Building the future of pharmacy: We are the Agents of Change

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73rd Annual General Meeting of the AFPC
7th Annual Canadian Pharmacy Education & Research Conference
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Diabetes and the occurrence of infection in primary care: A matched cohort study

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Objectives:
People with diabetes are thought to be at a higher risk for infections; however, there is a lack of evidence supporting this purported association between diabetes and infections in primary care. Our aim was to estimate the association between diabetes and infections occurring in primary care.

Methods:
Using the Newfoundland and Labrador Sentinel of the Canadian Primary Care Sentinel Surveillance Network (CPCSSN) database, we identified patients with diabetes who were ≥18 years between January 1, 2008 and March 31, 2013. We randomly matched each patient with diabetes on the date of study entry with up to 8 controls that did not have diabetes. Patients were followed until March 31, 2014. Our primary endpoint was the occurrence of one or more primary care physician visits for any infectious disease. Secondary outcomes included primary visits for head and neck infections, respiratory tract infections, gastrointestinal infections, genitourinary tract infections, skin and soft tissue infections, musculoskeletal infections and viral infections. Using multivariable conditional logistic regression analyses, we measured the adjusted odds ratios for the risks of infections in patients with diabetes compared to their matched groups with no diabetes.

Results:
We identified 1,779 patients with diabetes who were matched to 11,066 patients without diabetes. Patients with diabetes were on average older, higher prevalence of comorbidities, and more often referred to specialists compared to patients with no diabetes. After adjusting for potential confounders, patients with diabetes had an increased risk any infections compared to patients without diabetes (odds ratio (OR)=1.21, 95% confidence interval (CI) 1.07-1.37). Skin and soft tissue infections had the strongest association (OR=1.65, 95%CI 1.36-2.01), followed by genitourinary infections (OR=1.42, 95%CI 1.17-1.73), gastrointestinal infections (OR=1.41, 95%CI 1.13-1.75), and respiratory infections (adjusted OR=1.31, 95%CI 1.14-1.50). Diabetes was not associated with head and neck, musculoskeletal or viral infections.

Conclusion:
Patients with diabetes appeared to have an increased risk of infections compared to patients without diabetes. The highest risk was seen with skin and soft tissue infections in patients with diabetes compared to those without. An increased risk was also apparent for genitourinary, gastrointestinal, and respiratory infections in patients with diabetes.
The oxidation of the anticancer drug metabolite, 6-mercaptopurine ameliorates Cu-Zn superoxide dismutase activity: Potential involvement of peroxymonocarbonate

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Azathioprine and its metabolite (6-MP) are mainly effective in the treatment of many inflammatory bowel diseases. At sites of inflammation, reactive oxygen species (ROS) are generated, including hydrogen peroxide. The latter product is known to inactivate superoxide dismutase, which enhances oxidative stress. In the presence of HCO$_3^-$ and H$_2$O$_2$, peroxymonocarbonate, which is known to oxidize electron-rich species such as thiols, can be produced. 6-MP has a thiol moiety in its structure, but it is not known if peroxymonocarbonate can react with this drug. **Purpose:** To investigate if oxidizing thiol moiety of 6-MP by peroxymonocarbonate will ameliorate SOD activity. **Methods:** UV-Vis spectrometry was used to monitor spectral changes of 6-MP and other analogs including its parent drug, azathioprine. Electron paramagnetic resonance (EPR) spectroscopy was utilized to detect the effect of thiopurines on carbonate radical, a product of SOD-peroxidase activity (SOD/HCO$_3^-$/H$_2$O$_2$). LC/MS was used to determine the metabolites of oxidizing 6-MP. SOD activity was measured by using SOD colorimetric assay kit. **Results:** UV-Vis spectra showed that changes were observed with 6-MP and 6-thioguanine; with less changes observed with 6-thioguanine and 6-thiouric acid. Kinetic studies demonstrated that the changes in the 6-MP peaks were dependent on HCO$_3^-$ /H$_2$O$_2$ concentrations. Using EPR spectroscopy and 5,5-dimethyl-1-pyrroline-N-oxide (DMPO) as a spin trap, we found that the spin adduct of CO$_3$$^•$ (DMPO/•OH) was attenuated with increasing of 6-MP and 6-thioguanine concentrations. However, DMPO/•OH was not significantly attenuated with the presence of azathioprine. Also, oxidation of 6-MP by HCO$_3^-$ /H$_2$O$_2$ resulted in forming a sulfoxide product (C$_5$H$_4$N$_4$O$_2$S; 182.9981 m/z) that was detected by using high resolution LC/MS. Lastly; inactivation of SOD by H$_2$O$_2$/HCO$_3^-$ was significantly attenuated with the presence of 6-MP. **Conclusion:** Exposure of 6-MP to both H$_2$O$_2$ /HCO$_3^-$ significantly enhanced its oxidation, and led to protect CuZn-SOD activity. Further cellular studies are necessary to determine the effect of oxidizing 6-MP by H$_2$O$_2$/HCO$_3^-$ on its pharmacological activity and SOD activity.
‘The bus analogy’: A new analogy to help pharmacy students conceptualize the well-stirred model
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Objectives: The objective of this study was to determine whether an analogy relating a city bus to the well-stirred model of hepatic drug clearance and its application to the intravenous administration of drugs with a high extraction ratio may improve pharmacy students’ self-perceived and objectively-assessed understanding of the model.

Methods: Following informed consent, 52 students enrolled in a clinical pharmacokinetics elective course were recruited to participate. After a brief review of the well-stirred model, students completed a questionnaire and quiz (pre-test). The bus analogy was then presented, after which students completed a second questionnaire and quiz (post-test). Pre- and post-test questionnaires consisted of five items measuring students self-perceived understanding of the well-stirred model using a 5-point unipolar scale; the post-test questionnaire had three additional items to ascertain students’ impression of the analogy using a 5-point Likert scale. Pre- and post-test quizzes contained one question requiring mathematical, graphical, and intuitive understanding of the well-stirred model to earn a maximum of 4 points. Student’s paired t-test with unequal variances was used to compare pre- and post-test results, with significance deemed a priori as p<0.05.

Results: The bus analogy significantly improved students’ self-perceived understanding of the well-stirred model for all five questionnaire items (mathematical [p=0.0091], graphical [p<0.001], intuitive [p<0.001], and overall understanding [p<0.001], and ability to remember the model [p<0.001]). Students agreed that the bus analogy was not difficult to conceptualize, helped their understanding of the well-stirred model, and should be included in future pharmacokinetic curricula. When comparing pre- and post-test quiz results, the analogy significantly improved the mean score obtained (2.17 [SD 1.27] versus 3.11 [SD 0.94]; p<0.001).

Conclusions: The bus analogy significantly improved pharmacy students’ understanding of the well-stirred model when assessed both subjectively and objectively, and should be considered as an adjunct to pharmacokinetic curricula pertaining to this model.
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Descriptive Analysis of Fourth Year Pharmacy Students’ Perspective on Virtual Interactive Case (VIC) Software

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Background
In the Canadian pharmacy curriculum, students are expected to apply concepts from classroom learning into real life patient care through experiential placements. This leap can be challenging, and there are limited options for bridging this gap. VIC software allows pharmacy students to practice information gathering and clinical reasoning skills using the pharmaceutical care process. In VIC cases, students navigate through available information of a simulated patient to identify drug therapy problems (DTPs) and select care plan items. Upon completion, students are provided with immediate feedback on their patient assessments and care plans, including rationale on why their choices were correct or incorrect. Another advantage of the VIC software is that cases are easily modified for rapid new case creation.

Objective
To obtain student feedback on VIC cases.

Methods
Ten 4th year pharmacy students independently worked through four VIC cases followed by a semi-structured interview. The interviews were recorded, transcribed and coded for themes using qualitative research methods.

Results
Students found the VIC software intuitive, fun, user-friendly and the cases reflected real-life scenarios encountered in their hospital placements. Students commented that the cases helped them develop information gathering skills, as they had to discern relevant information from what was available. They appreciated the immediate and thorough formative feedback received. Most students required an explanation of the cost associated with their performance score presented at the end.

Conclusion
VIC cases provide pharmacy students with an opportunity to practice information gathering and clinical reasoning skills. It is a useful tool as a bridge between the classroom and experiential education. Other potential uses include remediation for students experiencing difficulty in rotations and to enhance active learning strategies in the classroom.

Keywords: virtual cases, clinical reasoning, active learning strategies
Experiential Education in the PharmD For Practicing Pharmacists Program: Preceptor Experiences and Expectations

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Background: Understanding the preceptor experience within pharmacy educational programs guides continuous improvement strategies with the aim of ensuring high quality professional education. Developing a thorough description of the preceptor experience within the PharmD for Practicing Pharmacists program is key in planning the next stages of program development and for informing the implementation of other PharmD programs proposed at the University of Alberta.

Objective: To examine preceptors’ experiences within the PharmD for Practicing Pharmacists program within their roles as educators, supervisors, and evaluators and how this relates to their definition of pharmacist practice success, as well as their general perception of program quality.

Methods: A semi-structured interview tool was developed to explore preceptors’ perceptions of their roles and their expectations of students. Sections of the interview tool include experience as a preceptor, knowledge about the PharmD program, perceived role as a preceptor, views on student and pharmacist success, and insights into overall program quality. The interview tool was piloted with an experienced preceptor and revised for clarity, conciseness, and content.

One-on-one interviews are being conducted with a purposeful sample of pharmacists who have precepted at least twice in the program. Participants were selected to include pharmacists practicing in a variety of settings (acute care, community practice, and primary care). Interviews are audio-recorded and transcribed verbatim. A descriptive qualitative approach will be used to identify emerging themes.

Results: Analysis of data gathered from interviews will be presented. The most salient preceptor expectations of students and perceptions of their roles as educators, supervisors and evaluators will be reported. Themes related to preceptor descriptions of student success, pharmacist success and program quality will also be provided.

Conclusion: Information obtained from preceptor interviews will generate insight into their expectations of students and roles they identify with, as well as how they define success in practice which will be valuable for quality improvement initiatives and development of future programs.

Word Count: 343
Compensation plan for pharmacy services: Communicating change in Alberta
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Objective: A comprehensive Compensation Plan for Pharmacy Services was implemented in Alberta in 2012. The objective of this study is to gain insight into how communication of the Compensation Plan, commonly known as the Pharmacy Services Framework, was presented in documents such as news media articles, policies, government reports, and communications from professional associations and regulatory bodies. Methods: Publicly available documents related to the Compensation Plan published between 2012 and 2015 were obtained from the Government of Alberta, Alberta Blue Cross, the Alberta College of Pharmacists, the Alberta Pharmacists’ Association, and the Blueprint for Pharmacy websites. Searches using the Canadian Newsstand database and Google identified additional documents. Search terms included “Pharmacy Services Framework”, “Compensation Plan for Pharmacy Services”, pharm*, compensat*, reimburse*, and Alberta. A grounded theory approach was used to identify thematic categories. During the analysis, attention was paid to how the Compensation Plan was presented to pharmacists and other audiences. Results: Analysis of 62 publicly available documents written for practicing pharmacists (28), general audiences (16), and for newspaper media (18) identified four main themes: reimbursing patient care services, legitimizing pharmacists’ professionalism, shifting focus to patient care role, and collaborating with health care team members. The Compensation Plan was framed as supporting pharmacists’ shift in practice to a patient care focus and supporting collaborative patient care. For the public, the Plan was framed as facilitating access to primary health care services, such as prescription renewals, in collaboration with physicians. Conclusions: The findings draw attention to different characterizations of the Compensation Plan as a reimbursement plan, as legitimizing a shift to clinical pharmacy services, and improving access to and the quality of primary health care. Researchers need to consider the political and societal contexts that influence provision and reimbursement of clinical services. The results provide a foundation for future research on how clinical services reimbursed by the Compensation Plan are implemented by community pharmacies.
The relationship between grades in prerequisite pharmacy courses and pharmacy grades at the University of Alberta

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Objective: To determine how well each of our selected required prerequisites predicted academic performance (grade point average, GPA) in the pharmacy program.

Methods: Multiple regression was used to seek out relationships. We compiled grades from over 700 students admitted over several recent years of the program and related academic achievement to each of the prerequisite courses. We also included variables of each student’s gender, age relative to average class-age, and stature of the student’s pre-pharmacy educational institution.

Results: At the University of Alberta the required courses have been set for many years to include English, general and organic chemistry, cell biology, biochemistry, calculus and statistics. Of these prerequisites, attainment in cell biology and biochemistry provided the strongest, significant predictors with the Year 1 and the combined year 1 to 3 Pharmacy GPA. The Statistics course prerequisite provided a weak but significant correlation with the combined year 1-3 GPA. None of the other prerequisites provided any significant relationship to overall GPA. Female gender, being younger in relation to average class age, and being from a University with higher stature (defined as being listed in the QS World University Rankings) were also positive correlates with Pharmacy GPA.

Conclusion: Faculties of Pharmacy possess program quotas on enrollment. The judgment for admittance, including screening for interview selection, can rely heavily upon GPA in necessary-predetermined prerequisite courses. Prerequisites can vary between Canadian Schools of Pharmacy. It was clear from the analysis of our prerequisites, that biologically-based prerequisites provide the strongest and best predictors of GPA in a pharmacy program. This can be explained by consideration of the modern day pharmacy curriculum, which is heavily laden with material related to pathophysiology and therapeutics.
Significant changes in cefazolin protein binding during cardiac surgery with cardiopulmonary bypass

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Cefazolin is used for antimicrobial prophylaxis in cardiac surgery with cardiopulmonary bypass (CPB). Although protein-bound cefazolin is inactive, most studies measure total plasma concentrations and only estimate the free fraction (e.g., 20%). Given the significant pharmacokinetic alterations during cardiac surgery, our goal was to characterize the protein binding of cefazolin using an adapted assay for total concentrations and developing a method for measuring free concentrations.

