CSHP PROFESSIONAL PRACTICE CONFERENCE 2024: POSTER ABSTRACTS / CONFÉRENCE SUR LA PRATIQUE PROFESSIONNELLE 2024 DE LA SCPH : RÉSUMÉS DES AFFICHES

doi: 10.4212/cjhp.3607

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.

ORIGINAL RESEARCH / RECHERCHE ORIGINALE

1. An Exploratory Descriptive Study on Employed Pharmacy Students' Contributions in an Inpatient General Internal Medicine Setting in Ontario, Canada
2. Assessment of Antipsychotic Prescribing in Older Adults Following Hospital Initiation
3. Assessment of Burnout, Mental Health, and Physical Health Among Pharmacy Leadership in Quebec Hospitals
4. Building a Roadmap to Support the Green Transition of Hospital Pharmacy: A Survey of Eco-Pharmacy Practices in Canada
5. Characterization of Proton Pump Inhibitor Prescribing for Prophylaxis of Upper Gastrointestinal Bleeding after Cardiac Surgery at University Health Network – A Retrospective Review
6. Comparing Discharge Opioid Prescribing Patterns with Post-Operative Inpatient Opioid Use in Adult Patients Undergoing Total Hip and Knee Arthroplasty – A Retrospective Observational Study
7. Compliance Observation of Practices Regarding Preparation and Administration of Medication in a Mother-Child University Center
8. Conversational Agent Responses to Pharmacist Roles and Outcomes: An Exploratory Study
9. Development of a Hospital Pharmacy Environmental Sustainability Audit Tool
10. Duration of Postoperative Antibiotics in Complicated Appendicitis: A Systematic Review and Meta-Analysis
11. Effect of Proprotein Convertase Subtilisin/Kexin Type 9 Inhibitors on Cardiovascular Outcomes and Lipid Levels in Patients with Heterozygous Familial Hypercholesterolemia: A Meta-Analysis
12. Effectiveness of Five Decontamination Strategies for Armrests Deliberately Contaminated with Cyclophosphamide
13. Effectiveness of Proprotein Convertase Subtilisin/Kexin Type 9 Inhibitors in Patients with Heterozygous Familial Hypercholesterolemia: A Retrospective Cohort Study
14. Environmentally Sustainable Opportunities for Health Systems: Metered-Dose Inhaler Prescribing, Dispensing, Usage and Waste at a Tertiary Academic Center
15. Evaluating the Impact of Access and Flow Pharmacists on Clinical Pharmacy Key Performance Indicators
16. Evaluation of the Management of Croup in a Pediatric Emergency Department Before and After the COVID-19 Pandemic
17. Evaluation of Warfarin Management in Primary Health Care Centers in Qatar: A Cross-Sectional Study
18. Gamification of Minor Ailment Prescribing Education for Pharmacy Students: A Needs Assessment
19. Impact of a Pharmacist in Intravenous Immunoglobulin Surveillance and Dose Optimization at a Pediatric Centre
20. Impact of Pharmacy-Supported Transition of Care Services in the Middle East and North Africa Region: A Systematic Review and Meta-Analysis
21. Intravenous Iron Prescribing Assessment in the Saskatchewan Health Authority
22. Monitoring Program of Surface Contamination with Eleven Antineoplastic Drugs in One Hundred and Twenty-six Canadian Hospitals
23. Opioid Prescribing Among Hospitalized Patients in Tertiary Care Hospitals: A Retrospective Cohort Study
24. Patient Perceived Barriers and Enablers to Medication Adherence in the Treatment of Depression: A Qualitative Study
25. Patient Suggestions for Supporting Medication Needs at Hospital Discharge
26. PERFECT MATCH: Can You Fit the Personality to the Service? Understanding Personality Traits of Hospital Pharmacists in Different Clinical Services
27. Pharmacist Integration into a Hemophilia Treatment Centre: A Pilot Project to Optimize Hemophilia Treatment and Promote Sustainability Amongst Pediatric and Adult Patients
28. Pharmacist Prescribing for Minor Ailments in Ontario: Needs Assessment of Pharmacy Students
29. Pharmacists' Prioritization of Patients for Medication Reconciliation on Discharge
30. Pharmacogenetic-Guided Opioid Therapy in Pain Management: A Systematic Review
31. Population Pharmacokinetics and Dosing of Gentamicin and Tobramycin in Neonates: A Scoping Review
32. Postsurgical Discharge Prescriptions for Opioid-Naive Pediatric Patients in Four University Teaching Hospitals in Quebec: A Descriptive Analysis
33. Quality Initiative in the Neonatal Intensive Care Unit at Surrey Memorial Hospital to Reduce Refeeding Like Syndrome

34. Real-World Characterization of Immune-Related Adverse Events in Nova Scotia Patients Treated with Pembrolizumab or Durvalumab and Adherence to Toxicity Management Guidelines
35. Stability of 0.1 and 0.01% Atropine Eye Drops in Tears Naturale Forte Stored in Low Density Polyethylene Dropper Bottles for 102 Days at 4°C and 25°C
36. Stability of Amoxicillin 50 mg/mL Suspension in Oral Mix/Oral Syrup or Ora-Sweet/Ora-Plus in Plastic Oral Syringes and Plastic Amber Bottles at 4°C and 25°C
37. Stability of Celestone® Soluspan® Stored in Polypropylene Syringes for 210 Days at Room Temperature with Protection from Light
38. Stability of Thiamine 0.45 and 7.94 mg/mL Diluted in 0.9% Sodium Chloride in Polyvinylchloride Minibags at 4°C and 25°C for 14 Days
39. Stability of Vancomycin 10, 25 and 50 mg/mL Ophthalmic Drops in Tears Naturale II Stored in Low Density Polyethylene Dropper Bottles at 4°C and 25°C for 30 Days
40. Strategies to Develop and Implement a Protocol for Prolonged Infusions of Beta-Lactam Antibiotics in an Inpatient Setting: A Scoping Review
41. Sustainability of Inhaler Use in Pediatrics: Medication Impact on Carbon Footprint
42. Teaching Pharmaceutical Management During the Hospital Pharmacy Internship: A Descriptive and Comparative Study of the Situation in France and Quebec
43. Team-Based Pharmacy Services and Its Impact on Clinical Pharmacist Burnout
44. The Creation of a National Pharmacy Association Focused on Climate Change and Planetary Health
45. The Impact of the Implementation of Access and Flow Pharmacists on Medicine Patient Outcomes
46. Virtual Reality Simulation of Suicide Risk Assessment Performed by Pharmacy Learners
47. What's the Impact of Vanessa Law on Serious Adverse Event Declaration at Quebec Heart and Lung Institute – Laval University
48. Workload Impact of Implementing Sporicidal Wipe Program at Academic Teaching Hospital

PHARMACY PRACTICE / PRATIQUE PHARMACEUTIQUE

1. Development of a Tool for the Oversight of Innovative Treatments
2. Development of an Evidence Informed Treatment Protocol for Emergency Department (ED) Management of Pediatric Migraine
3. Evaluation of the Standardization of Sterile Compounding Knowledge Module for Pharmacists
4. Expanding Opioid Stewardship: Hospital and Primary Care Pharmacist Collaboration
5. Five-Year Review of a Novel Opioid Stewardship Program Across a Health Authority: Impacts and Insights
6. Medication Reconciliation Compliance Improvement Using a Sustainable Quality Improvement Plan
7. Province-wide Pharmacy Education Rounds: A Contemporary Learning Program for Continuing Education
8. Putting the Heart into Pharmacy: Creation and Implementation of a PharmD Cardiology Rotation in Tertiary Care
9. Standardization of Medication Reconciliation in Ambulatory Clinics
10. The Evaluation of a Medical Directive for Pharmacist Dosing of Intravenous Vancomycin
11. Time Savings with Implementation of an Electronic BPMH Integration Tool
12. Utilization of Focus Groups and Case Based Discussions in Development of Clinical Practice Standards
13. Utilizing an Antimicrobial Stewardship Trained Unit Pharmacist Model to Enhance Adherence to the Community Acquired Pneumonia (CAP) Guideline Update

CASE REPORTS / OBSERVATIONS CLINIQUES

1. Case of Nonischemic Cardiomyopathy Secondary to Doxorubicin Requiring Heart Transplant while Managing Multiple Sclerosis on Ocrelizumab
2. Envarsus Induced Thrombotic Microangiopathy in an Adult Kidney Transplant Patient
3. Voriconazole in a Pediatric CYP2C19 Rapid Metabolizer

The texts of poster abstracts are published exactly as submitted by the authors and have not undergone any copyediting by the Canadian Journal of Hospital Pharmacy. / *Le* Journal canadien de la pharmacie hospitalière *n'a pas soumis le texte des résumés des affiches à une révision linguistique et les publie ici tels que remis par les auteurs.*

ORIGINAL RESEARCH / RECHERCHE ORIGINALE

An Exploratory Descriptive Study on Employed Pharmacy Students' Contributions in an Inpatient General Internal Medicine Setting in Ontario, Canada

Chan I[1], Nguyen V[1,2], Zhang I[1,3], Fan-Lun C[1,3], Ou L[1]
[1]Department of Pharmacy, Sunnybrook Health Sciences Centre, Toronto, ON
[2]School of Pharmacy, University of Waterloo, Kitchener, ON
[3]Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, ON

Background: The role of pharmacy learners has evolved considerably over the years to follow the shift in pharmacy practice, with changes in academic curricula to incorporate employment opportunities as part of experiential learning. Experiential learning has traditionally focused on job shadowing, but an increasing number of sites now heavily rely on employing learners to deliver higher volume care while simultaneously facilitating education. This study aims to describe the interventions made by employed learners beyond key performance indicators to ultimately guide preceptor and student development.

Objective(s): The primary objective is to quantify the number and types of interventions implemented by employed pharmacy students. Secondary objectives include the types and proportion of these recommendations accepted by prescribers.

Methods: This is a prospective study involving two pharmacy students employed consecutively at Sunnybrook Health Sciences Centre for an experiential rotation in an internal medicine unit. Data was collected by students daily over 27 weeks and included categories in direct and indirect patient care (Table 1). Descriptive statistics were used to evaluate outcomes.

Results: A total of 748 interventions were made, averaging 28 per week. Thirty-five Best Possible Medication Histories and 41 medication reconciliations were completed. Of 458 direct patient care interventions, 40% involved thromboprophylaxis, 14% in antimicrobial stewardship, 4% in deprescribing, 4% in patient education, and 2% in therapeutic drug monitoring. Thirty percent of 290 indirect patient care interventions was interprofessional education. On average, 80% of interventions were accepted by prescribers.

Conclusion(s): This is the first study on employed pharmacy learners and demonstrates a greater quantity and types of interventions in comparison to existing literature on unemployed learners. Pharmacy learners provide significant support to health organizations, and more resources should be dedicated to grow these experiential opportunities. Future directions include an exploration of other clinical areas and qualitative assessments on learner and prescriber comfortability.

TABLE 1: Interventions

Best Possible Medication History	Therapy Management
Medication Reconciliation	Deprescribing
90-Day Review	Antimicrobial Stewardship
Transitional Care	Opioid Stewardship
Patient Education	Thromboprophylaxis
Interprofessional Education	Therapeutic Drug Monitoring
Order Clarification	

Assessment of Antipsychotic Prescribing in Older Adults Following Hospital Initiation

Madey J[1], Tri S[1], Zimmer S[1], Haines A[1], Halpape K[2], Dumont Z[1]
[1]Pharmacy Services, Saskatchewan Health Authority – Regina, Regina, SK
[2]College of Pharmacy and Nutrition, University of Saskatchewan, Saskatoon, SK

Background: Antipsychotics in older adults, for delirium or behavioural and psychological symptoms of dementia, is potentially inappropriate and associated with adverse effects. Newly initiated antipsychotics may inadvertently continue at hospital discharge. The frequency and duration of antipsychotic continuation in older adults following initiation during hospitalization in the Saskatchewan Health Authority - Regina area is unknown.

Objectives: This study aimed to describe potentially inappropriate antipsychotic use in older adults discharged from hospital. Objectives included summarizing percentage of patients initiated on antipsychotics in hospital and continued at discharge; proportion with antipsychotics continued at 30, 90, and 180 days post discharge; describing regimens; risk factors associated with continuation; assessing pharmacist involvement; and describing antipsychotic discontinuation, taper, and/or follow-up plans.

Methods: A retrospective chart review for inpatients 65 years and older, discharged from medicine units at Regina hospitals between September 30, 2021 and June 28, 2022. Outpatient dispensing histories were also gathered.

Results: Of 189 patients, 60 (32%) were continued on an antipsychotic at discharge. Of these, 80%, 55%, and 40% had an antipsychotic continued at 30, 90 and 180 days post-discharge, respectively. Of included patients, 88% were 75 years of age or older and 15% had an outpatient antipsychotic follow-up plan documented.

Conclusions: Continuation of antipsychotics was similar to available literature. Patients continued on antipsychotics at discharge were at a greater than 50% risk of continuation at 90 days and unlikely to have a follow-up plan. Future direction should include quality improvement efforts including standardized prioritization of medication reviews, documentation of indication, and ensuring reassessment.

Keywords: antipsychotics, older adults, delirium, dementia, BPSD, prescribing

Assessment of Burnout, Mental Health, and Physical Health Among Pharmacy Leadership in Quebec Hospitals

Hung M[1,2], Marceau N[2]
[1]Department of Pharmacy, St. Mary's Hospital, Montreal West Island Integrated University Health and Social Services Center, Montréal, QC
[2]Association des pharmaciens des établissements de santé du Québec (A.P.E.S.), Montréal, QC

Background: Since the COVID-19 pandemic, many members of the health workforce, including hospital pharmacists, have taken on increased workloads at the expense of their own well-being. The mental and physical health of pharmacy leadership in Quebec hospitals in the post-pandemic era has not been documented.

Objective: To describe the prevalence of burnout and changes in mental and physical health among pharmacy leadership teams in Quebec hospitals.

Methods: An anonymous, cross-sectional, electronic, 28-question survey was distributed to all chief pharmacists, deputy chief pharmacists, and associate chief pharmacists working in Quebec hospitals. Burnout was assessed using a non-proprietary, single item, validated measure adapted from the Maslach Burnout Inventory. Changes in mental and physical health were evaluated using a 5-point Likert scale to compare respondents' current state of mental and physical health with their state of health during and prior to the COVID-19 pandemic. A score of 1 indicated a very poor state, and a score of 5 indicated an excellent state. Descriptive statistics and statistical analysis were conducted using Chi-squared test to compare the prevalence of burnout and respondent characteristics.

Results: A total of 109 of 186 participants (58.6%) completed the survey. The overall prevalence of burnout was 40.4%. Approximately 56.3% and 44.8% of respondents noticed a deterioration in their current state of mental and physical health, respectively, compared to their state of health prior to the pandemic. Burnout scores were similar across groups when respondents were stratified by gender, years of experience, work setting, leadership position, prior training in management, and duties and responsibilities.

Conclusion: Burnout and worsening states of mental and physical health are prevalent in close to half of members of pharmacy leadership teams in Quebec hospitals. Strategies to address and overcome these issues should be promptly identified to ensure a sustainable workforce in hospital pharmacy leadership.

Building a Roadmap to Support the Green Transition of Hospital Pharmacy: A Survey of Eco-Pharmacy Practices in Canada

Moulin D[1,2], Blanc A[1], Cameron J[1]
[1]Department of Pharmacy, Children's Hospital of Eastern Ontario-Ottawa Children's Treatment Centre (CHEO), Ottawa, ON, Canada
[2]Institut des Sciences Pharmaceutiques et Biologiques, Université de Lyon, Lyon, France

Background: A Lancet global report estimated that in 2019 the healthcare sector contributed to approximately 5.2% of global Green House Gas (GHG) emissions, a rise of over 5% from the previous year.

Objective(s): To evaluate the knowledge of eco-practices in hospital pharmacy and explore the overall interest in 'Going Green' by understanding the current landscape of sustainable eco-practices being employed in Canadian hospital pharmacies.

Method: A cross-sectional survey was administered securely online to pharmacy staff from Canadian hospitals, from February 15th to April 30th 2023, via email distribution list and media platform. The survey was designed to address 38 questions on 6 different themes: Participant Demographics, Government, Hospital and Pharmacy-wide eco-initiatives, Other Emissions Lowering Initiatives, and Commuting Practices.

Results: A total of 214 participants responded to the survey (n=9 directors, n= 25 managers, n= 74 pharmacists, n= 21 pharmacy technicians), the majority from Ontario (55%). Eco-initiatives identified to have the most impact on reducing GHG emissions were "Reduced drug waste" (21%), "Improved recycling program" (20%), and "Reduced paper usage" (15%). The most frequently method for work commute was personal gas vehicle (70%) and the primary factor preventing cycling was distance from work (49%). The top 3 areas of pharmacy waste were identified as single use plastic (28%), excessive paper use (18%), and improper recycling (17%). Furthermore, 53% indicated they were unaware of any eco-initiatives at their hospital, however, in those who were aware, 8% indicated these initiatives were aiming at switching Inhalators with smaller carbon footprint. Six percent of the respondents shared that the eco-initiatives were partially implemented and 2% were fully implemented.

Conclusion(s): Canadian Hospital Pharmacy staff shared a willingness to engage in more sustainable 'Go Green' practices but our data indicate that there are significant barriers that must be addressed to implement sustainable low carbon pharmacy practices.

Characterization of Proton Pump Inhibitor Prescribing for Prophylaxis of Upper Gastrointestinal Bleeding after Cardiac Surgery at University Health Network – A Retrospective Review

Lu L[1], Ragazzo J[1], Nguyen B[1], Dattilo K[2], Hambrook M[1], Heggie J[2], Leblanc K[1]
[1]Department of Pharmacy, University Health Network, Toronto, ON
[2]Department of Anesthesiology and Pain Medicine, University Health Network, Toronto, ON

Background: Patients undergoing cardiovascular (CV) surgery are at risk of upper gastrointestinal bleed (UGIB). Contributors include patient comorbidities, procedural factors, and postoperative antithrombotic therapy. Proton pump inhibitors (PPIs) prevent UGIB but have associated risks such as Clostridium difficile infection (CDI). No validated guidelines regarding PPI prescribing post-CV surgery currently exist. However, independent predictors for UGIB after CV surgery have been identified.

