 0.0009 for methotrexate; 0.004 for paclitaxel, 0.009 for vinorelbine, 0.02 for doxorubicine, 0.0037 for etoposide and 0.004 for the platinum (optional). The online REDCap® platform was used to collect centers' data.

Results: Hospitals sampled their surfaces from January 20th to June 8th, 2021. One hundred twenty-two Canadian hospitals participated. One thousand four hundred twelve compliant samples were analyzed. The antineoplastic drugs most frequently measured on surfaces were cyclophosphamide (451/1412, 32%) and gemcitabine (320/1412, 23%). The 90th percentile of the concentration measured on the surfaces was 0.0160 ng/cm² for cyclophosphamide and 0.0036 for gemcitabine. Less than 7% of surfaces were contaminated with the other nine drugs. The surfaces most frequently contaminated with at least one drug were the front grille inside the biological safety cabinet (BSC) (97/121, 80%), the armrest of patient treatment chair (92/118, 78%) and the floor in front of the BSC (79/121, 65%).

Conclusion: Traces of low concentration antineoplastic drugs persist on the surfaces of Canadian centers. This monitoring program allowed centers to benchmark their contamination with pragmatic contamination thresholds derived from the Canadian 90th percentiles. Problematic areas need corrective measures such as decontamination. The program helps to increase the workers' awareness and led to the creation of a community of practice in Quebec.

Pharmacogenetic Testing in Pediatric Neurology: A Pragmatic Study Evaluating Clinician and Patient Perceptions

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Background: Pharmacogenetics is an exponentially growing field; however, its integration into clinical practice has been limited to date. Pediatric epilepsy patients, in particular, could potentially benefit from pharmacogenetic testing as up to 40% of epilepsy patients are refractory to their initial treatment and children are generally more susceptible to adverse effects than adults.

Objectives: The primary objective of this study is to evaluate clinicians' perception of pharmacogenetic testing. Patients' and community pharmacists' perceptions are also evaluated in order to assess all participants in the clinical pharmacogenetic testing process.

Methods: This pragmatic prospective observational study comprises of mixed qualitative and quantitative methods. Neurologists from the study center were given access to pharmacogenetic tests for epilepsy patients with a follow up appointment within the study period. Three evaluation methods were used: 1) hospital pharmacists and neurologists participated in focus groups regarding pharmacogenetic testing; 2) patients who received pharmacogenetic testing completed surveys to assess their perception of these tests; and 3) community pharmacists responded to a survey on their perception of these tests. The documentation of test results was also measured.

Results: Most study participants had a positive view of pharmacogenetic testing. Three major themes were identified from the focus groups: receptiveness to pharmacogenetic testing, pharmacogenetic test characteristics and integrating pharmacogenetic tests into practice. Clinicians generally

consider that pharmacogenetic tests were relevant to their practice and the result reports were understandable. However, for these tests to become more commonly used in practice, reimbursement by insurance, an organizational structure to ensure cohesive use of test results and clinical decision support are necessary.

Conclusion: The views reported in this study are encouraging for the eventual implementation of pharmacogenetic tests in practice. Local integration of these tests is an essential step to eventually improve patient care and safety on a broader scale through personalized medicine.

Declarations: MA Pépin, AS Otis, Z Tremblay, M Boulé, and ME Métras received a PrecisionRx test from Dynacare ($200 value) with the objective to better understand the pharmacogenetic testing process for the present study. D Lebel participated in the Advisory Board of the Canadian Pharmacogenomics Network for Drug Safety. B Carleton received a grant from the Genomic Applications Partnership Program from Genome Canada, which requires an industry partner (Dynacare Next). JF Bussières received a grant from the Canadian Pharmacogenomics Network for Drug Safety. The authors have no other relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the abstract apart from those disclosed.

Portrayal of Autism Spectrum Disorder and Related Treatments in Printed Media

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Background: Although considerable progress in the diagnosis and treatment of autism spectrum disorder (ASD) has emerged over the last decade, negative media stereotypes about ASD and its treatments are amongst the most socially limiting stigma experiences reported by mental health service consumers and family members.

Objective(s): The main objectives of this study were to have a better understanding of the written media portrayal of ASD in Qatar, and to evaluate its influence on the public's understanding of ASD and its treatments.

Methods: A retrospective, quantitative, and qualitative content analysis of articles printed in Qatar's English and Arabic newspapers over one year was used. Quantitative descriptive analysis was employed to examine the extent of ASD media coverage. The qualitative analysis used a pre-determined coding approach derived from an extensive review of the literature to examine the discourse tone and assess the stigmatization of the main messages on the text. Articles discussing ASD treatments were analyzed separately, by reviewing the scientific evidence as outlined in the Qatar and the American Academy of Pediatrics (AAP) ASD treatment guidelines.

Results: A total of 178 ASD-related articles were found in 1 year of published articles. The quantitative analysis revealed that the overall attractiveness of ASD-related articles was poor, the majority were in relation to general news or local events and had a limited focus on the scientific aspects of this condition or its treatments. The discourse analysis revealed significantly more stigmatizing statements in articles in Arabic compared to those published in English newspapers. Based on current practice guideline recommendations, the majority of the ASD treatments discussed had insufficient or lacked scientific evidence.

Conclusion(s): Results from this study suggest that there is a need to improve how the print media addresses ASD. More scientific and responsible writing is needed, particularly when recommending treatments for this condition.

Encore Presentation

Probing Physicians' Perspectives on Pharmacist Prescribing Authority: 5P Study

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Background: Pharmacists' scope has expanded over the last decades in Nova Scotia (NS). Most recently, NS pharmacists were granted prescribing authority for uncomplicated cystitis, herpes zoster and contraception. Previous research has evaluated pharmacist perceptions and comfort with pharmacist prescribing, but scarce research exists assessing physicians' perspectives. This study investigated family physicians' perspectives on pharmacist prescribing.

Objectives: Determine physicians' comfort levels concerning pharmacist prescribing for uncomplicated cystitis, herpes zoster, and contraception, identify concerns and demographic factors associated with concerns.

Methods: A questionnaire was distributed online to family physicians in NS. Using a 5-point Likert scale, physicians indicated their comfort level with pharmacist prescribing, specific concerns, and perceived impact on patients, practice, and the healthcare system. Differences in comfort level were compared with Chi-square and one-way ANOVA. Thematic analysis was conducted on free-text responses.