Blood samples were collected from 55 patients undergoing cardiac surgery with cefazolin prophylaxis. Samples were centrifuged to yield plasma (total cefazolin) and a portion was centrifuged in a Centrifree® filter to yield ultrafiltrate (free cefazolin). The stable isotope cefazolin $^{13}$C$_2^{15}$N sodium salt was used as the internal standard and 85% acetonitrile in water with 0.1% formic acid as the mobile phase. The analysis was conducted using Shimadzu Nexara UHPLC and LCMS 8040 triple quadrupole mass spectrometer. Extensive intra- and inter-day validation was performed for total cefazolin concentrations from 4 to 100 mg/L and free concentrations from 1 to 100 mg/L.

A total of 135 intra-operative blood samples were analyzed. Total and free cefazolin concentrations ranged from 12.9 to 225.1 mg/L and 4.4 to 99.9 mg/L, respectively, with an average free fraction of 28.1 ± 7.6%. Initial observations were consistent with saturable protein binding at concentrations exceeding 150 mg/L. However, further analysis identified two sample populations including those drawn before (n=52) and after (n=83) starting the CPB pump. The protein binding was linear in both cases, however the free fraction was significantly higher in samples drawn after compared with before starting the pump (29.7 ± 8.4% vs 25.6 ± 5.2%, p = 0.002). Albumin concentrations drawn pre and post surgery were not predictive of protein binding.

This study characterizes important changes in cefazolin protein binding during cardiac surgery and highlights the limitations of utilizing literature values of free fraction to predict prophylaxis effectiveness.
Assessment of Entry to Practice PharmD Student Performance on Standardized Medication Reconciliation Validation at Academic Hospitals

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Background
Comprehensive hospital implementation of medication reconciliation is limited by human resources. PharmD students who need to acquire medication reconciliation skills during their hospital rotations can help to fill this need however, integrating these students can be challenging due to rotations spanning multiple sites for short durations (5 weeks). A standardized medication reconciliation validation (MRV) process allows students to transition more efficiently between multiple hospitals.

Objectives
1. To assess student performance on the standardized MRV
2. To assess if performance differs across hospitals
3. To use results to inform curricular improvement

Methods
A standardized MRV process consisting of a simulated in-patient hospital scenario was implemented across sites. Students were assessed on their ability to perform a best possible medication history (BPMH) followed by their medication reconciliation process. Student assessment results including BPMH time, score of individual components (BPMH and reconciliation) and pass/fail results were later entered anonymously into a data collection sheet. Scores from all sites were centrally compiled.

Results
The performance of 63 PharmD students on rotation at 4 academic hospitals between May 2014 and April 2015 was assessed. The average BPMH duration was 16 minutes and varied from 10-21 minutes between sites. Average BPMH process score was the most variable, ranging from 76-93%. Medication reconciliation process scores were consistently high (97%). There was variability between sites in the passing rates for first attempts as success was determined by global assessment of student performance.

Conclusions
The majority of students passed both BPMH and medication reconciliation components on first attempt. Future studies could explore results from subsequent student cohorts, the rationale for failed assessments, recommendations for improved training as well as other standardized validation approaches for essential patient care processes.
Implementation of an Assessment Strategy Using Human Patient Simulation Technology to Evaluate Pharmacy Students

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**Background:** In September 2012, Human Patient Simulation (HPS) was introduced to our 4-year entry-to-practice baccalaureate degree program. Since its implementation, students have used HPS technology to develop their physical assessment skills. Previously, physical assessment skills and therapeutic knowledge were evaluated separately. It was noted that students are often able to perform a physical examination skill, but are not able to incorporate these data into their patient assessment. We developed and implemented an assessment strategy to evaluate students’ physical examination skills and application of examination findings to their patient assessment.

**Objective:** The implementation of an assessment strategy using HPS technology to evaluate physical examination technique and application of these findings to a patient assessment is described.

**Methods:** Patient cases and assessment materials were developed and pharmacist facilitators were trained as examiners. The assessment was conducted in 2 components. The first component involved evaluation of students’ performance of a physical examination on a patient simulator. Students were assessed on the accuracy of their examination findings using a short written assessment. The second component involved a written assessment based on the same patient they had examined during the first component. Faculty, pharmacist facilitators, and our laboratory manager were involved in marking the examination.

**Results:** This assessment strategy allowed us to evaluate students’ individual competence in utilizing a holistic approach to patient care, as it integrated physical assessment, patient data, and therapeutic knowledge. Other benefits included the ability to standardize the evaluation of physical assessment technique, communication, and bedside manner. Challenges include examiner training, classroom time and space restrictions, workload, and troubleshooting of HPS technology.

**Conclusions:** This assessment strategy provided the opportunity to evaluate students using an integrated approach by combining physical and clinical assessment with therapeutic knowledge and critical thinking skills. Next steps include expansion of this assessment strategy in the faculty’s new entry-to-practice Doctor of Pharmacy program. This will include the addition of other physical exam skills and an oral assessment component.
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Defining Characteristics of Successful Pharmacists: A Qualitative Study
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Background: How we admit students into pharmacy programs should target applicants who are predicted to become successful, high level practitioners. Our primary objective was to identify the self-described characteristics of successful pharmacists. Our working definition of success in pharmacy is based on the premise that successful pharmacists practice to the full extent of their knowledge and skills.

Methods: Semi-structured individual interviews were conducted with selected pharmacists. The interview tool was developed using previous research on success in health care professions and was modified based on trial interviews with Faculty and practitioners. Potential candidates were nominated by prominent pharmacists in the field, using our definition of success. Lists from the nominators were compared and 10 pharmacists who appeared on more than one list were invited to participate.

Results: A total of 10 interviews have been conducted and analyzed. All pharmacists had additional prescribing authorization (APA), with 4 of those pharmacists being early adopters (receiving APA prior to remuneration model implementation). In terms of factors contributing to success, participants noted strong communication skills and developing relationships as important. When asked what success meant to them, participants believed that self-development played a large role. Participants also felt a focus on emotional intelligence would help ensure the success of pharmacist practice in the future.

Conclusions: A clearly delineated definition of success was developed and used to frame interviews with practitioners viewed as successful by their peers. Communication skills were the most prominent factor that contributed to success. This data will help individual pharmacists become aware of what characteristics they may want to foster in order to have success in practice and schools of pharmacy to tailor their admissions processes.
eHealth Education: Anatomy of an Interprofessional Initiative

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Objectives: The University of Montreal (UdeM) interprofessional eHealth (EH) initiative aimed to identify knowledge, skills and interventions needed to enable teaching and learning of eHealth within health sciences curriculum.

Methods: By different means, from November 2015 to February 2016, students from thirteen (13) health and psychosocial sciences faculties, schools and departments were asked to reflect on EH issues and its opportunities and challenges of collaborative practice. Elements such as EH related case-based learning activity, survey administration (n=294), interviews (n=5) and EH Symposium (n=398 participants) were proposed to broaden students’ perspectives on EH issues. Descriptive statistics were used to analyze collected data.

Results: 1600 students took part in an EH related case-based learning activity and reported expected benefits of patient remote monitoring in improving patients’ health outcomes. The survey responses (n=294) showed that further EH developments may also improve health professional communication and health care network efficiency. Although, the current technological state allows for efficient collaborative care delivery, political, social and professional issues must be clarified. EH education is presently insufficient (45%) or non-existent (30%). Integration in undergrad curriculum (72%) as mandatory (57%) or elective (30%) activities should occur within the next five years (89%), by prioritizing transdisciplinary (46%) or interprofessional (39%) approaches. Simulations (89%), online modules (67%) and exposure to health technologies within the curriculum (62%) appear to be the more suitable techniques to improve EH learning. Efficient technology use (81%), regulations (60%), and EH challenges (56%) should be priorities.

Conclusions: Although UdeM student mobilization around the initiative was partial and variable within each academic program, better awareness of EH opportunities and challenges combined with a strong desire to learn more are clear outcomes of this initiative. Nonetheless, to realize, as proposed, concrete and effective curricular improvements, further interventions toward academics and program administrations are needed to prioritize and coordinate such actions.
Entrustable Professional Activities (EPAs) for Pharmacy? A Literature Review
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Introduction:
Entrustable professional activities (EPAs) are units of professional work that describe the critical elements of a profession. Competency based educational outcomes should align with clinical pharmacy key performance indicators (cpKPIs) that form the foundation of pharmacists’ responsibilities with patient care activities. EPAs may serve to bridge the gap between competencies and workplace based assessment and may provide a valuable framework to guide curriculum development and experiential assessment in pharmacy education.

Objectives:
Present the findings of a literature review on EPAs to define and describe the process of development, implementation, and implications of EPAs for pharmacy education.

Methods:
A Literature search was conducted in five databases (Scopus, Medline, Embase, Web of Science, Educational Resources Information Center). Inclusion criteria: articles defining or describing the development, implementation, or effectiveness of EPAs. Abstract-only publications, perspectives, commentaries, and editorials were excluded from the review.

Results:
The literature review comprised of 17 articles exclusive to medical programs. Key steps in the development of EPAs included the generation of initial list of EPAs, refining, validation, and finally establishing frameworks to describe and align EPAs to competencies. The main development approach consisted of working groups of experts, faculty and clinical practitioners (16), the Delphi method (4) generate and refine initial lists, questionnaires to validate (4) and using frameworks to map EPAs to competencies, required knowledge, skills, and attitudes, progress assessment, time frames for unsupervised practice, and the basis for formal entrustment.

Conclusions:
A proposed methodology for the development of EPAs in pharmacy experiential program includes the formation of a working group of expert practitioners and faculty, refinement and generation of draft EPAs utilizing the Delphi method, and validation of EPAs through questionnaires to practitioners. The ten Cate et al. framework may be suitable for definition of EPAs. The methodology described may assist pharmacy programs to define EPAs for the profession with the potential for mapping educational outcomes, cpKPIs, curriculum development, or implementation into experiential assessments.
Comparison of pharmacy students’ and pharmacists’ activities using a clinical pharmacist workload measurement tool

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Study Objectives  
Pharmacy students in the final year of their Doctor of Pharmacy program at the Leslie Dan Faculty of Pharmacy, University of Toronto, are required to complete Advanced Pharmacy Practice Experience (APPE) direct patient care (DPC) institutional rotations. Students’ activities during their 5-week rotations were analyzed and compared to clinical pharmacists’ activities in a community teaching hospital, to help understand how students contribute to patient care activities.

Method  
Pharmacy students on APPE DPC rotations recorded the volume and time spent on each type of clinical and non-clinical activity (excluding dispensing) in a Microsoft® Access database clinical pharmacist workload measurement (WLM) tool. Data were collected between May 2014 and May 2015. Activities were classified into 4 main categories and the time spent on each was analyzed and compared to clinical pharmacists’ data for the same period.

Results  
Twenty students completed 33 DPC rotations during this period. On average, students spent 23.9 days per rotation on site. Students documented 69.8% of their hours worked compared to 63.2% of pharmacists. Students recorded a total of 248,019 minutes and pharmacists recorded 1,393,031 minutes. The proportion of time students spent compared to pharmacists respectively in the 4 activity categories was as follows: patient assessment and care plan development (42.3% vs. 43.2%); pharmacotherapy monitoring (26.9% vs. 31.3%); patient education (4.3% vs. 8.2%) and non-patient specific activities such as continuing education (25.9% vs. 17.3%).

Conclusions  
Pharmacy students and pharmacists spent the majority of their time in patient assessment and pharmacotherapy monitoring. Students spent more time in non-patient specific activities such as continuing education events. Compliance with WLM entry into the database was similar in both groups. This tool helped gain insight into where students spent their time during their rotations. Future research should aim at finding opportunities in pharmacist's activities that students can contribute to.

**Note this poster abstract was presented at the Canadian Society of Hospital Pharmacists Professional Practice Conference on Feb 2, 2016**
Docosahexaenoic acid activates bile acid detoxification in mice

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Background/Aim. Omega-3 fatty acids, such as docosahexaenoic acid (DHA), have been revealed as protecting against bile acid (BA)-induced toxicity. This study aimed at evaluating the effects of a DHA-rich diet on the plasma profile and expression of genes related to BA homeostasis in rodents.

Methods. 3-month old male and female C57BL/6 mice were fed a control (n=5/group/sex) and high DHA diet (0.75g/kg/day) during two (n=5/group/sex) or four weeks (n=6/group/sex). Plasma and hepatic omega-3 levels (DHA, eicosapentaenoic acid), their metabolites (17S-HDHA, 18RS-HEPE, PDX) and plasma concentration of 25BAs were analyzed by LC-MS². The expression of 14 genes coding for proteins involved in BA synthesis (Cyp7a1, Cyp27a1), transport (Mrp2, 3, Ostα, Ostβ) and metabolism (Cyp3a11, Sult2a1), or controlling these processes (Fxr, Shp, Lrh, βKlotho) was analyzed by RT-PCR in the liver, intestine and kidneys. For statistics, ANOVA and Spearman correlation test were applied.

