

**CSHP Summer Educational Sessions (SES) 2010: Poster Abstracts /
Séances éducatives d'été (SÉE) 2010 de la SCPH :
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Medication Safety on the Savannah: Application of Patient Safety Principles to a Mobile Medical Clinic in Northern Ghana

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Rationale: Basic medication safety principles are applicable regardless of the practice site - even in a mobile clinic for humanitarian medical and dental care. Initial experience during a 2007 mission in Northern Ghana demonstrated error potential in patient identification, appropriateness of drug therapy, dispensing and patient compliance.

Description of Concept: The 2008 and 2009 Ghana Health Teams adopted several patient safety measures to prevent medication error: All patients were given two identifiers, a unique number on their wrist band and medical record as well as verbal identification through a translator. This identifier was used to fill prescriptions and ensure that the correct patient received the correct drug. Since the patient population is largely illiterate, colour coding was used to differentiate prescriptions for family members. Accuracy and appropriateness of drug therapy was enhanced with a Formulary and a preprinted medication order form. Wherever possible, drugs with standard doses were prepackaged and labeled in advance. A pharmacist reviewed each medical record to screen for contraindications (e.g. allergies, pregnancy). All orders were processed using a laptop computer and RxTrack software. The software was preprogrammed to include complicated regimens (e.g. malaria, PID), calculate pediatric doses by weight and prepare a label. Each prescription had an independent double check by a second pharmacist. Patient understanding was enhanced with pictograms on prescription labels.

Evaluation: The volume of prescriptions was staggering: pharmacy dispensed almost 400 prescriptions each day and another 500 basic medications were given out by our physicians. Our system detected many "near misses" and prevented many dispensing errors.

Importance of Concept: Providing pharmacy services in developing countries is demanding and error prone, especially when it is hot and amenities such as power and running water are lacking. Our experience will be helpful to other pharmacists who are involved in humanitarian work.

the previous three months, 18 years or older and in NYHA functional class II - IV were included.

Results: For agents with established target doses (ACE inhibitors, ARBs, β -blockers, spironolactone, hydralazine), average and median dosages prescribed were below published recommendations, except for ACE inhibitors (see table below). The most frequently used agents were β -blockers (90%) and ACE inhibitors or ARBs (99%). Eighty-one percent of patients were on the recommended combination of an ACE inhibitor or ARB + β -blocker. Usage and dosages of medications commonly used for the treatment of heart failure, but without CCS Guideline recommendations (vasodilators, diuretics, digoxin), were also described.

Drug	Number of Patients (n=79)	CCS Suggested Doses	Median Dose (mg/day) [Range]	Average Dose (mg/day)
ACE Inhibitors				
Enalapril	10	10mg BID	25 [2.5-60]	29.5
Lisinopril	2	20-35 QD	25 [20-30]	25
Ramipril	21	5mg BID	20 [5-25]	15.6
Perindopril	3	4-8mg QD	8 [8-16]	10.7
ARBs				
Candesartan	4	32mg QD	16 [8-24]	16
Valsartan	4	160mg BID	140 [80-160]	130
β-blockers				
Bisoprolol	10	10mg QD	8.75 [2.5-20]	9.75
Carvedilol	48	25mg BID	50 [12.5-75]	43.1
Metoprolol	13	200mg QD*		
		*based on metoprolol CR/XL	100 [25-300]	130.8
Spironolactone	38	50mg QD	25 [6.25-50]	23.8
Hydralazine	2	75mg TID	140 [80-200]	140

Conclusions: Despite established target doses based on clinical trials, dosages were often below those recommended. ACE inhibitors were the only drug class for which patients were often dosed above recommended dose. Further investigations regarding optimal dosing of medications used in heart failure appears to be warranted.

Descriptive Analysis of Heart Failure Medication Usage in a Specialized Cardiac Function Clinic

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Rationale: Optimization of heart failure pharmacotherapy limits disease progression and improves quality of life. However, doses of the recommended agents utilized are frequently lower than those recommended in practice guidelines. There is also uncertainty regarding the maximum doses of at least some of these drugs, with almost no literature related to this question.

Objective: To compare the doses of heart failure medications in stable heart failure patients in the Foothills Medical Center Cardiac Function Clinic (CFC) to those recommended in the 2006 Consensus Guidelines from the Canadian Cardiovascular Society (CCS).

Methods: This retrospective chart review was a quality assurance study. Stable outpatients without changes in their heart failure medications in

Attitudes and Behaviours of Hospital Pharmacy Staff towards Near Misses

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Objectives: Near misses may be early warning signals for errors. This study examined attitudes and behaviours of Manitoba hospital pharmacists and technicians towards near misses and near miss reporting.

Methods: A web based survey of pharmacy staff at Manitoba hospitals that have non-punitive paper-based incident reporting systems was conducted in 2009. Survey respondents were asked about experience with, and attitudes and behaviours toward near misses using a validated survey. Factor analysis and Cronbach's alpha were used to determine internal consistency reliability for survey scales. Differences between pharmacists and technicians were compared with Fisher's Exact tests for categorical data and t tests for survey scales.