Results: Overall, 131 (10.1%) NS family physicians responded. Most were uncomfortable with pharmacist prescribing for uncomplicated cystitis (79.4%), herpes zoster (66.4%), and contraception (79.4%). Concerns included diagnosis (70.2%), patient assessment (67.1%), unnecessary prescribing (61.1%) and documentation for physician records (58.0%). Comfort with prescribing for uncomplicated cystitis increased when physicians worked with pharmacists at least weekly compared to monthly (p=0.007). Major themes from physicians highlighted concerns that pharmacist prescribing may lead to misdiagnosis and inappropriate prescribing, pharmacist training is inadequate to complete a thorough clinical examination for diagnosis, and that pharmacist prescribing is an infringement on the physician scope of practice.

Conclusion: Family physicians in NS are uncomfortable with pharmacist prescribing. This partly stems from misconceptions about pharmacist training and scope. This data will help pharmacy organizations implement pharmacist prescribing and provide insight for physician education needs about the pharmacist scope.

Preliminary Results of an Intra-Hospital Study on the Reporting of Drug-Associated Adverse Events

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Background: Since December 2019, hospitals in Canada are required by Vanessa's Law to report all serious adverse events (AEs), e.g., life threatening. However, according to an international study, only 5% of AEs are reported to health authorities (e.g., Health Canada); the latter cannot

appropriately assess the risks-benefits ratio of drugs commercialized in Canada. This proportion remains unknown in Canada.

Objective: To investigate the proportion of AEs reported to Health Canada before and after Vanessa's Law.

Methods: We are conducting a descriptive study at Institut universitaire de cardiologie et de pneumologie de Québec-Université Laval. Five cohorts of 250 adult patients (n = 1250) who were hospitalized between 01/01/2018 and 12/31/2022 are included. Descriptive analyzes (median [minimum-maximum]; proportions) will help us to characterize the sample (sex, age, main diagnosis of hospitalization, length of stay, etc.), the drugs taken as well as AEs that occurred.

Results: So far, most patients were hospitalized for diseases of the circulatory (59–64%). The median length of stay was 3 days [min-max:<1-186 days]. The characteristics of the 99 patients in the 2018 cohort, our preliminary data, from which data have been extracted are: 48% female; median age: 74 years [min: 29-max: 93], body mass index: 27.4 kg/m^2 [19.1-46.7], number of comorbidities: 5 [2-26]. During their hospitalization, patients took 15 different drugs [6-28] and the number of AEs per patient was 4 [0-18]. None of these AEs have been reported to Health Canada.

Conclusion: Based on our preliminary data, no AEs were reported to Health Canada before the Vanessa's Law. Following complete data extraction (2022), it will be possible to assess the impact of the Vanessa's Law on AEs reporting. If Vanessa's Law is not an effective solution to improve the reporting of AEs, alternative solutions will have to be found to improve population safety related to drugs.

Professional Identity of Hospital Pharmacists

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Background: The question "So what do you do as a pharmacist?" would elicit a diverse number of responses — not only because of differences in training and various practice settings, but also due to an absence of a cohesive professional identity. Previous studies exploring pharmacists' professional identities have described many different roles. Currently, there is limited information on the professional identity of pharmacists practicing in hospital settings.

Objective(s): To identify hospital pharmacists' professional identity and to compare and contrast it to the professional identity of pharmacists practicing in other settings. To identify what changes in the culture and beliefs are necessary to enable hospital pharmacists to practice to their full scope.

Methods: This was a qualitative study that utilized key informant interviews with semi-structured interview questions. Maximum variation of sampling strategy was used to recruit a cross-section of pharmacists from different geographical areas in British Columbia who practiced in a variety of different roles. Questions asked during the interview were developed from a detailed literature search. Interviews were transcribed and were thematically analyzed.

Results: Nineteen pharmacists participated in the study. Seven themes pertaining to hospital pharmacists' professional identity were generated. These themes were medication expert, therapy optimizer, collaborator, educator, researcher, patient advocate, and unknown professional. Similarities between personas identified in community pharmacists were found. The ideal pharmacist was described as being a medication expert, collaborator and leader. The ideal practice setting was characterized as having collaboration opportunities, expanded pharmacist scope and adequate funding for staffing.

Conclusion(s): Hospital pharmacists' professional identity is based on being the medication expert who is seen as an essential member of a collaborative team. When compared to community pharmacists, hospital pharmacists identified with a less business oriented, dispensary-based practice.

Profil des décisions du conseil de discipline de l'Ordre des Pharmaciens du Québec de 1970 à 2021 : une étude descriptive

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Contexte : En vertu du Code des professions, le conseil de discipline d'un ordre professionnel saisi et juge toute plainte formulée contre un pharmacien pour une infraction aux lois et règlements encadrant l'exercice de la pharmacie. Au 31 mars 2021, l'Ordre des pharmaciens du Québec (OPQ) comptait 9859 membres.

Objectif : Décrire le profil des décisions rendues par le Conseil de discipline de l'OPQ (CDOPQ).

Méthode : Étude descriptive rétrospective portant sur les décisions rendues par le CDOPQ de janvier 1970 à juin 2021. Les éléments suivants ont été codifiés par décision : année, numéro de permis, sexe de l'intimé, région, nombre de chefs d'infraction et de culpabilité, infractions recodées selon neuf thématiques et 35 libellés, nombre de mois de radiation, valeur totale des amendes.

Résultats : 1488 décisions ont été revues et codifiées (32±24/année) avec un top-10 annuel décroissant en 1980 (n=127, 9%), 1976 et 1978 (n=79, 5%), 1975 (n=64, 4%), 1988 (n=66, 4%), 2011 (n=57, 4%), 1977 et 1984 (n=49, 3%), 2020 (n=45, 3%) et 1990 (n=41, 3%). Les décisions portaient sur des pharmaciens (n=561, 38%), des pharmaciennes (n=255, 17%) ou le sexe n'était pas spécifié (n=672, 45%). Une majorité (n=1005, 68%) des décisions permettait d'identifier le pharmacien impliqué avec son numéro de permis. Les principaux libellés d'infractions (>5% des chefs d'accusation) étaient : erreurs de dispensation (n=287, 19%), absence de pharmacien sur place (n=214, 14%), publicité professionnelle (n=167, 11%), vente de médicaments de l'annexe I sans ordonnance (n=93, 6%) et omission d'analyser le dossier pharmacologique (n=90, 6%). La médiane de la somme des amendes imposées par année civile était de 134 642$ [min : 200$ en 1974; max : 630 500$ en 2011].