Results. Treatment with DHA reduced the total circulating BAs in mice [5-fold, p<0.0442], including the hydrophobic and toxic BA-conjugates [6-fold, p<0.05]. Feeding high DHA diet resulted in decreased expression of genes regulating BA synthesis and absorption, such as Cyp27a1 [1.3-fold, p<0.001] and Ntcp [1.2-fold, p<0.05], while those coding for hepatic BA metabolism (Cyp3a11 [2.7-fold, p<0.001]) and export (Mrp3 [1.7-fold, p<0.001]) were activated. DHA-rich diet was associated with higher levels of omega-3 and their metabolites in plasma and liver in mice. Their concentrations were negatively correlated with plasma tauro-conjugated BAs (r=−0.43243, p<0.0348). Positive association was found for their hepatic levels, BA hydroxyl-conjugates (r=0.43784, p<0.0416) and the increased gene expression of BA transporters (Mrp3, r=0.4474, p<0.0368) when all samples were analyzed.

Conclusion. Supplementation with DHA promotes BA detoxification in mouse and helps to limit the impact of their accumulation in the liver.
Defining an alternative murine model of cerebral ischemia: focal vasoconstriction via endothelin-1
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Stroke represents one of the leading causes of long-term disability and death in North America. The failure of a number of recent human clinical trials aimed at enhancing stroke therapy have highlighted the importance of developing clearly defined, reproducible models of stroke. Many current animal models of stroke depend upon anatomical impedance of local arterial sources resulting in very large cortical infarct volumes compared with that typically seen in humans, and in substantial injury to sub-cortical structures. These injuries lie in contrast to the presentation of the vast majority of human clinical strokes. Additionally, many of these models exhibit considerable variability in infarct representation due to the stochastic nature of the parent vascular bed even within genetically identical animals.

In order to understand the *in vivo* mechanisms regulating programmed cell death within cortical strokes, and to effectively evaluate potential therapeutic strategies, we must strive to first develop accurate and appropriate *in vivo* models. To this end, we have examined controlled stereotactic infusion of endothelin-1 into the adult mouse cortex as a means to generate transient focal ischemia/reperfusion injury within predefined cortical regions. Use of this approach results in discreet, well-defined infarcts which are limited to the cortex. Analysis of cellular ultrastructure in these infarct regions demonstrate features of programmed cell death that are consistent with apoptosis. This approach additionally exhibit reduced variability and morbidity compared to traditional models. This system is in turn currently being utilized to decipher PCD signaling interactions in control and genetically modified murine mutants.

(Presented for Society for Neuroscience Conference on October 21, 2015.)
AFPC-17

Chronic Early Life Social Isolation Affects Expression Of TrkB and NMDA receptor proteins in a sex-specific manner

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Exposing mammals to social isolation in early life can affect brain development and lead to changes in adult behavior. For example, the social isolation of rats during adolescence induces changes reflective of neuropsychological disorders, such as depression; however, the molecular mechanism(s) underlying these outcomes have not yet been elucidated. The purpose of this study was to analyze the effect of social isolation on the expression of two proteins that are implicated in neuroplasticity and that may be related to the observed behavioural effects of social isolation: the TrkB receptor and the NR2B subunit of the NMDA receptor. At post-natal day 21, male and female Sprague-Dawley rats were randomly separated into group or isolated housing conditions. After seven weeks, the animals were sacrificed and the hippocampus (HP) and pre-frontal cortex (PFC), which are associated with memory consolidation and the moderation of social behavior, respectively, were extracted, homogenized, and analyzed with immunoblotting. A significant increase in NR2B subunit expression was observed only in the PFC of male rats. For the TrkB receptor, an increase was observed in both the HP and the PFC of male rats, but only in the HP of female rats. Our preliminary data suggest that social isolation induces changes in receptor expression in a region and sex-specific manner, and will form the basis for subsequent work to improve our understanding of the neurodevelopmental effects of early-life stress.

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AFPC-18

Jadomycins induce DNA damage and caspase-dependent apoptosis in human MDA-MB-231 breast cancer cells

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Objectives: Jadomycins are natural products biosynthesized by the soil bacteria *Streptomyces venezuelae*. Previously we showed that jadomycins kill drug-sensitive and ABC-transporter overexpressing multidrug-resistant breast cancer cells *in vitro* primarily via the generation of intracellular reactive-oxygen species (ROS). The present study tests the hypothesis that the jadomycin-mediated ROS increase leads to DNA damage and apoptotic cell death in breast cancer cells *in vitro*.

Methods: Human MDA-MB-231 breast cancer cells were treated with jadomycins B, S, or F for 24-36 hours. Western blotting for phosphorylated histone H2AX at Ser139 (γH2AX) in nuclear fractions was used as a measure of DNA double strand breaks. Annexin-V-FLUOS and propidium iodide staining and flow cytometric analysis was used to measure cellular apoptosis. A caspase 3/7-activity assay was used to determine if jadomycins induce caspase-dependent apoptosis. The apoptosis and caspase 3/7 assays were conducted in the presence and absence of the pan-caspase inhibitor Z-VAD(OMe).

Results: γH2AX was significantly increased (3.6-5.3 fold) by 24-hour jadomycin B, S and F treatments compared to the vehicle control. After 36 hours, the number of MDA-MB-231 cells in early apoptosis was significantly higher in jadomycin B, S and F-treated (18.7-22.7%) versus vehicle control (9.7%) cells. Similarly, caspase 3/7 activities were increased (1.7-5.9 fold) following 36-hour treatments with jadomycin B, S and F compared to the vehicle control. The induction of early apoptosis and caspase 3/7 activities in MDA-MB-231 cells was partially reversed by Z-VAD(OMe).

Conclusions: Jadomycins B, S, and F induce DNA double strand breaks in MDA-MB-231 breast cancer cells resulting in caspase-dependent apoptosis.
The interprofessional medication reconciliation program: a quantitative evaluation

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Medication reconciliation has been shown to reduce medication errors, improve patient safety, and decrease healthcare costs associated with adverse drug events. An innovative interprofessional education program at the University of British Columbia was developed to enhance the competency of undergraduate healthcare students and recently graduated pharmacists when conducting medication reconciliation.

Objective: to provide a quality assurance evaluation of the initiative, utilizing quantitative analysis of the post-event participant feedback survey.

Methods: Healthcare students in pharmacy, medicine and nursing (n = 562) and recently graduated pharmacists/pharmacy residents (n = 18) participated in the three hour program, which included online pre-readings; an introductory live presentation; a small group multidisciplinary session; and a large group debrief. Post-event, participants were asked to complete a 20 question survey. A five point Likert Scale was used for 14 questions, and “agree” and “strongly agree” answers were combined. The quantitative data collected were summarized using descriptive statistics.

Results: The survey was completed by 355 participants (response rate 61.2%). Overall, the participants found that the activity was relevant to their program (90.9%); the small-group format was effective for collaborative learning (90.1%); this was a valuable learning opportunity (84.8%); they gained a better understanding of the importance of medication reconciliation for patient safety (83.9%); the debrief helped consolidate learning (83.0%); and they further developed their skills in the use of evidence-based medicine information (62.8%) and communication technology (46.5%).

Conclusions: This quantitative survey analysis suggests that medication reconciliation program participants found the activity to be highly relevant to their program and the small group format effective for collaborative learning. Low scores for development of evidence-based medicine skills and communication technology are appropriate, as these objectives were not incorporated into this program. Continued development of the program through revisions of program features will look to further enhance student engagement and expand learning opportunities.

This poster has been presented at the University of British Columbia Faculty of Pharmaceutical Sciences 2015 Summer Student Poster Competition on September 8, 2015.
The interprofessional medication reconciliation program: a qualitative analysis
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Medication reconciliation is a formal process where clinicians are involved in ensuring safe and effective transitions of care by verifying medication history and clarifying discrepancies. At the University of British Columbia, a novel interprofessional medication reconciliation training event was conducted with 580 senior pharmacy, nursing and medical undergraduate students and recently graduated pharmacists.

Objective: To gain an understanding of the participant’s attitudes regarding their experiences during the medication reconciliation event.

Methods: This qualitative study analyzed one-on-one interviews with a sub-set of event participants, and three short answer questions on the post-event survey. Interview subjects were recruited from profession-specific randomized lists of participants. Twenty-eight percent of pharmacy and medical students, and 100% of nursing students and practicing pharmacists were invited to participate. The interview consisted of eight open-ended questions with exploratory follow-up probes around participant’s experiences working in the interprofessional group, medication reconciliation skill-building, the strengths of the program and recommendations for future improvements. The 15 minute interviews (in person, telephone, or Skype audio-only) were conducted six months post-event by two research assistants, and were digitally recorded, transcribed and subjected to thematic analysis across and within healthcare professions. Separate thematic analysis was conducted on the short answer questions on the 355 post-event surveys submitted.

Results: Interviews were conducted with 38/580 (6.6%) event participants. Common positive themes were the opportunity to experience a meaningful interprofessional collaboration in a realistic team setting and the ability to clarify their role on a healthcare team. Suggested areas for program improvement included having at least one member of each profession in each small group session, increasing nursing engagement in the event, and exploring medication reconciliation at non-hospital transitions of care.

Conclusions: This study demonstrated that exposure to medication reconciliation in a realistic interprofessional collaborative setting can positively impact participants understanding of the benefits and challenges of this patient safety process at transitions of care. Future steps include expanding the engagement of nursing professionals and practicing pharmacists in the event.

This poster has been presented at the University of British Columbia Faculty of Pharmaceutical Sciences 2015 Summer Student Poster Competition on September 8, 2015.
A Model of Innovative Integration in the Doctor of Pharmacy for Practicing Pharmacists Program

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Background: Curriculum integration is utilized in the Doctor of Pharmacy for Practicing Pharmacists program at the Faculty of Pharmacy and Pharmaceutical Sciences at the University of Alberta to align pharmaceutical sciences with pharmacy practice, connect patient assessment skills with pharmacotherapeutic knowledge, and incorporate foundational concepts of group learning and interprofessional team care.

Objective: To describe curriculum integration across multiple courses in the Doctor of Pharmacy for Practicing Pharmacists program.

Methods: The teaching team set out to integrate various core components of the curriculum through purposeful planning at each stage of development. This occurred through frequent face-to-face meetings to design and modify course content between course coordinators and key contributors.

Results: The Doctor of Pharmacy for Practicing Pharmacists program positioned the ‘medication therapy expert’ role of pharmacists as the touchstone of the curriculum integration model. Integration of knowledge and skills occurred across pharmacy disciplines, within individual courses and connecting all courses in the program. The integration model and three integration approaches used in the Advanced Pharmacotherapy course are highlighted. First, foundational knowledge of pharmacogenomic principles was integrated with pharmacotherapy case studies. Second, students applied patient assessment skills in mental health to pharmacotherapy topics and discussions. Finally, students engaged in experiential and theoretical learning about groups and teams. Feedback obtained through student focus groups, student course evaluations, and teaching team assessments point to the benefits of curriculum integration on students’ and faculty members’ experiences with the program.

Conclusion: Integration of advanced pharmacotherapy with pharmaceutical sciences, patient assessment skills, and foundational concepts of interprofessional care added depth and breadth to the students’ knowledge, as well as group learning and critical thinking skills.

Word count: 309
Advancing and evaluating the Drug Information Resources (DIR) website
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Objectives:
To elucidate the online experience and needs of the users of the Dalhousie University College of Pharmacy’s Drug Information Resources (DIR) website through an online user questionnaire and focus group sessions.

Methods:
An online questionnaire was developed with the aid of Google Analytics data and a literature review. The questionnaire underwent content validity testing and test-retest reliability. The online questionnaire was deployed on the DIR website from October 15, 2014 to May 7, 2015. Excel XLSTAT was used for descriptive statistics. Responses to open-ended questions were used to inform the questions of the focus group sessions. Three semi-structured focus group sessions were held in the fall of 2015 with various DIR user groups – clinicians, faculty and students.

Results:
A total of 114 questionnaires were completed. The majority of respondents (93%) were from Canada and most (89%) were students. DIR was used daily by 63% of respondents. The majority of respondents (76%) indicated they found the information they needed using DIR and 33% indicated the information found on the site resulted in a change or recommendation to change a patient’s medication. Over 70% of respondents found the information clearly organized on the website and the topic pages well-designed with 87% indicating that they would use DIR in the future. Areas for improvement included the suggestion to add more topics in the clinical practice guideline section and a mobile platform. Three focus groups were held with a total of 25 participants. Focus group feedback was positive with most participants indicating daily use of DIR for both school and clinical practice.

Conclusions:
Overall, questionnaire respondents and focus group attendees found the DIR website to be a valuable resource for their educational and professional needs. The feedback provided will be used to continue to improve and evolve DIR to meet its current users’ needs while continuing to attract new users and remain a relevant and trusted provider of current, up-to-date health information.
Title: A mixed methods evaluation of a medication assessment clinic located within a pharmacy school

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Objectives: The Medication Assessment Centre (MAC) was launched in 2011 by the College of Pharmacy and Nutrition, University of Saskatchewan. The primary purposes of the MAC are to: (1) provide access to pharmacist-led medication assessments for complex patients who live anywhere in Saskatchewan and who have trouble accessing the service elsewhere; and, (2) create a faculty supervised experiential education program for pharmacy students, located directly on campus. The objective of this research project was to determine if this new student training clinic is valuable to patients and physicians.

Methods: Convergent mixed methods design. A retrospective chart review was performed that included all patients who attended at least one appointment at the MAC between March 2014 and July 2015 to measure: number/description of patients; referral sources; and numbers/severity of drug therapy problems (DTPs) identified by the MAC. An experience survey was also mailed to all patients and physicians who utilized the MAC between April and October 2015.