Objective: To characterize PPI prescribing post-CV surgery, including determining the rates of new PPI prescription in patients with independent predictors and identifying the proportion of patients who experienced UGIB or CDI.

Methods: Retrospective review of patients admitted to University Health Network post-CV surgery between April 01, 2021 to April 01, 2022.

Results: There were 1209 patients screened. Those who received surgeries for implantation of left ventricular assist devices (LVADs) or heart transplants or who were receiving PPIs prior to admission were excluded. Patients with prior to admission medication data unavailable in the electronic health record were also excluded. Of the 780 remaining patients, 150 patients were then sampled. A PPI was newly initiated in 121 patients (80.7%) and of those, 101 (67.3%) were continued on discharge. Of newly initiated PPI patients, 103 (85.1%) had at least 1 predictor for UGIB, and all received antithrombotic therapy. Of the 29 patients who did not receive a PPI, 23 (79.3%) had at least 1 predictor for UGIB, and 28 (96.6%) received antithrombotic therapy. Two patients developed UGIB; neither of whom received a PPI. Three patients developed CDI; all had received a PPI.

Conclusion: Our quality assessment showed that de novo PPI prescribing post-CV surgery targets the majority of patients with increased UGIB risk. A framework for PPI prescribing in this setting and better understanding of prescriber decision-making are needed.

Comparing Discharge Opioid Prescribing Patterns with Post-Operative Inpatient Opioid Use in Adult Patients Undergoing Total Hip and Knee Arthroplasty – A Retrospective Observational Study

Rauf MF[1,2], Too A[3], Harris V[1], Chang F[2]
[1]Pharmacy Department, London Health Sciences, London, ON
[2]Faculty of Science, School of Pharmacy, University of Waterloo, Waterloo, ON
[3]Pharmacy Department, St. Joseph's Health Care London, London, ON

Background: Opioid crisis in Canada has been a major cause of hospitalizations and death. Alongside illicit opioids, prescription opioids were also associated with misuse and addiction. Total hip and knee arthroplasty (THA and TKA) procedures were associated with higher opioid doses due to the nature of these procedures. The variability between patients' population makes it challenging to standardize opioid prescriptions.

Objective(s): To compare discharge opioid prescription patterns with post-THA/TKA inpatient opioid use in the 24 hours before discharge.

Methods: In this retrospective study of opioid naïve adult patients, 300 patients were included from London Health Sciences Centre – University Hospital, who underwent THA or TKA during January 2022 to December 2022. Patients were excluded if they had cancer, chronic kidney disease, substance use disorder, peripheral nerve infusion within last 24 hours before discharge or if they were discharged from another service.

Data collected include patient's age, sex, BMI, type of surgery, opioid medications and doses used in the last 24 hours before discharge, opioid medications, doses, and quantities prescribed at discharge. All opioids' doses were converted into morphine equivalent doses (MED) for analytical purposes.

Results: The mean prescribed MED were close to double the mean MED used by the patients 24 hours prior to discharge. Of the patients that did not use any opioids in the 24 hours prior to discharge, 96.7% were provided prescriptions for opioids. Opioid dose was significantly associated with secondary variables of age and pain.

Conclusion(s): The study demonstrate that opioids were prescribed in excess of what may be actually required for pain control after TKA and THA. It is important to devise institutional guidelines for post-operative opioid prescribing to provide adequate pain control while minimizing risk of adverse effects, misuse and diversion.

Compliance Observation of Practices Regarding Preparation and Administration of Medication in a Mother-Child University Center

Taibi L[1], Atkinson S[1], Duval S[2], Pelchat V[2], Bussières JF[1,3]
[1]Unité de recherche en pratique pharmaceutique, Département de pharmacie, CHU Sainte-Justine, Montréal, QC
[2]Direction des soins infirmiers, CHU Sainte-Justine, Montréal, QC
[3]Faculté de pharmacie, Université de Montréal, Montréal, QC

Background: Accreditation Canada requires evidence of compliance with practices, including medication guidelines. Nurses being responsible for most of the medication administration, their practice has an important impact on patient safety.

Objective: Observe and describe the compliance to standards of practice of preparation and administration of medication.

Methods: Descriptive, observational, cross-sectional study. The study takes place in a 500-bed mother-child university center. Two standardized audit grids based on the local current protocols (one for enteral and one for parenteral administration) were drawn up by nurse managers, two pharmacists and a research assistant. Descriptive (n=16) and compliance (n=74) criteria were grouped into six categories. Observations were carried out in October and November 2023 by the research assistant and trained nursing staff (n=44 observers).Each criterion could be rated as compliant, non-compliant or not applicable.

Results: 394 usable grids were completed. The average time was 10±9 minutes per observation. Observations were made during the day (271/394, 69%), evening (73/394, 19%) or night shifts (47/394, 12%). In decreasing order, the compliance rate was: labeling (94%), administration (93%), general verification (87%), preparation (87%), independent double check (86%), library use and basic infusions (77%). Majority of criteria (53%) had a compliance rate over 93%. Criteria with lowest compliance were: cleaning of the work surface (150/394, 39%), use of the inter-syringe connector (18/44, 41%), cleaning of the tablet cutter/mortar before (13/21, 62%) and after use (11/20, 55%), labeling of the tubing (118/188, 63%), verification of the label (67/96, 70%), use of free anti-flow valve on the intravenous circuit (129/181, 71%). Many nurses (141/386, 37%) were interrupted at least once during preparation.

Conclusion: Compliance to standards of practices regarding the preparation and administration of medication was high for the majority of criteria. Annual audits help maintain a culture of quality and safety within the hospital, and identify improvement pathways.

Conversational Agent Responses to Pharmacist Roles and Outcomes: An Exploratory Study

Martel-Côté N[1], Taibi L[1], Vérot J[1], Dayde A[1], Marc M[1], Dupré M[1], Sergerie-Côté C[1], Lebel D[1], Bussières JF[1,2]
[1]Unité de recherche en pratique pharmaceutique, Département de pharmacie, CHU Sainte-Justine, Montréal, QC
[2]Faculté de pharmacie, Université de Montréal, Montréal, QC

Background: Since the launch of ChatGPT in 2022, interest in conversational agents has only grown.

Objectives: To describe the general profile of the behavior of conversational agents and to qualify the adequacy of the answers proposed by conversational agents based on artificial intelligence to questions on the roles and outcomes of the pharmacist. Qualify the adequacy of the bibliographic references offered by these conversational agents.

Methods: Descriptive and qualitative exploratory cross-sectional study. Two conversational agents were selected: ChatGPT (free version 3.5, paid version 4.0) and Bing (three versions: balanced, precise and creative) for a total of five conversations. A selection of 46 questions relating to the roles and outcomes of the pharmacist was established by discussion and consensus. A panel of three experts was organized. We evaluated the profile of the agents and calculated the adequacy of the answers and references proposed.

Results: The two agents used offer a very high proportion of responses deemed adequate by the panel of experts, i.e. 95.3% (ChatGPT-3.5 and ChatGPT-4.0), 90.7% (Bing Balanced), 97.7% (Bing Creative) and 90.7% (Bing Accurate). The number of references per conversation ranges from 12 to 152 (average 69±59 references). ChatGPT provides far fewer references than Bing (16±6 vs. 103±49). The proportion of adequate references varies from one agent to another, i.e. 75% (3/4, ChaptGPT-3.5), 80% (4/5, ChatGPT-4.0), 89% (48/54, Bing Balanced), 91% (133/146, Bing Creative) and 91% (91/100, Bing Precise).

Conclusion: This descriptive and qualitative exploratory cross-sectional study shows that two conversational agents (Chat GPT-3.5, ChatGPT-4.0, Bing balanced, precise, creative) offer adequate answers to a series of questions surrounding the roles and outcomes of pharmacists. However, ChatGPT offers a more limited number of references than Bing and some of these references are inadequate or invented. It appears useful to continue to evaluate the usefulness and suitability of conversational agents.

Development of a Hospital Pharmacy Environmental Sustainability Audit Tool

Tangedal K[1], Roy C[1]
[1]Pharmacy Services - Saskatchewan Health Authority, Regina, SK

Background: Health care is a major contributor to greenhouse gas emissions in Canada (5%). Pharmacy professionals have a vital role in environmentally sustainable medication management. The hospital drug distribution system contains notable environmentally harmful practices. A baseline understanding is required to identify areas for improvement and a comprehensive audit tool does not currently exist in published literature.

Objective: To describe the development and implementation of an environmental impact audit tool for goal setting and benchmarking within a hospital pharmacy department.

Methods: A generic environmental audit tool from the Canadian Union of Public Employees (CUPE) was adapted with pharmacy specific considerations. Each section was ranked, with overall scoring, and comments for findings. The audit tool was reviewed by the pharmacy environmental committee volunteers for face validity, completeness, clarity, and usefulness. Volunteers completed the audit in SHA-Regina Pharmacy sites. Audit results informed goal setting and prioritization of interventions.

Results: In November 2020, two tertiary care hospitals, one long-term care facility, and one outpatient clinic in Regina scored 23/66 (35%). Strengths identified included reusing packaging, a workplace policy encouraging carpooling/shuttles, and meeting virtually and paperless. Areas for improvement included reducing paper, plastic, and energy use, and improved recycling/waste management. These findings informed priorities for the pharmacy environmental committee: reduce paper and plastic use and review recycling practices.

Conclusion: This audit tool fills a gap, as sustainability strategies for pharmacy services are often focused directly on the medication dispensing system or non-hospital practice, missing important non-medication aspects and hospital considerations of environmental sustainability. However, this tool is not validated and evidence is lacking to identify the most impactful interventions. The field of planetary health is evolving quickly and determination of effective mitigation interventions should be prioritized for future research. This audit tool can serve as a baseline assessment for hospital pharmacy environmental practices.

Duration of Postoperative Antibiotics in Complicated Appendicitis: A Systematic Review and Meta-Analysis

Bakowski NM[1], Huynh S[1], Wei W[1], Duffett M[1,2], Wallace C[3]
[1]Department of Pharmacy, Hamilton Health Sciences, Hamilton, ON
[2]Department of Pediatrics, McMaster University, Hamilton, ON
[3]Department of Pharmacy, St. Joseph's Healthcare Hamilton, Hamilton, ON

Background: The optimal duration of postoperative antibiotics for complicated appendicitis is unclear. Recent studies have suggested a shorter course of antibiotics does not increase the risk of postoperative complications.

Objective(s): To summarize the evidence for shorter duration of postoperative antibiotics.

Methods: In this systematic review, we searched Medline, Embase, and the Cochrane Library for randomized controlled trials (RCT) and observational studies comparing different durations of post-appendectomy antibiotic treatment in adults and children with complicated appendicitis. We categorized the studies into two groups: ≤ 3 vs. > 3 days and ≤ 24 vs. > 24 hours. Our primary outcome was intra-abdominal abscess, and secondary outcomes were surgical site infection, length of hospital stay, and readmission. We pooled RCTs and observational studies separately.

Results: We included 5 randomized controlled trials (randomizing 1090 adults and 797 children) and 8 observational studies (including 1984 patients who were mostly adults). Three RCTs were assessed to have some concerns for risk of bias, and 2 had high risk of bias, using the Cochrane Risk of Bias 2 tool, largely due to lack of blinding. In RCTs, compared to antibiotic treatment for > 3 days, treatment for ≤ 3 days was not associated with increased intra-abdominal abscess (risk ratio (RR) 1.1, 95% confidence interval (CI) 0.9–1.4), surgical site infection (RR 1.2, 95% CI 0.7–1.9), or readmission (RR 1.0, 95% CI 0.2–4.3). Antibiotic treatment for ≤ 3 days was associated with a reduced length of hospital stay (mean difference 2.3 days, 95% CI 2.2–2.4 days). The results of the observational studies were consistent with the RCTs. Only one RCT (80 patients) tested 24 hours or less, precluding definitive conclusions.

Conclusion(s): Post-appendectomy antibiotic treatment for 3 days or less was not associated with an increased risk of intra-abdominal abscess, surgical site infection, or readmission.

Effect of Proprotein Convertase Subtilisin/Kexin Type 9 Inhibitors on Cardiovascular Outcomes and Lipid Levels in Patients with Heterozygous Familial Hypercholesterolemia: A Meta-Analysis

Movahedan M[1], Ellis U[2], Barry A[3,4]
[1]St. Paul's Hospital, Lower Mainland Pharmacy Services, Vancouver, BC
[2]Woodward Library, University of British Columbia, Vancouver, BC
[3]Faculty of Pharmaceutical Sciences, University of British Columbia, Vancouver, BC
[4]Jim Pattison Outpatient Care and Surgery Centre, Lower Mainland Pharmacy Services, Surrey, BC

Background: Patients with heterozygous familial hypercholesterolemia (HeFH) are at high risk of major adverse cardiovascular events (MACE) and mortality due to elevated atherogenic serum lipids. Proprotein convertase subtilisin/kexin type 9 inhibitors (PCSK9i), including monoclonal antibodies (alirocumab, evolocumab) and small interfering RNA (inclisiran), have been demonstrated to lower lipid levels. However, gaps exist in understanding the effect of PCSK9i on cardiovascular outcomes and lipid levels specifically in patients with HeFH.

Objective: To examine the effect of currently-available PCSK9i on all-cause death, MACE, and lipid levels (low-density lipoprotein cholesterol [LDL-C], apolipoprotein B, and lipoprotein[a]) in patients with HeFH.

Methods: A librarian-assisted systematic search of MEDLINE, Embase, CENTRAL, and ClinicalTrials.gov was performed from 2013-2023. Randomized controlled trials of PCSK9i versus control in patients with HeFH were included. No language restrictions were applied. Both authors independently screened citations, extracted data, and assessed quality using the Cochrane risk-of-bias tool 2. Meta-analyses were performed using ReviewManager.

Results: Seven studies met the inclusion criteria (N=2196). Overall risk of bias was mostly low or with some concerns. The majority patients were on a statin at baseline. Median follow-up was 24 weeks. PCSK9i did not reduce MACE (odds ratio [OR] 1.25, 95% confidence interval [CI] 0.69-2.26, I^2=0%) or all-cause death (OR 2.47, 95% CI 0.33-18.26, I^2=0%), which was likely due to the low overall event rate. However, PCSK9i significantly reduced LDL-C by 54% (95% CI 49-58%), apolipoprotein B by 43% (95% CI 37-49%), and lipoprotein(a) by 20% (95% CI 13-28%).

Conclusions: This meta-analysis demonstrated that PCSK9i significantly reduced LDL-C, as well as apolipoprotein B and lipoprotein(a), in patients with HeFH. However, this did not translate into a reduction in MACE or all-cause death. Large-scale randomized controlled trials with longer duration are required to validate whether this short-term reduction in lipid levels translates into a reduction in clinically-meaningful outcomes.

Effectiveness of Five Decontamination Strategies for Armrests Deliberately Contaminated with Cyclophosphamide

Dupré M[1], Marc M[1], Bussières JF[1,2]
[1]Unité de recherche en pratique pharmaceutique, Département de pharmacie, CHU Sainte-Justine, Montréal, QC
[2]Faculté de pharmacie, Université de Montréal, Montréal, QC

Background: In Canada, over 80% of the arms chairs used by patients receiving outpatient chemotherapy were contaminated with at least one antineoplastic drug.

Objective: To evaluate the effectiveness of five decontamination strategies for chair armrests deliberately contaminated with cyclophosphamide.

Methods: Descriptive simulation study; 600 cm^2 squares of fabric (100% silicone on a knit/polyester base (Designtex)) were contaminated with 10ug cyclophosphamide, distributed over five points on each surface. Five cleaning strategies (four cleaning products) were tested: quaternary ammonium

(DR-100®), 0.5% hydrogen peroxide (Zochlor®), hydrogen peroxide wipes (Oxivir®), 0.005% detergent (Action 3®) and 0.5% sodium hypochlorite and. Each product was tested in triplicate after one cleaning, two cleanings and three cleanings of a microfiber wipe (Micronsolo®). Cleaning was carried out according to the usual procedure used locally. The limit of detection and quantification for cyclophosphamide were both 0.0006 ng/cm^2. All tests were performed on an ultra-performance liquid chromatography–tandem mass spectrometry system. Averages and standard deviations for the cleaning efficacy rate were calculated.

Results: Fifty-nine samples were collected: 3 blanks, 5 for recovery and 51 experimental samples Recovery rate for this surface was 93.7±4.6%. All blank samples were negative. The effectiveness rate of the products was greater than or equal to 99.7% with the exception of the commercial wipe (98.8%). Regardless of the agent used, the efficacy rate was 99.16±1.27% after one cleaning (n=15), 99.89±0.16% after two cleanings (n=15) and 99.94±0.0,07% after three cleanings (n=15). Several factor can explain residual contamination in healthcare facilities, including the heterogeneity of fabrics used on chair arms, their wear and tear, and the frequency and approach to cleaning. In this study, the tissue used was new.

Conclusion: An oncology treatment armrest surface could be almost completely decontaminated using different cleaning agents. Repeated cleaning in oncology outpatient clinics is probably necessary to further reduce contamination.

Effectiveness of Proprotein Convertase Subtilisin/Kexin Type 9 Inhibitors in Patients with Heterozygous Familial Hypercholesterolemia: A Retrospective Cohort Study

Siemens R[1], Pryjma M[2], Buchkowsky S[3], Barry A[2,4]
[1]Surrey Memorial Hospital, Lower Mainland Pharmacy Services, Surrey, BC
[2]Jim Pattison Outpatient Care and Surgery Centre, Lower Mainland Pharmacy Services, Surrey, BC
[3]Richmond Hospital, Lower Mainland Pharmacy Services, Richmond, BC
[4]Faculty of Pharmaceutical Sciences, University of British Columbia, Vancouver, BC

Background: Heterozygous familial hypercholesterolemia (HeFH) is a genetic condition that causes elevated lipoprotein levels resulting in a high risk of atherosclerotic cardiovascular disease (ASCVD). Proprotein convertase subtilisin/kexin type 9 inhibitors (PCSK9i) have been shown to substantially reduce serum low-density lipoprotein cholesterol (LDL-C) concentration in clinical trials.

Objective: To evaluate the real-world effectiveness of PCSK9i therapy in patients with HeFH.

Methods: This was a retrospective cohort study at a specialized lipid clinic in Surrey, British Columbia. Patients with definite or probable HeFH on a PCSK9i monoclonal antibody (alirocumab or evolocumab) were included. Data were collected between September 2015 and October 2022 from paper-based/electronic medical records. The primary objective was proportion of patients who attained the guideline-recommended ≥50% reduction in LDL-C from baseline after 12 months of treatment.