Conclusion : Chaque année, un nombre limité de pharmaciens sont reconnus coupables d'une infraction aux lois et règlements encadrant l'exercice de la pharmacie. Une diversité d'infractions a été identifiée.

Physician and Nurse Practitioner Perceptions of the Routine Opioid Outcome Monitoring (ROOM) Tool

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Background: The Routine Opioid Outcome Monitoring (ROOM) Tool was developed and validated in community pharmacies in Australia. It facilitates pharmacists' screening and brief interventions regarding an individual's opioid use for chronic pain. An adapted version was piloted at University Health Network's outpatient pharmacies. The tool's value to prescribers caring for patients living with chronic pain who are prescribed opioids is unknown.

Objectives: The primary objectives were: 1) identify prescribers' perspectives on aspects of the tool that facilitates its use in clinical practice; 2) identify barriers and limitations to the integration of the tool into their practice. The secondary objective was to identify perspectives on the impact of the tool on patient care and safety.

Methods: The study involved focus groups with prescribers from the Toronto Western Hospital Family Health Team. These participants work in a setting where they may receive a ROOM Tool. Qualitative content analysis of transcripts was performed to identify themes.

Results: Six prescribers were interviewed and themes were organized into the following categories. *Facilitators*: comprehensive and valuable information, enables collaboration between pharmacist and prescriber, integrated mode of communication, ease of use; *Barriers*: lack of clarity regarding action items for prescribers, form too long, administrative and communication barriers, perceived redundancy in healthcare provider roles; *Recommendations*: optimize content and format, enhance pharmacist brief interventions; *Impact on patient care and safety*: prioritize population at greatest risk, optimize pharmacist role and expertise in improving safe patient care, harm reduction.

Conclusion: The ROOM Tool has potential value in supporting pharmacist collaboration with prescribers to improve care for patients who are prescribed opioids for chronic pain. There are opportunities to refine the tool which may increase its utility to prescribers, and may enhance the impact on patient care and safety.

Declaration: Christine Papoushek is a member of the advisory board/ speaker bureau of the Canadian Stroke Best Practice Advisory Committee.

Revue d'utilisation des opioïdes au CHU Sainte-Justine : prescriptions émises au congé à la suite d'une chirurgie

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Contexte : Au cours des 20 dernières années, l'augmentation de mésusage des opioïdes prescrits chez les jeunes a été corrélée avec l'augmentation du nombre de prescriptions d'opioïdes. Une portion importante des prescriptions est destinée au soulagement de la douleur postopératoire. Le profil de prescription est mal connu.

Objectif : Décrire le profil des prescriptions remises au congé à la suite d'une chirurgie.

Méthode : Revue rétrospective. Inclusion : Prescriptions des patients âgés de moins de 18 ans, naïfs aux opioïdes, du 1er avril au 31 août 2021. Sélection du plus grand nombre de chirurgies et de prescripteurs différents. Profil décrit à l'aide des caractéristiques suivantes : présence de coanalgésie, détails de la posologie, précision de la quantité maximale permise, format et type de prescripteurs.

Résultats : Cent-cinquante prescriptions ont été incluses: orthopédie (n=34; 23%), plastie (n=34; 23%), ORL (n=34; 23%), urologie (n=33; 22%), neurochirurgie (n=8; 5%), gynécologie (n=7; 4%). La morphine était l'opioïde le plus prescrit (n=141; 94%) et une coanalgésie était prévue sur 146 (97%) des prescriptions. Le nombre de prescriptions permettant un écart de doses est de 15 (10%) ou un écart d'intervalle est de 64 (43%). Le nombre de prescriptions avec un intervalle régulier est de 7 (5%) ou au besoin est de 143 (95%). La quantité maximale était précisée en comprimés ou en millilitres de solution sur 18 (12%) ou en nombre de doses maximales sur 127 (85%); la durée maximale était précisée sur 24 (16%) des prescriptions. Le nombre de prescriptions pré-rédigées est de 72 (48%) et la quantité totale est exprimée en lettres sur 49 (33%) des prescriptions. Les prescripteurs étaient majoritairement des résidents (n=89; 59%).

Conclusion : Différentes pratiques de prescription sont observées. La description des prescriptions pourra servir de point de départ de discussion sur les possibilités d'optimisation avec les équipes cliniques.

Stability of Voriconazole 10 mg/mL in Isopto® Tears 0.5% Stored in Glass Vials and Low-Density Polyethylene Droppers at 4°C and 25°C for 28 Days

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Background: Voriconazole ophthalmic drops are used for the treatment of deep or superficial fungal eye infections. There is no stability data for voriconazole in Isopto Tears 0.5%.

Objective: To evaluate the stability of voriconazole 10 mg/mL reconstituted with Isopto Tears 0.5% over 28 days at 4°C and 25°C in the original glass vials and low-density polyethylene (LDPE) eye dropper bottles.

Methods: On day 0, 12 vials of 200 mg voriconazole were reconstituted with 19mL of Isopto tears 0.5%. Six were retained in the original glass vials and six were transferred into sterile LDPE droppers. Three containers of each type were stored at 4°C and 25°C. Concentration and physical inspection were completed on study days 0,1,3,7,10,14,21 and 28.

Results: Samples stored at 4°C remained clear and colourless for the 28-day period. However, samples stored at 25°C developed flocculation on day 1 that remained throughout the study. The analytical method separated degradation products from voriconazole such that the concentration was measured specifically, accurately (deviations from known averaged 1.78%) and reproducibly (replicate error averaged 0.85%). Multiple linear regression revealed significant differences in percent remaining due to day (p=0.003), but not temperature (p=0.94) or container (p=0.77). Analysis of variance did not identify significant differences in percent remaining due to temperature (p=0.95), study day (p=0.26), or container (p=0.79). The study was capable of detecting a <1% difference in percent remaining due to study day, container or temperature. The calculated beyond use date exceeded 28 days for both temperatures and containers.