Results: Of 37 hospitals, one large tertiary care hospital declined to participate. Of approximately 500 pharmacy staff, 122 (24%) responded. The majority (54.1%) were pharmacists in Winnipeg (74%). The majority of respondents (62% overall; 48% of technicians and 73% of pharmacists p=0.008) had experienced at least one near miss within three months; however, only 27% had reported a near miss with occurrence reporting forms. There were no differences in the reporting behaviours scale (8 items, Cronbach's alpha 0.824) between pharmacists and technicians (pharmacist score 30.9± 4.8, technician score 29.6 ± 6.0, p=0.215). Items with greatest agreement suggested

that feedback about near misses and minimal time commitment would increase likelihood of reporting near misses. There were no differences in the attitudes scale (23 items, Cronbach's alpha 0.837) between pharmacists and technicians (pharmacist score 81.9 ± 9.4 , technician score 80.2 ± 10.6 ; $p=0.388$). Items with the greatest agreement were those about the role of pharmacy staff in improving patient safety and the importance of medication errors.

Conclusions: We observed similar behaviours and attitudes between hospital pharmacists and technicians. Near miss reporting occurred infrequently. Education of pharmacy staff and managers about near misses may help to encourage reporting.

Development of a "Do Not Crush or Chew These Oral Dosage Forms" Chart

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Rationale: Proper administration of medication is essential to patient safety and achieving optimal health outcomes.

Description: An educational resource at Capital District Health Authority (Capital Health) specifying which drug products should not be crushed or chewed was required.

Development and Implementation: A pharmacy student reviewed various resources to identify Canadian drug dosage forms that should not be crushed or chewed. For certain drug products, additional information was requested from manufacturers and/or expert medical opinion was sought. To facilitate fast and efficient transfer of information on nursing units, a wall chart was chosen as the optimal format. A 60 cm x 90 cm chart was developed. It included 152 drugs and incorporated information from Capital Health policies (e.g., Safe Handling of Oral Hazardous Medications) and inventory practices to promote consistency across all hospitals in the District. Practical information such as the availability of liquid or alternate dosage forms (oral dissolving tablets, regular release tablets, etc.) was provided. Chart content was reviewed independently by a Drug Information Pharmacist and Medication Safety Pharmacist for relevance, accuracy and clarity. It was distributed to all nursing units and placed on the Capital Health Pharmacy Intranet site.

Limitations: Inclusion of Capital Health specific content could limit the global applicability of this chart; however, the majority of information can be used by other hospitals. New drugs released on the Canadian market since printing the chart, would require addition in subsequent updates.

Importance to Current and/or Future Practice: This educational resource improves patient safety by providing an accessible and practical reference for nurses and pharmacists to identify drug products that should not be crushed or chewed.

Perceived Somatic Symptoms and Aspects of Asthma Management by Analyzing Coloured Drawings Made by Chronic Asthmatic Children

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Rationale: The addition of pictures to health information can improve comprehension, recall and treatment adherence, all of which can lead to improved disease management.

Objectives: To evaluate self-drawn illustrations made by chronic asthmatic pediatric patients to identify their perception of somatic

symptoms and aspects of asthma management. Secondly, to use the emergent themes to develop child-specific pictograms to be used as a supplementary aid to improve communication for use in the management of chronic asthma in pediatric patients.

Study Design and Methods: Chronic inpatient and outpatient asthmatic children recruited at a Canadian pediatric hospital. Participants were asked to draw how they feel when their asthma is under control and during an attack. A multi-disciplinary team determined key drawing features from each individual picture to incorporate these identified themes as pictogram components of an asthma action plan.

Results: Drawings from 53 participants analyzed. When asked to draw how they felt when their symptoms were well controlled, emerging themes included images of clear lungs, happy expressions, sunny skies and children playing sports and other outdoor activities. When asked how the children felt during an asthma attack, images of coughing, lung pain/tightness, sad expressions, and confinement or inability to play were common. No differences in common drawing features found between age groups.

Conclusion: The next step will be to validate the pictograms with pediatric patients. This development of a validated easy to use asthma action plan can lead to improved asthma outcomes for asthmatic patients with a wide range of health literacy.

Development of Culture-Specific Pictograms for the Labeling of Medication

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Rationale: Effective communication between healthcare providers and their patients regarding pharmaceutical therapy promotes compliance and positive patient health outcomes. However, accurate comprehension by the patient is often difficult due to varying levels of health literacy, language differences, and cultural variations.

Objective: To develop pictographic instructions for the labelling of medication that is meaningful and sensitive to First Nations' culture.

Study Design and Methods: Focus Groups composed of community members and health care providers were conducted in six British Columbia First Nations communities. The focus groups were presented the current medication labelling pictograms and were asked to provide feedback to develop pictograms that would be best understood by members of each community. The redesigned pictograms were then communicated back to the communities through several iterations until agreement on the final version.