Results: Eighty-seven patients were included. Mean age was 63 years, 49% were female, and 40% had ASCVD. Mean baseline LDL-C was 4.1 mmol/L. Forty percent were on a statin (21% on moderate-to-high intensity) and 71% were on ezetimibe. Overall, 71% of patients achieved ≥50% reduction in LDL-C after 12 months of PCSK9i therapy, while 86% achieved ≥40% reduction in LDL-C. Mean LDL-C decreased to 1.8 mmol/L (57% reduction from baseline) after a mean follow-up of 15 months, though it increased to 2.1 mmol/L after 27 months of follow-up. Similar trends were observed with non-high-density lipoprotein cholesterol and apolipoprotein B. Eight percent of patients permanently discontinued therapy. Barriers to PCSK9i use were mostly related to cost.

Conclusions: A high-majority of patients with HeFH were able to achieve a ≥50% reduction in LDL-C from baseline after >12 months of PCSK9i therapy, which is consistent with clinical trial data of patients with ASCVD. Accordingly, PCSK9i should be considered in patients with HeFH who are unable to achieve a ≥50% reduction in LDL-C with statin therapy ± ezetimibe.

Environmentally Sustainable Opportunities for Health Systems: Metered-Dose Inhaler Prescribing, Dispensing, Usage and Waste at a Tertiary Academic Center

Caron C[1,2], Sajwani S[1], Bateman K[1], Degenhardt O[1], Gaudreau-Simard M[3,4], Pakhale S[5], Kanji S[1,3]
[1]Pharmacy Department, The Ottawa Hospital, Ottawa, ON
[2]Département de Pharmacie, Hôpital Monfort, Ottawa, ON
[3]Ottawa Hospital Research Institute, Ottawa, ON
[4]Department of Medicine, The Ottawa Hospital, Ottawa, ON
[5]Department of Respirology, The Ottawa Hospital, Ottawa, ON

Background: Canada's health sector's carbon footprint is amongst the highest in the world, and is responsible for 4.6% of Canada's total greenhouse gas emissions. A quarter of Canada's health care greenhouse gas emissions are linked to pharmaceuticals, with metered dose inhalers (MDIs) contributing disproportionally high amounts.

Objectives: To describe MDI prescribing, dispensing, usage and waste patterns at a Canadian tertiary care academic hospital.

Methods: This study is a retrospective point-prevalence cohort study of 100 consecutive patients discharged from medical and surgical services and who were prescribed at least one MDI during their admission. Through health records review, data was collected to describe patient demographics, MDI prescribing, dispensing, usage and waste patterns. Usage and waste data was applied to annual purchasing data to estimate annual usage and waste. Financial cost was computed using local purchasing estimates while carbon cost was calculated using published estimates.

Results: In 100 consecutively discharged patients 315 MDIs were dispensed in total, of which 96 were unused. This represents 61440 actuations or doses dispensed, with 56773 (92%) of doses unused or wasted. Waste data was applied to annual estimates, with a calculated annual carbon footprint of 315.8 tonnes of carbon dioxide equivalents (tCO2e). We estimate that a 20% waste reduction would result in carbon savings of 68.5 tCO2e. If 20% of salbutamol prescriptions were switched to the dry powder inhaler alternative, terbutaline, a 14% reduction in waste would be required to offset the additional monetary cost.

Conclusions: This study suggests that 92% of MDI doses are unused and wasted. Many opportunities for waste reduction exist and would be associated with both financial and carbon savings that could be used to offset the cost of adding dry powder inhaler alternatives to formulary.

Evaluating the Impact of Access and Flow Pharmacists on Clinical Pharmacy Key Performance Indicators

Gellatly R[1,2,3], Minhas R[1,3], Kim E[1], Sy,I[1]
[1]Pharmacy Department, Surrey Memorial Hospital, Surrey, BC
[2]Faculty of Pharmacy and Pharmaceutical Sciences, Monash University, Parkville, Australia
[3]Faculty of Pharmaceutical Sciences, University of British Columbia, Vancouver, BC

Background: Ensuring patients receive quality care in the right place at the right time is critical. This process, referred to as access and flow, supports positive outcomes and experiences for patients. Pharmacists play an integral role in access and flow, however shortages of clinical pharmacists within our health region, led to challenges in supporting ward-based activities. Access

and Flow (A&F) Pharmacists were introduced to enable team-based pharmacy services to support these activities.

Objectives: To compare clinical pharmacist activities as described by the Canadian Society of Hospital Pharmacists (CSHP) key performance indicators (KPIs) pre- and post-implementation of A&F Pharmacists.

Methods: This was a retrospective, cohort study of pharmacists providing direct patient care activities on medicine units from October to December 2022 (pre-implementation phase) and February to April 2023 (post-implementation phase). Data was compared pre- and post-implementation using a chi-squared test.

Results: There was an increase in the number of patients that received medication reconciliation on admission by a pharmacist during the post-intervention phase as compared to the pre-intervention phase (53.8% vs 41.4%, p = 0.00004). Patient education during hospital stay and at discharge also improved from 13.8% to 21.7% (p = 0.0007) and 36.8% to 45.9%, respectively (p = 0.05). There was no change in the number of patients pharmacists provided medication reconciliation at discharge to, with all patients discharged during the week being seen by a pharmacist.

Conclusions: There was improvement in the number of patients that received key clinical pharmacy interventions as outlined by CSHPs KPIs. The long term impact of team-based clinical pharmacy services is unknown and warrants further exploration as practice evolves and scope changes.

Evaluation of the Management of Croup in a Pediatric Emergency Department Before and After the COVID-19 Pandemic

Armstrong S[2], Bogle D[1,2], Carey K[1], MacInnis M[1,2]
[1]Emergency Department, IWK Health, Halifax, NS
[2]College of Pharmacy, Dalhousie University, Halifax, NS

Background: The Covid-19 pandemic brought change to the management of respiratory illnesses. Croup management was impacted as administration of inhaled epinephrine changed from nebulization to metered dose inhaler (MDI) to minimize aerosol generating medical procedures (AGMPs). A standardized approach to croup management was adopted, placing emphasis on early steroid administration, and using the Westley Croup Score (WCS) to guide therapy.

Objectives: The primary objective investigates if both efficacy and safety were changed; by comparing the WCS, heart rate, and pulse oximetry at time periods within each cohort. The secondary objectives include measurement of time spent in the emergency department from triage to discharge, the completeness of documentation in the patient record of WCS and associated scoring parameters, and time points of medication administration.

Methods: This study was performed as a pre-post retrospective study for the calendar years of 2019 and 2021. There were a total of 1980 patients possible for review who met inclusion criteria of a croup diagnosis, aged 6 to 60 months, and a Canadian Triage Acuity Scale (CTAS) score of 2 to 5. Two independent reviewers screened randomized charts for additional inclusion and exclusion criteria and data collection. Discrepancies were resolved a third investigator. The calculated sample size of 385 charts was met.

Results:

	Pre-Covid (n=199)	Post Covid (n=198)
Documented WCS within 1 hour of triage	0	56/198 (28.3%)
Average heart rate (bpm) at triage	132	129
Average heart rate (bpm) before epinephrine	143	157
Average heart rate (bpm) after epinephrine administration	148	145
SpO_2 (%) at triage	99	98
SpO_2 (%) after epinephrine	93	99
Treatment with dexamethasone only	174 (87%)	193 (97.5%)
Treatment with dexamethasone and nebulized epinephrine	25 (12.6%)	0
Treatment with dexamethasone and epinephrine MDI	0	5 (2.5%)
Duration of stay in ED (minutes)	117	147
Patients who returned to ED within 7 days with similar complaint	15 (7.6%)	3 (1.5%)

Conclusions: Preliminary results indicate that rate of WCS documentation increased with the use of the treatment standardization. In the pre-covid cohort, not all patients received dexamethasone, and more received epinephrine. In the post-covid cohort, more patients received dexamethasone only for treatment, and duration of stay was longer. The post covid cohort saw a reduction in return visit to the emergency department.

Evaluation of Warfarin Management in Primary Health Care Centers in Qatar: A Cross-Sectional Study

Alshihab S[1], Ibrahim MIM[1], Hadi MA[1], Sayed A[2], Arabi A[3], Al-Qahtani A[3], Al-Mujalli A[2], Rafie I[3], Al-Kuwari M[2], Kandy M[2], Al-Zaidan M[2]
[1]Clinical Pharmacy and Practice Department, College of Pharmacy, QU Health, Qatar University, Qatar
[2]Primary Health Care Corporation, Qatar
[3]Heart Hospital, Hamad Medical Corporation, Qatar

Background: Warfarin is widely used to prevent thromboembolic events associated with several disease conditions. However, given its narrow therapeutic window, it requires frequent monitoring. In Qatar, warfarin is the most commonly prescribed oral anticoagulant. However, no previous study has assessed the quality of warfarin management in primary care settings. Time-in-therapeutic range (TTR) is used as a quality indicator for the management of patients on warfarin, and a cut-off of >70% is considered high-quality management.

Objectives: Our objective was to evaluate the quality of warfarin management in primary healthcare centers by measuring the percentage of TTR. In addition, we explored the proportion of extreme out-of-range international normalized ratio (INR) values.

Methodology: A cross-sectional study was conducted between June and September 2023. Data were extracted from a national electronic dataset (Cerner©). All adult patients who were managed on warfarin within primary healthcare centers in Qatar from January 2018 to August 2023 and had ≥1 INR values were included. The TTR was calculated using the

traditional method. An independent t-test was employed to compare the population TTR with the recommended cut-off. A Chi-square test and one-way ANOVA were conducted to compare the mean TTR and INR categories (subtherapeutic, supratherapeutic) across patient characteristics.

Results: The mean (SD) TTR of the 494 patients included in this study was 45.33% (17.52%). This was significantly lower than the recommended cut-off value ($p< 0.001$, 95% CI: -26.22, -23.12). Patients older than 65 years achieved higher TTR compared with those under 65 years (46.60 vs. 43.42%, respectively; $p= 0.049$). Approximately 19% (n=8,014) of the total INR readings were subtherapeutic (≤1.5) and 5.8% (n=2456) were supratherapeutic (≥4).

Conclusions: The management of patients taking warfarin in primary settings in Qatar is suboptimal. Future research should investigate strategies to ensure safe and effective therapy.

Keywords: warfarin, time in therapeutic range, anticoagulant primary health care

Gamification of Minor Ailment Prescribing Education for Pharmacy Students: A Needs Assessment

Zhou Z[1], Zhao X[1], Kanji S[1], Brady L[1], Sabet F[1], Lim YH[1], Ho C[1]
[1]Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, ON

Background: On January 1, 2023, pharmacists in Ontario were granted the authority to prescribe for 13 minor ailments. As of October 1, 2023, the list was expanded to six additional conditions. Serious games (or gamification) in health profession education aims to improve knowledge retention in a more engaging format than traditional teaching and learning methods. We intend to design educational games related to pharmacist prescribing for minor ailments (PPMA) for early career pharmacists and pharmacy students.

Objective(s): The objective of this needs assessment project is to identify minor ailment conditions, disease-related, and drug-related concepts that may benefit from educational games for reinforcing pharmacy students' and pharmacy professionals' knowledge and skills on PPMA.

Methods: We surveyed 230 Year 4 University of Toronto PharmD students using a six-item online questionnaire, distributed via the student listserv and Facebook page on December 7, 2023. Quantitative data collected were analyzed using descriptive statistics. Free-text input was subject to thematic analysis.

Results: To-date, we received 20 responses (9% response rate). Pinworms and threadworms were perceived to be the most challenging condition, followed by nausea and vomiting of pregnancy. Other highly ranked conditions included impetigo, vulvovaginal candidiasis, and dermatitis. These conditions were perceived to be of complex presentation and differential diagnosis and hence the need for knowledge reinforcement. Among disease-related concepts, students were interested in a refresher for alarming symptoms that would require referral, for pharmacological therapy. In terms of drug-related concepts, contradictions, pharmacokinetics, and side effects of therapeutic options were ranked similarly.

Conclusion(s): Designing and implementing PPMA gamification should tailor to learner-identified needs. Findings from this project will play a pivotal role in shaping the design and content of our Minor Ailments Gamification Application, scheduled to launch in 2024, that may serve as a knowledge-and-skill refresher for pharmacy students and pharmacy professionals.

Impact of a Pharmacist in Intravenous Immunoglobulin Surveillance and Dose Optimization at a Pediatric Centre

Hann N[1], Blanc A[1], Varughese N[1], Aberkane H[2], Cameron J[1], Grenier S[3]
[1]Department of Pharmacy, Children's Hospital of Eastern Ontario – Ottawa Children's Treatment Centre (CHEO), Ottawa, ON, Canada
[2]Institut des Sciences Pharmaceutiques et Biologiques, Université de Lyon, Lyon, France
[3]The Canadian Blood Services, Medical Affairs and Innovation, Ottawa, ON, Canada

Background: Intravenous Immunoglobulin (IVIG) are a collection of human donors' plasma antibodies used to treat various immune conditions. Global use has skyrocketed over the last decade and Canada is one of the highest per capita consumers globally, with a growing annually demand of 6-10%. In 2017, the Immune Globulin Product Supply and Related Impacts expert panel was established by Health Canada in response to concerns of market access and sustainability of long-term supplies. Canadian Blood Services (CBS) reported a 2022 expenditure of $202 million on Immunoglobulin products.

Objective(s): Previous pharmacist collaboration between hospital pharmacists and CBS has demonstrated that clinical pharmacist intervention can reduce unnecessary healthcare expenditure on Hemophilia A and B treatments. This study aims to assess whether pharmacist intervention on IVIG may be valuable in promoting a wise usage of IVIG.

Methods: A retrospective chart review was performed examining all IVIG treatments given at a pediatric hospital from January 1st 2022 to December 31st 2022. IVIG treatments were assessed based on their clinical indication to determine areas where optimization may be realized. This included review of appropriate indications and using adjusted body weight (AdjBW) dosing.

Results: In this 1-year span, over 12,300g IVIG was used across 404 treatment encounters. Twenty-nine percent of treatments (5,500g IVIG) were prescribed off-label. For indications where dosing guidelines exist, an estimated 620g IVIG (5%) could have been saved by dosing on AdjBW.

Conclusion(s): Given the magnitude of IVIG use and limited supplies in Canada, ensuring a wise usage of Immunoglobulin products is pivotal in reducing healthcare expenditure, ensuring continued access for patients needing these treatments, and reducing the healthcare impact of IVIG logistics on planetary health. This project highlights an opportunity for hospital pharmacist interventions to optimize IVIG usage and the need to further explore the impact on cost and sustainability.

Impact of Pharmacy-Supported Transition of Care Services in the Middle East and North Africa Region: A Systematic Review and Meta-Analysis

Alhmoud E[1], Alrawi S[1], El-Anany R[1], Ibrahim MIM[2], Hadi MA[2]
[1]Department of Pharmacy, Al-Wakra Hospital, Hamad Medical Corporation, Doha, Qatar
[2]Department of Clinical Pharmacy and Practice, College of Pharmacy, QU Health, Qatar University, Doha, Qatar

Background: Transition of care (TOC) is associated with an increased risk of medication discrepancies, medication errors, and adverse drug events (ADEs). Limited evidence is available on pharmacists' contributions in optimizing TOC from the Middle East and North Africa (MENA) region.

Objective: This study aimed to evaluate the impact of pharmacy-supported TOC interventions on healthcare utilization, medication discrepancies, medication errors, adverse drug reactions, and medication adherence.

Methods: PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), EMBASE, Web of Science, and International Clinical Trials Registry Platform (ICTRP) were searched electronically from inception until March 9, 2023. Randomized and quasi-randomized studies comparing

the effectiveness of pharmacist-supported TOC interventions with usual care for adults (age 18 years or older) discharged from the hospital were included. The risk of bias was evaluated using Cochrane's risk-of-bias tool for randomized trials (ROB2) and the risk of bias in non-randomized studies of interventions (ROBINS-I) tool. Data were analyzed using narrative synthesis and/or meta-analysis based on clinical and statistical homogeneity among the included studies.

Results: Twelve studies including 10 randomized controlled trials (RCTs) and 2 quasi-randomized trials were included (n=2377 subjects). The included studies had a high risk of bias. The included studies were quite heterogeneous in terms of the nature and delivery of intervention and assessment of outcome measures. The meta-analysis found a significant reduction in preventable ADEs in the pharmacist-led TOC group compared with the control (Odds ratio (OR) 0.34, 95% CI: 0.13-0.94, P= 0.04). However, all-cause hospital readmission was not reduced. All studies, except one, demonstrated a significant improvement in medication adherence in the intervention group.

Conclusion: Pharmacy-supported TOC interventions in the MENA region can potentially improve patient outcomes. However, the findings should be interpreted with caution considering the low quality of the studies and poor description of the intervention characteristics.

Intravenous Iron Prescribing Assessment in the Saskatchewan Health Authority

Roy C[1], Heilman L[2], Schutz G[2], Luu A[2], Sarma N[1], Saboni A[2], Klein V[2,3], Lett R[4], Semchuk B[1]
[1]Pharmacy Services, Saskatchewan Health Authority, Regina, SK
[2]Pharmacy Services, Saskatchewan Health Authority, Saskatoon, SK
[3]College of Pharmacy and Nutrition, University of Saskatchewan, Saskatoon, SK
[4]Department of Anesthesiology, Saskatchewan Health Authority, Regina, SK

Background: Intravenous (IV) iron is indicated for iron deficiency anemia (IDA) treatment in patients requiring urgent replacement or when oral iron is ineffective. Increased IV iron use significantly impacts costs for the Saskatchewan Health Authority (SHA). A provincial IV iron order set for IDA adult inpatients was created to support appropriate prescribing practices.

Objectives: To assess IV iron prescribing appropriateness through adherence to the provincial order set.

Methods: This retrospective chart review included adult inpatients across the SHA prescribed IV iron one month pre- or post- order set implementation (July 20, 2023). A BDM Pharmacy report of patient orders was screened using the electronic health record for inclusion and exclusion criteria (hemodialysis, admitted more than 365 days, and sites with less than 10 patients). Data was collected from the patient's electronic and paper health record using REDCap. Descriptive statistical analysis was conducted using Microsoft Excel.

