2014 Poster Abstracts

40. TITLE: Interprofessional reciprocal peer teaching - success with pharmacy and physiotherapy students.

AUTHORS: Cheryl A. Sadowski, B.Sc.(Pharm), Pharm.D., FCSHP, Faculty of Pharmacy & Pharmaceutical Sciences, University of Alberta; C. Allyson Jones, Ph.D., Faculty of Rehabilitation Medicine, University of Alberta.

OBJECTIVES: To evaluate reciprocal peer teaching activities between physiotherapy and pharmacy students.

METHODS: The study was a series of pre:post peer-teaching evaluations conducted over 4 years. In years 1and 2 the pharmacy students were the 'learners' and the physiotherapy students were the 'teachers'. The pharmacy students who provided consent were asked to complete a pre-multiple choice test involving cases. All pharmacy students then participated in a hands-on activity with physiotherapy students teaching them about sizing, use, and safety at 3 stations – canes, crutches, and walkers. After completing the lab activities, pharmacy students completed a post-multiple choice test. Although the same questions were used as the pre-test, the order and options were re-ordered from the pre-test. In years 3 and 4 the pharmacy students were the 'teachers' and taught the physiotherapy student 'learners' about use of inhalation devices. Similar methodology was used, except for an additional survey of the 'teachers' about their experience. Descriptive statistics were used for demographics, and scores on the multiple choice questions were correlated. Feedback was analyzed qualitatively for themes and provided suggestions for revisions.

RESULTS: A total of 3 years of data have been analyzed, with a total of 226 pharmacy students participating in years 1-2, and 104 in year 3. A total of 34 physiotherapy students participated in year 3. The scores from the 10 multiple choice questions pre to post-test improved significantly in all years. Student responses indicated an enjoyable and effective learning exercise that they desired to see expanded.

CONCLUSIONS: Peer learning was viewed as positive and effective method of improving knowledge and skills regarding ambulatory assistive devices for pharmacy students, and inhaler use for physiotherapy students.

41. TITLE: Pharmacist identified learning needs regarding osteoporosis management in patients with renal failure.

AUTHORS: Cheryl A. Sadowski, B.Sc.(Pharm), Pharm.D., FCSHP, Faculty of Pharmacy & Pharmaceutical Sciences, University of Alberta; C. Nese Yuksel, B.Sc.Pharm, Pharm.D., FCSHP Faculty of Pharmacy & Pharmaceutical Sciences, University of Alberta.

OBJECTIVES: To determine the learning experience and self-identified educational needs of hospital- based pharmacists regarding osteoporosis management in patients with renal failure.

METHODS: This was a cross-sectional survey of pharmacists working in hospitals and related healthcare settings. An email invitation to participate in a survey was sent to members of the Canadian Society of Hospital Pharmacists in November 2012. The 34-item online questionnaire consisted of 4 sections: demographics, practice, beliefs, and comfort level. Data summarizing learning needs and preferences from the findings are the focus of this presentation. Summary statistics were used for analyses.

RESULTS: A total of 367 pharmacists participated. Respondents were mostly female (70%), > 10 years in practice (58%), and working in an inpatient practice setting (64%). Majority reported caring for ≥ 1 – 2 osteoporosis patients per week (58%). Respondents believed that long term oral bisphosphonate use increased the risk of osteonecrosis of the jaw (69%) and atypical fractures (76%) but were unclear if these risks were increased in patients with renal impairment with many "do not know" responses (48 and 49% respectively). For level of interest respondents noted 'safety of bisphosphonates' as the priority learning need, followed by 'understanding effectiveness', then 'deciding on duration of treatment'. Most common learning resources used to learn about osteoporosis were articles (68%), print continuing education (CE) (56%), and guidelines (55%). The preferred methods of learning included summaries of latest research or guidelines (71%), practice tools (66%), and print CE (54%). The least preferred learning methods were webinars (33%), peer to peer sharing (28%) or audio/video conferencing (21%).

CONCLUSIONS: Pharmacists frequently responded "do not know" to therapeutic questions commonly encountered in everyday practice. Their learning preferences indicate traditional methods of delivery with a focus on safety.