Results: Focus group discussions identified appropriate modifications to medication pictographic instructions to reduce interpretation errors based on cultural specifications and have allowed incorporating the culture-specific pictograms into the storyboard concept. The focus groups agreed that the majority of the original pictograms were not appropriate so 15 new pictograms were created and validated for use in First Nation communities.

Conclusion: Developing culturally meaningful pictograms can be used to improve patients' understanding and memory of complex medical instructions and reduce risk of taking medications incorrectly, thereby contributing to patient safety.

Development of Culture-Specific Pictograms for Type-II Diabetes Patient Counseling

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Rationale: Language and literacy barriers between patient and health-care providers are key factors affecting patient comprehension of medical instruction and ultimately affecting health outcomes. Using pictograms to supplement written and oral instructions increases patient comprehension.

Objective: The authors sought to develop pictograms for type II diabetes education and counselling, that were meaningful and sensitive to First Nations' culture.

Study Design and Methods: Focus Groups composed of community members and health care providers were conducted in six British Columbia First Nations communities. The focus groups were presented current diabetes counselling pictograms and asked to provide feedback on whether they would be understood by members of their community. Pictograms were redesigned and communicated back to the communities through several iterations until final agreement was reached.

Results: Pictograms provided to the focus groups depicted the effects of type II diabetes on its primary complications including: heart disease and stroke, blood sugar control, infections, eye problems, kidney disease and foot care. The majority of the original pictograms were not appropriate for First Nations, therefore 32 new pictograms were created and validated by the focus groups for use in FN communities.

Conclusion: Diabetes affects First Nation people disproportionately. However, the disease and its complications are manageable when patients adhere to accepted guidelines for self-care. Culturally meaningful pictograms can be used to improve patients' understanding and memory of complex medical instructions and enhance their ability to manage their own self-care.

Validation of a Set of Asthma Illustrations in Children with Chronic Asthma in the Emergency Department

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Rationale: National and international asthma guidelines support the use of written asthma action plans. However those presented in text format are difficult for pediatric patients and those with low literacy skills to comprehend. Pictograms enhance comprehension of information in action plans.

Objectives: To validate a set of asthma illustrations in children with chronic asthma presenting to an Emergency Department (ED) for their eventual inclusion into an action plan.

Study Design and Methods: Semi-structured interviews using guessability and translucency questionnaires tested the comprehensibility of 15 illustrations (8 representing different levels of asthma control and 7 representing asthma triggers) in asthma patients seen in the pediatric hospital ED over the 10-month study period. For patients 1-9 years of age (group A) the questionnaire was performed on the parent, patients 10-17 years of age (group B) completed the questionnaire themselves. Literacy was assessed using the Rapid Estimate of Adult Literacy in Medicine (REALM) or REALM-teen scales.

Results: 80 patients enrolled in the study. After the first 30 patients were interviewed, modifications were made to 7 of the original 15 pictograms to improve comprehension. Data analysis was performed

on the subsequent 50 patients (25 in each of Group A and B). Guessability was 94% (Group A) and 97% (Group B). On a 1-7 translucency scale, the pictograms were rated as ≥ 6 by 92% of all participants. Literacy assessments found both groups to be equivalent in having the ability to read most patient education material.

Conclusion: The 15 illustrations were validated to be useful and comprehensible tools for inclusion into an action plan

Interaction between Warfarin and Mirtazapine Resulting in Increased INR: A Case Report

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Rationale: Literature searches found no reports of a drug interaction between warfarin and mirtazapine. We report a case of a possible drug-drug interaction between warfarin and mirtazapine.

Description: A 73-year-old female patient with a history of pulmonary embolism, depression, and decreased appetite, receiving 6 mg of warfarin daily presented to the emergency room with a 2 day history of epistaxis and contusions on both legs. Laboratory investigations resulted in a PT >120.0 seconds and an INR > 16.20. In the 3 weeks prior to hospital admission, the INR was 2.97 on a warfarin dose of 6 mg daily. Two weeks prior to hospitalization, the patient had been prescribed 15 mg of mirtazapine daily to help with symptoms of depression and decreased appetite. The patient denied any recent changes to other medications or any illnesses. The INR returned to normal after warfarin and mirtazapine were discontinued, two units of fresh frozen plasma were transfused, and vitamin K therapy was initiated.

Assessment of Causality: The supratherapeutic INR was observed within 2 weeks of initiation of mirtazapine therapy. Mirtazapine and warfarin were both discontinued on admission. The Drug Interaction Probability Scale indicates a possible (score=4) relationship between the drug interaction and the supratherapeutic INR.

Evaluation of Literature: One case report of a potential interaction is noted in the drug product monograph for mirtazapine. A small, but significant, increase of the mean difference in INR values (0.2, 95% CI:0.04-0.36) was seen in 16 healthy male subjects being treated with mirtazapine 30 mg daily and steady state warfarin dosages. The authors did not deem this interaction to be clinically significant

Importance of Case to Pharmacy Practitioners: Further study is needed to elucidate the interaction between mirtazapine and warfarin. Close monitoring of INR levels may be warranted when these medications are used in combination.