Results: Overall, 607 patients (mean age 53 years) were included, most commonly admitted for childbirth (25%), and prescribed iron sucrose (89%) or ferric derisomaltose (11%). Two-thirds (n=386) of patients met order set eligibility criteria (62% pre- and 67% post-order set). Reasons for non-adherence (n=222) included iron studies unavailable (n=117, 53%) and unclear indication for IV rather than oral iron (n=98, 44%), costing $60,639.20 (35% of overall costs). Ambiguous indications were common with handwritten orders (64%), obstetrics and gynecology orders (27%), and at certain sites (52% in one geographic area).

Conclusions: Most inpatients prescribed IV iron met eligibility criteria. Those inappropriately prescribed IV iron may qualify for oral iron or lack an IDA diagnosis altogether, increasing adverse event risk and healthcare costs. Enactment of a mandatory order set facilitated by targeted anemia management education may increase appropriate IV iron prescribing. Locally, project learnings will support development of an outpatient anemia program.

Monitoring Program of Surface Contamination with Eleven Antineoplastic Drugs in One Hundred and Twenty-six Canadian Hospitals

Dupré M[1], Bussières JF[1,2], Tanguay C[1]
[1]Unité de recherche en pratique pharmaceutique, Département de pharmacie, CHU Sainte-Justine, Montréal, QC
[2]Faculté de pharmacie, Université de Montréal, Montréal, QC

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 since 2010.

Objective: To describe contamination with 11 antineoplastic drugs measured on surfaces of Canadian healthcare centers.

Methods: Twelve standardized sites were sampled in each center, six in oncology pharmacies and six in outpatient clinics. 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; 0.02 for doxorubicine; 0.0037 for etoposide; 0.04 for 5-fluorouracil; 0.0004 for gemcitabine; 0.0007 for irinotecan; 0.0009 for methotrexate; 0.004 for paclitaxel; 0.004 for the platinum (platinum dosing was optional) and 0.009 for vinorelbine. The proportion of positive samples and the percentile of the contamination were calculated.

Results: 126 Canadian centers sampled their surfaces in January-April 2023. Half of centers (64/126, 51%) opted to dose the platinum in addition to the other ten drugs. 1476 compliant samples were analyzed. Cyclophosphamide (411/1476, 28%) and gemcitabine (352/1476, 24%) were the most frequently found on surfaces. The 90th percentile of the concentration was 0.0095 ng/cm² for cyclophosphamide and 0.0040 ng/cm² for gemcitabine. Less than 10% of surfaces were contaminated with the other nine drugs. The surfaces most frequently contaminated with cyclophosphamide were the armrest of patient treatment chair (93/123, 78%), the front grille inside the biological safety cabinet (BSC) (61/123, 50%), and the floor in front of the BSC (59/123, 48%).

Conclusion: Low concentration of antineoplastic drugs were frequently measured on the surfaces on Canadian centers. This monitoring program allowed centers to benchmark their contamination with pragmatic contamination thresholds and helped increased the awareness of all stakeholders. Thorough and frequent decontamination, safe handling practice and the use of personal protective equipment is mandatory.

Opioid Prescribing Among Hospitalized Patients in Tertiary Care Hospitals: A Retrospective Cohort Study

Roy C[1,2], Mansell H[1], Evans C[1], Yao S[1], Blackburn D[1]
[1]College of Pharmacy and Nutrition, University of Saskatchewan, Saskatoon, SK
[2]Pharmacy Services, Saskatchewan Health Authority, Regina, SK

Background: Canada is experiencing an opioid epidemic. Hospitalization may be an important source of opioid prescriptions in the community.

Objectives: We aimed to describe and identify predictors of opioid prescribing in tertiary care hospitals in Canada.

Methods: This retrospective cohort study linked electronic discharge abstracts and prescription claims for adult inpatients admitted to medicine or surgery units between 2017 and 2019. Opioid prescriptions were quantified and characterized by dosage, duration, and concomitant prescriptions. A random effects logistic regression model was built to identify independent predictors of opioid prescriptions on day of discharge in patients with a medicine admission.

Results: Of the 38,218 patients included, 32,472 (57.7%) were admitted to a medicine unit, 15,114 (26.8%) to surgery, and 8,716 (15.5%) other units. At least one opioid was prescribed in 36,626 (65.1%) of all admissions; 25,899 (70.7%) of these with an as-needed interval only. On average, opioid

prescriptions were active for 87.1% of the hospitalization, 35,437 (96.8%) were for strong potency agents, 24,834 (67.8%) for intravenous use, and 34,694 (94.7%) included a nonopioid analgesic prescription. On the day of discharge, 55.2% (24,467) of all admissions had an active opioid prescription. Two factors were highly predictive of an opioid prescription on day of discharge: percentage of the admission with an opioid prescription and patients that were exclusively prescribed as-needed opioids only.

Conclusions: Opioids are currently prescribed to a high percentage of patients in Canadian hospitals, including on the day of discharge. The prescribing patterns identified provide targets for strategies to reduce unnecessary opioid exposure, such as individualizing analgesia and formulary restrictions. Future research should evaluate routine use of as-needed opioids, high potency agents, and duration of prescriptions.

Patient Perceived Barriers and Enablers to Medication Adherence in the Treatment of Depression: A Qualitative Study

Meng Y[1,2], Chiu C[2], Kapoor M[1], Li SA[1,3], Kaur N[1], Marr P[1,3], Kwan D[1,2], Leblanc K[1,2], Ji C[1,3], Papoushek C[1,3]
[1]University Health Network, Toronto, ON
[2]Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, ON
[3]Department of Family and Community Medicine, University of Toronto, Toronto, ON

Background: Depression affects approximately 280 million individuals globally and it is a leading cause of disability. Despite effective medication options, 50% of patients prematurely discontinue antidepressants within 6 months. We sought to understand patients' perspectives regarding their needs and expectations related to antidepressants.

Objectives: To identify and describe enablers and barriers that influence adult patients' medication adherence in depression treatment and to explore patients' educational needs on initiating or continuing antidepressant therapy.

Methods: Qualitative descriptive study using individual, semi-structured interviews of adult patients with depression who were prescribed an antidepressant within 3 months of study recruitment at an urban primary care clinic in Toronto, Canada. Interviews were recorded and transcribed verbatim for inductive thematic analysis.

Results: Six themes emerged from 13 participants that were interviewed: safety and effectiveness of antidepressant, understanding of depression and its management, medication administration, health care experiences in the treatment of depression, and social influences and relationships. Barriers to adherence included adverse effects of antidepressants, preference for non-pharmacological therapies, uncertainty about therapeutic effects, and social stigma. In contrast, enablers were positive responses from antidepressants, fear of relapse, reminder aids, established routine, and a trusting patient-provider relationship. Participants desired access to reliable, evidence-based, and personalized educational information delivered through verbal, written, and digital formats to support antidepressant adherence.

Conclusion: To overcome the identified barriers, educational strategies should involve both patients and their prescribers to identify patient-specific needs and treatment goals, engage in shared decision-making, and maintain consistent follow-up to support antidepressant adherence.

Patient Suggestions for Supporting Medication Needs at Hospital Discharge

Davis S[1], Murphy M[6], Oakes S[6], Devaguptapu V[6], Bridges S[5], Fowler S[5], Doucette D[4], LeBlanc M[4], Boudreau C[3], Demmings P[7], Naylor H[2], Goodine C[1]
[1]Pharmacy Department, Horizon Health Network, Fredericton, NB
[2]Pharmacy Department, Horizon Health Network, Saint John, NB
[3]Pharmacy, Sobeys, Fredericton, NB
[4]Regional Pharmacy Department, Horizon Health Network, NB
[5]Research Services, Horizon Health Network, Saint John, NB
[6]Research Services, Horizon Health Network, Fredericton, NB
[7]Patient Experience Advisor, Horizon Health Network, Fredericton, NB

Background: Improvements in inpatient medication management and education are required at hospital discharge. Hospital pharmacists are an ideal health care provider (HCP) to communicate medication changes and educate patients at transitions of care (TOC). TOC interventions by hospital pharmacists could support the medication needs of older adult inpatients and empower them to stay healthy at home post-discharge.

Objective(s): To gather patient suggestions on how to better support medication needs during TOC from hospital to home.

Methods: As a component of a mixed-methods quasi-experimental study, inpatients were assigned to either TOC intervention (by hospital pharmacist) or control group (usual care) based on hospital unit. Thirty days post-discharge, participants completed a telephone survey including an open-ended question: "Do you have any suggestions on how we can support your medication needs better when you go home from the hospital?". Responses were paraphrased by research assistants and underwent content analysis.

Results: Seventy-three older adults (n= 44 intervention; n= 29 control) responded to the open-ended question (M age= 76.68; SD = 7.43; 60.27% female). Most intervention patients did not have suggestions for improvement in supporting medication needs and had positive sentiments toward hospital pharmacist medication education. Approximately half of control patients had suggestions on supporting medication needs; the majority regarding inpatient medication education. Members of both groups identified barriers to supporting medication needs post-discharge, including HCP follow-up.

Conclusions: Responses suggest patients' medication needs were supported by a hospital pharmacist, emphasizing their role in TOC-interventions and importance of pre-discharge medication education for older adults. Further inquiry is needed to specify patients' medication needs during post-discharge follow-up, and to inform HCPs on how to best support patients during TOC. Patient interviews and surveys to gain further insight are undergoing analysis as part of the larger study.

PERFECT MATCH: Can You Fit the Personality to the Service? Understanding Personality Traits of Hospital Pharmacists in Different Clinical Services

Brideau S[1,2], Duong T[1,2], Nacevska I[1,2], Sabuga AJ[1,2], Ruo N[2], Villeneuve E[2]
[1]Faculty of Pharmacy, Université de Montréal, Montréal, QC
[2]Pharmacy Department, McGill University Health Centre, Montréal, QC

Background: Limited research has been conducted on the pertinence of using psychometric tests to evaluate hospital pharmacist's compatibility with certain clinical services based on personality traits.

Objectives: The objective of the study was to evaluate the relevance of using a validated psychometric test, The Big Five Personality Test (BFPT), to predict the compatibility of the personality traits of hospital pharmacists working in selected clinical services.

Methods: Participants in this descriptive study had 10 days to respond to the demographic questionnaire and BFPT. Pharmacists working in a hospital setting providing care to adult patients at the McGill University Health Center in selected clinical services (hematology-oncology/oncology clinic, intensive care unit, emergency medicine, internal medicine, geriatrics,

infectious diseases) were included. Group means for each trait were compared using ANOVA and a Tukey post hoc test was used in case of statistical significance. The effect size was evaluated using an eta-squared (η^2).

Results: Clinical service had a large effect on "Extraversion" (η^2 = .336) and "Conscientiousness" (η^2 = .297), and there was a significant difference between the group means (p = .025 and p = .05, respectively). A Tukey post hoc test showed that the significant difference found for "Extraversion" was mainly due to differences in means between emergency medicine and geriatrics pharmacists (p = .040). Although there was no significant difference between the group means for "Openness" (p = .063) and "Neuroticism" (p = .130), clinical service had a large effect on these traits (η^2 = .283 and η^2 = .237, respectively).

Conclusion: Our findings suggest that using a psychometric test such as the BFPT could be relevant during the pharmacist hiring and training process, as the size of the group effect on the means was clinically important. It could be used to orient the choice of clinical service for incoming hospital pharmacists.

Pharmacist Integration into a Hemophilia Treatment Centre: A Pilot Project to Optimize Hemophilia Treatment and Promote Sustainability Amongst Pediatric and Adult Patients

Al Badri A[1], Hann N[1], Varughese N[1], Klaassen R[1], Cameron J[1], Kuo A[2], Blanc A[1], Grenier S[3]
[1]The Children's Hospital of Eastern Ontario – Ottawa Children's Treatment Centre (CHEO), Ottawa, ON
[2]The Ottawa General Hospital, Ottawa, ON
[3]The Canadian Blood Services, Medical Affairs and Innovation, Ottawa, ON

Background: The management of Hemophilia A and B involves expensive therapies (i.e. Factor VIII, IX, and emicizumab), representing a 6-digits yearly cost per patient. The variability in pharmacokinetic profiles requires treatment to be individualized, a role suited for pharmacists.

Objective(s): The primary objective of this innovative project was to incorporate pharmacists into hemophilia treatment centres (HTC), in a cost savings model, to improve patient quality of life and health outcomes by optimizing treatment. An exploratory objective was to examine optimized prescribing and environmental impact.

Methods: From January 1st, 2023 to November 30th, 2023, 40 pharmacist-led interventions occurred, with 16 and 24 at the pediatric and adult hospital respectively. To implement optimized regimens with the interprofessional team, the pharmacist participated in hemophilia rounds, clinics, patients' education, and therapy counselling. The interventions involved pharmacokinetic studies using McMaster's Web-Accessible Population Pharmacokinetic Service to assess factor half-life, emicizumab serum concentration levels and dose-capping/rounding to provide treatment with full clinical benefit while reducing product wastage.

Results: Two and 4 pharmacist-led interventions at the pediatric and adult hospital respectively, were pharmacokinetic-based decisions for factor concentrates. These interventions based on patients' half-lives resulted in conservation of a total of 184,000 units of Factor VIII and 96,000 units of Factor IX. Thirteen total interventions involved optimization of emicizumab, saving cost and reducing wastage of a total of 1,110 mg at the pediatric hospital, and 9,720 mg at the adult hospital. Cumulative savings for all products extrapolated to 1 year was $1,500,000 from pharmacist-led interventions.

Conclusion(s): We showed that ongoing monitoring by a pharmacist as part of the HTC resulted in reduction of valuable medication waste through individualized recommendations while saving cost. Maintaining a pharmacist role in an HTC promotes cost-savings and sustainable medication management for Hemophilia. Future research should evaluate how optimized dosing may aid carbon footprint goals.

Pharmacist Prescribing for Minor Ailments in Ontario: Needs Assessment of Pharmacy Students

Zhou Z[1], Austin Z[1], Ho C[1]
[1]Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, ON

Background: As of January 2023, Ontario pharmacists have been granted prescribing authority for 13 minor ailments (i.e., PPMA). Currently, no literature has explored the attitudes and preparedness of pharmacy students towards PPMA.

Objective(s): The objective of this study is to identify pharmacy students' perceived confidence, readiness, and needs, including potential barriers and facilitators of PPMA.

Methods: In this needs assessment project, we surveyed 465 senior University of Toronto PharmD students using a 30-item online questionnaire distributed via the student listserv and Facebook page from October 11 to 25, 2022. Quantitative data collected were analyzed using descriptive statistics. Thematic analysis of free-text input was performed.

Results: We received 67 responses (14.4% response rate). Of the initial 13 minor ailments approved for PPMA in Ontario, students were most confident in managing gastroesophageal reflux disease and uncomplicated urinary tract infection, and least confident in skin conditions (e.g., impetigo and tick bites). Students' confidence was associated with their perceived preparedness acquired from the school curriculum, frequency of ailment encounters, and complexity of the condition. Student-perceived barriers to PPMA included lack of time, legal liabilities and risks, and minimal financial compensation, as indicated by 97%, 84%, and 81% respondents, respectively. Students were concerned about potential mistrust from other prescribers and inadequate knowledge. Notably, 96% respondents agreed that additional resources could guide decision-making and 90% respondents perceived that increased number of pharmacy staff would be beneficial to support PPMA. Having access to health records and enhanced pharmacy software would also facilitate PPMA.

Conclusion(s): Students' confidence in managing minor ailments differed based on their learning and practice experience, familiarity with the conditions, and complexity of the disease. Further research with a larger sample size and higher response rate is needed to strengthen the results and make valid inferences on students' attitudes and needs regarding minor ailments prescribing.

Pharmacists' Prioritization of Patients for Medication Reconciliation on Discharge

Goldstein A[1], Shea A[1], Spec S[1], Newman P[2], Fernandes O[3,4,5], Macdonald E[1,6,7]
[1]Department of Pharmacy, The Ottawa Hospital, Ottawa, ON
[2]North West Telepharmacy Solutions, The Northwest Company, Winnipeg, MB
[3]Department of Pharmacy, University Health Network (UHN), Toronto, ON
[4]Toronto General Hospital Research Institute, Toronto, ON
[5]Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, ON
[6]Ottawa Hospital Research Institute, Ottawa, ON
[7]School of Pharmaceutical Sciences, University of Ottawa, Ottawa, ON

Background: Pharmacist involvement in discharge medication reconciliation (DMR) can mitigate harm when delivered as part of a medication management bundle. With current workload, pharmacists cannot complete DMR for every inpatient. As a result, pharmacists must prioritize patients for DMR interventions.

Objectives: Primary: To describe how pharmacists prioritize patients for DMR at our institution and identify facilitators and barriers to pharmacist involvement in DMR. Secondary: To describe how pharmacists' assessment of patient priority for DMR compares to the Epic risk of unplanned readmission, PRIME, and PADR-EC risk assessment tools.

Methods: Part 1: Pharmacists involved in DMR participated in focus groups. Discussions explored factors considered in prioritization of patients for DMR and facilitators and barriers to DMR. Part 2: For patients admitted

to their service expected to be discharged within 48 hours, pharmacists ranked the patient's priority for DMR and indicated their intent to complete DMR via a questionnaire. For each patient, the Epic, PRIME, and PADR-EC scores were collected.

Results: Thirteen pharmacists participated in focus groups and 11 pharmacists completed the questionnaire. Twenty-two factors and 27 subfactors for patient prioritization were identified. The top five factors reported were complex medication regimen, high-risk medications, medication changes, medication access, and length of stay. Facilitators and barriers were categorized into six themes: 1) team dynamics; 2) pharmacist workload; 3) prior pharmacist involvement; 4) process for DMR; 5) discharge planning, and 6) technology. We observed a lack of overlap between the patients identified as high priority by the pharmacists and the high-risk patients based on the scores.

Conclusion: Pharmacists at our institution do not have a consistent approach to prioritizing patients for DMR. Furthermore, pharmacists' assessment of patient priority different from the three risk scores. Findings could be used to address identified barriers and to develop and pilot a standardized DMR process.