Results: 173 patients were included in the chart review. Patients came to the MAC via either a health professional referral (65.9%) or self-referral (34.1%). Patient mean age was 64.8, with a mean of 6.5 diagnoses and 13.8 medications each. The MAC identified 6.2 DTPs per patient (31.1% moderate severity using adapted Schneider criteria). Surveys were mailed to 121 patients and 81 physicians (response rate 66.9% and 43.2% respectively). Almost 95% of both groups described their overall experience with the MAC as ‘very satisfied’ or ‘satisfied’ and similar proportions reported that they would refer the MAC to friends/colleagues. 59.2% of patients and 88.6% of physicians felt MAC improved patient health outcomes. 98.8% of patients felt they were treated with dignity and respect and that the pharmacist listened to their concerns. Finally, 97.5% of patients felt they were involved in decisions that were made about their health.

Conclusion: The MAC appears to be a valuable resource to both patients and physicians.
Title: Development of a pharmacist-run Medication Therapy Services Clinic

Authors: Dr Deborah V. Kelly B.Sc. (Pharm), ACPR, Pharm.D, FCSHP, AAHIVP; A. Nicole Pittman B.Sc., M.Sc. (Med), School of Pharmacy, Memorial University of Newfoundland

Objectives: It is important to identify innovative ways to make pharmacists’ expertise in medication therapy management more accessible to those at highest risk of drug related problems, and measure the impact of these services on health outcomes and sustainability. Additionally, as entry to practice doctor of pharmacy programs are implemented, Schools of Pharmacy are challenged to find more clinical placements for students. In response, Memorial University established a pharmacist-run Medication Therapy Services (MTS) Clinic. We describe the MTS Clinic model, development process, and evaluation plan.

Methods: To ensure clinic feasibility, usefulness and acceptance, a series of consultations were held with stakeholders in academia, pharmacy, medicine, and government. Feedback was incorporated iteratively throughout planning and implementation. Similar pharmacist-run clinics in SK and BC were also consulted. A business plan was developed, including a comprehensive communications strategy, promotional plan, and 5 year budget. Formative and summative evaluations are planned to assess the impact of the medication therapy assessment service and enable continuous quality improvement.

Results: Stakeholder consultations strongly supported the principle of planned evaluations of the impact of clinic services on health outcomes and economics, and several partnerships were identified. The clinic model was developed to address 3 strategic priorities:

1. Provision of referral-based, pharmacist consultations to patients with complex medication-related needs, in collaboration with primary care providers;
2. Provision of excellent educational experiences for pharmacy students, and mentorship to practicing pharmacists; and
3. Creation of an incubation centre to study priority research questions around pharmacy practice, health outcomes and health policy, and generate evidence to inform policy development and decision making around the value proposition of pharmacy services and expanded scope.

Conclusions: The commitment to planned evaluation of all clinic services at the outset of program planning and delivery makes the MTS Clinic unique, and has resulted in support from all stakeholders. The MTS Clinic provides an environment to build research capacity, improve learning and optimize health outcomes.
Classic labs for a new program: development of integrated pathophysiology activities for the Entry-to-Practice PharmD curriculum

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Introduction: Integrated activities combining multi-disciplinary aspects of Pharmacy can greatly facilitate student comprehension. By adapting classical physiology laboratory activities we developed low cost, engaging, and easy-to-deliver “wet lab” activities covering core pathophysiology concepts. These were delivered as part of the pathophysiology Integrated Activities (IA) in the 1st Year UBC Entry-to-Practice (E2P) PharmD program.

Methods: Experiments were designed to provide hands-on experience in qualitative and quantitative analysis in two Medication Management Modules (PHRM111); Intro to Infectious Disease, and Fluids and Electrolytes. Students challenged a laboratory E.coli strain using bacteriostatic and bacteriocidal antibiotics to identify an “unknown” antibiotic. Principles of osmolality, osmolarity, and electrolytes were taught through two activities: 1) voltmeter measurements of electrolytic conductance in commercial, therapeutic, and homemade oral rehydration therapies, and 2) the Naked Egg, where deshelled chicken eggs were subjected to hyper- or hypotonic solutions of identical osmolalities.

Results: Optimization focused on 1) low cost; 2) ease of preparation; 3) large-scale implementation; 4) reproducibility; and 5) student engagement via questionnaire. Key decision points in the Infectious Disease IA included selection of five antibiotics based on mechanism of action, prevalence in clinical use, and effective concentrations yielding distinct and measureable zones of inhibition. The Fluids and Electrolytes IA was optimized using Faculty volunteers to determine 1) effectiveness of the voltmeter electrode, 2) the number of solutions testable per station, and 3) the predictions and observations made by experienced (pharmacists) and naïve (administrative staff). The Naked Egg required optimization to 1) determine conditions that removed the shell while leaving the membrane intact, without denaturing the albumin, and 2) identify hyper- and hypotonic solutions to demonstrate qualitative and quantitative differences in the shrinking and swelling of the deshelled eggs.

Conclusion: We developed simplified laboratory experiments that were easily integrated with pharmacology, therapeutics, and physical assessment in short activities, enhancing learning outcomes and increasing student engagement.
Bandana Science: Peers in the preparation for and teaching of pathophysiology in PharmD entry to practice integrated activities
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Introduction: A pilot program using current BSc, BSc Pharm, PharmD, and Pharm Sci graduate students was implemented in the Klassen Lab as a team “Bandana Science” assistants in 2015-2016. The highlight of the program is how a team of student facilitors are able to assist in the bench science preparation and subsequent delivery of novel, science-based integrated activities (IA). These IAs combine simplified biology wet laboratory experiments with topics in pharmacology, therapeutics, and physical assessment in a single activity lasting <90 minutes; resulting in enhanced student learning and engagement with the material.

Methods: Our team of student assistants worked as a group to 1) prepare demonstration and activity materials (e.g. prepare bacteria growth media) in an active research lab setting, for the pathophysiology Integrated Activities in the 1st Year Entry to Practice Program at UBC; and 2) acted as student demonstrators, and peer teachers in the delivery of the Integrated Activities. Here students were introduced to the concept of peer teaching, and were actively involved in the delivery of pathophysiological concepts in an interdisciplinary Entry-to-Practice PharmD (E2P PharmD) curriculum.

Results: This program enabled current BSc Pharm students to simultaneously experience basic laboratory science, assist in the development of new Integrated Activities, and obtain teaching experience while reinforcing their own understanding of the taught concepts. They were also able to interact and teach their 1st-year E2P PharmD colleagues, allowing the new students to benefit from their experience in the program.

Conclusions: The Bandana Scientists are obtaining cross-disciplinary training directly related to the AFPC educational outcomes as 1) communicators, 2) collaborators and 3) scholars while gaining the experience, confidence and knowledge required to become inter-professional leaders. Current students in the E2P PharmD program are already undertaking training to become future Bandana Scientists demonstrating both continuing interest in, and the success of our program.
Point prevalence survey of antimicrobial use at the Queen Elizabeth II Health Sciences Centre in Halifax, Nova Scotia

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Objectives:

Point prevalence surveys (PPS) have been used internationally to characterize the use of antimicrobial agents within and across institutions and are also useful in identification of targets for quality improvement and evaluation of antimicrobial stewardship programs (ASP) within an institution. The Queen Elizabeth Health Sciences Centre (QEII) in Halifax, Nova Scotia is a 953 bed teaching hospital, with 760 acute care and 193 long term care beds. The objective of this survey was to determine the prevalence and characterize the use of antimicrobials at the QEII and to determine adherence to select local guidelines.

Methods:

A PPS was completed through an audit of inpatient charts to identify all patients prescribed a systemic antimicrobial agent. Patients admitted to acute care units for at least 24 hours by 0800 on the day of the audit were included. Prevalence was determined by calculating the proportion of admitted patients who were on systemic antimicrobial agents. Collected data included patient demographics, antimicrobial drug and Anatomical Therapeutic Chemical classification, route, dose, indication, intended duration, and adherence to local guidelines.

Results:

A total of 519 charts were reviewed and considered for inclusion between June 22nd and July 22nd, 2015. The prevalence of antimicrobial use was 35.6% (185/519). The most common diagnostic site was for infections of the respiratory tract (12.6%, 24/222). Cefazolin was the most commonly prescribed antimicrobial agent (13.8%, 38/275), followed by metronidazole (9.8%, 27/275) and piperacillin/tazobactam (9.5%, 26/275). Adherence to local guidelines was 32% (8/25).

Conclusions:

This survey provides valuable insight into antimicrobial utilization locally, which can be compared with other hospitals nationally and internationally. Results can be used to tailor ASP in order to promote judicious use of antimicrobials.

This work was previously presented at the Dalhousie College of Pharmacy Research Event on November 17th, 2015.
Survey of knowledge and attitude regarding HPV infection, vaccine and testing

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**Objective:** Human papillomavirus (HPV) is the cause of all cases of cervical cancer and a sizable percentage of anogenital and oropharyngeal malignancies. Despite proven effectiveness, publicly funded vaccine uptake is still low in most Canadian provinces. This study assessed knowledge and attitude regarding HPV infection, vaccine and testing in two samples of the general population: an inner city health clinic and a pharmacy in a diverse neighbourhood in Winnipeg. Women’s opinions about self-sampling were also recorded. Ultimate objective was to inform the development of effective information material regarding HPV.

**Methods:** An anonymous questionnaire of 23 questions assessing demographics, knowledge and attitude was designed to be completed by individuals ≥18 years of age. Data were analyzed by descriptive statistics.

**Results:** A high response rate (53\%) was obtained. Most of respondents were female (70\%). Differences were observed between responders attending the pharmacy compared to those attending the health clinic: 47\% and 57\% were below the age of 40, respectively; more than 80\% of responders in the pharmacy had heard of HPV compared to only 48\% of those attending the clinic; 54\% of the pharmacy group believed that HPV was the main cause of cervical cancer compared to only 25\% in the clinic group; 78\% of the pharmacy group believed that vaccines were generally safe and effective compared to 54\% in the clinic group. The pharmacy sample had a significantly higher level of education (47\% university degree). Overall, more than 30\% of women would use self-sampling for HPV testing regularly, if available, but approximately 70\% would use it regularly or on occasion.

**Conclusion:** This study indicates that knowledge and attitude toward HPV can vary considerably in different populations. Misinformation about HPV is high in some segments of the population. A baseline of public knowledge can help address gaps and create more effectively targeted information material for the public.
Pharmacy student perceptions of a medication assessment clinic located within a pharmacy school

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Objectives
In 2011 the College of Pharmacy and Nutrition (University of Saskatchewan) opened a patient care clinic on campus known as the Medication Assessment Centre (MAC). The MAC offers a faculty supervised experiential training opportunity for pharmacy students in all years of study. The objective of this study was to explore the experiences of MAC student volunteers.

Methods
The perspectives of MAC students who had volunteered at least once between January and November 2015 were gathered through focus groups. Students were assigned to one of five focus groups based on their year of study and the amount of time they had spent at the MAC. A semi-structured focus group guide was developed and used to gather the students’ perceptions on their experiences and learning as a result of volunteering at the MAC. The focus groups were recorded and anonymously transcribed. The transcripts were analyzed by three researchers using thematic analysis. The final themes were approved by the student participants and then reviewed by an additional researcher.

Results
A total of 29 students participated in this study. Students generally felt that volunteering at the MAC was a valuable experience. Students perceived that the MAC had a positive effect on their learning and competence in the following areas: (1) clinical skills (patient interviewing and communication skills), (2) overall confidence, (3) clinical and therapeutic knowledge, and (4) professional socialization. The aspects of the MAC that students liked most were: (1) structure of the learning experience, (2) perceived benefit to the patient, and (3) authentic patient care environment. Students identified several challenges to participating: (1) sign up process, (2) quality of the technology, (3) use of remote observation, (4) limited student knowledge, (5) clarity of student role, and (6) student initial confidence.

Conclusions
MAC student volunteers feel that the MAC is a valuable learning experience that has a positive effect on their learning and competence. Further research should focus on confirming this finding using different measurement strategies.
Docetaxel Loaded PLGA Nanoparticles for Intravenous Application: Pharmacokinetics and Bio-distribution profile

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Study Objectives: Docetaxel is a highly potent anticancer agent being used in a wide spectrum of cancer types. There are important matters of concern regarding drug’s pharmacokinetics related to the conventional formulation. Poly (lactide-co-glycolide) (PLGA) a polymer with biocompatible/biodegradable properties whose application in human has been approved by United States Food and Drug Administration (FDA) gives polymeric nanoparticles with unique drug delivery characteristics. Application of PLGA nanoparticles as Intravenous (IV) sustained-release delivery vehicles for docetaxel is believed to modify pharmacokinetics, bio-distribution, and pharmacotherapy of the drug in cancer patients. Surface-modification of PLGA nanoparticles with poly (ethylene glycol) (PEG) on the other hand confers neutral and hydrophilic characteristic to nanoparticles. This decreases biological interaction of nanoparticles and ultimately prolongs nanoparticle systemic circulation. The objective of the study is to determine how delivery of docetaxel by PLGA and PLGA-PEG nanoparticles modifies the pharmacokinetics and bio-distribution profile of docetaxel compared to free solution of the medication.

Methods: In this study, an emulsion solvent evaporation technique was used to fabricate docetaxel-loaded PLGA and PLGA-PEG nanoparticle formulations. Prepared nanoparticles were characterized in terms of physicochemical characteristics. Nanoparticle formulations were then used in pharmacokinetic and bio-distribution experiments. Experiments were done by IV-injecting docetaxel-loaded PLGA nanoparticles, docetaxel-loaded PLGA-PEG nanoparticles, and docetaxel’s free solution to mice. Then, distribution profile of docetaxel to blood and various mouse organs was followed up to 24 hours and compared between three study groups.