Implementation of Medication Order Writing Standards

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Rationale: Abbreviations, symbols and faulty dose designations can cause serious medication errors. In 2007 the Winnipeg Regional Health Authority (WRHA) and its 48 affiliated facilities implemented a Medication Order Writing Standard (MOWS).

Objectives: We assessed the effect of didactic education and direct feedback on improving compliance with the MOWS.

Study Design and Methods: A baseline retrospective audit of medication orders was conducted February 2007. Post-interventional audits were conducted September 2007 following Intervention 1 (Audit 1),

and October 2009 following Intervention 2 (Audit 2). Intervention 1 (March 2007 to June 2007) consisted of didactic lectures and a poster campaign directed at all health care providers. Intervention 2 (April 2009 to October 2009) involved direct feedback to non-complying prescribers. Non-compliance with five MOWS elements ("OD"; "U"; "SC"; abbreviated drug names; trailing zeros) was used to identify the direct feedback target group. Direct feedback consisted of the medication safety pharmacist and chief medical officer sending a memo plus a copy of the offending order to the prescriber. The two sample test of proportions was used to evaluate changes in compliance between Audit 1 versus baseline, and Audit 2 versus baseline.

Results: Medication orders audited at baseline (8565), Audit 1 (5461) and Audit 2 (6198) from 6 facilities formed the basis of comparison. Use of targeted abbreviations "OD" and "U" decreased significantly following Intervention 1 ($p < 0.05$). Use of targeted abbreviations "OD", "U" and "SC" decreased significantly following Intervention 2 ($p < 0.05$). For example, use of "OD" declined from 81% (baseline) to 73% following education alone, to 40% following direct feedback. Use of abbreviated drug names increased significantly from 2.8% to 4.3% following Intervention 2 ($p < 0.05$). Compliance with non-targeted MOWS elements was unaffected or worsened from baseline.

Conclusion: Direct feedback to prescribers augmented education alone in improving adherence to the MOWS.

Fentanyl Patches: Analysis of International Medication Incidents

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Rationale: There has been a steady stream of reports in the medical literature of adverse events with fentanyl patches, including fatalities. A coordinated, system-based solution is needed to reduce errors and optimize use of this powerful opioid.

Description: On behalf of the International Medication Safety Network (IMSN), the Institute for Safe Medication Practices Canada (ISMP Canada) collated and analyzed fentanyl patch incident reports from the U.S., U. K., Canada and Ireland. A literature review was also conducted to identify other reports and system-oriented solutions.

Evaluation: In quantitative analysis ($n=3271$), 8% of incidents were found to result in harm or death. Wrong dose, strength or quantity and dose omission accounted for almost two-thirds of all incidents and incidents resulting in harm or death. Administration and supply of the medication from a clinical area was the most common stage at which error occurred (52% of all incidents and 68% of errors resulting in harm or death). Qualitative analysis ($n=1076$) identified four major error categories: too little medication or administered too late (42% of cases); too much medication or administered too soon (27%); patient didn't need or should not have received the medication (3%); and other (27%). The "didn't need" category was associated with the highest proportion of cases resulting in harm or death (over 40%), whereas the "too soon" category had the lowest (< 10%). For each category, the stage or process at which errors occurred and contributing factors were determined.

Conclusion: By combining results from four jurisdictions and the literature a more robust and richer analysis of the factors contributing to fentanyl patch incidents could be identified. This information can be used to develop and implement safety procedures at the patient, care interface, manufacturer and regulatory agency levels and at the stages of prescribing, order entry/transcription, dispensing, and administration/monitoring.

Encore Presentation

Analysis of Medication Incidents in Ontario

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Rationale: The Ontario Medication Incident Database (OMID) developed by the Institute for Safe Medication Practices Canada (ISMP Canada) has been capturing medication incidents since 2000. Analysis of the OMID can help identify high-risk areas in the medication-use process.

Description and Steps Taken: As of April 2008, 30,612 medication incidents have been voluntarily reported by 58 Ontario institutions and facilities and by individual practitioners. A quantitative analysis was performed with a focus on the severity of outcome of the incidents and medication-use areas associated with these incidents.

Evaluation: Most (90.10%) of the voluntarily reported medication incidents were associated with no harm, but 1,169 incidents (3.81%) were associated with a harm or death outcome. The three most common types of medication incidents resulting in harm or death were dose omission (27.89%), incorrect dose (27.20%), and incorrect drug (13.77%). The top 10 individual medications reported as causing harm or death through medication incidents were insulin, morphine, hydromorphone, heparin, fentanyl, warfarin, furosemide, potassium, metoprolol, and oxycodone. Drugs from floor stock (15.14%), intravenous solutions (13.26%), and infusion devices (8.98%) accounted for a significant proportion of the medication incidents reported as causing harm or death. The most common causes were miscommunication of drug order (9.92%), staff education problems (7.78%), environmental, staffing, or workflow problems (7.19%), and lack of quality control or independent check systems (6.16%).