Pharmacogenetic-Guided Opioid Therapy in Pain Management: A Systematic Review

Ma E[1], Dang K[1], Wallace C[1], Duffett M[2,3]
[1]Department of Pharmacy, St. Joseph's Healthcare Hamilton, Hamilton, ON
[2]Department of Pharmacy, Hamilton Health Sciences, Hamilton, ON
[3]Department of Pediatrics, McMaster University, Hamilton, ON

Background: Interindividual variability in opioid response and adverse effects are explained in part by genetic variations in the CYP2D6 gene. For example, prodrugs such as codeine and tramadol require the CYP2D6 enzyme for activation and may have differing efficacy and side effect profiles depending on an individual's CYP2D6 genotype. Using pharmacogenetics (PGx) to inform the choice or dosing of opioids has the potential for more optimal pain and safety outcomes.

Objective(s): In this systematic review, we summarized the evidence for using PGx guidance to improve patient outcomes in patients taking opioids for pain.

Methods: We searched MEDLINE, Embase, and Cochrane Library for interventional studies investigating pain and/or safety outcomes in PGx-guided opioid therapy compared to usual care. We included studies in all types of pain. Two independent reviewers screened citations for inclusion, and risk of bias was assessed using the appropriate Cochrane tools. Pain-related outcomes, opioid consumption, and safety data were extracted for analysis.

Results: We included 8 studies - 5 randomized control trials (576 patients) and 3 non-randomized interventional studies (560 patients) that compared the use of PGx testing of CYP2D6 activity to inform opioid therapy vs. usual care. We assessed all studies as moderate or high risk of bias. Four studies used PGx testing in chronic pain (cancer and non-cancer), and 4 studies in post-operative pain. We did not conduct a meta-analysis due to heterogeneity in pain measurement methods and reporting. Three chronic pain studies and 2 post-operative pain studies found that PGx-guided opioid therapy led to improvement in at least one pain outcome. Two post-operative studies reported a statistically significant decrease in morphine mg equivalents with PGx-guided therapy. Safety outcomes were not consistently reported.

Conclusions: Although individual studies suggest a potential for improved pain outcomes in both chronic and post-operative pain, estimates of effect are very uncertain.

Population Pharmacokinetics and Dosing of Gentamicin and Tobramycin in Neonates: A Scoping Review

Lim YH[1], Chung E[2,3], Seto W[1,2,3]
[1]Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, ON
[2]Department of Pharmacy, The Hospital for Sick Children, Toronto, ON
[3]Child Health Evaluative Services, SickKids Research Institute, Toronto, ON

Background: Gentamicin and tobramycin are commonly used in neonatal intensive care units to treat gram-negative bacterial infections. However, dosing regimens vary significantly between institutions from traditional dosing (2.5-3.5 mg/kg/dose IV q8-24h) to high-dose extended-interval (HDEI) (≥ 4 mg/kg/dose IV q24-72h). Population pharmacokinetic (popPK) models can be used to derive more individualized dosing in neonates.

Objectives: This review described popPK models, significant patient factors influencing pharmacokinetic variability and the recommended dosing regimens for gentamicin and tobramycin in neonates.

Methods: Literature searches were conducted in Medline and Embase from January 2013 to May 2023 to identify articles that described gentamicin/tobramycin popPK models and/or dosing in neonates.

Results: Eleven studies with a total of 4,982 neonates (range: n=12-2,357 neonates per study) at postmenstrual age (PMA) between 21-44 weeks with 1-23 serum gentamicin/tobramycin concentrations per patient that described neonatal gentamicin/tobramycin popPK models were included. Birth weight (45%), current bodyweight (45%), PMA (45%), postnatal age (PNA) (45%), and serum creatinine (45%) were the most common factors included in the popPK models. Two-compartment model was the most common structural model (82%). The most common target maximum concentration was at least 8 mg/L (50%) and target minimum concentrations were below 1 mg/L (50%) or 2 mg/L (50%). Among 45 articles that described gentamicin/tobramycin dosing regimens, the most common gentamicin/tobramycin dosing was HDEI (96%) with most frequent dosing of 4-5 mg/kg/dose IV q24-48h (76%). The most common variables used for dosing stratification were gestational age (47 %), PNA (42%) and bodyweight (22%).

Conclusion: Eleven popPK models of gentamicin/tobramycin were identified for neonates, with pharmacokinetic variability explained commonly by bodyweight, age/prematurity, and kidney function. Most studies recommended HDEI for gentamicin/tobramycin in neonates. Future direction include validation of the popPK models with external dataset to compare accuracy and precision to derive most optimal gentamicin/tobramycin dosing in neonates at local institution.

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

Pelletier E[1,6], Guevremont C[2,6], Bérard G[3,6], Simard M[4,6], Marcotte N[4,6], Michel M-C[4,6], Varin F[5,6], Deschênes L[4,6], Froment D[5,6], Ovetchkine P[1,6], Rajan R[2,6], Farand P[3,6]
[1]CHU Sainte-Justine, Montréal, QC
[2]Centre Universitaire de Santé McGill, Montréal, QC
[3]Centre intégré universitaire de soins et services sociaux de l'Estrie – Centre hospitalier universitaire de Sherbrooke (CIUSSS de l'Estrie - CHUS), Sherbrooke, QC
[4]CHU de Québec - Université Laval, Québec, QC
[5]Centre hospitalier de l'Université de Montréal, Montréal, QC
[6]Programme de gestion thérapeutique des médicaments (PGTM)

Background: Opioid prescribing habits at discharge following pediatric surgeries are not described in Quebec. Unused prescribed opioids may be a starting point for misuse by children and adolescents. In the context of the opioid crisis, a descriptive analysis of opioid prescriptions in four university teaching hospitals is relevant.

Objectives: Describe opioid prescription characteristics (types of orders, duration, partial-fill orders, quantities issued, nonopioid coanalgesics) in patients under 18 years old.

Methods: Retrospective analysis of prescriptions in opioid-naive pediatric patients following different surgeries in seven surgical specialties (orthopedics, plastics, urology, otolaryngology, gynecology, general surgery and neurosurgery), between April 1st and October 31st, 2021.

Results: A total of 505 prescriptions were identified for hospitalized and ambulatory populations. Variations in prescribing patterns were observed between hospitals but prescriptions were mostly issued for orthopedics, urology, otolaryngology and general surgery. Residents wrote most of them (75%). Preprinted orders were available for 22% of the prescriptions. Only 6% of prescriptions had a duration. Partial-fills orders were not frequent (2%) because the median number of doses prescribed was low. The median number of doses was 5 to 10 for both populations except orthopedics, neurosurgery and otolaryngology for hospitalized patients, and orthopedics and gynecology following ambulatory procedures. These orders had a quantity of at least 30 pills. Quantities were overall adequate compared to the literature. The median dose was 0.1 mg/kg/dose of oral morphine equivalent (OME) and the largest variation was found in orthopedics. The total OME dose (mg/kg) was higher for adolescents (aged 12 years and older) following a hospital stay. Nonopioid coanalgesics were present on most prescriptions (86%).

Conclusion: This descriptive analysis gives us a real-life picture of the prescriptions' characteristics. It allows us to target which areas need to improve and what actions are required, like preprinted orders and educational tools for patients and caregivers.

Quality Initiative in the Neonatal Intensive Care Unit at Surrey Memorial Hospital to Reduce Refeeding Like Syndrome

Newby B[1]
[1]Neonatal and Pediatric Pharmacy, Surrey Memorial Hospital, Fraser Health, Surrey, BC

Background: Refeeding like syndrome can occur in neonates with initiation of nutrition following placental insufficiency or inadequate intake. It can lead to potentially fatal shifts in fluids and electrolytes, and is associated with sepsis, chronic lung disease and impaired neurodevelopment. As the consequences of refeeding like syndrome are significant; identifying, preventing and treating refeeding like syndrome may improve neonatal outcomes.

Objectives: To identify if there is an issue with refeeding like syndrome in the Neonatal Intensive Care Unit (NICU) at Surrey Memorial Hospital. Cycle 1 - To reduce the incidence of refeeding like syndrome, with a specific aim to reduce the incidence of hypophosphatemia in the first week of life by 10% in a year.

Methods: Plan-do-study-act cycles. Chart review for baseline data, November 2018 to October 2021 and for cycle 1, June 2022 to February 2023. Descriptive statistics were used for analysis.

Results: Baseline data – The incidence of refeeding like syndrome and hypophosphatemia for neonates over 1500 grams was 0.4% and 10.5%, 1000 to 1500 grams was 2.3% and 20.8% and less than 1000 grams was 20.9% and 51.6% respectively. The incidence of complications, excluding death, for neonates less than 1000 grams was higher if there was hypophosphatemia in the first week of life. Cycle 1 – Changed first total parenteral nutrition (TPN) solution to include phosphate. Hypophosphatemia was reduced by 10% for neonates over 1000 grams, no reduction for less than 1000 grams. Cycle 2 – Changed first TPN solution to have a lower protein content.

Conclusions: The incidence of refeeding like syndrome and hypophosphatemia increased with decreasing birth weight. Common complications in the NICU occurred at higher rates for neonates with hypophosphatemia. Adding phosphate to the first TPN was not enough to reduce refeeding like syndrome and hypophosphatemia in extremely low birth weight neonates.

Real-World Characterization of Immune-Related Adverse Events in Nova Scotia Patients Treated with Pembrolizumab or Durvalumab and Adherence to Toxicity Management Guidelines

Bowles S[1], Daniels A[1], DiCostanzo T[1], Minard L[1], Scott S[1], Snow S[2], Teimouri A[1]
[1]Department of Pharmacy, QEII Health Sciences Centre, Halifax, NS
[2]Division of Medical Oncology, QEII Health Sciences Centre, Halifax, NS

Background: Immunotherapy has transformed cancer treatment, introducing several immune checkpoint inhibitors (ICIs) in recent years. These agents target various checkpoint proteins, enhancing T-cell-mediated destruction of cancer cells. However, ICIs carry the risk of causing immune-related adverse events (irAEs) in essentially any organ or tissue. Prompt identification and management of irAEs are crucial to avoid morbidity and mortality.

Objectives: The primary objectives were to characterize irAEs and describe adherence to toxicity management guidelines throughout Nova Scotia. Secondary objectives included documenting changes in adherence over time and evaluating the involvement of subspecialty disciplines.

Methods: This multi-centered retrospective chart review included adult medical oncology patients who received immunotherapy with pembrolizumab or durvalumab at centers across Nova Scotia from 2010 to 2021. Data from electronic medical records were collected, including patient demographics, treatment details, and irAE information. Descriptive statistics and logistic regression modeling were used for data analysis.

Results: 292 patient charts were included for review. There were 204 irAEs identified, and 131 patients (44.8%) experienced at least one irAE. Management of irAEs was in accordance with guidelines in 67.6% of cases. Approximately 25% of identified irAEs resulted in emergency department visits, predominantly due to diarrhea/colitis, pneumonitis, and cardiotoxicity. Adherence to toxicity management guidelines varied over time and across provincial zones in Nova Scotia, with lower rates in more rural areas.

Conclusion: This study provides valuable insights into the characterization and management of irAEs in patients treated with pembrolizumab and durvalumab. Future research could focus on comparing guideline adherence between oncologists and non-oncology physicians, as well as exploring interventions such as pharmacist-led clinics. The findings from this study can guide clinical decision-making and enhance patient outcomes by identifying opportunities for improvement in irAE management.

Stability of 0.1 and 0.01% Atropine Eye Drops in Tears Naturale Forte Stored in Low Density Polyethylene Dropper Bottles for 102 Days at 4°C and 25°C

Lam K, Perks W, Law S, Ma NH
Department of Pharmacy, Sunnybrook Health Sciences Centre, Toronto, ON

Background: Atropine eye drops are used for treatment of myopia in children. There is no stability data for 0.1% and 0.01% atropine in Tears Naturale Forte which was chosen due to its commercially sterile packaging and lack of the preservative benzalkonium.

Objective: The objective of the study was to evaluate the stability of 0.01 and 0.1% atropine eye drops in Tears Naturale Forte stored in low density polyethylene (LDPE) dropper bottles over 102 days at 4°C and 25°C.

Methods: On study day 0, 1% atropine eye drops were diluted to 0.01 and 0.1% with Tears Naturale Forte in 6 LDPE dropper bottles and 2 glass vials. Three LDPE dropper bottles and one glass vial of each concentration were each stored at 4°C and 25°C. Physical inspection and concentration analysis were completed for all samples on study days 0,2,4,8,15,21,28,49,64,79,

and 102. Atropine concentrations were determined using a validated, stability-indicating liquid chromatographic method with UV detection.

Results: The analytic method separated degradation products from atropine such that the concentration was measured specifically, accurately (deviations from known averaged 0.82%), and reproducibly (within and between day replicate error averaged 0.32% and 0.65% (coefficient of variation [CV])). A second estimate of between-day reproducibility, the standard deviation of regression of study samples, averaged 2.19. All samples remained clear and colourless for the 102 day study period. Samples stored at 4°C retained more than 98% of their initial concentration for the duration of the study. Samples stored at 25°C achieved 90% of their initial concentration with 95% confidence after 17 days. Multiple linear regression identified differences in percent remaining due to study day ($p<0.01$) and temperature ($p<0.01$) but not concentration ($p=0.38$).

Conclusion: Atropine eye drops are stable for at least 102 days when stored at 4°C and 17 days when stored at 25°C.

Stability of Amoxicillin 50 mg/mL Suspension in Oral Mix/Oral Syrup or Ora-Sweet/Ora-Plus in Plastic Oral Syringes and Plastic Amber Bottles at 4°C and 25°C

Perks W, Caku A, Lam K, Lye M, Marchesano R, Law S, Ma NH
Department of Pharmacy, Sunnybrook Health Sciences Centre, Toronto, ON

Background: Limited availability of commercially available amoxicillin oral suspensions necessitated the formulation of a simple and palatable suspension.

Objective: To evaluate the stability of amoxicillin suspended in Medisca Oral Mix/Oral Syrup (Medisca-OM-OS) and Perrigo Ora-Sweet/Ora-Plus (Perrigo-OS-OP) stored in amber polyethylene terephthalate (PET) bottles and polypropylene syringes at 4°C and 25°C for 18 days.

Methods: On day 0, 50mg/mL amoxicillin oral suspensions were prepared by levigating the contents of amoxicillin capsules in Medisca-OM-OS 80:20 and Perrigo-OS-OP 60:40. Three units of each container were stored at 4°C and 25°C. Concentration and physical inspection were completed on days 0,2,5,7,9,11,14,18. Amoxicillin concentrations were determined using a validated, stability-indicated liquid chromatographic method with UV detection. Chemical stability was determined based on the intersection of the lower limit of the 95% confidence interval of the observed degradation rate and the time to achieve 90% of the initial concentration.

Results: The analytic method separated degradation products from amoxicillin such that the concentration was measured specifically, accurately (deviation from known averaged 1.35%) and reproducibly (within day variation averaged 0.31%; between day variation averaged 1.12%). Univariate analysis identified temperature ($p<0.001$) and formulation ($p=0.045$) as significant predictors for percent remaining, but not container ($p=0.88$) or study day ($p=0.19$). Colour changes were noted for suspensions stored at 25°C on day 5 but not for suspensions stored at 4°C. The suspension separated into two layers on day 7 for samples stored at 25°C and day 9 for samples at 4°C but formed a homogenous suspension after shaking. The calculated time to achieve 90% of the initial concentration with 95% confidence exceeded 10 days, for all formulations, storage containers and temperatures.

Conclusion: We conclude amoxicillin 50mg/mL suspended in Medisca-OM-OS or Perrigo-OS-OP is stable for 10 days stored in PET bottles or polypropylene syringes at 4°C and 25°C.

Stability of Celestone® Soluspan® Stored in Polypropylene Syringes for 210 Days at Room Temperature with Protection from Light

Ma NH[1], Law S[1], Murphy KE[2], McDonald SD[3]
[1]Department of Pharmacy, Sunnybrook Health Sciences Centre, Toronto, ON
[2]Division of Maternal-Fetal Medicine, Department of Obstetrics and Gynecology, Sinai Health System, Toronto, ON
[3]Division of Maternal-Fetal Medicine, Departments of Obstetrics & Gynecology, Radiology & Health Research Methods, Evidence & Impact, McMaster University, Hamilton, ON

Introduction: Celestone® Soluspan® is an injectable suspension containing 3mg/mL betamethasone acetate (BA) and 3mg/mL betamethasone sodium phosphate (BSP). Drugs used for clinical trials may be drawn up in ready to administer doses and blinded to reduce drug preparation time and facilitate ease of access. However, a stability study is required to demonstrate the drugs retain their concentration when repackaged in an alternate container.

Objective: The objective of the study was to evaluate the stability of Celestone® Soluspan® stored in polypropylene syringes at room temperature with protection from light over 210 days.

Methods: On study day 0, 50x 3mL polypropylene syringes were each filled with 2mL of Celestone® Soluspan® then stored at room temperature (15-30°C) with protection from light. Physical inspection and concentration analysis were completed on study days 0,15,30,60,90,120,150,180,210. The concentrations of BA and BSP were determined using a validated, stability-indicating liquid chromatographic method with UV-detection. Chemical stability was determined based on the intersection of the lower limit of the 95% confidence interval of the observed degradation rate and the shortest time to achieve 90% of the initial concentration for either BA or BSP.

Results: The analytic method separated BA and BSP from each other as well as their degradation product. BA and BSP were measured specifically, accurately (deviations from known averaged 1.11% and 1.37%, respectively), and reproducibly (within day variation 0.31% and 0.28%; between day variation 1.07% and 1.05%). Both BA and BSP retained >96% of their initial concentration for the 210 day study duration and no physical changes were noted. The calculated time to achieve 90% of the initial concentration with 95% confidence exceeded the 210 day study duration for BA and BSP.

Conclusion: Celestone® Soluspan® is stable for at least 210 days when repackaged into polypropylene syringes and stored at room temperature with protection from light.

Stability of Thiamine 0.45 and 7.94 mg/mL Diluted in 0.9% Sodium Chloride in Polyvinylchloride Minibags at 4°C and 25°C for 14 Days

Marchesano R, Perks W, Tin LY, Law S, Ma NH
Department of Pharmacy, Sunnybrook Health Sciences Centre, Toronto, ON

Background: High dose thiamine is used for the treatment of Wernicke's encephalopathy. Currently there is no data on the stability of thiamine diluted in 0.9% sodium chloride (NS) polyvinyl chloride (PVC) minibags.

Objectives: The objective of the study was to evaluate the stability of thiamine 0.45 and 7.94mg/mL diluted in NS stored in PVC minibags over 14 days at 4°C and 25°C with and without protection from light.