Results: Injected PLGA and PLGA-PEG nanoparticles had average diameters of 123.6±9.5 nm and 186.7±2.9 nm respectively, and negative zeta potential (-28.3±1.2 mV and -25.9±3.5 mV, respectively). Nanoparticle formulations exhibited a biphasic in vitro drug release behaviour giving rise to a burst release during the first 24 hours followed by sustained drug liberation. Docetaxel from nanoparticle formulations demonstrated a gradual decline in levels in mouse serum, liver, lung, kidney, and heart and were detectable after 24 hours compared to free solution of the drug.

Conclusion: Pharmacokinetics and bio-distribution profile of docetaxel was modified by nanoparticle formulations. The relationship between nanoparticles’ characteristics and these modifications can now be established.
An observational study to assess the accuracy of carboplatin area under the concentration-time curve in oncology patients with standardized creatinine measurement and modern formulas for renal function estimation

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Background and objectives The aim of this study was to compare concordance between measured carboplatin area under the plasma concentration-time curve (AUC) and predicted AUC obtained with Calvert formula and standardized creatinine measurement. Methods In this prospective observational study, adult cancer patients receiving intravenous carboplatin underwent blood sampling for pharmacokinetic analysis and carboplatin AUC was calculated with non-compartmental (NCA) analysis. Carboplatin doses were calculated with Calvert formula using Cockcroft-Gault (CG) equation with actual body weight (ABW) and adjusted ideal body weight (AIBW) if body mass index (BMI) was equal or over 27 kg/m² and target AUC. Other formulas for GFR estimation were also tested for bias and precision of carboplatin AUC prediction. Predicted AUC using a limited sampling method measuring concentration of carboplatin at 0,25 and 2,75 h after the end of the infusion was also compared to NCA-AUC.

Results Eleven subjects (aged 28-78 years) participated in this study. Target carboplatin AUC for these subjects ranged from 4 to 6 mg*min/mL. Difference between NCA measured AUC and target AUC was not statistically significant (mean difference = -0.4 mg*min/mL, 95% CI, -1.177 to 0.378). The limited sampling method showed limited bias and acceptable precision.

Conclusion This study shows that for carboplatin dosing calculation, the CG equation is still an accurate way to estimate renal function in the Calvert formula with the introduction of standardized creatinine measurement.

Key words: carboplatin, area under the plasma concentration-time curve, Calvert formula

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Novel missense mutations in SCN1B as a cause of pediatric epilepsy.

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Abstract:

BACKGROUND: Voltage gated sodium channels (Nav) are composed of a pore-forming α-subunit and one or more regulatory β-subunits. A known cause of excitability disorders, mutations in the β1-subunit (Navβ1) result in a spectrum of pediatric epilepsies confounding molecular diagnostics. Navβ1 mutations for Generalized Epilepsy with Febrile Seizures Plus (GEFS+) and Dravet’s Syndrome, including the well characterized C121W amino acid substitution known to decreases Nav sensitivity to anticonvulsants, are located in the extracellular domain.

METHODS and RESULTS: A bioinformatics analysis of the known human variants published in the 1000 Genomes, EVS and ExACT servers was performed for the region 20 amino acid upstream and downstream form C121W. Variants N114S and N135K were determined to be potentially deleterious mutations, based on their in silico Polyphen, SIFT, GERP, and Grantham scores. The full-length rat Scn1b gene, and the C121W mutation were subcloned into our proprietary ion channel expression vector, pICDNA. The I106, V138I, and D153N extracellular epilepsy mutations, as well as the population mutations N114S and N135K, were generated via overlapping extension PCR site directed mutagenesis. Fortuitous PCR-induced mutations in the region of interest were also generated; R152X, Q102R, K183R, E56G and a 12 amino acid C-terminal insertion, all of which were sequenced validated.

CONCLUSIONS and FUTURE DIRECTIONS: Future directions include co-expressing rScn1b constructs into HEK 293 cells with Nav1.1, 1.2 and 1.5 α-subunits for trafficking analysis and patch-clamp electrophysiological assays with and without anticonvulants phenytoin, lamotrigine and carbamazepine. Characterization of SCN1B mutations may increase understanding of epilepsy pathophysiology and the role of mutations in pharmaco-resistant epilepsy, which may impact pharmaceutical target identification.
The Impact of Standardized Patients on First Year Students in an Entry-to-Practice PharmD Program at the University of British Columbia.

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Study Objective
Standardized patients (SPs) were used in Program Year 1 (PY1) of a new Entry-to-Practice (E2P) PharmD program. Students were given the opportunity to counsel on a prescription medication and respond to patient questions and concerns. They received feedback from a SP and a pharmacist facilitator. In the previous E2P BSc(Pharm) program, counselling with SPs was limited to third year students. The objective of this study is to evaluate the impact of the SP program on PY1 students.

Methods
An on-line survey was sent to 212 students currently registered in PY1 to assess the SP program’s impact on:

1. improving students’ ability to counsel and communicate
2. applying pharmacy knowledge
3. simulating realistic situations in community pharmacy
4. increasing student confidence in patient counseling and communication in preparation for upcoming experiential rotations
5. providing a safe learning environment where mistakes will not pose harm to real patients

Summary of Results
Respondents to the survey included 164/212 students. Of PY1 respondents, 92% indicated that the interaction with SPs was valuable and helped improve their counselling and communication skills. 89% indicated that interacting with SPs provided an opportunity to apply their pharmacy knowledge. 84% indicated that SP interactions were realistic to situations encountered in community pharmacies. 85% indicated that interacting with SPs improved their confidence to communicate with real patients for upcoming clerkships. 72% indicated that the SP activity provided an environment where mistakes could be made without harming real patients.

Statement of Conclusions
Based on student feedback, the SP program had a positive impact on students’ ability to counsel and communicate. The experience fostered their ability to apply pharmacy knowledge and also improved their confidence level. It also simulated authentic pharmacy scenarios within a safe learning environment. Next steps include expansion of the SP program into PY2 and PY3 of the E2P PharmD program.
Parliamentarians in the classroom: learning ethics and pharmacy practice issues through debates.

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**Background:** To implement and evaluate debate as a curricular platform for teaching ethical and professional issues in First Professional Degree Programs in Pharmacy.

**Methods:** Utilizing a formal policy debate format, 48 third-year pharmacy students were assigned into teams to debate on a series of assigned ethical and pharmacy practice topics. Debate teams were assessed by peers and faculty judges. A survey consisted of 15 Likert scale-based statement questions, designed to address 4 of the 7 AFPC educational outcomes was administered to the students after the debate activity. Questions were pooled and tested for difference in proportion between favourable (agree or strongly agree) and unfavourable (disagree or strongly disagree) responses (α=0.05).

**Results:** Forty-five completed survey response were received. Majority of the students indicated positive experience with the debate activity, with a significantly higher proportion reporting favourable educational outcomes under the roles of communicator (49% vs 27%, \(p=0.04\)), collaborator (93% vs 0%, \(p<0.0001\)), advocate (100% vs 0%, \(p<0.0001\)) and scholar (82% vs 4%, \(p<0.0001\)). Age, sex and previous debate experience did not predict student response. Overall, 93% found the debates useful for exploring various ethical and practice issues relevant to the pharmacy profession, and 82% indicated that the debates changed their opinion of some, or several of the issues presented. Most students expressed preference for the debate format over conventional lecture based learning, and found the workload for debate preparation to be reasonable (71% and 73%, respectively).

**Conclusion:** Students perceived formal debates as a stimulating activity to explore complex ethical and practice issues facing the pharmacy profession as well as a useful tool to develop core skills such as critical thinking, communication, teamwork and advocacy.
Enhancing quality by using instruction on qualitative methods as a course evaluation tool

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Background: Manitoba has a single 3rd year course in Principles of Scientific Literature Evaluation which covers all required biostatistics, research methodology and critical appraisal. Qualitative literature is covered in a single lecture on the last day of the term. This study explored the use of informal qualitative techniques as a method of gathering feedback while simultaneous exposing students to qualitative research.

Methods: Students were asked the following open ended questions:
#1. Principles of Scientific Literature Evaluation is …..
#2. Scientific Literature Evaluation would be better if…..
In real time, the anonymous answers were grouped into themes as a class exercise as qualitative research methods were introduced.

Results: Overall (#1) this “perception altering” course fostered “a unique skillset [to help one] make better or the best clinical decision” through “critically thinking about studies… and assessing the quality of evidence to therapies”. While many found the course was “useful, valuable, important and fun”, a few suggested it more applicable for “clinical pharmacists who work in a hospital setting”, and not as “relevant to most people who go into community practice.”

When asked how the course would be better (#2), time emerged as the dominant theme in three distinct ways. There was consensus that more time spent on “paper analysis” and less on statistics. Many suggested “statistics as a prerequisite.” Students also felt that time in course was too concentrated with “3 days of classes back to back” with not enough “time to wrap [their] head around the concepts… and apply [the skills] learned”. Lastly, timing of the course in the program was discussed with suggestions to have the course “earlier in the program”, or spread out over more time so they can “get more practice using the skills”.

Conclusions: Introducing qualitative research while gathering evaluative course information is an efficient way to gather information to guide future quality initiatives. Suggestions for more time, earlier time and a statistic prerequisite have been incorporating into PharmD planning.
New skills lab component for pharmacy students: ordering and interpreting laboratory tests

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Background: As of January 1, 2014, the province of Manitoba passed new pharmaceutical regulations that allow pharmacists to order laboratory values for their patients. Our objective is to develop, implement and evaluate the integration of a teaching module on laboratory tests into the third-year pharmacy curriculum.

Methods: A module for “Ordering and Interpreting Lab Values” consisted of 7 online didactic modules and 5 case-based in-class discussions incorporated over the fall and winter terms of the Pharmacy Skills Laboratory 3 (PHRM3110) course, for 52 third-year pharmacy students during the 2014/15 academic year at the College of Pharmacy, University of Manitoba. Student t-test comparing the final course grades for PHRM3110 of the 2014/15 and 2013/14 cohorts was conducted to assess the impact of the new laboratory test module on students’ clinical skills. Simple linear regression was also used to examine other predictors for the students’ performance in the course. All statistical analyses were run with $\alpha=0.05$.

Results: Forty-eight and 52 students were included in the 2013/14 and 2014/15 cohorts, respectively. Final PHRM3110 course grades for the 2014/15 cohort was statistically significantly higher than the previous cohort year, with a mean of 77.1% vs 74.2% ($p=0.001$). The grades remained significantly higher after adjusting for the students’ performance in their second and third year clinical therapeutics courses, both of which were also found to influence their PHRM3110 grades. Gender was not shown to be an important predictor of students’ performance. Secondary analysis showed that the 2014/15 cohort did not achieve higher grades in their clinical therapeutics course.

Conclusion: The integration of a laboratory test ordering module into an undergraduate pharmacy curriculum further develops the competency of pharmacy students in preparing for an advanced practice upon graduation.
The impact of practical skills instruction and application in improving student confidence to engage in point of care INR monitoring and management.
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Study Objective
To evaluate the effect of an online activity, focused on the practical aspects and application of Point of Care (PoC) INR monitoring, in improving student confidence in the provision of this service.

Methods
A survey was administered before and after an activity about the practical aspects of PoC INR monitoring. The study involved 212 students in the 3rd-year pharmacy skills course enrolled in the Entry-to-Practice B.Sc Pharm program. Participants already received education on the pharmacology and therapeutics of warfarin and anticoagulation in other courses. The activity focused on practical information about the devices and references used to measure and monitor INR in non-institutionalized settings. Students viewed videos, received electronic versions of relevant guidelines, and completed online formative assessments to validate learning. A focus was placed on the operation of several INR monitoring devices, discussion about various clinical guidelines, and utilization of online and paper based dosing nomograms. Student learning was reinforced through formative assessment with the provision of detailed feedback on incorrect responses.

Summary of Results
Respondents to the survey included 211 of 212 Year 3 students. Students reported high levels of engagement and interest in the provision of PoC INR monitoring and management. 95% of students agreed that anticoagulation monitoring and management was an appropriate role for a community pharmacist and that they would also like to incorporate this service into their future practice. Students did not agree with survey questions related to preparedness and confidence in their ability to provide these services. Only 21% of students felt they could use the equipment, 44% felt comfortable with the resources, and 27% were comfortable adjusting doses. After the activity these numbers rose to 89%, 91%, and 82% respectively.

Statement of Conclusions
The results validate the importance of practical skills instruction and application in empowering students to embrace an expanded scope of practice.
AFPC

Designing, Testing and Implementing a Standard Assessment Tool for Field-Based Pharmacy Training

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Objective:
To design, test and implement a standard assessment tool for field-based pharmacy training to be used by pharmacy schools, hospital residency programs and the provincial licensing body in Ontario.

Methods:
Representatives from Ontario training programs designed a competency-based assessment tool based on standards from the Association of Faculties of Pharmacy of Canada 2010 Educational Outcomes, National Association of Pharmacy Regulatory Authorities – Entry to Practice Competencies for Pharmacists and Canadian Pharmacy Residency Board Accreditation Standards. The SOLO taxonomy served as the anchor for the 5-point Likert scale. A companion glossary contains key definitions and support materials for preceptors. Initial feedback regarding assessment tool practicality and design was sought from preceptors, university faculty, and residency coordinators. Face and content validity testing was conducted using focus groups of preceptors and learners and mapping out assessment domains against national standards respectively. Preceptor training programs delivered as live workshops or on-line modules were implemented to introduce the tool.