Conclusions: We conclude that 10 mg/mL voriconazole in Isopto Tears 0.5% is chemically stable for at least 28 days at 4°C and 25°C in the original glass vial and LDPE droppers. We recommend storage at 4°C to minimize microbial growth and due to physical incompatibility when stored at 25°C.

Declaration: William Perks is a consultant to Medisca. There are no conflicts of interest to declare with respect to this project.

Status of Validation for Accuracy of Blood Pressure Devices Sold in Community Pharmacies in Qatar

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Background: Digital blood pressure (BP) devices sold in community pharmacies are commonly used for home blood pressure monitoring. Devices validated for accuracy are important for management of hypertension. Non-validated devices are more likely to be inaccurate and could potentially lead to poor BP control and compromise patient-safety.

Objectives: We wanted to 1) determine the proportion of validated BP devices sold in community pharmacies in Qatar and 2) to determine the relationship between the validation status of devices and cuff location and price.

Methods: We visited 28 community pharmacies including the 2 major pharmacy chains in Qatar. The following data were collected about BP devices: brand/model, validation status on the package, cuff location, and price. Validation status was checked in an internationally recognized registry on automated BP monitors (Medaval: https://medaval.ie/blood-pressure-monitors/). Descriptive and inferential statistics were used as appropriate.

Results: A total of 83 distinct models of BP devices from 19 different brands are sold in Qatar community pharmacies. The majority are upper arm devices (76%) while the rest are wrist devices (24%). Among all models, only 36% are validated while an equal proportion is not validated. Thirty five percent of upper-arm devices and 40% of wrist devices are validated. Importantly, 41% of lower priced (QAR 250-500) devices are not validated while 60% of higher priced (QAR 501-750) devices are validated (P<0.01). Among 31 devices indicated as "not validated" on medaval.ie, packages of 16 of these devices indicated they were validated. The validation status for 22% of the devices is under audit while information was not available for 4 devices.

Conclusions: A high proportion of BP devices sold in community pharmacies are not validated for accuracy, a finding that has the potential to compromise patient safety. Pharmacists should advocate for the clinical use of validated BP devices.

The Drug Interactions between Tacrolimus and Fluconazole or Voriconazole in Heart Transplant Patients

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Background: Transplant patients undergo prolonged immunosuppression and are at risk of acquiring fungal infections. Tacrolimus, an immunosuppressor used in heart transplant patients, as CYP3A4 substrate, is frequently involved in drug interactions with antifungals. The azole antifungals increase tacrolimus serum concentrations, putting patients at risk for toxicities. Thus, to improve pharmaceutical care of patients, the impacts of these interactions on the doses of tacrolimus must be better characterized.

Objective(s): The main objective was to investigate the drug interaction between azole antifungals and tacrolimus in heart transplants patients treated at IUCPQ-UL, specifically comparing potential changes in tacrolimus dosage when an azole antifungal is used concomitantly.

Methods: This study used a longitudinal descriptive design with retrospective data collection including heart transplant patients who received concomitant azole antifungals (fluconazole or voriconazole) and tacrolimus for 5 days or more. Serum concentrations of tacrolimus were analyzed at 3 times before, 9 time during and 3 times after the antifungal treatment.

Results: Preliminary data included 22 heart transplant patients who received fluconazole-tacrolimus (n=13) or voriconazole-tacrolimus (n=9) drug combinations. When combined with voriconazole treatment, the doses of tacrolimus were initially reduced by 33%. Serum levels of tacrolimus increased more with voriconazole than with fluconazole (p = 0.0001). Among the 9 patients using voriconazole and tacrolimus, 8 required further dose reduction to maintain tacrolimus concentrations within goal of targeted level. On average, a cumulative reduction of 75% in the dosage of tacrolimus was necessary to maintain serum concentrations within goal.

Conclusion(s): This study documented larger variations in tacrolimus serum concentrations when used in combination with voriconazole than with fluconazole. Although they need further validation upon completion of the study, these preliminary results suggest that closer attention should be given to dosage adjustments, potentially mounting to an average reduction of 75% in the tacrolimus dose when voriconazole is used concomitantly.

Declaration: Julie Methot received funding from the foundation of the Institut universitaire de cardiologie et de pneumologie de Québec—Université Laval.

The Emotional Impact of Medication-Related Patient Safety Incidents on Canadian Hospital Pharmacists: A Mixed Methods Study

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Background: Patient safety incidents are cited as the third leading cause of death in Canada. These occurrences have negative consequences for patients and the wellbeing of healthcare professionals as well as adding a financial burden on the healthcare system. Several organizations focus on minimizing patient safety incidents, however an area requiring additional research is evaluating the emotional impact of medication-related patient safety incidents (MRPSIs) on Canadian hospital pharmacists. This research project aims to describe the psychological burden on pharmacists when facing MRPSIs and identify supportive strategies.

Medication-related patient safety incident (MRPSI): a preventable, unintended outcome that was the result of medication management as opposed to an underlying disease. Consequences may result in no harm, temporary harm, prolonged hospital stays, disability or death.

Objectives:

1. Describe the emotional impact of MRPSIs on Canadian hospital pharmacists;
2. Identify factors influencing Canadian hospital pharmacists' emotional burden following MRPSIs;
3. Identify current and desired support strategies that can assist hospital pharmacists with their emotional burden following MRPSIs.

Methods: This mixed methods study included a voluntary survey of hospital pharmacists (N=179) and structured individual interviews (N=18). Survey respondents scored their emotional distress on the Impact of Events Scale (IES), a validated self-reported tool used to assess the impact of traumatic life events. Interviewees' responses were analyzed qualitatively.

Results: Eighty-two percent of pharmacists had a significant score (>8) on the IES, indicating that the MRPSI was an impactful event. Commonly reported factors contributing to the event were heavy workload, interruptions and inexperience. The most desired support strategies included: talking to a colleague, compassionate notification of the event through management and involvement in team debriefs.

Conclusions: Emotional impact reported by Canadian hospital pharmacists is significant. The majority of participants felt that increased support to overcome emotional burden related to MRPSIs is needed.

PHARMACY PRACTICE / PRATIQUE PHARMACEUTIQUE

Customization of Order Alerts through Filters: Impact on Pharmacists' Override Rate and Perceptions of Alert Fatigue

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Background: Clinical decision supports (CDS) in electronic medication order systems help identify important alerts for clinicians. However, CDS may cause alert fatigue. Alert fatigue is the tendency for clinicians to ignore prompts presented by CDS due to excessive numbers and/or their perceived limited clinical significance. Alert fatigue may increase the risk of missing important alerts and decrease work efficiency.