Methods: On study day 0, 50mg of thiamine was injected into 9x 100mL NS minibags each to yield a concentration of 0.45mg/mL. Additionally, 500mg thiamine was injected into 9x 50mL NS minibags each, yielding a concentration of 7.94mg/mL. Three minibags of each concentration were stored at 4°C. Three minibags of each concentration were stored at 25°C with and without protection from light. Concentrations were measured on study days 0,1,2,3,6,8,10,14. Thiamine concentrations were determined using a validated, stability-indicating liquid chromatographic method with

UV-detection. The chemical stability was determined by calculating the intersection of the lower limit of the 95% confidence interval of the observed degradation rate and time to achieve 90% of the initial concentration.

Results: The analytical method separated thiamine from its degradation products such that the concentration was measured specifically, accurately (deviations from known averaged 1.5%), and reproducibly (within day replicate error averaged 0.41%; between day replicate error averaged 0.32%). Analysis of variance identified significant differences in percent remaining due to study day (p=0.009), temperature (p=0.006), and exposure to light (p=0.012) but not initial concentration (p=0.08). Thiamine retained its initial concentration for the 14 day study period for all concentrations, storage temperatures and exposure to light.

Conclusion: Thiamine is chemically stable for at least 14 days when diluted to 0.45 and 7.94mg/mL in 0.9% sodium chloride PVC minibags and stored at 4°C and 25°C.

Stability of Vancomycin 10, 25 and 50 mg/mL Ophthalmic Drops in Tears Naturale II Stored in Low Density Polyethylene Dropper Bottles at 4°C and 25°C for 30 days

Caku A, Lam K, Marchesano R, Perks W, Tin LY, Law S, Ma NH
Department of Pharmacy, Sunnybrook Health Sciences Centre, Toronto, ON

Background: Vancomycin ophthalmic drops are commonly used in combination for the treatment of various ocular infections. There is no suitable stability data for vancomycin ophthalmic drops when prepared in Tears Naturale II.

Objectives: To evaluate the stability of vancomycin 10, 25 and 50mg/mL in Tears Naturale II over 30 days at 4°C and 25°C prepared in low density polyethylene eye (LDPE) dropper bottles.

Methods: On study day 0, vancomycin 1g vials were reconstituted with 20mL of Tears Naturale II to yield a 50mg/mL solution. Additional vancomycin vials were reconstituted and further diluted with Tears Naturale II to prepare the 10 and 25mg/mL solutions. Three dropper bottles and one glass vial of each concentration were prepared and stored at 4°C and 25°C. Concentrations were measured and physical inspection completed on study days 0,1,4,8,14,21,24 and 30 and physical inspection completed daily. Vancomycin concentrations were determined using a validated, stability-indicating liquid chromatographic method with UV-detection. Chemical stability was determined using the lower limit of the 95% confidence interval of the observed degradation rate and time to achieve 90% of the initial concentration.

Results: The analytical method separated vancomycin from its degradation products such that the concentration was measured specifically, accurately (deviations from known averaged <2%) and reproducibly (within day replicate error averaged <1% and between day replicate error averaged <2%). The shortest time to achieve 90% of the initial concentration was >30 days for solutions stored at 4°C and 26 days for solutions stored at 25°C. All solutions remained clear and colourless except the 50mg/mL solution at 4°C which developed a white precipitate on day 21.

Conclusion: We conclude that vancomycin 10, 25 and 50mg/mL drops in Tears Naturale II are chemically stable for 30 days at 4°C and 26 days at 25°C. The 50mg/mL drops are physically stable for only 14 days.

Strategies to Develop and Implement a Protocol for Prolonged Infusions of Beta-Lactam Antibiotics in an Inpatient Setting: A Scoping Review

Saunders H[1,2], Richler C[3,4], Purkayastha D[2,3], Kanji S[2,5], Thabet P[3,4]
[1]Horizon Health Network, Fredericton, NB
[2]The Ottawa Hospital, Ottawa, ON
[3]L'Hôpital Montfort, Ottawa, ON
[4]École des sciences pharmaceutiques, Université d'Ottawa, Ottawa, ON
[5]Ottawa Hospital Research Institute, Ottawa, ON

Background: Despite established evidence supporting prolonged infusion of beta-lactam antibiotics in critically ill patients, uptake of this practice in clinical settings has not been universal. There is a lack of evidence-based guidance on developing and implementing prolonged infusion protocols in the hospital setting.

Objectives: To summarize implementation and development strategies, barriers, facilitators and key themes surrounding the implementation of prolonged infusions of beta-lactam antibiotics in an inpatient setting.

Methods: A PubMed, Embase and Cochrane Database of Systematic Reviews search was completed to identify studies that answered our research questions. Included studies described strategies for the development and implementation of a prolonged infusion protocol of beta-lactams in a hospital setting. A thematic analysis was completed to identify key protocol development and implementation themes.

Results: Eleven studies met the criteria for inclusion. Protocol development and implementation themes identified were: multidisciplinary approach, protocol adherence support, institution readiness assessment, behaviour change modelling, education, and protocol approval. Barriers to protocol success include confusion surrounding protocol, decreased adherence to protocol over time, lack of provider buy-in, limited resources, medication administration errors, medication incompatibilities, and limited IV access. Identified barriers were matched to possible identified facilitators. The only barrier for which no facilitator was identified is limited IV access.

Conclusions: Our findings suggest that a multifaceted approach is required when preparing to develop and implement a protocol for prolonged infusions of beta-lactam antibiotics. Creating a thorough and strategic plan before protocol development and implementation is essential to ensure the successful uptake of the new protocol.

Sustainability of Inhaler Use in Pediatrics: Medication Impact on Carbon Footprint

Blanc A[1], Cressot L[1,2], Varughese N[1], Kovesi T[1,3], Radhakrishnan D[1,3], Cameron J[1]
[1]Children's Hospital of Eastern Ontario – Ottawa Children's Treatment Centre (CHEO), Ottawa, ON, Canada
[2]Institut des Sciences Pharmaceutiques et Biologiques, Université de Lyon, Lyon, France
[3]Department of Pediatrics, University of Ottawa, Ottawa, ON, Canada

Background: Carbon footprint (expressed in carbon dioxide equivalent (CO2e)) is the preferred method to measure our impact on climate change. Hydrofluoroalkane, used as a propellant in Pressurized Metered-dose Inhalers (pMDIs) results in a higher carbon footprint compared to the primary alternative, Dry Powdered Inhalers (DPIs), and this represents a carbon-reduction target for sustainable medication management.

Objective(s): The main objectives were: 1) to examine the prescribing of inhalers in the respirology clinic of a pediatric teaching hospital in Canada from January 1 2022 to Dec 31st 2022, and 2) in a carbon stewardship model, to anticipate the feasibility/impact of prescribing changes when switching to more sustainable DPI inhalers.

Methods: This chart review of Epic electronic health records consisted of data from all patients between the ages of 6 -18 years old who were followed the hospital respirologists and prescribed an inhaler for any indication (excluding those with acute decompensation). Data were summarized

using frequencies and percentages and included age at visit, drug name (strength, dose, frequency), inhaler type (pMDI or DPI), lactose allergy, and spacer use.

Results: There were a total of 1650 participants (3388 inhaler orders). pMDIs were 92.9% of all prescribed inhalers and 7.1% were DPIs. In a sub-analysis of the 12 to 18 year old age category (n=580), DPIs were 15.3% of all prescriptions, where according to treatment guidelines, 95% of these prescriptions could be switched to DPI if deemed clinically feasible.

Conclusion(s): In our pediatric hospital, we showed for 2022 that 92.9% of inhaler prescriptions were for pMDI inhalers. This represents an opportunity for changes in medication management, if safe and feasible, by switching to lower carbon footprint DPI inhalers. This timely pharmacy initiative highlights opportunities to work with clinicians in a carbon stewardship model and punctuates the need for tools to guide prescription practice changes.

Teaching Pharmaceutical Management During the Hospital Pharmacy Internship: A Descriptive and Comparative Study of the Situation in France and Quebec

Marc M[1], Morel C[1], Maurin C[1], Monnier A[1], Saint-Lorant G[2], Collomp R[3], Lipat S[4,5], Paubel P[6,7,8], Bussières JF[1,9]
[1]Unité de recherche en pratique pharmaceutique, Département de pharmacie, CHU Sainte-Justine, Montréal, QC
[2]Normandie université, CHU de Caen Normandie, UNICAEN, UNIROUEN, ABTE—pharmacie centrale, Caen, France
[3]Département de pharmacie, CHU Nice, Nice, France
[4]Université de Franche-Comté, INSERM, UMR RIGHT, Besançon, France
[5]Pôle Pharmaceutique, CHU Besançon, France
[6]Agence générale des équipements et produits de santé (AGEPS), Assistance publique—Hôpitaux de Paris (AP-HP), Paris, France
[7]Faculté de pharmacie de Paris, Université Paris Cité, Paris, France
[8]Institut Droit et Santé, INSERM UMR S 1145, Université Paris Cité, Paris, France
[9]Faculté de pharmacie, Université de Montréal, Montréal, QC

Background: To fully assume the roles and responsibilities of a pharmacist in a hospital environment, successful completion of a management course is essential.

Objective(s): Compare the teaching and evaluation of pharmaceutical management in hospital pharmacy within the internship program in France and Quebec.

Methods: Descriptive, observational, cross-sectional study. Four pharmacy residents from France were exposed to the hospital pharmacy management course in France and Canada. Management contents in hospital pharmacy taught in France (4 universities) and Quebec (2 universities) were used. Similarities and differences in teaching approach, speakers, content were compared.

Results: Similarities were observed: management compulsory teaching, a lecture approach with documents, several educational approaches (e.g. feedback/reflection workshops in France vs journal club/ case simulation in Quebec), a semi-structured research project in management to be carried out during the training with oral/written communication. Students are encouraged to submit their manuscripts to pharmaceutical journals. Differences were also noted: four themes in France compared to seven in Quebec, standardization planned for 2024 in France vs effective in Quebec, more speakers involved in France vs a unique speaker in Quebec for the theoretical part, educational materials varying depending on the speaker in France vs a detailed 300 pages book is used in Quebec, and more course hours in France than in Quebec (62 vs 39). There is heterogeneity in the sub-themes covered between faculties in France and Quebec, which can be explained in part by the 12-fold increase in the number of French faculties. Courses in Quebec are face-to-face, whereas they can also be distance learning in France.

Conclusion: Theoretical and practical teaching of pharmaceutical management in hospitals is offered in France and Quebec. Although training programs differ in terms of duration and scope, the two countries should be encouraged to work more closely together in terms of content and collaboration.

Keywords: teaching, theoretical, practical, pharmaceutical management, health establishment, pharmacy.

Team-Based Pharmacy Services and Its Impact on Clinical Pharmacist Burnout

Minhas R[1,2], Sy I[1], Gellatly R[1,2,3]
[1]Pharmacy Department, Surrey Memorial Hospital, Surrey, BC
[2]Faculty of Pharmaceutical Sciences, University of British Columbia, Vancouver, BC
[3]Faculty of Pharmacy and Pharmaceutical Sciences, Monash University, Parkville, Australia

Background: Burnout, a syndrome of emotional exhaustion (EE), depersonalization (DP), and reduced personal accomplishment (PA), is on the rise amongst pharmacists. Excessive workload, understaffing and change in regular duties are known driving factors for burnout. During shortages of clinical pharmacists within our health region, Access and Flow (A&F) pharmacists were introduced to alleviate workload and understaffing while enabling team-based clinical pharmacy care to patients.

Objectives: To describe burnout profiles in clinical pharmacists before and after the implementation of A&F Pharmacists. The secondary objective was to describe the prevalence of burnout using the conservative cut-off scores, liberal cut-off scores and burnout profiles before and after A&F pharmacist implementation.

Methods: This was a cross-sectional study of a pre-intervention and post-intervention survey using the Maslach Burnout Inventory (MBI). Prevalence of burnout was measured using the MBI conservative cut-offs (high: EE + DP + low PA), liberal cut-offs (high: EE or DP) and the burnout profiles approach (high: EE + DP).

Results: Eleven participants responded to pre-intervention (85% response rate) and post-intervention (92% response rate) surveys. Pre- to post-intervention, the changes observed in profiles were: increased engagement (27% to 45%), a reduction in ineffectiveness (36% to 27%) and overextension (27% to 0%). Disengagement (0% to 9%) and burnout (9% to 18%) increased by one profile, respectively. The conservative cut-off scores showed no change in burnout pre- and post-intervention (9%). The liberal cut-off scores demonstrated a reduction in burnout from 82% pre-intervention to 55% post-intervention.

Conclusions: The introduction of A&F pharmacists' was associated with eradication of overextension amongst clinical pharmacists likely due to workload reduction and improved staffing. There is discordance in burnout rates using the cut-off scores and the burnout profiles, making it challenging to determine if burnout improved. A consistent approach to evaluate burnout is needed so effective actions can be taken.

The Creation of a National Pharmacy Association Focused on Climate Change and Planetary Health

Roy C[1,2], Sajwani S[1,3]
[1]Canadian Association of Pharmacy for the Environment
[2]Pharmacy Services, Saskatchewan Health Authority, Regina, SK
[3]Pharmacy Services, The Ottawa Hospital, Ottawa, ON

Background: The climate crisis is the greatest health threat of the modern era and health systems contribute approximately 5% of greenhouse gas (GHG) emissions. Within healthcare, pharmaceuticals represent 25-33% of health system GHG emissions. Pharmacy plays a crucial role in mitigating these effects through interventions on anesthetic gases, inhalers, medication optimization, and waste management. Within climate adaptation, pharmacists are tasked with developing disaster management policies, addressing

clinical impact of extreme heat, and the management of drug shortages. Additionally, the pharmacy team also addresses pharmaceutical and plastic pollution. The Canadian Association of Pharmacy for the Environment (CAPhE) was rapidly established through leveraging pharmacy volunteer resources in Canada.

Objective: To describe development of a volunteer-based association focused on the interconnectedness of planetary health and pharmacy.

Methods: During April and May 2022, founding members of the association reviewed current work on environmental sustainability within pharmacy across Canada. From September to December 2022, the team approved a constitution, logo, and terms of reference, and recruited co-leads for its eight pillars: supply chain management, distribution, mitigation, adaptation, communications, education, partnerships/advocacy, and research.

Results: Between June 2022 and April 2023, the organization completed recruitment of 17 core team members, six students, and six environmental pharmacy consultants. Subsequently, CAPhE has successfully completed multiple actions, including multiple presentations to universities and practicing professionals locally and nationally (most recently CPhA national webinar), reviewed and endorsed publications (e.g. CASCADES pharmacy playbook, COP28 advocacy letter, CPhA disaster planning, Choosing Wisely recommendations), and collaborated with CSHP to develop the sustainability taskforce. A strategic plan under development will inform future activities.

Conclusions: Climate change and planetary health are niche areas that require urgent attention within the pharmacy profession. The rapid formation of this new association has filled an identified professional gap in Canada and can be a model for implementation science.

The Impact of the Implementation of Access and Flow Pharmacists on Medicine Patient Outcomes

Gellatly R[1,2,3], Minhas R[1,3], Kim E[1], Sy I[1]
[1]Pharmacy Department, Surrey Memorial Hospital, Surrey, BC
[2]Faculty of Pharmacy and Pharmaceutical Sciences, Monash University, Parkville, Australia
[3]Faculty of Pharmaceutical Sciences, University of British Columbia, Vancouver, BC

Background: Ensuring patients receive quality care in the right place at the right time is critical. This process, referred to as access and flow, supports positive health outcomes for patients. Pharmacists play an integral role in access and flow, however shortages of clinical pharmacists within our health region, led to challenges in supporting direct patient care. Access and Flow (A&F) Pharmacists were introduced to enable team-based pharmacy care.

Objectives: To compare in-hospital mortality, 30-day readmission, and hospital length of stay (LOS) pre- and post-implementation of A&F pharmacists on medicine units.

Methods: This was a retrospective, cohort study of patients admitted to medicine units from October to December 2022 (pre-implementation phase) and February to April 2023 (post-implementation phase). Descriptive statistics were used to summarize the demographic characteristics of participants. Nominal data was compared pre- and post-implementation using a chi-squared test and continuous data was compared using a t-test or Mann-Whitney U test, as appropriate.

Results: Two hundred fifteen patients were included in the pre-intervention period as compared to 236 patients in the post-intervention period. Patient demographics were similar in the pre and post-intervention phase. In-hospital mortality was not statistically different between the pre- and post-intervention groups (5.6% vs. 4.7%; p = 0.66). There was no difference in 30-day readmission at 8.4% and 9.7%, respectively (p = 0.26). Hospital LOS was 7 days pre-intervention and 6.2 days post-intervention (p = 0.33).

Conclusions: While there was no statistically significant change in patient outcomes, there was a numerically lower mortality and hospital LOS after the implementation of A&F pharmacists. Patient outcomes are impacted by many factors, however, an associated increase in ward-based pharmacy services and numerical lowering in those outcomes is of interest.

Virtual Reality Simulation of Suicide Risk Assessment Performed by Pharmacy Learners

Ho C[1], Yao A[1], Chen A[1], Giannini J[1], Patel N[1], Zhou Z[1], Zhao X[1], Hargreaves F[2], Antinucci R[2], Mak M[2], Abdool P[2]
[1]Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, ON
[2]Centre for Addiction and Mental Health, Toronto, ON

Background: With the COVID-19 pandemic, there is an increased prevalence of suicide ideation and mental health concerns in health care system. Pharmacists are often the first point of contact for patients with healthcare needs. It is crucial for pharmacists to be trained in interacting with patients at risk or with ideations of suicide. Virtual reality (VR) offers the opportunity for pharmacy learners to conduct a Suicide Risk Assessment (SRA) in a simulated clinical environment.

Objective(s): This pilot study builds on preliminary findings from VR SRA user testing and is aimed to explore the feasibility and risks/benefits of using VR as a tool for pharmacy learners to be trained in conducting a SRA.

Methods: Six pharmacy students participated in the VR SRA training session at the Centre for Addiction and Mental Health (CAMH). Students were given the opportunity to try two different patient profile simulations using VR headsets, where various pre-developed questions prompted specific dialogue. A self-reported pre- and post-training evaluation was used to identify changes in confidence pertaining to the learning objectives, engagement, general tolerability of VR, intention to change practice, and the overall training experience. A group debrief session was conducted after the training.