43. TITLE: Integrating CPSI's safety competencies into undergraduate health professions programs: A comparison of five Canadian faculties of pharmacy.

AUTHORS: Nancy E. Winslade, Winslade Consultants Inc.; Olavo A. Fernandes, Leslie Dan Faculty of Pharmacy, University of Toronto; Lavern M. Vercaigne, Faculty of Pharmacy, University of Manitoba; Nancy M. Waite, School of Pharmacy, University of Waterloo; Carla M. Dillon, School of Pharmacy, Memorial University; Chantal C. Pharand, Faculté de pharmacie, Université de Montréal; Pierrette Leonard, Canadian Patient Safety Institute.

OBJECTIVES: The Canadian Patient Safety Institute (CPSI) has defined competencies that are required for provision of safe patient care. Health profession faculties are seeking to ensure appropriate integration of these Safety Competencies (SC) into their educational programs. We evaluated the relative coverage of CPSI's SC in a sample of five Canadian undergraduate pharmacy programs.

METHODS: Using a software application developed with CPSI, course objectives were entered and mapped to one or more SC according to standardized rules.

RESULTS: On average 61% of the SC were addressed in the objectives of the pharmacy programs (range 51%-79%). The SC related to managing safety risks were addressed most thoroughly (83% of SC mapped), followed by communication (78%) and working in teams for patient safety (69%). Lower numbers of objectives covered the detailed competencies of managing adverse events, core patient safety theories and safe writing of prescriptions. Faculties varied in how repeatedly their objectives addressed the SC, with two schools having greatest emphasis on managing safety risks, two schools working in teams and one school communicating for patient safety.

CONCLUSIONS: The SC addressed in the undergraduate pharmacy program objectives often related to skills underlying safe care (e.g. critical appraisal, decision-making), without application specifically to patient safety scenarios. The SC of managing safety risks were addressed within management of distribution and patient care during dispensing of medications. Gaps identified may reflect that the SC were developed for practitioners and that only a select portion can be appropriately taught in undergraduate programs. Alternatively, high level course objectives may not allow explicit statement of detailed patient safety content included in the curriculum.

45. TITLE: Survey of Canadian advanced practice training opportunities.

AUTHORS: Heather Kertland, St Michael's Hospital, University of Toronto; Debbie Kwan, University of Toronto, University Health Network; Peter Loewen, University of British Columbia; Nancy Sheehan, Université de Montréal, McGill University Health Centre.

OBJECTIVES: The Canadian Pharmacy Residency Board (CPRB) is developing standards and educational outcomes to support the accreditation of Year 2 Advanced Practice residencies. The goal of a Year 2 residency would be to support the development of an advanced practice pharmacist. To inform this process a survey was conducted of currently offered advanced practice or specialty training programs.

METHODS: Using an existing database and knowledge of the CPRB Standards subcommittee members, Canadian programs that were perceived to offer specialized or advanced training opportunities (residency, fellowship or other) were approached for an interview. The goals and educational outcomes of the program, how the program was differentiated from a Year 1 residency, and challenges in establishing and maintaining the program were ascertained.

RESULTS: Thirteen programs were identified and interviewed. They are located in Alberta (1), Ontario (8) and Quebec (4). Four of the programs have a goal of offering an advanced practice residency but use the current (Year 1) standards and do not require any prior residency training. Areas of focus of the remaining programs are Cardiology (2), Critical Care (2), Oncology (2), Drug Information (1), Geriatrics (1) and HIV (1). The programs are designed, often using US residency standards, to build on the outcomes achieved during a Year 1 residency with the goal of being able to apply knowledge and skills to patient care at an expert level and to influence care at a systems level. More advanced outcomes are also expected in areas such as teaching, scholarly output and research. None of the programs were accredited by any pharmacy organizations. Common challenges reported were funding, attracting suitable candidates and scheduling of preceptors due to competing teaching demands.

CONCLUSIONS: Advanced practice training programs exist in Canada and generally follow a US residency model. This indicates there is potential for advanced practice standards to be developed and subsequent accreditation of such programs. The experiences of existing programs may help in the development of standards, and in the creation of new advance practice residency programs.