Description: At North York General Hospital, pharmacists managed over 50% of all medication CDS alerts amounting to approximately 60 alerts per day per pharmacist. Pharmacists' override rate was over 90% indicating a high likelihood of alert fatigue. As such, we decided to attempt to reduce pharmacists' alert fatigue.

Action: Utilizing a visual analytics dashboard, high frequency alerts were tabulated with type, volume and override rate. With this data and discussions with pharmacists, three targeted interventions were designed and implemented to suppress non-significant alerts for duplicate orders and drug interactions.

First, a filter to suppress duplicate checking for specific medications ordered multiple times in one session. Second, a filter targeting selected medications commonly ordered both as scheduled and as needed. Lastly, we customized how long discontinued drugs are eligible for CDS checking.

Evaluation: After implementation, alerts decreased from 59.7 to 27.1 alerts per day per pharmacist. Pharmacists perceived a reduction of unnecessary CDS alerts and found they had more time to review alerts. Review of medication incidents found no increase in medication errors after changes. However, override rate was minimally reduced from 98.1% to 97.3%. Most pharmacists surveyed felt that there was still room for improvement in the CDS system.

Implications: Customization of CDS filters can be an effective strategy to reduce non-meaningful alerts without increasing medication errors. It is imperative that hospital pharmacies review alert data and re-assess CDS settings periodically to manage non-clinically significant alerts to minimize pharmacists' alert fatigue.

Comprehensive Medication Reviews for Children with Medical Complexity

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Background: Children with medical complexity (CMC) are at increased risk for drug-related adverse events due to polypharmacy, complicated regimens with specialized dosage forms, multiple prescribers, and a lack of pediatric-specific evidence regarding safe and effective drug therapy. CMC stand to benefit from comprehensive medication assessment, but clinical pharmacist services were limited to inpatient care at BC Children's Hospital (BCCH).

Description: The Complex Care program at BCCH provides coordinated care for CMC. Our goal was to incorporate a pharmacist into the Complex Care outpatient program and provide comprehensive medication reviews.

Action: The Pharmacy Department provided one half-day per week of pharmacist services. Patients were scheduled for a virtual appointment in the weeks before their annual comprehensive review with Complex Care. The pharmacist met with the patient/family to gather medication history, identify and resolve drug therapy issues, and provide education. A written medication history and recommendations were provided to the Complex Care team, primary care provider, and patient/family.

Evaluation: Over the 38 weeks of this program to date, 24 patients attended appointments and five cancelled or did not attend. The most common drug therapy issues identified were adverse effects (46% of patients), unnecessary drug therapy (33%) and insurance coverage (33%). The most frequent interventions were education about drug therapy and medication safety (63% and 54% respectively), and stopping a medication or changing its dose (38% each). A satisfaction survey of families is in progress and expected to have results in the coming weeks.

Implications: The high frequency of drug therapy issues identified demonstrates the need for pharmacist assessment of CMC outside the acute inpatient setting. In addition, duplication of effort collecting medication history was avoided, allowing other clinicians to focus on different aspects of care. The introduction of this pharmacist role has facilitated high-quality, longitudinal care for CMC.

Decreasing Antibiotic Use in the Neonatal Intensive Care Unit by Limiting Time to Blood Culture Results to 36 Hours

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Background: Many infants in Neonatal Intensive Care Units (NICU) receive empiric broad spectrum antibiotics because of high infection risk. However, most of these infants do not suffer from actual bacterial infections. Antibiotic over-use in neonates risks the development of antibiotic-resistant bacteria as well as short- and long-term adverse events related to early-life microbiome perturbations. Sunnybrook Health Sciences Centre's (SHSC) NICU-Antimicrobial Stewardship Program (NICU-ASP) and Division of Microbiology collaborated to reduce the NICU's antibiotic usage rate (AUR) by 20% over 2 years by implementing a change to facilitate earlier antibiotic discontinuation based on neonatal blood culture results reported at 36 hours rather than 48 hours.

Description: A Plan-Do-Study-Act (PDSA) cycle was designed to measure the effect of earlier blood culture reporting, from 48 to 36 hours. AUR was an outcome measure. Late bacterial infections, a balancing measure.

Action: Time to positivity data for all neonatal blood culture results was collected and collaboratively analyzed for 1 year. After reviewing this data with all stakeholders and providing unit-wide education, a practice change was implemented to reduce neonatal blood culture reporting time to 36 hours.

Evaluation: By basing the decision to discontinue antibiotics on a 36-hour rather than a 48-hour blood culture result, SHSC's NICU was able to decrease AUR by a relative 28% (15.8 to 11.3 antibiotic days per 100 patient days), over a span of 2 years. Despite discontinuing antibiotics sooner, the incidence of late bacterial infection was not impacted (6.9% to 6.4%). Identified challenges include a delay in blood culture reports due overnight and a lack of an automated mechanism to stop antibiotics.

Implications: By shortening the time to receive blood culture reports from 48 hours to 36 hours, SHSC's NICU was able to reduce antibiotic use by 28% over 2 years without any increase in late bacterial infections.

Development and Validation of a Clinical Guide for the CannabisCareRx Program

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Background: Pharmacists are uniquely positioned to provide integrated care to the one-quarter of people in Canada who report using cannabis. A reported lack of comfort with their own cannabis-related knowledge is one of the barriers limiting this role.

Description: This project aimed to develop and validate a cannabis-focused clinical guide to support pharmacists in the delivery of a novel integrated care program, CannabisCareRx.

Action: We developed a cannabis-focused clinical guide by consolidating and adapting existing resources and clinical expertise. It was designed with suggested phrasing to minimize stigma and a motivational approach to behavior change. We included the best available clinical information to support pharmacists to gather information, assess risk, review drug interactions, provide brief interventions (including harm reduction, product selection and dose titration), make referrals, and provide follow-up.