Results: Post-training evaluations showed that VR was associated with relatively high scores for meeting the learning objectives (M=3.17 out of 5, SD=0.79) and was regarded as an engaging training experience. User testing suggests that VR may have greater educational benefit than traditional desktop tools for teaching pharmacy students how to conduct a SRA.

Conclusion(s): Participants reported overall satisfaction with the training and gains in confidence were seen across most of the learning objectives when comparing pre- and post-training evaluation scores. This pilot study will help inform the healthcare simulation community about the effectiveness of VR as a teaching modality in pharmacy education and practice.

What's the Impact of Vanessa Law on Serious Adverse Event Declaration at Quebec Heart and Lung Institute – Laval University

Lavallée M[1,2], Corbin S[1,2], Pradhan P[3], Blonde Guefack L[3], Thibault M[2], Méthot J[1,2], Bérard A[4,5], Piché ME[2,6], Escobar Gimenes FR[7], Darveau, R[8], Cloutier I[1,8], Leclerc J[1,2]
[1]Université Laval, Faculty of Pharmacy, Quebec, QC
[2]Centre de recherche, Institut universitaire de cardiologie et de pneumologie de Québec-Université Laval, Quebec, QC
[3]Université du Québec à Trois-Rivières, Anatomy department, Trois-Rivières, QC
[4]Centre de recherche du Centre Hospitalier Universitaire Ste-Justine, Montréal, QC
[5]Université de Montréal, Faculty of Pharmacy, Montréal, QC
[6]Université Laval, Faculty of Medicine, Quebec, QC
[7]University of São Paulo, Faculty of Nursing, São Paulo, Brazil
[8]Quebec Heart and Lung Institute – Laval University, Quebec, QC

Background: An international study suggested, in 2006, that <6% of adverse events (AE) would be reported to health authorities. Reporting serious AE (SAE) is now mandatory for healthcare institutions, in Canada since the implementation of the Vanessa's Law. However, impact on SAE declaration to Health Canada remains unknown until today.

Objectives: 1) To document the incidence of AE and SAE over time in a "real" clinical context, 2) To quantify SAE reported to Health Canada among those that have occurred, and 3) To assess the Vanessa's Law impact in SAE reporting to Health Canada.

Methods: We carried out a retrospective study at the Quebec Heart and Lung Institute (2018-2021). 500 patients were randomized into 4 cohorts (125 patients/year). Electronic medical records were investigated to identify AE and their reporting. Descriptive (median, min-max, interquartile range and proportion) and comparative analyzes were performed. Rates to calculate incidence of AE and SAE and stratifications were also performed.

Results: The characteristics of the cohorts are: 43.6% women; median age = 69 years [min: 21- max: 96], number of comorbidities = 4 [1-12]. During their hospitalisation, the patients consumed 18 different drug products [2-56] and the median number of SAE/patients is 0 [0-10]. Rates of AE decreased from 4.54 in 2021 to 5.40 per person-year in 2018. Spearman's rho revealed a correlation between the number of AE/patient and the number of comorbidities (r=0.117; p=0.009), the number of drugs products consumed (r=0.578; p<0.001), and the length of hospital stay (r=0.629; p<0.001). The proportion of SAE reported among all those documented in electronic medical record is 0%.

Conclusion: According to our results, the SAE were not reported to Health Canada, even after the Vanessa's law was implemented. Different solutions would have to be found to improve reporting as this law doesn't seems to have an impact.

Workload Impact of Implementing Sporicidal Wipe Program at Academic Teaching Hospital

Bola H, Field K, Li C, Li Z, Manlapat R, Thai J, Perks W, Ma NH
Department of Pharmacy, Sunnybrook Health Sciences Centre, Toronto, ON

Background: The National Association of Pharmacy Regulatory Authorities (NAPRA) standards require products previously packaged in cardboard be wiped with sporicidal agents before introduction into the anteroom to minimize the risk of contamination.

Objective: evaluate the workload impact of wiping all required products with a sporicidal agent.

Action: A time-motion analysis was conducted to determine the activities required for sporicidal wiping and their associated workload impact. Time for each activity were evaluated with different pharmacy technicians over five days. The average times were used to estimate the workload impact for the month of October.

Evaluation: We identified three areas of workload impact: order management to ensure products were wiped in advance for compounding large batches of sterile products; applying the sporicidal agent to the products; and additional daily activities, including loading and unloading the products on a cart, transporting the products to and from the dedication wiping room, and donning and doffing personal protective equipment. Order management caused an incremental workload increase to the existing orders pharmacy technician and a new pharmacy technician portfolio was created for wiping. Over the 21-day work period in October 2023, 13,719 sterile products were compounded requiring 378 minibag sleeves, 1,463 large volume parenteral bags, and 8,031 vials be wiped with a sporicidal agent. The orders pharmacy technician had 8.7 days' worth of extra workload. The pharmacy technician responsible for sporicidal wiping spent 9.9 days wiping bags, 4.7 days wiping vials, and 10 days to complete the additional daily activities. Overall, sporicidal wiping caused 33.3 days' or 1.8 full-time equivalent worth of additional work.

Implication: The sporicidal wiping process adds significant additional workload onto pharmacy staff. Extra staffing is required to maintain compliance with this NAPRA standard.

PHARMACY PRACTICE / PRATIQUE PHARMACEUTIQUE

Development of a Tool for the Oversight of Innovative Treatments

Tanguay C[1], Côté-Sergerie C[1], Cardinal G[2], Bussières JF[1,3], Lebel D[1]
[1]Pharmacy Department, CHU Sainte-Justine, Montréal, QC
[2]Bureau de l'éthique de la recherche, CHU Sainte-Justine, Montréal, QC
[3]Faculty of Pharmacy, Université de Montréal, Montréal, QC

Background: The director of the pharmacy department is responsible for establishing the drug utilization rules of his center. In some situations, the decision is complex because of uncertainties and risks. Innovative treatment needs increased oversight, but prescribers may not be equipped to provide a complete justification for their request.

Description: The aim of this project was to illustrate the complexity associated with innovative, emerging and off-label treatments and to facilitate their oversight.

Action: A tool intended for clinicians and decision-makers was developed. Five questions must be asked: 1-What is the intent of the treatment? 2-What is the uncertainty? 3-What is the legal status of the drug? 4- What are the accessibility considerations? 5-Are there other considerations? These are further divided into nine independent considerations. Each consists of a risk gradient that is illustrated as a grey scale. The more the consideration is dark grey, the more risky/uncertain it is and the more it should be overseen. There are three levels of oversight: patients, clinicians or other internal of external stakeholders. For example, the patient consent can be requested, the authorization or opinion of a committee can be sought, and formal contracts or treatment follow-up plans can be written.

Evaluation: The tool was tested with multiple examples of complex treatments. A multidisciplinary committee was created to discuss these issues during two meetings. It comprised representatives from pharmacy, research ethics committee, clinical ethics committee, research center, legal affairs office, patients/caregivers' associations, researchers and doctors. The tool was iterated accordingly.

Implications: This tool offers guidance when innovative treatments are in grey areas and need proper management. It will serve as the basis for a conversation between clinicians and decision makers. Our center is currently using it with the new requests for innovative treatment and we are planning a training.

Development of an Evidence Informed Treatment Protocol for Emergency Department (ED) Management of Pediatric Migraine

Davies B[2], Bogle D[1,2], Carey K[1], MacInnis M[1,2]
[1]Emergency Department, IWK Health, Halifax, NS
[2]College of Pharmacy, Dalhousie University, Halifax, NS

Background: Migraine has a prevalence of 11% in the pediatric population. Headache is estimated to be 1% of all pediatric emergency department presentations. It is known that standardized treatment protocols improve the efficacy, efficiency, and clinical outcomes in management of migraines. There are currently many options available for the management of migraines. In our ED, lack of formulary options led to overuse of potentially unsuitable treatments.

Description: Differences in indications, routes of administration, patient age, primary symptoms of presentation, and time of presentation from onset of symptoms all influence therapeutic choices. A systematic search

of the literature was conducted to synthesize the available evidence into a treatment decision algorithm.

Action: A PubMed search using MeSH terms pediatric, migraines, emergency department, and treatment provided 183 results. Titles were screened for relevance; 68 articles proceeded to abstract review. Thirty-one articles proceeded to full review. The articles reviewed were then placed in to 9 categories according to method of intervention. Agents used in the included studies were compared to treatment options in Canada. Level of evidence further informed development of a practical, evidence informed treatment algorithm specific to the Canadian context in pediatric patients.

Evaluation: The treatment pathway developed used available evidence to inform treatment options at various points in the management of migraine according to diagnostic criteria and practical considerations. Each decision point in the treatment pathway is informed by the collected evidence. Formulary approvals have been secured for the recommended therapeutic alternatives. The developed treatment pathway has been presented to the divisions of emergency medicine and neurology for endorsement to proceed with implementation.

Implications: This is the first step in a quality improvement project in the management of pediatric migraine. Future steps include evaluation of pathway implementation in practice.

Evaluation of the Standardization of Sterile Compounding Knowledge Module for Pharmacists

Proceviat J[1], Tom E[1], Garland J[1]
[1]Unity Health Toronto St. Michael's Hospital, Toronto, ON

Background: Hospital pharmacists possess varying levels of experience and familiarity with sterile compounding principles. To ensure pharmacists have a standardized approach to assessing, processing and checking sterile compounds and have knowledge of the National Association of Pharmacy Regulatory Authorities (NAPRA) sterile compounding principles the Pharmacy Practice Advisory committee created an education module which all pharmacists were required to complete.

Description: Following implementation of a sterile compounding standardization program, an evaluation of the value of the program was completed.

Action: A baseline was collected prior to the education module rollout. Pharmacists were asked to complete a questionnaire on their confidence assessing and checking sterile compounds. In addition, they were asked to complete a knowledge and skills assessment consisting of 11 multiple choice questions and 4 medication orders they were required to enter on mock patients. The same questionnaire and assessment was repeated after completion of the module. A post-module questionnaire was then distributed to assess the perceived value of this program.

Evaluation: Prior to the module 37% of pharmacists were confident in their knowledge of NAPRA principles, 56% were confident in assessing suitability of sterile admixtures, and 84% were confident checking a sterile product prepared by a pharmacy technician. Fifty-one pharmacists completed the pre- and post-module tests. The average test score increased from 75% to 86 % post-module. All but one pharmacist was successful in achieving the passing grade set at 80%. Pharmacists saw the value in the module stating that it improved patient safety with the standardization. Pharmacists perceived that they have received adequate training to safely process and check sterile products.

Implications: Results suggest that pharmacists benefit from this standardization program. New pharmacist hires will be required to complete the education module to ensure a standardized approach to pharmacist sterile compounding practice.

Expanding Opioid Stewardship: Hospital and Primary Care Pharmacist Collaboration

Lac J[1], Leung C[1]*, Kapanen A[1], Tilli T[1]*
[1]Faculty of Pharmaceutical Sciences, University of British Columbia, Vancouver, BC
**These two authors contributed equally to this work*

Background: In response to the opioid crisis, opioid stewardship programs have been initiated to reduce opioid-related harms. Hospital-based opioid stewardship pharmacists optimize pain management during in-patient stays but lack capacity to make adjustments post-discharge.

Description: A collaboration between three hospital-based opioid stewardship pharmacists and primary care pharmacists at the UBC Pharmacists Clinic (the Clinic) was developed to address this care gap. Patients were eligible for referral to the Clinic if they were seen by a hospital-based opioid stewardship pharmacist. Clinic pharmacists met with patients for 60-minute initial appointments booked within 2 weeks of discharge with follow-up as needed.

Action: A retrospective chart review was undertaken for patients seen between November 1, 2021 and April 19, 2023. Data was collected from each patient's initial Clinic appointment to 3 months later. The objective was to describe the impact of this collaboration on providing continuity of care for patients' pain management.

Evaluation: The Clinic saw a total of 22 patients, most for opioid tapers (86%) experiencing acute pain (73%). Top reasons for opioid stewardship-developed hospital pain care plans not being fully implemented were suboptimal effect (28%), insufficient supply (13%), patient preference (13%), and discharge prescription different than pharmacist recommendations (13%). Clinic pharmacists made 114 recommendations, to address 89 drug therapy problems, including to change medication (stop medication: 30%, start medication: 25%) and/or dose (increase dose: 17%, decrease dose: 16%). For recommendations with known outcomes, 69% were accepted with 23% rejected by patients and 8% rejected by prescribers. Patients' total daily dose of opioids decreased from 49.4 milligrams morphine equivalent (MME) at the initial appointment to 41.6 MME within 3 months, with 5 patients discontinuing opioids.

Implications: Hospital and primary care pharmacist collaboration provided continuity of care post-discharge. Primary care pharmacists addressed changing pain care plan needs as patients returned home.

Five-Year Review of a Novel Opioid Stewardship Program Across a Health Authority: Impacts and Insights

Ng K[1], Chernushkin K[1]
[1]Fraser Health Authority, New Westminster and Surrey, BC; Department of Pharmaceutical Sciences, University of British Columbia, Vancouver, BC

Background: Opioid misuse and overdose continue to pose a significant public health challenge globally. Opioid stewardship programs (OSP) have emerged as a critical approach to address upstream issues of this crisis.

Description: The Fraser Health OSP was the first program of its kind in Canada, implemented in 2018 with funding for two clinical pharmacy specialists, focusing on opioid use for pain in acute care.

Action: Initially modelled after successful Antimicrobial Stewardship programs with providing audit and feedback clinical service, the OSP has progressed to broaden impact beyond the patient level towards more systemic and regional influence. Adjustments through the years include prioritization of resources towards goals with broader impact, by limiting time allotment for clinical service, refocusing clinical service towards opioid stewardship rather than specialized pain management, and reserving resources for wider practice guidance and knowledge dissemination.

Evaluation: Over the five-year period, the OSP demonstrated notable achievements, including optimizing patient-centered pain management with reduction in high risk opioid prescribing, forging post-discharge opioid and medication support, and the release of a novel pain and opioid stewardship mobile application. Monthly trends of OSP clinical service process measures were examined using run charts to identify potential impacts of change ideas, with annual acceptance rates. The three most common OSP interventions were opioid dose/route/duration optimization, non-opioid analgesia optimization, and opioid tapering. The OSP has encountered challenges, with limited resources in both fields of opioid stewardship and pain. By integrating multiple components including real-time clinical support, formation of strategic collaborations, multidisciplinary knowledge dissemination, and policy and procedure interventions, the OSP has developed strategies to positive influence opioid prescribing.

Implications: The Fraser Health OSP is now the most mature program nationally, and its evolution can serve as a model for other organizations seeking effective strategies to enhance opioid safety and improve patient outcomes.

Medication Reconciliation Compliance Improvement Using a Sustainable Quality Improvement Plan

Simao S[1], Puri K[1], Wong P[1], Lau J[1], Karasev D[1], Patel D[1]
[1]Pharmacy Department, Mackenzie Health, Richmond Hill, ON

Background: Medication reconciliation improves patient safety by preventing medication errors across care transitions. After implementation of a new electronic health record (EHR) in 2017, our organization's compliance with admission medication reconciliation was only 55%. Compliance is documented when every home medication is reconciled.

Description: Medication reconciliation was highlighted as an organizational priority and established as a quality aim in our journey to zero harm. A target of 70% completion within 24 hours of admission was identified. The quality aim consistent of a multidisciplinary working group comprised of physicians, pharmacists, operational leads, clinical informatics and data analysts.

Action: The quality aim targeted five main change ideas to impact compliance.

1) Establishing accountabilities for all roles
2) Process improvement in the EHR tool and leveraging alerts to support prioritization
3) Training clinicians on the standardized reconciliation tools in the EHR
4) Optimizing scope of practice through implementation of a Medication Order Adaptation by Pharmacists Policy
5) Using electronic dashboards to create compliance visibility and support resource allocation across the organization.

Evaluation: Overall admission medication reconciliation compliance improved from 56% to 86%. Compliance with medication reconciliation within 24 hours of admission increased from 45% to 70%. Leveraging a weekly compliance drilldown by patient care area on the electronic dashboards and a Plan-Do-Study-Act cycle, the working group engaged front-line clinicians to identify workflow solutions in the Women and Child (W&C) Program. Compliance with medication reconciliation for W&C improved from 8% to 79%, an increase of 71%.

Implications: Medication reconciliation is a shared responsibility, and the widespread engagement of clinicians is instrumental to success. This case also highlights the importance of using technology to optimize process design and alerts to support workflow. The accessibility of compliance data from the electronic dashboard allows teams to identify areas of vulnerability and improvement opportunities through ongoing monitoring.

Province-wide Pharmacy Education Rounds: A Contemporary Learning Program for Continuing Education

Edgington L[1], Haines A[1], Lamb D[2], Clarke A[2], Dumont Z[1], Evans B[2], Herbert J[2], Nystrom T[3], Plishka A[4], Greening S[5]
[1]Department of Pharmacy Services, Saskatchewan Health Authority, Regina, SK
[2]Department of Pharmacy Services, Saskatchewan Health Authority, Saskatoon, SK
[3]Department of Pharmacy Services, Saskatchewan Health Authority, Yorkton, SK
[4]Department of Pharmacy Services, Saskatchewan Health Authority, Battleford, SK
[5]Department of Pharmacy Services, Saskatchewan Health Authority, Prince Albert, SK

Background: Provision of quality, professional education is complex. Modern, interactive, and learner-centric educational practices improve effectiveness of adult learning. Province-wide implementation of a continuing education framework based on best practices in adult education was believed to result in learner satisfaction, standardization, and efficiencies.

Description: The aim of the Provincial Pharmacy Education Rounds working group was to develop and implement a province-wide monthly pharmacy education rounds program that will aid in the learning needs of Saskatchewan Health Authority (SHA) pharmacists to optimize patient care. The program identifies presenters and hosts one province-wide education session per month via web conference (WebEx). Presenters follow a specific framework for education delivery based on CCCEP, MainPro+, ACCP and ACPE standards, and contemporary adult learning theory.

Action: The program developed through expansion of a local pilot project, which evaluated satisfaction and effect of adult learning principles. A needs assessment survey was delivered to hospital pharmacists in Saskatchewan. Based on the results, an education curriculum was developed, which aligned clinical topics with health promotion initiatives. A feedback mechanism was developed for each session, and the program conducted periodic evaluations that explored learner satisfaction at greater depths.