46. TITLE: Qualitative assessment of community pharmacists' educational and skill needs concerning addiction.

AUTHORS: Sarah A. Fatani; Roy T. Dobson; Anas M. El-Aneed, College of Pharmacy and Nutrition, University of Saskatchewan.

OBJECTIVES: Health care professionals have a responsibility to reduce the harm, including harm associated with the disease of addiction. Community Pharmacists are the most accessible health care providers in Canada and are seen by the public as a trustworthy source for medical advice. Utilizing these cadres in effectively addressing substance abuse and addiction problems would help minimize the health and socioeconomic negative outcomes associated with the addiction, on both individuals and communities. Currently, curriculum dedicated to addiction in Canadian educational pharmacy programs is limited or absent. Although pharmacists display a willingness to assist addiction patients, the lack of skills and knowledge is a major barrier to effective engagement. The purpose of this project is to identify the educational and skill needs for community pharmacists so that optimum care can be provided for those struggling with drug addiction.

METHODS: To identify suitable community pharmacists willing to participate in the qualitative study, a questionnaire was sent to all community pharmacists in the Saskatoon, Saskatchewan, Canada. In addition to identify potential participants, the questionnaire was designed to gather information regarding community pharmacists' perspectives about addiction. Those pharmacists selected and agreeing to be interviewed where asked to comment on the education and skill needs for community pharmacists and the means to address such needs. Preliminary analysis of the data indicated that community pharmacists recognize the seriousness of the disease of addiction in Saskatoon. Although they are willing to help, they believed they lacked the necessary communication skills, such as motivational interviewing that would help them intervene and approach drug addicts at the right moment. They also acknowledged the critical need for a valid referral guide to social and health services devoted for drug addicts within the city.

RESULTS: Data analysis will be completed by the end of May, 2014.

CONCLUSIONS: This work will impact future educational plans as well as provide suggestions to improve the contemporary educational plans based on a view from the fields of practice.

47. TITLE: Assessment of caregivers' attitudes and practices related to testing and disclosure of HIV status to at-risk children in rural Uganda.

AUTHORS: Rick Lorenz, College of Pharmacy and Nutrition; Eisha Grant, College of Pharmacy and Nutrition, Faculty of Medicine, Mbarara University of Science and Technology (MUST); Winnie Muyindike, Faculty of Medicine, MUST; Samuel Maling, Faculty of Medicine, MUST; Claire Card, College of Veterinary Medicine, University of Saskatchewan; Carol Henry, College of Pharmacy and Nutrition; Adil Nazarali, College of Pharmacy and Nutrition.

OBJECTIVES: As access to antiretroviral drugs and prophylactic antibiotics increases throughout the developing world, how children born with HIV should be informed of their diagnosis becomes increasingly important. There is minimal research available on best-practice guidelines for how status should be disclosed to an HIV positive child in sub-Saharan Africa.

METHODS: We interviewed 30 caregivers of HIV positive children in Isingiro district, Uganda to identify current trends related to HIV testing and age of disclosure of HIV status to the child. Caregivers with at least one HIV positive child were approached at either the MUST Immune Suppression Syndrome clinic or through Foundation for Aids Orphaned Children parish meetings and invited to participate in semi- structured interviews.

RESULTS: Disclosure of HIV status to the child occurred during middle childhood (age 6-8yr) for 50 ±18% of all children, with the caregiver performing the disclosure in 82 ±18% of cases. Prior to disclosure, only 40 ±15% of caregivers spoke to an HIV counselor to prepare themselves and/or the child, while 28 ±15% reported doing nothing to prepare. Doubt as to the child's HIV knowledge at the time of disclosure was a persistent theme of the caregivers interviewed. In spite of this, 72 ±15% of caregivers interviewed felt that disclosing to the child when and how they did was the correct decision, although the reasons given were varied.

CONCLUSIONS: Doubts expressed by the caregivers regarding the child's level of HIV knowledge at the time of disclosure, especially the common misconception that HIV is a death sentence, suggest that children need to be better-prepared prior to disclosure. This could include working with an HIV counselor to develop a disclosure plan, and to tailor HIV education to fit the child's intellectual development.