Evaluation: Nine pharmacists participated in virtual interviews to rate content relevance, assess face value, and provide recommendations for improvement as part of an iterative 3 round process with 3 participants per round. Participants rated aspects of the guide using a Likert scale to determine face validity. We performed thematic content analysis to summarize participant feedback. Content validity scores improved after revision. Over 89% of participants rated each face validity statement as "agree" or "strongly agree". Thematic content analysis revealed strengths (e.g., valuable information, patient-centered approach, logical flow) and areas for improvement (e.g., clarity of pharmacist role/action, process for collaboration with primary care provider, format).

Implications: A cannabis-focused clinical guide to support pharmacists in the delivery of integrated care was developed and evaluated. Content validity of the clinical guide neared universal agreement and face validity was high. A planned pilot implementation of the cannabis-focused clinical guide in pharmacies as part of the CannabisCareRx program will contribute to the iterative development process.

Declarations: Avery Loi received funding from the Canadian Foundation for Pharmacy Innovation Fund. Andrea Furlan received an unrestricted educational grant to maintain the online opioid self-assessment program from the Canadian Generic Pharmaceutical Association. The funding organization has no role in the preparation, approval, or data analysis of the course content. Responsibility for the course content is solely that of authors. Maria Zhang developed a CCCEP accredited program for cannabis education to Ontario pharmacists through the University of Toronto.

Implementation of a Pharmacist-Led Proton Pump Inhibitor Deprescribing Assessment (PDA) Initiative in Complex Continuing Care Patients

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Background: Proton pump inhibitors (PPIs) are one of the most commonly prescribed drugs with between 40% and 65% of hospitalized patients in the United States and Australia respectively lacking documented indication for PPI therapy. There are a number of adverse effects associated with continued PPI use such as impaired vitamin B12 absorption, hypomagnesemia, *Clostridium difficile* infection, and fractures. The Canadian Deprescribing Network published recommendations to reduce unnecessary use of PPIs. PPI deprescribing is stopping or decreasing the dose of a patient's PPI with the intent of reducing medication burden and chances of developing adverse effects in a supervised process.

Description: The objective of this pharmacy practice study was to evaluate and implement a PPI deprescribing assessment (PDA) for hospitalized complex continuing care patients at a community hospital led by a pharmacist.

Action: The pharmacy team in collaboration with the utilization committee developed the PDA based on published evidence-based guidelines. The deprescribing rate, refractory patients who required re-initiation of a PPI, and number of PPI doses were tracked pre- and post-implementation.

Evaluation: In the 4 sites of the hospital where PDAs were implemented, 179 PDAs were completed. Of that, 163 (91%) recommendations by the pharmacist were accepted by the most responsible prescriber (MRP). From the PDAs completed, 58 patients (32%) were deprescribed successfully, 8 patients (5%) required step-up therapy after initially being deprescribed, and 113 patients (63%) had no change in their PPI therapy.

Implication: Approximately one third of hospitalized patients admitted into complex continuing care on a PPI did not meet indication for chronic PPI therapy. Deprescribing unnecessary PPI resulted in the reduction of medication burden, cost, and a decreased risk of the downstream adverse events. A targeted deprescribing approach, such as the PDA, was an effective practice and promotes future deprescribing efforts in other therapeutic areas.

Medication Safety Training: An Opportunity for Virtual Interactive Case System Innovation

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Background: Current literature on virtual cases illustrates increased student self-directed learning and satisfaction. Yet, the use of virtual cases has not been explored in the context of patient or medication safety.

Description: The Virtual Interactive Case (VIC) System allows educators to create online clinical reasoning scenarios with a bridge between theory and practice. We aimed to share our experience in the development and evaluation of 3 VIC teaching modules on patient or medication safety.

Action: We created VIC training modules on medication incident disclosure, root cause analysis (RCA), and failure mode and effects analysis (FMEA). We piloted tested them during the COVID-19 pandemic.

Evaluation: We administered a 16-item online questionnaire from May 22, 2020, to June 8, 2020 and obtained feedback from pharmacy students and practitioners in Ontario, Canada. Most of our 18 respondents had 1-5 years of practice experience. Their practice settings ranged from associations, academia, to community pharmacies and hospitals. Respondents found the VIC platform easy to navigate. They perceived the content to be relevant and easy to implement in patient care settings. Majority of them indicated that they were confident in carrying out incident disclosure, RCA, and FMEA at their practice settings.

Implications: The VIC System can be used to educate students and practitioners on patient or medication safety. It is a safe and user-friendly platform to support patient safety in virtual pharmacy care.

Encore Presentation

Redevelopment of Clinical Orientation to Encourage Self-Reflection and Assessment

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Background: A provincial Clinical Orientation (C.O.) has been offered to all new pharmacists in our organization to ensure consistent orientation to clinical practice since 2010.

Description: In 2018, revisions to the C.O. program helped address changes in the pharmacy curriculum and scope of practice, increased diversity in experience of new hires and the desire for our pharmacists to build upon skills in self-reflection and self-directed learning alongside their peers.

Action: The overarching goal of the new framework was to develop a foundation of clinical knowledge and skills through facilitated discussions, peer support, reflection and self-assessment. The desired outcomes were to help increase confidence, integration and the formation of peer-to-peer linkages. The three half-day virtual sessions include the following topics: Clinical Vision and Expectations, Acute Kidney Injury, Pharmacokinetics, Infectious Disease and Transitions in Care. After completion, six monthly Transition to Practice Support (TIPS) peer-supported sessions are offered to each cohort of new pharmacists. The purpose of TIPS is to create a community of practice for new practitioners, providing a safe place to meet and share practice challenges and interesting cases.

Evaluation: On-line surveys conducted pre and post C.O. revealed a substantial decrease in attendees feeling not or only somewhat confident performing key clinical activities. Evaluation of the TIPS sessions revealed that the overwhelming majority of respondents reported feeling comfortable contributing and sharing during the sessions. Most felt confident or very confident that participation helped identify opportunities to enhance their practice and almost all indicated they would recommend TIPS to a new practitioner.

Implications: The revised C.O. program has been successful and well received by the participants. The sessions will continue to be offered twice yearly to address the clinical orientation needs of new pharmacists. Evaluation of the longer-term impact of this program is currently being planned.

Working from Home for Clinical Pharmacists during the COVID-19 Pandemic

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Background: While many employees worked from home during the COVID-19 pandemic, it was difficult for frontline clinical pharmacists ("pharmacists"). However, situations such as quarantine, emergency childcare, and the switch to virtual clinics required the implementation of an alternative work solution to support continuity of clinical pharmacy services.