Conclusion: It is impossible to infer the probability of specific incidents on the basis of the voluntary reports, but the OMID analysis suggests that there is a potential to significantly reduce preventable patient harm by focusing on several or specific high-risk medication-use areas.

Importance: As the OMID continues to accumulate data over time, trends and changes in medication incident patterns will be identified. OMID will continue to provide guidance to Ontario, and help identify new areas of focus to enhance medication safety.

Encore Presentation

Medication Incidents Involving Cancer Chemotherapy Agents

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Rationale: Cancer chemotherapy agents are considered "high-alert" medications with inherent heightened risk of causing significant patient harm when associated with a medication incident. It is therefore imperative to evaluate current chemotherapy practices and derive system-based safeguards to optimize patient safety. One way of achieving this purpose is via an analysis of medication incidents involving chemotherapy.

Description: Medication incidents reported between 2002 and 2009 involving chemotherapy were extracted from the ISMP Canada medication incident database. A quantitative analysis was conducted to provide an overview of various trends such as the severity of outcome. A qualitative analysis was conducted with the subset of incidents containing sufficient narrative descriptions to identify recurrent themes and contributing factors.

Evaluation: A total of 519 incidents were included in the quantitative analysis. Of these incidents, 40 (7.7%) had an outcome of harm, and 4 (0.8%) had an outcome of death. Nearly 90% of these reports ($n=456$) contained sufficient narrative descriptions and were included

in the qualitative analysis. The qualitative analysis revealed 7 main themes; each theme reflects a high-level process within the medication-use system common to the provision of cancer chemotherapy in most patient care settings. They include: 1) scheduling the patient's visit to clinic for treatment, 2) prescribing, 3) order entry or transcription, 4) clinical assessment and communication of treatment changes, 5) dispensing, 6) administration of medication, and 7) monitoring. Incidents were categorized under each main theme and were further analyzed to identify underlying systems based contributing factors. Examples of contributing factors identified included the lack of a systematic process for communicating change orders and look-alike and / or sound-alike chemotherapy protocol names.

Importance: The findings of this analysis can be used to support local quality improvement initiatives. The contributing factors identified can provide insights into areas for system improvements to optimize safety for chemotherapy practices.

Identification of Medication Safety Indicators in Acute Care Settings for Public Reporting in Ontario

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Rationale: In healthcare settings, indicators are useful tools for assessing the structure, process, and outcomes of patient care. Moreover, when used for public reporting, indicators can offer greater transparency of our healthcare system. The objective of this study is to identify three medication safety indicators in acute care settings for public reporting in Ontario.

Description and Steps Taken: A multi-phase process was developed for this project. This included a systematic literature review, compilation and evaluation of possible medication safety indicators, and a consensus generation process (modified nominal group technique) involving a group of 17 Ontario healthcare experts from various disciplines.

Evaluation: More than 300 medication safety indicators were identified through the systematic literature review. Two analysts, working independently and using a defined set of selection criteria, selected 49, and subsequently narrowed to 12 candidate indicators, which were then presented to a group of leading practitioners across the healthcare fields in Ontario. The group reached consensus on three medication safety indicators, which focused on the areas of venous thromboembolism prevention, discharge medications of acute myocardial infarction, and medication reconciliation.

Conclusions: This report describes a systematic process undertaken by ISMP Canada to identify three medication safety indicators in acute care settings for public reporting in Ontario. These indicators refer to important aspects of medication safety at which deficiencies can result in significant patient harm. They can potentially provide hospitals and healthcare providers with tangible and realistic mechanism for measuring performance and, ultimately, improving quality of care.

CSHP 2015

Canadian Antimicrobial Benchmarking Initiative (CABI): Pilot Project of Systemic Antimicrobial Use in Nine Canadian Hospitals

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Rationale/Objectives: Surveillance of antibiotic use is a recommended strategy for antimicrobial stewardship. Several European countries have led nation-wide antimicrobial use projects, however, there are limited data available on drug use patterns in Canadian hospitals. Our objective was to facilitate antimicrobial drug use comparisons between individual hospitals and initiate an ongoing surveillance project.

Methods: Systemic antibacterial (J01) and systemic antifungal (J02) use were examined in adult hospital inpatients using the World Health Organization Anatomic Therapeutic Chemical/Defined Daily Dose (ATC/DDD) system for fiscal years (April- March) 2005-06 to 2008-09. Drug use was expressed using standardized units of DDD per 100 patient days (DDD/100 pd). Hospital demographics such as acuity of care, and services such as intensive care were compiled.