48. TITLE: Predicting responders to interferon-β in multiple sclerosis: what factors must be addressed to ensure future progress?

AUTHORS: Rebecca J. Carlson, Laboratory of Molecular Cell Biology, College of Pharmacy and Nutrition; Adil J. Nazarali, Laboratory of Molecular Cell Biology, College of Pharmacy and Nutrition, Neuroscience Research Group, University of Saskatchewan, Cameco Multiple Sclerosis Neuroscience Research Center.

OBJECTIVES: Pharmacogenomics is an emerging science that promises safer and more effective use of medicines by offering the ability to predict clinical response based on the patient's genetic make-up and DNA sequence. Multiple sclerosis (MS) is an area that would greatly benefit from the application of pharmacogenomics since up to 50% of the patients do not respond to interferon-β, a first-line disease- modifying therapy. Objectives are to conduct detailed analyses of currently available data on interferon- β pharmacogenomics research and to identify important sources of confounding factors that may explain lack of interferon-β response in non-responders.

METHODS: A systematic literature search of available information published in English up to January 2014 was performed using MEDLINE and EMBASE databases. Key words included: "pharmacogenomics", "pharmacogenetics", "personalised medicine", "interferon-β", "neutralising antibodies" and "multiple sclerosis". Relevant sources provided in bibliographic references were also reviewed.

RESULTS: Our findings reveal inconsistency between existing pharmacogenomic studies with few independently verified findings. A number of confounding factors were identified that are likely contributing to the discrepant findings. These include insufficient statistical power, varying categorisations of responders vs. non-responders between studies, lack of placebo control or consideration for anti-interferon-β antibodies, and non-standardized methodology or assay protocol, all of which were identified as significant barriers that need to be addressed in future studies. In spite of these drawbacks, the most promising genetic differences predicting response to interferon-β lie within genes encoding for glypican 5, a heparin sulfate proteoglycan that supports neuronal development and function, and interferon regulatory factor 5, a transcription factor that regulates the Type 1 interferon immune pathway.

CONCLUSIONS: There are significant discrepancies between studies of interferon-β pharmacogenomics in treatment of MS. Adopting standardized protocols for conducting pharmacogenomics research to reduce confounding factors will advance science and bring us a step closer to helping patients with MS.

49. TITLE: Stewarding the next generation of antimicrobial stewards: Design and implementation of an entry-to-practice PharmD curriculum in antimicrobial stewardship.

AUTHORS: Miranda S. Y. So, Pharm.D., University Health Network, Leslie Dan Faculty of Pharmacy, University of Toronto; Linda D. Dresser, Pharm.D., FCSHP, University Health Network, Leslie Dan Faculty of Pharmacy, University of Toronto.

OBJECTIVES: Accreditation Canada made antimicrobial stewardship program (ASP) a Required Organizational Practice in 2013 for all acute care, rehabilitation and complex continuing care institutions. Pharmacists are integral to ASPs, often playing a leadership role in their development and daily functions. Although educational opportunities exist to support practising pharmacists, this Year 3 elective "Introduction to Antimicrobial Stewardship" is the first time the topic has been part of the undergraduate pharmacy curriculum in Canada. The

objectives of the course were to help students develop a comprehensive and integrated approach to antimicrobial stewardship.

METHODS: The instructional design addressed four key domains in the development and implementation of an ASP: clinical application of stewardship strategies in common infectious syndromes; inter-professional collaboration and communication; quality improvement methodologies; and program development. Content was delivered as didactic lectures (58% of total contact hours) and small group in-class activities (42%). Students worked as teams in clinical case studies, and to create an ASP business proposal based on a profile representative of a typical community hospital. To simulate "pitching" a program to hospital executives, each team presented data analyses, program components, interventions and deliverables to a panel of judges (who in practice are ASP clinicians or executives). Achievement of course objectives was assessed through a mid-term, a final examination, a video assignment (in which the student makes a recommendation as a steward to the prescriber), a metrics assignment, and team performance.

RESULTS: Students' grades, their course evaluations, feedback from panel judges and observers will be presented.

CONCLUSIONS: This course promotes interests, develops knowledge and skills required in the next generation of antimicrobial stewardship pharmacists, and is the first of its kind in Canada. These skills and knowledge are transferrable to other settings and will facilitate collaborative practices within the healthcare system.