Description: Facilitated by secure access to the hospital's electronic health information system, EPIC®, a Work from Home (WFH) program was implemented. Pharmacists signed an Agreement and completed a daily workload tracker. A key element of the program was continued provision of high-quality clinical pharmacy services.

Action: To evaluate the program, data was collected on the number of pharmacists who worked from home and the reason, from March 2020 to May 2021. The pharmacists were then surveyed to gain their perspective on the new program, and to learn about their daily clinical activities.

Evaluation: Overall, 77% (24/31) of pharmacists worked from home at least once during the study period, representing 304 shifts. Reasons for WFH are represented in Figure 1. Fifteen pharmacists worked from home more than 5 times. Of this group, 40% indicated they could complete 90 to 100% of their clinical role while working from home.

Implications: The majority of pharmacists preferred to work in-person in order to complete their full clinical role. However, by leveraging EPIC®, working remotely from home is an alternative work solution for clinical pharmacists that supports continuity of clinical pharmacy services, during and after a pandemic.

For the figure that goes with this abstract, please see Abstract Appendix, available at https://www.cjhp-online.ca/index.php/cjhp/issue/view/208

CASE REPORTS / OBSERVATIONS CLINIQUES

Ceftaroline Induced Neutropenia in the Setting of Methicillin Resistant *Staphylococcus aureus* Bacteremia Salvage Therapy: A Case Report

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Background: Ceftaroline is a 5th generation cephalosporin, available in Canada via the Special Access Program, indicated for treatment of bacterial skin infections and community acquired pneumonia. Ceftaroline offers coverage for Methicillin Resistant *Staphylococcus aureus* (MRSA) and can be used at off-label doses as salvage therapy in serious MRSA infections. While hematological adverse effects rarely occur with cephalosporins, there is limited information on the incidence with off-label ceftaroline use.

Case Description: A 27-year-old presented with MRSA bacteremia and endocarditis with septic emboli to the lungs. When blood cultures failed to clear after 6 days of vancomycin, therapy was switched to daptomycin. Two days later, ceftaroline 600 mg IV every 8 hours was added. Clearance of blood cultures was achieved. Leukocyte and neutrophil counts began to decline on day 16 of ceftaroline therapy. Ceftaroline was stopped on day 17 due to suspected ceftaroline-induced neutropenia. Two days after reaching nadir (day 18 absolute neutrophil count = 0.1x109/L), cell counts began to recover. No granulocyte colony-stimulating factor was given.

Assessment of Causality: Upon stopping ceftaroline this case of neutropenia quickly resolved. This case received a score of 4 (possible adverse drug reaction) on the Naranjo Probability Scale. As per the WHO-UMC Causality Assessment, it is probable ceftaroline was responsible for the neutropenia.

Literature Review: A series of 37 case reports involving ceftaroline induced neutropenia found an incidence of 12% in patients exposed for ≥7-14 days (range 7%-18%). Median time from ceftaroline start to development of neutropenia was 25 days. A retrospective analysis concluded ceftaroline-associated adverse events appear to occur at higher rates than reported in clinical trials which may be due to off-label, prolonged use.

Importance to Practitioners: Off-label, extended duration ceftaroline use may be significantly associated with a risk of neutropenia. Close monitoring for laboratory abnormalities is warranted.

Dapsone-Associated Methemoglobinemia Treated with Cimetidine: A Case Report

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Background: Exposure to oxidizing agents can convert hemoglobin to methemoglobin, a configuration that cannot bind or deliver oxygen. Dapsone is a major cause of drug-induced methemoglobinemia. Various cytochrome P450 (CYP450) enzymes are involved in the metabolism of dapsone to its oxidizing hydroxylamine metabolites. Oxidizing agents can also induce hemolysis, which is exacerbated in those who are glucose-6-phosphate dehydrogenase (G6PD)-deficient. Through competitive inhibition of CYP450 enzymes, oral cimetidine can mitigate dapsone-associated methemoglobinemia by limiting production of toxic metabolites.

Case Description: A 28-year-old woman receiving high-dose corticosteroids required prophylaxis for pneumocystis jirovecii pneumonia. Following an allergic reaction to sulfamethoxazole-trimethoprim, therapy was switched to dapsone 100 mg daily, which she took for 10 days before presenting to hospital with shortness of breath, lethargy, hematuria, and petechiae. She was found to have hemolytic anemia and a methemoglobin level of 15.9%. Dapsone was held, and supportive care was provided. Given dapsone's long half-life and enterohepatic recirculation, cimetidine 300 mg jirovecii pneumonia was administered every 8 hours to inhibit further production of hydroxylamine metabolites. Over 8 days, the patient's methemoglobin level decreased to 1.0%. Following her admission, she was confirmed to be G6PD deficient.

Assessment of Causality: This case of dapsone-associated methemoglobinemia received a score of 7 on the Naranjo scale, indicating a probable association. It is not possible to conclude the extent of cimetidine's role in the patient's recovery.

Literature Review: Available case series in adults and children support that dapsone is commonly implicated in methemoglobinemia. Case reports support that cimetidine 400 mg three times daily can lead to a significant and sustained drop in methemoglobin for patients on chronic dapsone therapy.

Importance to Practitioners: Cimetidine presents an accessible, convenient, and relatively safe treatment option for dapsone-associated methemoglobinemia. This case also demonstrates successful treatment of methemoglobinemia in a patient with G6PD deficiency, where methylene blue is contraindicated.

Erroneous Computerized Interpretation of Corrected QT Interval and Influence on a Patient's Drug Therapy

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Background: A prolonged QT interval from drug interactions increases the risk of torsades de pointes. Twelve lead electrocardiograms (ECG) calculate a corrected QT interval (QTc), however this computerized calculation can be inaccurate.

Case Description: A 64-year-old female with a history of heart failure, atrial fibrillation, anxiety and chronic kidney disease was hospitalized with urosepsis and treated with piperacillin/tazobactam. Concurrent medications included amiodarone, bisoprolol, spironolactone, furosemide, mirtazapine, venlafaxine and apixaban. Her baseline creatinine was 178 mmol/L, potassium 2.9 mmol/L, magnesium 0.7 mmol/L and baseline ECG showed sinus rhythm, biphasic p waves, t wave inversion and computer calculated QTc of 465 msec. On day 2, piperacillin/tazobactam was changed to oral ciprofloxacin. A repeat ECG was ordered on day 5 (Figure 1). The repeat ECG was similar to baseline but with a computer calculated QTc of 684 msec, suggesting a significant drug-drug interaction with ciprofloxacin.