Results: Nine hospitals from 4 cities participated in the study, representing an annual average of 1.54 ± 0.052 million patient days. Antimicrobial use remained stable over the four year period for each hospital but varied considerably between sites. The consumption of J01 drugs was vastly higher than J02 drugs, with the exception of a Toronto, ON oncology hospital which averaged 40.2 ± 2.0 DDD/100 pd for J02 drugs accounting for 31.1% of their total J01 plus J02 use. Average hospital J01 consumption ranged from 37.7 ± 1.3 DDD/100 pd (Halifax, NS) to 89.0 ± 5.0 DDD/100 pd (oncology hospital, Toronto, ON). The most commonly used classes overall, in order, were J01D (other beta-lactams), J01C (penicillins), and J01M (quinolones). The use of oral route for all J01 drugs varied from 25% to 40% and quinolone (J01M) use by oral route varied from 46% (Toronto, ON) to 87% (Calgary, AB).

Conclusion: Centralizing of drug use data by standardized measures is time consuming but improves validity of comparisons. This research gives a reference point and guides the methods used in surveillance for future, more extensive projects.

Pharmacy Technician Expanded Role in Medication Reconciliation and Patient's Own Medications on a Hospital Urology Service

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Rationale: Pharmacy technicians (PT) may assist nurses in certain technical duties to manage medications. The use of patient's own medications (POM) by short stay patients (less than 5 nights stay) may increase efficiency and improve patient satisfaction. Our objectives were to determine if a PT could perform medication reconciliation and implement a POM program on a urology service.

Description of Role: The PT received training to interview patients, reconcile the Best Possible Medication History (BPMH), obtain consent to enroll the patient in a POM program, and verify medications were safe and accurate to use.

Project Implementation: A 0.5 FTE PT was funded for April 1, 2009 to March 31, 2010. Policies and procedures were approved and in-services provided to nursing staff. Patient and nurse satisfaction surveys were completed in April (pre) and October 2009 (post). The PT recorded all activities performed.

Project Evaluation: During an average month, the PT reconciled 45 BPMH, conducted 59 patient interviews, identified 7 incidents on the BPMH, verified 79 medications, made 38 calls to the patient's retail pharmacy, and answered 10 questions from patients. The POM

program used 69 medications and saved the nursing unit \$383 per month. Nurses reported higher satisfaction with the amount of time available to administer medications (64% agree pre vs. 86% agree post) and prepare patients for discharge (57% vs. 71%). Patient survey results indicated high satisfaction with medication management on the urology service, and an increase in support for using POMs (12% vs. 39%). Medication reconciliation success indices such as unintentional discrepancies improved (0.26 vs. 0.50).

Importance to Pharmacy Practice: A PT in an expanded role can work collaboratively with the patient care team to meet medication reconciliation standards and ensure the safe and accurate use of POMs. This role will be continued on a fulltime basis.

Validation of a Pictogram-Based Diabetes Education Tool in Counselling Patients with Type 2 Diabetes

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Rationale: Pictograms have been used to provide health care and health-related education in persons with low literacy and language barriers, however, there is little information available regarding use of pictograms to educate patients with diabetes.

Objective: To validate selected components (Heart Disease and Stroke, Nerve Damage) of a pictogram-based diabetes education tool for use in counselling outpatients with type 2 diabetes mellitus. A pictogram was considered validated where the overall level of understanding reached 70 percent or greater.

Design: The study was conducted in offices of consenting primary care physicians in the Greater Moncton area under the auspices of the Diabetes Education Centre, Zone 1 Moncton. During the initial interview session, eligible patients with diabetes were shown a series of pictograms and asked how each related to diabetes self-management. Patient interpretation of each pictogram was rated by the assessor who provided key information, where indicated, to improve the patients' understanding of managing their diabetes. The same series of pictograms were shown at a follow-up visit to assess recall of the pictogram and its meaning.

Results: Seventeen patients were enrolled (1 lost to follow-up). Patients were primarily female (75%), English (88%), and aged 60 at enrolment. At the follow-up visit, correct interpretation was found in 70 percent or greater of pictograms for all 8 (100%) pictograms in the Heart Disease and Stroke group. In the Nerve Damage group, however, only 2 of 7 (29%) of pictograms achieved correct responses at a level of 70 percent or greater.

Conclusion: Early efforts to validate two groups of pictograms as an alternate method of educating patients with type 2 diabetes indicated excellent patient understanding and recall of Heart Disease and Stroke graphics when tested within 2 months of initial assessment and teaching. Pictograms related to management of neuropathic complications of diabetes were not as well interpreted or recalled by patients.

Innovation and Collaboration: The Roles of a Geriatric Patient Care Pharmacist at a Nova Scotia Community Hospital

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Rationale: Polypharmacy and its consequences present a significant problem for frail older adults, which are compounded by cognitive and functional impairment.

Description: A residency-trained pharmacist was integrated into the newly formed Geriatric Team at the Dartmouth General Hospital, a community hospital in Dartmouth, Nova Scotia. The pharmacist worked to full scope of practice, incorporating cognitive, functional, and physical assessment into their practice, as well as the more traditional role of medication assessment and management.