50. TITLE: BC pharmacist perceptions and preferences for a Flexible PharmD Program.

AUTHORS: Glenda P. MacDonald; Ginette M. Vallée; Jon-Paul Marchand; Patricia Gerber; Peter S. Loewen, Faculty of Pharmaceutical Sciences, University of British Columbia.

OBJECTIVES: The UBC Faculty of Pharmaceutical Sciences is developing a flexible program for BSc trained pharmacists who wish to attain the Doctor of Pharmacy (PharmD) degree. This Program would be completed over 2-5 years by working pharmacists with much of the coursework delivered online. The first phase of program development was a market survey to ascertain BC pharmacists' preferences for and perceptions of such a program. The objective is to ascertain BC pharmacists' perceptions, interest in, and preferences for a Flexible PharmD Program.

METHODS: An anonymous online survey was made available to all BC pharmacists (n=5,390). Participants were recruited by email and through website announcements. Survey domains included: mode of delivery, program structure, duration, and requirements. The survey remained open for 4 months. Descriptive statistics were calculated for quantitative responses. Qualitative responses were analyzed for themes.

RESULTS: Of the 289 pharmacists who completed the survey, 85% expressed interest in such a program. The most common primary motivation cited was to improve clinical skills and job satisfaction. Sixty three percent of respondents indicated a goal of program completion of 3 years or less. There was a strong preference (90%) for the program granting credit for prior learning, work experience or training.

CONCLUSIONS: Participating BC pharmacists expressed interest in enrolling in a Flexible PharmD Program. The survey results are being used to guide the planning of the UBC Flexible PharmD Program.

51. TITLE: Implementation and student perspectives of a physical assessment skills module on vital signs for pharmacy students.

AUTHORS: Christine Leong, Pharm.D.; Christopher Louizos, B.Sc.(Pharm); Grace Frankel, Pharm.D.; Sheila Ng, B.Sc.(Pharm); Drena Dunford, B.Sc.(Pharm); Kelly Brink, B.Sc.(Pharm); Nancy Kleiman, BSP; Neal Davies, Ph.D., Faculty of Pharmacy, University of Manitoba.

OBJECTIVES: To describe the implementation and student perspectives of a Physical Assessment Skills Module on Vital Signs for pharmacy students.

METHODS: A Physical Assessment Module comprised of an Online Module, a Practical Skills Workshop, and an Experiential Practice Site at a Periodontal Clinic, was implemented at the Faculty of Pharmacy. Forty-eight third-year pharmacy students during the 2013-14 academic year were enrolled in the program. Students provided feedback on the Online Module and Practical Skills Workshop using a 5-point Likert scale and open-ended comments.

RESULTS: Forty pharmacy students provided feedback on the module. The majority of students felt the module was relevant to their role as a healthcare provider and plan to use the information learned in their future practice (93% and 88%, respectively). Eighty-eight percent and 83% of pharmacy students felt confident and comfortable, respectively, about performing a physical assessment of vitals on a patient. Pharmacy student-rated knowledge of physical assessment skills improved from a 4 to a 9 out of 10 (1 being least, 10 being most) after completing the workshop. Areas in which students have noted they would like to learn in more detail with respect to physical assessment skills include the cardiovascular system (n=20), musculoskeletal system (n=14), and skin (n=14).

CONCLUSIONS: Designing a physical assessment course is a relatively new and important area of interest to pharmacy educators. This module provided students with the opportunity to develop and demonstrate their skill, confidence, and knowledge in the performance and interpretation of findings of relevant physical assessments. The incorporation of a physical assessment module into the pharmacy curricula aligns with the educational outcomes and accreditation standards set out by the Association of Faculties of Pharmacy of Canada and the Canadian Council for Accreditation of Pharmacy Programs. Future developments of the physical assessment course will include expanding skills in physical assessment by system.

55. TITLE: Efficacy of an oral and tropically stable lipid-based formulation of Amphotericin B (iCo-010) in an experimental mouse model of systemic candidiasis.