Evaluation: In-depth satisfaction surveys were completed in 2021 and 2023. Thirty-two pharmacists completed the survey in 2021 and 20 completed the survey in 2023. The most recent results demonstrated learner satisfaction; 70% of respondents agreed education sessions were interactive and engaging, 65% agreed sessions increased their confidence in topic knowledge and application to patient care, and 75% agreed learnings were applicable to their practice area.

Implications: Provincial implementation of a continuing education framework based on best practices in adult education resulted in learner satisfaction, standardization and efficiencies. Next steps will aim to achieve knowledge transfer and retention through pre-/post-testing, and improve facilitator and learner satisfaction with the continuing education provided.

Putting the Heart into Pharmacy: Creation and Implementation of a PharmD Cardiology Rotation in Tertiary Care

Hermanus A[1], Tangedal K[1], Semchuk W[1], Rustad K[1]
[1]Department of Pharmacy Services, Saskatchewan Health Authority, Regina, SK

Background: This poster describes the structure of the cardiology-focused rotation at Regina General Hospital offered to fourth-year pharmacy students at the University of Saskatchewan.

Description: This 8 week rotation provides a novel pharmacy experience and facilitates the achievement of the additional 32 weeks in experiential learning required within the PharmD program. The rotation is designed to facilitate the achievement of the Association of Faculties of Pharmacy of Canada required competencies.

Action: Students and preceptors were engaged in activities such as therapeutic discussions, presentations, research, and complex patient workups including direct patient care as a part of the interdisciplinary team. This

rotation also provided opportunity for different learning strategies such as tiered learning alongside pharmacy residents at the hospital.

Evaluation: Rotation feedback from students and preceptors has been positive and has contributed to patient care with potential for future growth in capturing their intervention metrics. This rotation provides exposure to the hospital setting in which the vast majority of those who have completed the rotation have pursued a career in hospital pharmacy.

Implications: Ultimately, this article outlines the benefits and structure of a specialty cardiology rotation that assists pharmacy students in navigating complex cardiovascular conditions.

Standardization of Medication Reconciliation in Ambulatory Clinics

Puri K[1], Simao S[1], Wong P[1], Lau J[1], Karasev D[1], Patel D[1]
[1]Pharmacy Department, Mackenzie Health, Richmond Hill, ON

Background: Our organization is a regional community service provider with many ambulatory clinics. The clinics were lacking a formal medication reconciliation process. Standardization of medication reconciliation practices across ambulatory clinics was undertaken to align with Accreditation Canada Required Organizational Practices (ROP).

Description: A pharmacy-led interdisciplinary working group was established to define and support the implementation of standardized medication reconciliation process across 10 ambulatory settings where medication management was identified as a major component of care.

Action: The working group engaged with clinic physician leads, patient care managers and subject matter experts from pharmacy and clinical informatics to understand current processes and identify existing barriers to meeting ROP requirements. A standardized medication reconciliation process was established, leveraging tools existing in the organization's electronic health record (EHR). Each clinic identified roles and responsibilities within their staff to support reconciliation. A Best Possible Medication History (BPMH) electronic training module was developed to standardize BPMH collection. The reconciliation workflow on the EHR was updated to streamline documentation of BPMH and reduce redundancy in the reconciliation process for prescribers. The After Visit Summary (AVS) tool was defined as the organizational standard for communication of medication changes to patients and community providers. Clinic-specific prescriber education was provided to communicate expectations and review deployed EHR tools.

Evaluation: All 10 ambulatory clinics have developed a comprehensive Standard of Practice document for medication reconciliation. The ambulatory clinics have successfully implemented the standardized protocol as demonstrated by improvement in BPMH completion and compliance with providing AVS to patients.

Implications: The standardization of process and tool for ambulatory medication reconciliation is important to ensure patients are provided with information about changes to their medications during ambulatory visits. An established standardized protocol will support successful implementation for future ambulatory clinic and allow data extraction to develop reliable compliance metrics for monitoring.

The Evaluation of a Medical Directive for Pharmacist Dosing of Intravenous Vancomycin

Cesario S[2], Kertland H[1,2]
[1]Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, ON
[2]St Michael's Hospital, Unity Health Toronto, Toronto, ON

Background: A medical directive (MD) was developed for pharmacists dosing of intravenous (IV) vancomycin, as they possess the pharmacokinetic expertise for optimal management.

Description: To evaluate how the MD, implemented May 2023, impacted patient quality-of-care and pharmacist practice in 5 critical care and cardiology units at a tertiary care academic hospital in Toronto.

Action: Quality metrics examining the process, outcome, and balancing measures were extracted from electronic health record data for the pre-implementation period (May 2 – July 1, 2022) and compared to post-implementation data (May 2 – July 1, 2023). Safety incidents were reviewed from the safety reporting software in these periods. All implementing pharmacists were asked to complete a validated survey assessing the impact of the MD on their practice and perceptions.

Evaluation: A total of 267 and 455 orders for IV vancomycin were entered for 72 and 89 patients in the pre- and post-implementation periods, respectively. Post-implementation, 15% of medication orders were entered by pharmacists. For serum concentrations, 110 and 173 orders were entered in pre- and post-implementation periods, respectively, and 66% of post-implementation orders were entered by pharmacists. Of all post-implementation serum concentrations within the targeted therapeutic range, 12% were entered by pharmacists. In the pre- and post-implementation periods, a statistically similar proportion of vancomycin serum trough concentration orders were entered either earlier, at the time of, or later than pre-fourth dose. Only one safety event, not dose-related, was reported in the two periods. The average number of serum concentrations obtained per patient was slightly higher post-implementation, whereas the average number of dose changes per patient was statistically similar. Survey results indicate a positive impact on pharmacist perceptions with no perceived change in workload.

Implications: Quality-of-care was not negatively impacted with the implementation of a MD for pharmacist management of vancomycin with a positive perception from implementing pharmacists.

Time Savings with Implementation of an Electronic BPMH Integration Tool

Maliakkal A[1]
[1]Southlake Regional Health Centre, Newmarket, ON

Background:

- Best Possible Medication Histories (BPMHs) are an important part of medication management
- Completing BPMHs is time-consuming: there is no automatic communication between the electronic medical record (EMR) and provincial drug repositories (i.e., Connecting Ontario), and it takes time to call pharmacies to obtain medication records.
- At Southlake Regional Health Centre (SRHC), it takes, on average:
  - 10 minutes to collect medication history from Connecting Ontario and the retail pharmacy
  - 30 minutes to interview and gather information
  - 20 minutes to complete manual entry into the EMR
  - 45 minutes total to complete a BPMH

Description:

An electronic BPMH integration tool will:

a. Collect medication history from retail pharmacies and Connecting Ontario;
b. Enable medication history to flow directly to the EMR, bypassing manual entry;
c. Leverage AI technology to assist documenting home medications.

Action:

- The pharmacy department implemented the tool into BPMH practice in 2023
- A time study was conducted 6 months post-implementation
  - Cohort: inpatients 65+ with home meds from Connecting Ontario (n=21), and inpatients 25-64 with 1+ new home med(s) added to the

EMR from a retail pharmacy (n=7). Average number of home medications = 11.
- Observers timed clinicians (n=6) completing BPMHs
- Outcomes measured:
  - Time to collect medication history
  - Time to enter medications into the EMR
  - Total time it takes to complete a BPMH

Evaluation:

1. 67% reduction in data collection and interview time (from 30 minutes to 10 minutes)
2. 70% reduction in medication entry time (from 20 minutes to 6 minutes)
3. 64% reduction in total BPMH time (from 45 minutes to 17 minutes)

Implications: Immense time savings occur with the use of an electronic BPMH tool that integrates into the EMR. BPMHs can be completed more efficiently. Time saved could be directed to other patient care duties.

Utilization of Focus Groups and Case Based Discussions in Development of Clinical Practice Standards

Len S[1], Gray C[1]
[1]Department of Pharmacy – Critical Care, Saskatchewan Health Authority, Regina, SK

Background: The Saskatchewan Health Authority (SHA) consolidated 12 Health Regions to coordinate services and improve patient care. Nine hospitals have Intensive Care Unit beds; rural and tertiary centers have variable levels of patient acuity and provider groups. Clinical practice standards (CPS) to identify critical care pharmacist activities and the scope of pharmacy services are required for consistent and evidence-informed patient care.

Description: This project was to develop provincial CPS for critical care via focus groups. An advisory group of SHA Critical Care Pharmacy Practice Network representatives was utilized to lead the process. SHA pharmacists and managers associated with critical care were surveyed regarding current practice. This information, along with the Society of Critical Care Medicine 2020 position statement, informed the draft CPS. The CPS were then taken to a focus group for evaluation.

Action: A focus group met to review the CPS for applicability and feasibility. This group (n=19) was comprised of representatives from each site and included frontline pharmacists, leadership, and a clinical specialist. Principles of teaming and case-based discussion were employed to guide dialogue. A reflection tool was used during the meeting and a satisfaction survey was distributed to all attendees following the meeting. Feedback was then integrated into the final CPS.

Evaluation: The reflection tool (89% completion rate) identified additional feedback on the CPS not captured during the focus group. The survey (100% response rate) identified high degrees of satisfaction amongst all attendees that the process utilized was advantageous in developing CPS.

Implications: CPS support consistent activities of critical care pharmacists across centers with variable levels of patient acuity and provider groups. Use of a focus group and case-based discussion was effective to develop the CPS and assisted with team building and reducing communication barriers. Next steps include measurement of CPS implementation at all 9 sites.

Utilizing an Antimicrobial Stewardship Trained Unit Pharmacist Model to Enhance Adherence to the Community Acquired Pneumonia (CAP) Guideline Update

Pourgolafshan P[1], Ying I[2], Simao S[1]
[1]Pharmacy Department, Mackenzie Health, Richmond Hill, ON
[2]Department of Infectious Diseases, Mackenzie Health, Richmond Hill, ON

Background: Mackenzie Health is a multi-site network of community-based hospitals, with a total of 652 beds, servicing York Region. An Antimicrobial Stewardship Program (ASP) was established in 2012 and expanded in 2017 using a novel unit pharmacist adjunctive model.

Description: Since 2017, all unit pharmacists undergo an annual recertification training for antimicrobial stewardship consisting of didactic learning, knowledge assessment quiz and ongoing quality assurance through prospective audit and feedback rounds. Knowledge on Community Acquired Pneumonia (CAP) and appropriate use of atypical coverage with macrolides are among the core competencies.

Action: IDSA (Infectious Diseases Society of America) published CAP Guidelines in October 2019 recommending to reserve azithromycin for severe CAP. Between the summer of 2020-2022, multiple educational initiatives were implemented to support guideline adherence. The ASP team emphasized the appropriate use of azithromycin during rounds with unit pharmacists. In August 2021, our institutional antimicrobial handbook CAP guidelines were updated to reflect appropriate macrolide use in CAP. Formal teaching rounds on this topic were conducted in December 2021 for all pharmacists.

Evaluation: The aim is to evaluate the impact of the ASP unit pharmacist model on azithromycin usage and whether an effect is seen on Streptococcus pneumoniae susceptibility to azithromycin. From 2018 to November 2023, annual azithromycin usage decreased by 24% (20.8 vs. 15.9 Defined Daily Doses (DDD) per 1000 patient days respectively). Using linear regression analysis, it was calculated that the decreased usage reached statistical significance ($p<0.01$). Streptococcus pneumoniae susceptibility to erythromycin/azithromycin increased from 50% in 2020 to 79 % in 2022 but did not reach statistical significance.

Implications: This data highlights that an antimicrobial stewardship trained unit pharmacist model is effective in enhancing prescriber adherence to guidelines, reducing unnecessary macrolide use, and decreasing antimicrobial resistance. Other institutions can benefit from supplementing their existing ASP with this model.

CASE REPORTS / OBSERVATIONS CLINIQUES

Case of Nonischemic Cardiomyopathy Secondary to Doxorubicin Requiring Heart Transplant while Managing Multiple Sclerosis on Ocrelizumab

Mader JA[1], Martin S[1,2], Davey RA[2,3], Smith SJ[2,3]
[1]Department of Pharmacy, London Health Sciences Centre, London, ON
[2]Department of Cardiology, London Health Sciences Centre, London, ON
[3]Department of Cardiology, Western University, London, ON

Background: Doxorubicin (DOX) is an antineoplastic agent approved for several cancer types. Though an established and effective cytotoxic agent, the systemic adverse effects require dosing limits and long-term monitoring. As part of the anthracycline family DOX is known to cause dose-dependent cardiac toxicity, potentially leading to congestive heart failure (CHF) and requiring cardiac transplantation in some cases.

Case Description: A 49-year-old female with known nonischemic cardiomyopathy, secondary to receiving DOX at age 16 for osteosarcoma, was

admitted to hospital for cardiogenic shock. She presented with worsening shortness of breath and palpitations. Echocardiography showed a markedly reduced ejection fraction and biventricular dysfunction. After hemodynamic stabilization, she was listed for cardiac transplantation. Concurrently, she also had known relapsing-remitting (RR) multiple sclerosis (MS) and was due for her regularly-scheduled ocrelizumab infusion. After consultation with the cardiologist and neurologist, she was able to continue on ocrelizumab maintenance therapy. She was then successfully transplanted, which was slightly complicated by rejection but adequately addressed with immunosuppressant management.

Assessment of Causality: This case of DOX-induced heart failure resulting in cardiac transplantation received a score of 2 on the Naranjo scale indicating possible association. There are previous conclusive reports on this reaction and toxicity appeared after administration within a reasonable timeframe, however an association between MS and increased risk of CHF does exist which may have contributed.

Literature Review: Chronic DOX cardiotoxicity occurs in approximately 1.7% of recipients. Exposure in childhood and adolescence further predisposes individuals to the development of cardiomyopathy in adults. In some cases, the time period between exposure and cardiomyopathy identification were as long as 30 years.

Importance to Practitioners: Pharmacy practitioners must be aware of the potential late-onset cardiotoxicity that may arise following DOX administration in patients. This case also outlines the appropriate consideration of medications post-transplant, in the context of concurrent RR MS.

Envarsus Induced Thrombotic Microangiopathy in an Adult Kidney Transplant Patient

Zhang J[1], Suarez A[1]
[1]Multi-Organ Transplant Program at London Health Sciences Centre, London, ON

Background: Envarsus (tacrolimus prolonged-release tablet) suppresses T-cell activation and is approved for prevention of allogenic rejection in kidney transplant patients. Drug induced thrombotic microangiopathy (TMA) is a documented adverse effect associated with tacrolimus.

Case Description: A 57-year-old female with end-stage renal disease was admitted to hospital for a kidney transplant. The patient received Envarsus post-op day (POD) 0 as part of maintenance immunosuppression. The patient started to experience significantly reduced urine output on POD 1 concerning for acute rejection. A kidney biopsy demonstrated extensive necrosis, focal infarction, acute tubular necrosis, and fibrin thrombi. The patient also developed thrombocytopenia with a platelet count of $60x10^9$/L. On POD 2, tacrolimus trough level was significantly supratherapeutic at 30.6ng/mL, and platelet count further decreased to 39 x 10^9/L. On POD 5, LDH was elevated at 1132 U/L, haptoglobin was less than 0.10, and platelets remained low at $22x10^9$/L. On POD 6, Envarsus was discontinued and plasmapheresis was initiated for presumed tacrolimus induced TMA. Platelets restored with Envarsus discontinuation and 4 sessions of plasmapheresis. The patient was successfully maintained on cyclosporine with no further TMA recurrences.

Assessment of Causality: This case received a 5 on the Naranjo Adverse Drug Reaction Probability Scale indicating probable association of tacrolimus causing TMA.

Literature Review: Tacrolimus induced TMA has been reported in case reports which demonstrated TMA causing kidney impairment with and without graft failure. The mechanism is theorized to be dose dependent secondary to endothelial dysfunction with platelet aggregation.

Importance to Practitioners: Tacrolimus induced TMA can lead to systemic complications causing significant morbidity and mortality. This case demonstrates the importance of considering tacrolimus induced TMA as a differential in patients demonstrating graft dysfunction and thrombocytopenia.

Voriconazole in a Pediatric CYP2C19 Rapid Metabolizer

Lee M[1], Sudbury B[1], Plesa A[1], Zorzi A[1,2,3]
[1]London Health Sciences Centre, London, ON
[2]Children's Hospital at London Health Sciences Centre, London, ON
[3]Western University, London ON

Background: Voriconazole is an azole antifungal agent used in a variety of fungal infections and metabolized primarily by CYP2C19. Voriconazole concentrations are impacted by multiple factors, including variant CYP2C19 alleles. As a result, therapeutic drug monitoring is recommended to avoid both therapeutic failure and toxicity. In patients who possess CYP2C19 ultrarapid or rapid metabolizer genotypes, the ability to obtain therapeutic concentrations may not be possible.

Case Description: A 10-year-old girl with high-risk acute lymphoblastic leukemia was hospitalized with disseminated fungal infection (C. albicans and Cladosporium species). Voriconazole was initiated and trough concentrations were obtained. Despite dose and frequency escalation beyond maximum dosing recommendations, trough concentrations were persistently subtherapeutic. Although some levels returned supratherapeutic with dose increases, subsequent troughs would show subtherapeutic levels shortly after despite no dose changes. Genotype testing revealed a CYP2C19 genotype of *1/*17, predicting her to be a CYP2C19 rapid metabolizer.

Assessment of Causality: Despite continual dose increases over 3 months, the patient was unable to maintain therapeutic concentrations of voriconazole and required bridging with liposomal amphotericin. The patient was later switched to posaconazole and was able to achieve therapeutic concentrations.

Literature Review: Substantial evidence exists demonstrating that CYP2C19 rapid metabolizers have increased clearance of voriconazole. Guidelines for pediatric rapid metabolizers recommend titrating voriconazole doses to effect or using an alternate agent. However, there is still much uncertainty on dosing recommendations and when to switch agents.

Importance to Practitioners: Due to gain of increased function CYP2C19 alleles, voriconazole concentrations may be subtherapeutic which leads to the risk of therapeutic failure. Incorporating pharmacogenomic testing may allow for early identification of patients who are not normal metabolizers of CYP2C19, and guide therapy to prevent harm and ensure appropriate treatment. More information is required for dosing strategies in cases of rapid metabolism and when to change to an alternative agent.