Implementation: In conjunction with the Geriatric Team the pharmacist received referrals from inpatient physicians, pharmacists & emergency department staff. Referrals with multiple medication problems were triaged to the pharmacist. Demographic information, the number of medications & the medication appropriateness index was collected for each patient at initial patient contact and discharge from the pharmacist's care.

Evaluation: 158 consults were made to the pharmacist over 7 months. 91 % of the Geriatric Team consults were referred to the pharmacist. The average age of patients referred to the pharmacist was 80.3 years and 39.2 % were male. 60 % of patients returned home, 23 % went to long term care and 6 % died in hospital. The average number of medications per patient was 10.3 at initial visit and 9.8 at discharge. Medication appropriateness was calculated at the initial visit and again at discharge. The initial medication appropriateness index was 10.72 and decreased to 4.74 at discharge, indicating a significant improvement in medication appropriateness ($p < 0.0001$).

Importance: A residency trained pharmacist can share a leadership role in the care of the frail elderly, in collaboration with a geriatrician or family physician. Medication management of frail seniors by a pharmacist does not have a significant impact on the number of medications used but can have a significant impact on the appropriateness of medications used.

Differences in Nova Scotian Pharmacists' Knowledge of and Attitudes toward the Emergency Contraceptive Pill Based on Primary Practice Site

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Rationale: There is a paucity of literature about differences between pharmacists whose primary place of practice is hospital versus community, with regard to their knowledge of and attitudes towards the emergency contraceptive pill (ECP).

Objectives: In 2005 ECP became more accessible to women when levonorgestrel became available without a prescription in pharmacies. The objective of this study was to examine if there is a difference between primarily hospital based versus community based pharmacists' knowledge of and attitudes towards ECPs.

Study Design and Methods: The research was conducted by anonymously surveying all pharmacists licensed to practice in Nova Scotia using a 25 item paper questionnaire. The research was approved by Dalhousie University Health Sciences Ethics Board. Data was analyzed using SPSS.

Results: The response rate was 53% (595/1123) with 450 pharmacists indicating that they work at least part time in community pharmacy.

Thirteen of the 450 pharmacists indicated that their primary place of practice was hospital. In comparing knowledge about levonorgestrel as ECP, interim analysis found more hospital pharmacists than community pharmacists knew: 1) it will not end an existing pregnancy (100% vs. 92.4%); 2) it can be effective up to 5 days (61.5% vs. 38.4%); and 3) it does not cause women to vomit more than half the time (92.3% vs. 68.7%). With regard to attitudes to emergency contraception, more hospital pharmacists than community pharmacists disagreed that: 1) non-prescription availability encourages sexual risk taking (84.6% vs. 69.3%); 2) levonorgestrel should be available with self-selection by patients (76.9% vs. 67.0%); and 3) availability without a prescription encourages repeated use (69.2% vs. 52.5%).

Conclusion: Possible differences between hospital and community based pharmacists in knowledge and attitudes regarding levonorgestrel as EC should be explored further. Regardless of any differences, results suggest that continuing education about EC may be beneficial for all pharmacists.

Optimization of Medication Reconciliation on Admission for Pediatric Inpatients

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Rationale: Medication reconciliation (MR) is a process designed to provide the most complete and accurate list possible of all medications during transfer of care. The pharmacy department is reviewing the existing MR process completed by a team of Pharmacy Assistants (PA's) to optimize patient care and capture all inpatient admissions.

Description of Concept: At its conception, MR was performed by a single PA. However, the process is now supported by a team of 4 PA's 7 days a week. In an effort to harmonize the MR process, the process is being reviewed to establish best practice and improve the ability to capture all inpatient admissions. Specific objectives include: 1) prioritizing patients requiring MR based on unit /diagnosis; and 2) creating a decision tree to identify the need for pharmacist involvement.

Steps Taken to Implement New Program:

1. Observe current practice of MR as performed by each PA.
2. Diagram current process and propose changes for quality improvement.
3. Audit successes and barriers to revised MR process.
4. Re-assess for additional training or educational needs.

Evaluation of Project: From January to March 2010, over 1810 admissions to hospital in which 865 medication history interviews were conducted (57.5% of 1504 eligible admissions (defined as >24hrs admissions, non-oncology patients, non-neonates). The number of MR per PA varied from 50.3% to 66.2%. The number of MR greatly varied between them (7.6-10.8/day), as did the number of medication histories completed prior to admission (2.3-7.2%).

Concept's Importance and Usefulness to Current and/or Future Practice:

A harmonized MR process upon admission is intended to increase efficiency and effectiveness in obtaining and documenting medication histories. The decision tree will help reduce the number of clarifications requiring intervention by a pharmacist and improve timeliness in reconciliation of medication discrepancies.