Results:
The assessment tool consists of competency domains of patient care, communication and education, professionalism, professional collaboration and practice management. The tool addressed all required national competencies. Feedback from stakeholders and focus group members confirmed the usability and face validity of the tool. The assessment tool length, Likert scale and inclusion of a global rating scale were acceptable to respondents. Areas for improvement included: descriptors that assessed multiple items, sections with unclear terminology, and incorporation of more examples in the glossary. After implementing the preceptor training program, components that required further clarification were competency-based assessment, guidance terms and technical aspects in the practice management domain.

Conclusions:
A standard assessment tool for field-based pharmacy training will harmonize preceptor documentation of learner performance across provincial training programs. The implementation of the assessment tool was successfully initiated.
Effectiveness of the Peer-to-Peer Mentoring Model for Transitioning from Classroom to Professional Practice

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Objective: To better prepare pharmacy students for practice by implementing a peer-to-peer mentoring model of student-led pharmacotherapy sessions (SLPS) in the PharmD program. The learning impact of this model for student perceived preparedness for Advanced Pharmacy Practice Experiences and the licensing exam was examined.

Methods: SLPS were conducted by fourth year students in the spring of 2015 and 2016 to an audience of third and fourth year students. Session topics of Cardiology, Infectious Diseases, Patient Self-Care (2015 only) and Endocrinology (2016 only) were delivered live and simultaneously broadcasted on-line. A retrospective self-assessment survey was administered to students after each SLPS to self-report on five knowledge domains (etiology, clinical presentation, pharmacotherapy, monitoring/follow-up, and overall knowledge). A paired t-test was utilized to analyze the survey data. Thematic analysis was applied to the qualitative comments on the survey. A pre- and post-SLPS knowledge test was administered for the Infectious Diseases session to triangulate results of the self-assessment survey.

Results: Eighty-one students (59% third-years; 41% fourth-years) completed the survey in 2015. A statistically significant increase \( (p \leq 0.001) \) was shown in all five knowledge domains post-SLPS for both third and fourth year students. Survey results from the 2016 SLPS had similar patterns. The post-SLPS knowledge test in Infectious Diseases corroborated an increase in students’ knowledge. Students stated that cases, drug charts and therapeutic overview in the SLPS were the most useful. Suggestions for improvement included increased peer-to-peer interactions and counselling points integrated with practice examples.

Conclusions: The peer-to-peer mentoring model was an effective model for student learning. Students perceived and demonstrated a therapeutic knowledge increase after attending the SLPS. Future SLPS should include more interactive activities, case development support, and student association involvement. This model has proven to be effective in developing knowledge and skills for students transitioning from classroom to professional practice.
Implementing the Informatics for Pharmacy Students E-resource into the University of Manitoba, College of Pharmacy

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The Informatics for Pharmacy Students e-resource was created through a partnership of the Association of Faculties of Pharmacy of Canada (AFPC) and Canada Health Infoway to develop a national, online, competency based educational resource written by faculty members, informaticians, and clinicians. A project integrating selected topics of the Informatics for Pharmacy Students e-resource was needed to supplement and enrich the existing pharmacy informatics curriculum at the University of Manitoba. To accomplish this, integration occurred at multiple points in the pharmacy program, including the first (PHRM 1110) and second (PHRM 2100) year skills lab courses. Additionally, to increase awareness amongst pharmacy faculty of the e-resource and to determine appropriate integration in the curriculum, two lunch and learns were held. A final integration was designed and implemented amongst six second year students to assess the usefulness of the e-resource. Post-activity surveys were administered following the 2\textsuperscript{nd} year skills lab integration to ensure the following; enrichment of the curriculum to satisfy competencies, faculty engagement, and utilization of e-resource as a training tool to improve future pharmacy practice. All Pharmacy Skills Lab 2 students surveyed agreed or strongly agreed that Domain 3 of the Informatics for Pharmacy Students e-Resource was a useful tool to optimize the learning of the pharmacy practice skill of answering a drug information request. After careful analysis of the survey results and comments, it was concluded that pre-lab learning activities should include only targeted sections that correlate to a specific activity and not entire domains. The Informatics for Pharmacy Students e-resource is best implemented throughout the current Bachelor of Science in Pharmacy program, specifically in the Pharmacy Skills Lab stream. The new entry-to-practice Pharm D program would offer a great opportunity to further embed the e-resource into the curriculum.
Brain Gain: Evaluation of Prior Learning Assessment and Recognition (PLAR) in a Canadian Doctor of Pharmacy Program

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Objectives:
Prior Learning Assessment and Recognition (PLAR), sometimes referred to as “Brain Gain”, is a fair and rigorous process that “enables individuals to identify, document, be assessed and gain recognition for their prior learning”. PLAR has been incorporated into the curriculum of UBC’s Flexible Doctor of Pharmacy (PharmD) program, recognizing that students may have gained the knowledge, skills and abilities to meet some program learning outcomes through formal, informal or work-related learning prior to entering the program. The objective is to design a sustainable, systematic, comprehensive PLAR program and associated evaluation plan that meets high University educational standards.

Methods:
The PLAR program was designed using best practice principles from published literature. Applying an iterative 4-phase action research framework, a systematic program evaluation model was developed. Following program implementation, key documents relating to program processes, student and stakeholder feedback will be analyzed and compared to program goals and best practice standards. The data collected will be used to define, document and constantly improve the program and the evidence-based practice of PLAR.

Results:
Initial components of the PLAR evaluation program have been developed. Ongoing work includes prioritization and refinement of evaluation goals and questions and identification of sources of information. Future steps include implementation of the program evaluation, ongoing data collection and analysis and identification of potential program improvements.

Conclusions
The evaluation framework will provide a comprehensive, systematic plan for evaluation and continuous quality improvement of the PLAR program.
Profile of the hospital pharmacists workers in Rio de Janeiro, Brazil

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Purpose: Brazil has 205 million of inhabitants and 6,800 hospitals. Most of these hospitals are public (68%). Rio de Janeiro is the second largest state in Brazil in terms of population and the first one in a number of public hospitals. The presence of the pharmacist in a hospital is mandatory in Brazil. The aim of this study was to describe the profile of the pharmacists that work in public hospitals in Rio de Janeiro as a strategy to support the discussion and prepare measures to improve the hospital pharmacists performance.

Method: An electronic survey was sent to a sample of pharmacists that work in the public hospitals in Rio de Janeiro (95% confidence level, absolute error 5%). All these pharmacists were contacted by telephone and invited to respond semi-structured electronic questionnaire developed by the authors. The project was approved by the Brazilian National Ethical Committee.

Results: The survey was completed by 265 respondents. The average age was 38 years old. The most of these pharmacists finished their undergraduate 10 or fewer years ago (65%). The pharmacists start to get interested in a hospital pharmacy while studying in undergraduate disciplines (44%) or as a result of employment opportunities (36%). Most of these pharmacists studied in public universities and did an internship in Hospital Pharmacy (54.3%); 66% of them did courses to improve their performance and 74% of them have a postgraduate degree.

Conclusion: The hospital pharmacists that work in public hospitals in Rio de Janeiro are young and worried about their professional performance. The undergraduate disciplines and the internship are important to direct professional choice. However, in many cases, the work in a hospital pharmacy was not a choice but a job opportunity, due to a large offer in the labor market.
Perceptions of Teamwork and Interprofessional Education in Undergraduate Pharmacy Students

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Background: Interprofessional education (IPE) is a mandatory component of all accredited Canadian pharmacy programs. Little is currently known, however, about pharmacy student perceptions of interprofessional collaboration.

Objective: To survey pharmacy students and characterize their attitudes and interest toward IPE, and identify variables associated with positive perceptions of teamwork.

Methods: Students in all years of an undergraduate program at the University of Saskatchewan completed a questionnaire in September 2015. The survey consisted of the Readiness for Interprofessional Learning Scale (RIPLS) and additional questions assessing student’s skills, knowledge, and interest in collaboration. Descriptive and univariate statistics were calculated between demographic variables and survey scores to identify associations and correlations.

Results: 88.9% of pharmacy students (n=311) completed the study. 94.2% reported interest in future IPC training. Mean rank total RIPLS scores were significantly higher in females (p=0.000) and inversely correlated to year of pharmacy, declining by an average of 23 RIPLS points with each year (p=0.000). Students were most interested in a one-day workshop (88.8% somewhat or very interested) and least interested in an online module (63.3% somewhat or very interested).

Conclusion: Perceptions of teamwork are positive in pharmacy students, but decline with each year of study, supporting early implementation of IPE into the curriculum. The development of new IPE initiatives should be tailored to student feedback with the aim of maintaining engagement throughout all years of study.
Career communications workshops for pharmacy students: Development, implementation and evaluation

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Objective: Communication has been identified as a core competency in pharmacy education at UBC yet weaving career communications skills into curricula remains challenging. The objective of this project was to develop, implement, and evaluate two pilot career communications workshops for pharmacy students intended to build competency and curriculum opportunities in this area.

Methods: The Faculty of Pharmaceutical Sciences worked in partnership with the Centre for Student Involvement and Careers to develop, implement and evaluate workshops on resume and cover letter writing, and interviewing skills. To ensure content was specific to employment within the pharmacy profession, panelists from the Faculty, community and institutional pharmacy settings participated. The format included expert presentations combined with hands-on group activities involving one-on-one discussions and reviews of participant resumes, cover letters, and interviewing skills. Participants provided feedback using a 5-point Likert scale and open-ended responses. To reach a wider audience, the expert presentations were digitally recorded and later made available for all entry-to-practice students to access online.

Results: Registrations were fully subscribed, with a total of 30 participants per workshop and a fairly equal representation from years 1-4. Feedback was positive and indicated workshop format, content, and presenters were effective and relevant to student professional development needs. Students also commented that presenters and panelists added value to their learning experience by providing customized feedback, and, indicated a strong desire to have career communications included in their curriculum.

Conclusions: The workshops provided a safe opportunity for pharmacy students to enhance knowledge, skills, and confidence for the preparation of resumes, cover letters and interview performance. This project demonstrated the need for and desire of students to have career communications integrated into their curriculum. Collaboration between UBC departments and other organizations can provide powerful opportunities to connect students with seasoned recruiters. Next steps include exploring best practices for incorporating career communication opportunities into our academic programs.
Impact of a communication session for pharmacy students: Preparation for IPE collaboration

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Objectives: Interprofessional education (IPE) has become an integral component of the new entry-to-practice PharmD program at UBC. While communication, an IPE core competency, is deemed essential for collaborative practice, creating authentic learning opportunities in communications that involve the spectrum of health professions has proven challenging. The objective of this pilot activity was to develop, implement and evaluate a pharmacy-specific uni-professional session to enhance our student’s understanding of communication styles and determine feasibility for a larger, broad-based IPE activity across the health professions.

Methods: A two-hour communication styles session was designed on the principles of adult learning and implemented with a full cohort of 220 first-year students. This mandatory session was designed to provide opportunities to reflect on communication style and utilize techniques to adapt an approach in a simulated interprofessional team environment. Prior to the live session, students were required to complete a self-assessment to determine dominant communication style and review an online introductory podcast. For the live session, students were divided into 37 small groups to discuss others’ styles and adjust style to better communicate with others. Groups were facilitated by five IPE faculty leaders. Students provided feedback on the session using a 5-point Likert scale and open-ended responses.

Results: Student survey results showed a positive response to this session. Eighty-five percent of participants “agreed” or “strongly agreed” that they enjoyed the activity and found it valuable. Students appreciated learning about the different communication styles and its impact on collaboration. Suggested improvements included incorporating more cases for group discussion and application to situations that may be encountered in practice.

Conclusions: This pilot session had a positive effect on student understanding and impact of communication style on collaboration and teamwork, and provided opportunities for students to develop and practice communication skills to be applied in future interprofessional collaborations. Next steps include exploring ways to provide this activity as a larger, health professions-wide IPE activity.
Providing academic support to students in experiential education (PASS-EE): A survey of Canadian and American Faculties of Pharmacy
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Study Objectives
The objective of this survey was to assess the framework for providing academic support (remediation) to learners who experience difficulty during experiential rotations in Canadian and American Faculties of Pharmacy.

Methods
A survey was emailed to the American Association of Colleges of Pharmacy Experiential Education Special Interest Group (AACP-EE SIG), representing 130 American schools, as well as to the Pharmacy Experiential Programs of Canada (PEP-C) group, representing ten Canadian schools. One respondent from each school was requested to complete the survey. University of Toronto Research Ethics Board approval was obtained.

Summary of Results
A total of 35 schools (25%) responded; all ten Canadian and 25 American schools. 77% of respondents agree that academic support at their institution is individualized to the student’s learning needs. 69% of respondents indicated that improvements are needed to their academic support process. There is a wide range of approaches, from schools having no formal academic support process in place (11%) to those with detailed procedures (43%). The most common processes following unsuccessful completion of a placement include: faculty meeting with students (46%), extra rotation(s) (34%) and constructing a learning plan (31%). The most common academic support activities identified include: individual performance assessments (77%), referral to on-campus services (71%), faculty feedback on student work (69%) and providing additional self-study material to the student (66%).

Conclusion
Providing academic support to pharmacy learners in experiential rotations is necessary, albeit resource intensive. Best practices have not yet been identified; approaches that are individualized to specific learner needs are most common. Direct faculty involvement is essential from initial assessment of learning needs to implementation and evaluation of support activities. It is hoped that results of this survey will foster sharing of ideas to assist faculties of pharmacy in developing effective methods to support students in experiential education.
Evaluating the function and impact of a formative assessment program in the UBC E2P PharmD program: First term insights
George Pachev, Marion Pearson, Simon Albon and Andrea Busse

Objective
The formative assessment program for term 1 of the modularized Foundations of Pharmacy course UBC’s new E2P Pharm D program included multiple formative assessments called Check-Points (CP). The CPs were scheduled weekly and designed to support student learning by providing multiple opportunities to practice, timely feedback, and study-guidance. CPs counted for a small portion of the module grade and once completed, could be used multiple times as a learning aid. This study explores the degree to which the CPs fulfilled their function, and the extent to which CP scheduling was conducive for learning. The impact of the formative assessment program on student learning was studied by attempting to identify CP usage patterns, and calculate correlations between patterns of CP use and performance on module summative assessments.