Assessment: Based on manual assessment of the repeat ECG, the computer erroneously interpreted the biphasic p waves as part of the QT interval, thus miscalculating the QTc. The correct, manually assessed QTc was 448msec and thus no changes to the patient's drug therapy were warranted.

Literature Review: Computerized calculation of QTc has known to be inaccurate, especially with abnormal or poor quality ECGs. Previous literature and guidelines recommend manual interpretation of QTc.

Importance to Practitioners: Pharmacists should not be solely rely on computer calculated QTc and QTc should be manually assessed if drug interactions are identified.

Metronidazole and Mebendazole Combination Therapy for Treatment of Chronic Giardia in a Pediatric Patient with Immunodeficiency

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Background: Chronic Giardia, defined as infection persisting for over two months, can lead to severe diarrhea, malnutrition and extraintestinal manifestations. Patients with severe immunodeficiency or malnutrition can be more susceptible to chronic Giardia. For infections that become resistant to standard antimicrobial monotherapy, the use of combination antimicrobials with different mechanisms of actions may exert synergistic effects to maximize therapeutic benefit.

Case Description: A 15-year-old male with common variable immunodeficiency (CVID) and autoimmune enteropathy presented with chronic Giardia, malnutrition and failure to thrive. The patient had a two-year history of treatment refractory Giardia, failing four trials of oral metronidazole and two trials of albendazole. Given the history of treatment failure, combination antimicrobial therapy with metronidazole 10mg/kg IV every 8 hours and mebendazole 200mg oral three times daily for 10 days was trialed, resulting in successful eradication of the Giardia.

Assessment of Causality: This case demonstrated successful treatment of refractory Giardia using combination therapy in a patient with immunodeficiency. After completion of the 10-day course of metronidazole and mebendazole, the patient's endoscopy biopsy and stool test were negative for Giardia. In addition, the patient improved clinically in the following months with resolution of diarrhea and improved nutritional status.

Literature Review: There are limited randomized control trials studying the benefit of combination therapy in chronic Giardia. Observational studies demonstrate that combination of a 5-nitroimidazole and a benzimidazole may be more effective treatment for metronidazole-resistant infections than repeated courses of monotherapy. A case series with 22 patients demonstrated a 7-day course of albendazole and metronidazole combination therapy compared to albendazole monotherapy had a higher cure rate in treating metronidazole-resistant Giardia.

Importance to Practitioners: Refractory Giardia infections can be difficult to treat due to increasing resistance to metronidazole. Combination therapy with mebendazole and metronidazole may be an effective, accessible and affordable alternative to standard monotherapy.

Severe Pancytopenia Secondary to Azathioprine

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Background: Thiopurines (azathioprine and 6-mercaptopurine) are commonly used in inflammatory bowel disease to induce and maintain remission. The metabolism of thiopurines in the body varies according to genetic differences in enzymatic activity. Loss-of-function alleles in the thiopurine methyltransferase *(TPMT)* and the nudix-type motif 15 *(NUDT15)* genes are associated with increased risk of toxic adverse effects including leukopenia, neutropenia, and myelosuppression.

Case Description: A 15-year-old girl of Southeast Asian descent, with a history of ulcerative colitis was hospitalized for right-sided pneumonia in the context of severe pancytopenia. Prior to admission the patient was initiated on azathioprine 50 mg daily to help manage a disease flare. Routine blood work taken two weeks after initiating azathioprine detected the pancytopenia and the medication was discontinued. Patient presented to hospital a few days later. Genotype testing revealed normal functioning alleles in the *TPMT* gene and a homozygous loss-of-function allele (c.415C>T) in the *NUDT15* gene.

Assessment of Causality: Based on the Naranjo Scale, this case is considered a probable adverse drug reaction (score = 6).

Literature Review: Significant literature exists detailing the link between deficiencies in the *TPMT* gene and increased incidence of myelosuppression. This has led to the development of guidelines detailing genotype test interpretation to individualize dosing. Recommendations to screen for genetic polymorphisms in *TPMT* prior to initiating thiopurines are also included in many European and American clinical practice guidelines. A newer link was demonstrated between myelosuppression and loss-of-function alleles in the *NUDT15* gene, more commonly observed in East and Southeast Asians. Although less widespread, updated recommendations exist supporting testing for both genes to improve clinical outcomes.

Importance to Practitioners: Myelosuppression is a serious and potentially fatal adverse effect of thiopurines. Performing regular blood work and routinely incorporating pharmacogenomic screening into clinical practice in Canada can help mitigate harm, particularly in at risk populations.

Successful Use of Edoxaban for Resolution of Left Ventricular Thrombus

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Background: Historically, warfarin has been the drug of choice for treating left ventricular thrombus (LVT). Patient specific factors may make the use of direct oral anticoagulants (DOACs) a more feasible option; however, they have not been extensively studied in this disease state.

Case Description: A 71-year-old female presented with shortness of breath, chest pain and elevated troponin. She was diagnosed with an acute myocardial infarction and an echocardiogram identified an LVT. Warfarin was deemed inappropriate for this patient and edoxaban was chosen as an alternative. The patient was subsequently admitted five months later for congestive heart failure and an echocardiogram was repeated. There was no LVT noted and edoxaban was stopped.

Assessment of Causality: Prior to her second admission, she was compliant with her edoxaban and was not taking any other form of anticoagulation. She did not experience another thrombotic event during this time or any adverse events.

Literature Review: There is consistently new evidence for use of DOACs in LVT emerging. The current evidence for this topic is mostly made up of observational studies and case reports. There have been a few meta-analyses done on literature surrounding this topic, which have all suggested DOACs may be a reasonable alternative to warfarin; however, some retrospective reviews have shown negative outcomes. There has been one case report published on edoxaban use in this context, which resulted positively in resolution of the patient's LVT.

Importance to Practitioners: Although warfarin is standardly used for the treatment of LVT, it may not be appropriate for all patients. This case report strengths evidence for edoxaban for treatment of LVT and may be considered as an alternative to warfarin.