Failure Mode Effects Analysis (FMEA) for Morphine Prescribing Practices

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Rationale: At the Children's Hospital of Eastern Ontario, medication related events represent the highest percentage of patient safety incidents (28%). Of these, there have been 38 morphine related events (5.7% of medication incidents). Due to the voluntary nature of the Safety Reporting System, the recorded number of 38 reported events is likely an underestimation. Although not the sole contributing factor, prescribing practices contributed to a number of these incidents.

Objective: To identify and prioritize potential failures in morphine prescribing, with the objective of improving patient safety by identifying and acting upon those parts of the morphine prescribing process which are most in need of change.

Study Design and Methods: A failure mode effects analysis (FMEA) was used by the multidisciplinary team to diagram the process of prescribing morphine and to brainstorm potential failure modes and predict their effects should the failures occur in real-time. Following this, the team identified causes of failure modes and prioritized these using severity, detectability and frequency.

Results: A total of 70 failure modes were identified and prioritized these using severity, detectability and frequency as scores. Single point weaknesses are steps so critical that their failure would result in a system failure or adverse event. These were found to be distributed across the entire process (n = 23). Secondly those scored with severity 5, meaning a severe or catastrophic effect should a failure of the step occur (n = 12). Finally, risk priority number (RPN) which is calculated based on frequency, detectability and severity (n = 5).

Conclusions: By identifying the potential failures in morphine prescribing, developing strategies and recommendations that include the following: 1) development of corporate dosing guidelines; 2) development of a verbal order policy; 3) promotion of pre printed orders hospital wide; and 4) support for computerized physician order entry with forcing functions.

Sun Protection Behaviors among Outdoor Recreation Workers in Nova Scotia

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Rationale: Pharmacists are increasingly being involved in public health services. Although skin cancer is the most common cancer in Canada (Canadian Cancer Society, 2008), preventative behaviors and regular screening can dramatically reduce the prevalence and severity of this disease.

Objectives: This research was to assess the knowledge, attitudes, and sun protection behaviors among Nova Scotia outdoor recreation workers and highlight educational opportunities for pharmacists that assist young workers.

Study Design and Method: Using a Theory of Planned Behavior (Ajzen, 1991) framework, and previously validated surveys, we developed a questionnaire that assessed informational sources about risk factors, attitudes toward sun protection and sun exposure, normative influences (e.g., my fellow lifeguards use sunscreen at work), perceived behavioral control, and intention to use sunscreen.

Results: Seventy-one of 232 outdoor recreation workers responded to the survey. The age range was from 14 to 33 (M = 19.5). Occupations included lifeguards (62%), sailing instructors (17%), and tennis instructors (12%). Forty-five percent of respondents reported applying sunscreen only when it was sunny outside, very few (10%) of respondents examined their entire body for skin cancer, and a health care professional had never checked 82% for skin cancer. Sun protection behaviors frequently performed while at work included 90%

wearing sunglasses, 34% wearing lip balm, and 19% staying in the shade. The majority of sunscreen users (56%) wore a sunscreen with an SPF of 30 -59. SPF was a significant predictor of intention to use sunscreen while at work ($R^2 = .166, p < .001$) with individuals that use higher SPF being more likely to intend to use sunscreen on a regular basis. We also identified barriers to sunscreen use.

Conclusion: Our study provided information on specific sun protection behaviors; including rationale for behaviors that were performed inadequately. Pharmacists can use this knowledge when participating in sun-safety campaigns.

Funding: Funded in part by Green Shield Canada and CIHR Summer Student Grant (through the School of Nursing, Dalhousie University)

Encore Presentation

Drug Utilization Evaluation (DUE) Of Pre-operative Antibiotic Administration: Time Administered to Incision

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Rationale: Evidence shows that surgical site infections are reduced when prophylactic pre-operative antibiotics are administered within one hour of skin incision. A DUE for antibiotic use within the perioperatives services program is planned; timing of antibiotic administration is one parameter being evaluated. Prior work has already

commenced and been determined successful in the orthopedic and cardiovascular surgical programs simply by changing wording in pre-printed orders.

Objectives: To determine if our institution is following established guidelines with respect to timing of prophylactic antibiotic administration in a minor surgical procedure population. To determine if a similar approach of pre-printed orders should be implemented for all surgical patients.

Study Design and Methods: Decision support was requested to provide information on admitted surgical patients undergoing minor procedures (defined as 24-36h length of stay). From that data, four non consecutive typical weeks of patient data were evaluated. Information collected included time of pre-operative antibiotic administration, and surgical start time.

Results of the Study: Of 52 patients reviewed, only 17 had documentation of antibiotics administered within 60 minutes of surgery start time. Two patients did not have time of antibiotic administration documented. On average, the time from administration to surgical incision was 90 minutes.

Conclusion of the Study: The results of the study indicates a re-evaluation of how, where, and when pre-operative antibiotics are administered is required. In addition, how the antibiotics are ordered should be assessed. A working group with a representation of surgeons, administration, and the program pharmacist will be implemented to discuss strategies to improve practice to comply with best practice guidelines.

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