Methods
Data for this study was collected from multiple sources. Specific questions about the CPs were included in an evaluation survey administered at the end of each module. The perceived effect of CP timing, scheduling and incentives were addressed through items included in an end-of-course survey. Narrative comments pertaining to the formative assessment program from the surveys were analyzed for themes. Web-analytics were used to determine usage patterns. Correlations between these patterns of use and performance on summative assessments were explored.

Results
The majority of students agreed or strongly agreed that the CPs enhanced their learning. Differences between modules can be explained by the different formative assessment tools used. No consistent usage patterns, in terms of frequency and/or timing could be identified. For this analysis, students were grouped according to frequency of use: once only, rarely – 2-3 times during the module, and many times. Correlations were sporadic but mostly for CP with questions similar to the questions in the respective summative measure.

Conclusions
The formative assessment program was successfully implemented in the first iteration of the E2P PharmD curriculum. Students’ comments allowed for identifying several aspects to improve the CP: increase the feedback, make feedback more detailed, and ensure better alignment of CP format with summative exams.
Title:
Training Pharmacists to Become Personalized Medicine Experts

Authors:
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Objectives
To develop and evaluate a pharmacogenomics (PGx) specialization training program directed to pharmacists initially, that could be adapted for other health professions as part of the PRIME (Pharmacists as Personalized Medicine Experts) study.

Methods
The training program (Oct 2015 to Jan 2016) had 3 parts: review of online lectures covering foundational PGx concepts, participation in a two-day training workshop, and completion of 3 patient case pharmacotherapy work-ups. The workshop reviewed therapeutics and introduced PGx in focused clinical areas, oriented participants to genetic testing technology, and included discussions of ethical and communication considerations when applying PGx to patient care. Pharmacists’ PGx knowledge was measured through a pre-post multiple choice test. A survey, developed for this study, measuring pharmacists’ comfort and readiness applying PGx in their practices was administered before and after the training program.

Results
From 143 expressions of interest, 26 pharmacists were selected for the training program. All 26 completed the early online training, 24 attended the training workshop and 21 successfully completed the entire program; all withdrawals were for personal reasons. The majority of PRIME pharmacists were female and aged 40-59 years (both 57.7%). Seventy-seven percent of pharmacists had more than 5 years of practice experience and 69.2% practiced in community pharmacy. Before training, pharmacists felt that PGx was highly applicable to their practice but they lacked comfort and confidence when applying PGx to patient care. After the training, comfort and confidence greatly improved. Pharmacists’ PGx knowledge increased based on test performance from mean score of 55.8% (pre) to 86.5% (post), p<0.05.

Conclusion
The multi-component PRIME training program successfully increased pharmacists’ knowledge, comfort and confidence in applying pharmacogenomics to patient care.
Predictive validity of admission tools on student performance in the pharmacy program and on the national licensing examination.

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Objectives: In most predictive validity studies, student background characteristics are compared with performance in the pharmacy program. While these findings are helpful to identify which background variables best predict performance in a pharmacy program, one concern is that the criterion varies across programs. A second limitation is that most predictive validity studies do not consider performance after completion of the pharmacy program. The purpose of this research was to explore mainly the relationship between student background variables, their performance in the pharmacy program, and subsequent performance on the PEBC Qualifying Examination.

Methods: Data representing background variables, performance throughout the pharmacy program, and scores on the PEBC exam were obtained from 309 students who completed the pharmacy program from 2010 to 2015, inclusive. The relationships between latent variables consisting of student background characteristics, performance in the pharmacy program, and performance on the Qualifying Examination were examined in a structural equation model (SEM).

Results: Overall model fit was very good ($\chi^2$(14)=15.3, $p=0.36$; CFI=0.998; RMSEA=0.017). The correlation between latent scores representing student background and overall performance in the pharmacy program was 0.57. Controlling for student background including incoming GPA, the correlation between performance in the pharmacy program and overall performance on the Qualifying Examination was 0.83. More specific analyses such as which years of the pharmacy program best reflect overall performance in the program, and relationships between parts of the pharmacy program (e.g., skills labs) and corresponding parts of the Qualifying Examination (e.g., OSCE) are explored.

Conclusions: Performance in the pharmacy program strongly predicted subsequent performance on the PEBC Qualifying Examination. The methodological strength of this study is the robust SEM analysis that examines the components more thoroughly and with less error. Future research can explore additional criterion measures such as job performance, and other components within the overall model.
Establishment of a 2nd Year Midpoint Assessment to identify students for remediation

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Objectives

Each year, a few students at the University of Waterloo School of Pharmacy reaching the final experiential component of the program lacked some of the knowledge and skills for successful completion. To mitigate remediation in the 4th year, the School implemented a Midpoint Assessment (MA) including a multiple choice question (MCQ) test and Objective Structured Clinical Examination (OSCE).

Methods

All instructors participated in providing questions that were reviewed by a panel prior to inclusion in the exam, and the exam was created to ensure proportional representation of the major AFPC outcomes (care provider, communicator, collaborator, manager, advocate, scholar). This required assessment was delivered at the end of the students’ 2nd year in the program and is intended to identify students who struggle with foundational material. Students scoring below the minimal competency standard in either component of the MA are identified as needing additional support and are not re-tested. Their progress through the program is not affected; however, they must meet with an assessment team member to discuss results and design an individualized education plan collaboratively.

Results

August 2015 was the first offering of the MA comprising a 100 MCQ test and a 5 station OSCE. Using the Modified Angoff Method, the passing mark was 52.7% for the MCQ test and 57% for the OSCE. The MCQ test average was 66.5%, and the OSCE average was 71%. Students required remediation if they failed both exam components, or failed one component and were at risk of failing the other component. Three of 120 students were identified as needing remediation that took place in Winter 2016.

Conclusions

Early remediation aids in preventing students from falling behind their peers and allows time for skill development. A rigorously developed and standardized assessment will serve as a consistent benchmark for student performance over the coming years.
The Implementation of New Assessment Strategies in a Medication Management Module within an Introductory Course in an Entry-to-Practice PharmD Program

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Study Objective
In Term 1 of Program Year 1 of the Entry-to-Practice (E2P) PharmD program, students take a required course called Foundations of Pharmacy. The Introduction to Medication Management (IMM) is one of 6 modules within Foundations. The assessment program for the module emphasized formative assessment and employed multiple low stakes summative exams. This contrasts with the outgoing E2P BSc(Pharm) Program, where student assessment is predominantly summative and higher stakes. The purpose of this study is to describe the assessment program and students’ and faculty’s evaluation of the program’s features.

Methods
A variety of in-class and online assessments were used in this module. Formative assessments included 20 checkpoints in the form of on-line quizzes and problem sets. Lower stakes summative assessments included 6 assignments, 4 mini-assessments, 2 math quizzes, 2 midterm examinations, and a pharmacy practice lab exam. The timing and weighting were designed to support students’ learning, retention of material and application of knowledge. At the end of IMM, students were asked to evaluate the features of the assessments in relation to learning objectives, fairness, and support for their learning. Feedback on this assessment approach was also solicited from Faculty throughout the term and during an end-of-course review session.

Summary of Results
The majority of students (74%) either strongly agreed or agreed that assessments in the module were related to learning objectives. Students also either strongly agreed or agreed (81%) that the assessments of learning in the module were fair. Many students (63%) either strongly agreed or agreed that weekly formative MCQ quizzes supported their learning. Common themes identified by Faculty include the ability to assess students’ progress fairly and with precision, increased workload, and time commitment.

Statement of Conclusions
Based on feedback, the assessment plan demonstrated value for students and Faculty. Next steps include expansion and refinement of the formative assessments and exploration of methods to increase sustainable resources.
Development and Implementation of a Foundations of Pharmacy Course in an Entry-to-Practice PharmD Program

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Background: In September 2015, the Faculty of Pharmaceutical Sciences at the University of British Columbia launched an Entry-to-Practice PharmD Program. The majority of Year 1, Term 1 of the program is comprised of a course called the Foundations of Pharmacy. The purpose of this course is to serve as an introduction to basic scientific concepts and pharmacy practice principles, to be further developed in subsequent courses in Term 2 of the program, and beyond.

Objective: To describe the development, implementation, and evaluation of the Foundations of Pharmacy course.

Methods: Six modules were identified to lay the groundwork for the course curriculum: (i) Anatomy, Physiology, Pharmacology, and Pathology; (ii) Pharmacist, Patient, and Health Care Systems; (iii) Reading the Drug Molecule; (iv) Pharmacokinetics and Pharmacogenomics; (v) Pharmaceutics and Drug Delivery; and (vi) Introduction to Medication Management. Module Leaders were identified as content experts to develop learning objectives and course content. Course delivery included didactic, hands-on, and online learning. The assessment plan included both summative and formative components, which were delivered both in-class and online. Following completion of the course, feedback was solicited from both Faculty and students.

Results: Faculty identified a number of successes, including: functionality of the online learning management system; efficiency of online exams; implementation of hands-on sessions; and weekly formative assessments. Student feedback indicates that they learned a great deal, they valued the quality of instructors, and they appreciated the organization of the course. Challenges to implementation included the need for better workload equity and organization for teaching assistants; consistency in providing formative feedback on online assessments; increased security for online summative assessments; and improving student use of online discussion boards.

Conclusions: Based on feedback, we were able to identify common themes of achievements and challenges in the implementation of this course, which will be used to make quality improvements moving forward.
Bridging the gap from the classroom to the institutional practice site: Evaluation of an online transition module for student pharmacists

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Objectives:
In recent years, feedback from students and practice educators indicates student pharmacists are ill-prepared for inpatient clinical placements. Students frequently require a prolonged orientation period at the practice site and close clinical supervision, which negatively impacts their ability to achieve learning outcomes. Literature suggests that medical students exhibit less anxiety and better clinical performance in institutional settings when supported with transitional learning activities, and we predicted the same holds true for pharmacy students. Accordingly, we designed and evaluated three self-paced online transition learning modules for student pharmacists to complete prior to their inpatient clinical placement.

Methods:
Input from students, residents, faculty, and practice educators guided the development of three modules: General Orientation to Institutional Practice, Introduction to Patient Medical Records, and Patient Workup and Report. In September 2015, all three modules became mandatory to students completing their inpatient practicums. An online survey was distributed to all students completing their practicum during the 2015-2016 academic year to evaluate their experience with the modules.

Results:
Data on reactions to the modules were collected through items rated on a 5-point Likert scale and open-ended questions. Responses from the student user survey (n=51) demonstrated a mean completion time for all three modules of 3.5 hours (SD=1.65). Most agreed that the modules were of appropriate difficulty (M=3.85, SD=0.59), were logically organized (M=3.89, SD=0.54), and were relevant to inpatient pharmacy practice (M=3.87, SD=0.65). Opinion was divided on the modules’ ease of use (M=3.39, SD=0.94) and their effect on reducing anxiety with respect to inpatient practice (M=3.01, SD=0.94).

Conclusion:
While the transition modules were designed to meet learning needs identified by key stakeholders, evaluation data from the first module indicate mixed views of its learning value. Future iterations must address feedback regarding content and efficiency of delivery.

This research was previously presented at CSHP’s Professional Practice Conference on February 2, 2016.
Developing online learning modules for pharmacy practice educators  
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Objective: To describe the development of a series of six online learning modules designed to provide guidance and training for pharmacy practice educators who precept entry-to-practice pharmacy degree program learners. The Office of Experiential Education (OEE) at the University of British Columbia’s (UBC) Faculty of Pharmaceutical Sciences (FoPS) developed these modules for provincial as well as national use, as UBC’s in-kind contribution to the Blueprint project. The goals of this project were to build skills and provide accessible training for practice educators in pharmacy practice education, contribute to quality learning experiences for learners and practice educators through education, build placement capacity, and provide recognition for the important role of practice educators.

Methods: Beginning with identification of core topics, divided between six modules or 150 maximum storyboard slides, the development team of project lead, education assistant, content experts, and online developers designed each module with special consideration given to best practices in practice education and online pedagogy. The overall process from crafting a module storyboard, to two feedback cycles for online drafts, to having the finished product live online required an average of 4 months. Each module has narration, graphics, animation, on-screen text, and embedded documents throughout. The six modules cover the role of the practice educator, effective teaching strategies, feedback, work-integrated learning assessment, and integrating and supporting learners during pharmacy practice experiences.

Results: The first module was launched March 2015, while the final module was launched March 2016. Each takes 30 to 45 minutes to complete, with built in reflective assessments to encourage deeper learning and engagement with the content. Determining achievable objectives for the most relevant and practical content busy pharmacists could effectively view in a short timeframe proved to be the greatest challenge.

Conclusion: The online practice educator development modules, designed to be user-friendly, concise, and relevant, are important, accessible tools to support current and new pharmacy practice educators in building skills to precept undergraduate pharmacy learners.
Objective: To conduct preliminary evaluation of online practice educator development modules created to build skills and provide accessible training for pharmacists in the area of pharmacy practice education. In addition, these modules will contribute to ensuring quality learning experiences for learners and practice educators, building placement capacity, and providing recognition for the important role of practice educators. Module topics include the role of the practice educator, effective teaching strategies, feedback, work-integrated learning assessment, and integrating and supporting learners during pharmacy practice experiences. The preliminary quality assurance process for the modules evaluated the effectiveness of the modules through, user survey responses, content expert feedback, and module completion data over the first twelve months of the project.

Methods: A mixed methods approach was used to analyze data from the OEE Practice Educator Resource Centre website hosting the modules. This included completion data for each online module and demographic information for users registered with the resource centre collected from April 2015 to March 2016. Additionally, qualitative and quantitative analysis of user surveys completed upon finishing each module was conducted, along with analysis of content expert feedback.

Results: Of the practice educator users completing feedback surveys, most found their understanding of how to be an effective practice educator had increased from their personal baseline. All 100% of survey respondents stated that they would recommend the module to other pharmacists interested in or currently precepting, while 95% stated they would view other modules based on the experience with one module. Of the total 197 registered users, 56% self-declared their geographic location as being within the Lower Mainland, while 44% were located outside of this area. A total of 113 users have either begun or completed at least one of the online modules. Content expert feedback positively received the modules as informative and interactive.

Conclusion: Preliminary survey results affirm these online learning modules are an effective and accessible means of skill development for practice educators, reaching practice educators throughout the province.
Development and evaluation of a hierarchical model of teaching for a hospital pharmacy direct patient care rotation
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Introduction: The need for clinical pharmacist preceptors has risen dramatically over the last few years given the changes to pharmacy school curriculum and practicing pharmacists returning to complete their PharmD. The capacity for institutions to train learners has not increased similarly and risks saturation. Therefore, different models of teaching must be explored to fairly accommodate all future students. Licensed pharmacists returning post-graduation to complete their PharmD create a unique learner who can teach less experienced students the basics of clinical practice while simultaneously refining their own clinical abilities.

Objective: To develop and evaluate a hierarchical model of teaching designed for a pharmacy direct patient care rotation.

Methods: In a parallel study design between January and March 2016 over an eight week period, three pharmacy learners (one post graduate PharmD and two fourth year students) were asked to work up twenty percent of their patient case load in a hierarchical model of teaching and the remaining eighty percent of their patient case load in the traditional one-on-one model. Students were then asked through qualitative questionnaires and multiple choice questions to evaluate the hierarchical model of teaching.

Results: Positive comments of the hierarchical model of teaching were that students learned from each other and were exposed to different methods of solving drug related problems. All students also agreed that they would recommend this model of teaching for future students. Some concerns included scheduling conflicts and a lack of consensus on a final care plan. Preceptors noted that this model did not compromise the quality of care plans developed by the students and positively impacted pharmacist practice from a time-saving perspective.

Conclusion: The hierarchical model of teaching implemented over an eight week direct patient care rotation was found to be beneficial to both student learning and pharmacist practice. This model can be applied to a wide variety of clinical settings to accommodate the increased number of pharmacy learners.

Word count: 349
Communities of practice: An innovation in experiential education

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Objectives: PharmD students at the University of Waterloo (UW) School of Pharmacy complete three 8-week patient care rotations in one of 14 Ontario regions. The Communities of Practice Model (CoP) is part of the rotations’ guiding framework. Community of practice refers to “groups of people who share a concern or passion for something they do and learn how to do it better as they interact regularly” (Wenger-Trayner, 2013). An innovative approach to the traditional work integrated pharmacy learning model, CoP promotes collaborative learning between pharmacists, allied practitioners and students placed in the region. This presentation describes (1) the CoP model, (2) characteristics of CoPs within Ontario regions, and (3) barriers/facilitators to learning associated with the model.

Statement of methods: Students, preceptors and regional clinical coordinators (RCCs) completed a survey, CoP assignments, and course feedback evaluations. This study was approved by the University of Waterloo Research Ethics Board.

Summary of results: 87.5% of RCCs (n=14), 37.2% of preceptors (n=86), and 33% of students (n=38) participated in the study. All 14 Ontario regions as well as 4 types of practice sites (community, family health team, hospital, long-term care) were represented. Findings show varying levels of intentionality and formality of CoPs, as well as student/preceptor/RCC integration and involvement by region. Involvement in their CoP had a significant impact on learning among 23.7% (n=9) of students and some impact on 42.1% (n=16). 7.3% of RCCs and preceptors were not already engaged in a CoP before the UW patient care rotations, while 39.6% felt that rotations enhanced their participation with the CoP. Aspects that did (e.g., knowledge sharing and collaboration) and did not (e.g., logistics and coordination) work well were also identified, as well as areas for improvement (e.g., clearer CoP assignment guidelines and examples).

Statement of conclusions: Findings will be used as part of the curricular quality assurance process for improving the model in subsequent iterations, and creating curricular tools that support enhancements.
The Process of Developing an Entry to Practice Faculty of Health Sciences Interprofessional Collaborative Care Longitudinal Curriculum

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Background
Interprofessional education (IPE) is foundational to graduating health care practitioners whose values are aligned with collaborative practice. However, creating a longitudinal curriculum to ensure that the University of Manitoba (UM) students of the newly formed Faculty of Health Sciences’ (FHS) ten health professional education programs are collaborative practice ready, presented both a unique challenge and an undeniable opportunity. To meet the challenge the five deans from the individual health sciences colleges (Dentistry, Medicine, Nursing, Pharmacy and Rehabilitation Sciences) created and endorsed a consultation unit to develop a longitudinal curriculum.

Objectives
This presentation describes the theories, values, and process used to develop an interprofessional collaborative care longitudinal curriculum, support student-led activities and promote/support FHS/UM scholarship in interprofessional collaborative care.

Method
Five faculty members from each of the above-mentioned Colleges with two days a week release time, a Vice Dean along with an office assistant collectively and iteratively developed a process to create a faculty-wide two-year interprofessional education curriculum. The systematic process of discussion about interprofessional collaboration values, assumptions, and principles created a cultural shift among the interprofessional group of faculty members and poised the group for the content development of the curriculum.

Outcomes
A two-year curriculum based on an educational curriculum model (Latucca and Stark, 2011), the D’Amour & Onandasan (2004) IPE/IPC model, and an IPE curriculum blueprint (Winnipeg Regional Health Authority-UM IPE Initiative 2014) was developed. Approximately 500 students will be placed in interprofessional learning groups that will remain consistent as the students learn about, from and with as they participate in case-based/simulation and service learning, student–lead interprofessional collaboration clinical groups, annual faculty-wide student-learning/showcase forums...

Conclusions
Building an IPC curriculum requires academic inquiry into values, models, frameworks, and evidence-base informing its construction. Meeting the needs of the Colleges and gaining their support is vital to sustain the ICC curriculum.
AFPC-60

**Doctor of Pharmacy program development: Stakeholder survey, College of Pharmacy, Dalhousie University**

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**Study Objectives:** The College of Pharmacy, Dalhousie University is planning to transition from a Bachelor of Science in Pharmacy (BScPharm) degree to an entry-to-practice undergraduate Doctor of Pharmacy program with an anticipated start date of September 2017. The objective of this project was to survey College stakeholders to 1) help inform the development of the content and design of the Doctor of Pharmacy program; and 2) determine interest in a bridging program (defined as a program designed for pharmacists with a BScPharm degree that would enhance knowledge and skills to the level of an entry-to-practice Doctor of Pharmacy graduate).

**Methods:** A literature search was performed to examine the use of stakeholder feedback to inform pharmacy curricular design. The Curriculum Committee drafted a questionnaire. Only targeted areas of the new program were included in the survey to ensure that the length was manageable and to maximize likelihood of respondents completing all sections. The questionnaire was pilot tested and final changes made in response to feedback. The questionnaire was administered via Dalhousie University’s online survey tool “Opinio”. An email inviting participation was sent to 1509 stakeholders (College faculty/staff, students, stakeholders (e.g. in pharmacy practice, industry, government)) on February 23, 2015 with two follow-up reminders. Data was analyzed using SPSS.

**Results:** There were 505 (33.5%) completed responses. Respondents ranked (from 1=very unimportant to 5=very important) the importance of clinical and practice skills as well social and administrative pharmacy content. Respondents also rated their level of agreement with the benefit of various potential practice experience rotations and their interest in a bridging program.

**Conclusion:** Feedback from stakeholders has helped the College gain a broader understanding of what educational components pharmacists feel are of value to education. Two-thirds of survey respondents indicated that they would be interested in enrolling in a bridging program. The survey results are being used by the Curriculum Committee to aid in the development of the content and design of the Doctor of Pharmacy program.
AFPC-61

Former/current student feedback regarding the progress exam at the College of Pharmacy, Dalhousie University
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Study Objectives: An innovative student assessment method, called the progress exam, was introduced with the problem-based learning (PBL) curriculum in 1997 at the College of Pharmacy, Dalhousie University. One formal evaluation study was conducted shortly after its initiation with quality assurance monitoring since that time. This present study was part of a larger project that collected information from College stakeholders to inform the development of a new Doctor of Pharmacy program. The objective of this part of the project was to gather feedback on the perceived value now and in the future of the progress exam.

Methods: A questionnaire was developed with one section pertaining to the progress exam. Former/current students were asked their level of agreement that the intended objectives of the exam had been achieved, and their thoughts on the role of the exam in the Doctor of Pharmacy program. After pilot testing, final changes were made and the questionnaire was administered using Dalhousie University’s online survey tool. 1509 stakeholders were invited to participate and received two follow-up reminders. Data was analyzed using SPSS.

Results: There were 505 (33.5%) completed responses with 208 indicating that they had written the exam as a former/current student. These 208 answered the progress exam questions. With regard to six original objectives of the progress exam, respondents were “neutral to agreed” that four had been achieved and “disagreed” that two had been achieved. 45% of respondents agreed that the progress exam should be kept in the Doctor of Pharmacy program while 71.5% thought it should not be high stakes.

Conclusion: Feedback from former/current students has helped the College gain a broader understanding of the perceived value of the progress exam. This feedback will be considered in addition to results from other evaluation strategies to determine what role, if any, the progress exam will have in assessment within the Doctor of Pharmacy program.
Describing student performance: a comparison between clinical preceptors across cultural contexts

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OBJECTIVES: Health professional student evaluation during experiential training is notably subjective and assessor judgments may be affected by socio-cultural influences. Understanding how perceptions of student performance may vary in different countries is essential quality assurance for programs transplanted or sharing curriculums, such as those CCAPP-accredited internationally. We sought to explore how clinical preceptors in pharmacy conceptualize varying levels of student performance and what contextual differences may exist across different countries.

METHODS: The qualitative research design employed semi-structured interviews. A sample of twenty clinical preceptors for post-baccalaureate Doctor of Pharmacy programs in Canada and the Middle East gave personal accounts of students they supervised who fell below, met, or exceeded their expectations. Discussions were analyzed following constructivist grounded theory principles.

RESULTS: Seven major themes encompassing how clinical pharmacy preceptors categorize levels of student performance and behaviour were identified: knowledge; team interaction; motivation; skills; patient care; communication; and professionalism. Expectations were outlined using both positive and negative descriptions. Pharmacists typically described supervisory experiences representing a series of these categories, but arrived at concluding judgments in a holistic fashion; if valued traits of motivation and positive attitude were present, overall favourable impressions of a student could be maintained despite few observed deficiencies. Some prioritized dimensions could not be mapped to defined existing educational outcomes. We found no difference in thresholds for how student performance was distinguished by participants in the two regions.

CONCLUSIONS: Doctor of Pharmacy preceptor experiences, values, and subsequent interpretations of student performance and behavior were largely consistent among Canadian and Middle East clinical pharmacists we interviewed. Our research findings are congruent with current literature related to the subjectivity of health professional student assessment by clinical supervisors during experiential training and the first to grant insight into cross-national perspectives. As previously determined in social work and medicine, study of how evaluation instruments and associated processes can integrate these judgements should also be pursued in pharmacy.
Pharmacy student evaluations in landscapes of changing educational outcomes and expectations

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OBJECTIVES:
Experiential training is an integral component of pharmacy programs and relies heavily on clinical partners for both student mentorship and assessment. However, subjectivity of preceptor judgements influences both validity and reliability of evaluations in clinical contexts and may be difficulty to calibrate among preceptors supervising diverse levels of trainees. We report the findings of how Canadian preceptors perceive and subsequently evaluate students during experiential training.

METHODS:
In a prior study, twenty clinical preceptors for post-baccalaureate PharmD programs in Canada and the Middle East gave personal accounts of students (nameless) they have supervised. Using constructivist grounded theory principles, 16 short narratives were devised to describe students who fell below, met, or exceeded expectations. Using modified Delphi technique, 17 PharmD preceptors from across Canada categorized narratives pertaining to student performance. In this study, preceptors were asked if they would fail the student described in narratives they had rated below expectations and if this judgement would change if the student instead was a resident (post-baccalaureate) or an entry-to-practice PharmD (EPPD) student.

RESULTS:
Eleven (68%) student narrative profiles were categorized as below expectations by at least one preceptor in the initial review, which changed to nine (56%) following round 2. Only 6 (35%) descriptions were categorized unanimously. Out of 104 ratings of below expectations by responding preceptors, the majority (103, 99%) of post-baccalaureate PharmD students described would be failed. Conversely, if the same narrative instead profiled a resident or an EPPD student, rotation failure decreased to 83 (80%) and 84 (81%), respectively.

CONCLUSIONS:
Given the changing landscape of Canadian degree and residency programs, strategies to address anticipated assessment challenges for pharmacist mentors involved in all parts of the pharmacy student’s continuum of education must be considered.