AUTHORS: Riley Walsh, School of Health Sciences, British Columbia Institute of Technology, Faculty of Pharmaceutical Sciences, University of British Columbia; Olena Sivak, Faculty of Pharmaceutical Sciences, University of British Columbia; Fady Ibrahim, Faculty of Pharmaceutical Sciences, University of British Columbia; Ellen K. Wasan, School of Health Sciences, British Columbia Institute of Technology, Faculty of Pharmaceutical Sciences, University of British Columbia; Kishor M. Wasan, Faculty of Pharmaceutical Sciences, University of British Columbia.

OBJECTIVES: Amphotericin B (AmB) is a broad-spectrum antifungal and antiparasitic agent used to treat invasive fungal infections. The use of AmB is limited by its nephrotoxicity and acute side effects due to intravenous administration. An oral and tropically stable (iCo-010) lipid-based formulation was developed to enhance the oral

absorption of AmB. The purpose is to investigate the efficacy of a tropically stable, oral lipid based formulation of Amphotericin B (iCo-010) in a mouse model of systemic candidiasis.

METHODS: The mice were infected with 1×108 CFU's of Candida albicans ATCC 18804 strain by tail vein injection after which the infection was left to develop for three days. The treatment was then started and each mouse was assigned to the following groups: no treatment (control) and iCo-010 at 5, 10 and 20 mg/kg administered via oral gavage once daily (QD) for five consecutive days. After 7 days recovery post treatment the animals were sacrificed and the concentration of AmB and remaining fungal burden (in colony forming units (CFUs)) were assessed within the kidney, liver, spleen, heart, lungs and brain.

RESULTS: The infection was relatively low (~60-100 CFU/ 1ml of tissue homogenate) in the liver, lungs and heart, however the infection was relatively high (70 000 CFU/ 1ml of tissue homogenate) in the kidney tissues for the control group. The fungal burden in the tissues was lowered by 69-96% in the treatment groups when compared to the control group. The highest concentrations of AmB were recovered in the kidneys and the spleen.

CONCLUSIONS: Oral administration of iCo-010 once daily for five days is an effective treatment for systemic candidiasis in the mouse model.

56. TITLE: Pharmacist-led monitoring program for patients on Sunitinib for metastatic renal-cell carcinoma.

AUTHORS: Scott Edwards; Lori Wood; Joy S. McCarthy; Andrew Collins; Lynn Hartery; Rick Abbott; Maria Whelan; Sara Abdi.

OBJECTIVES: Sunitinib is a first-line treatment of metastatic clear cell renal-cell carcinoma (mRCC). Despite having a relatively good safety profile, Sunitinib does have several clinically important toxicities. With the rapid rise in the use of Sunitinib and other oral cancer agents, we instituted a pharmacist-led monitoring program in the ambulatory care setting to prospectively document, monitor, and manage toxicities.

METHODS: The monitoring program consisted of patient assessments in clinic with the oncology team combined with a call back program. The program consisted of a patient assessment in the oncology clinic on day 1 of a Sunitinib cycle followed with a call back on day 14. A chart review of consecutive patients who were prospectively monitored by this progam after receiving Sunitinib for mRCC was conducted. Treatment specific data for the first six cycles of therapy included dose reductions, therapy delays/interruptions, therapy discontinuation, and reason for each was recorded. Toxicity data including the occurrence and severity grade was collected. The time to treatment failure (TTF) defined as the time from therapy initiation to treatment discontinuation for any reason was measured.

RESULTS: Fifty six patients are included in the study cohort. Of these, 52 (92.86%) started at the standard 50 mg once daily and the remainder at a reduced dose. Additionally, 15 patients experienced hypertension requiring drug therapy adjustment or additional antihypertensive therapy. There were a total of 39 dose reductions in this patient population over a six cycle period. The majority of dose reductions (46.2%) and therapy interruptions (34.5%) occurred during cycle one. The time to treatment failure for the 45 patients that discontinued therapy was 9.72 months.

CONCLUSIONS: There is an important role for pharmacist intervention and toxicity management of Sunitinib especially during the first cycle of therapy. Pharmacist-Led monitoring of oral cancer therapies is a practical and

feasible method of monitoring patients on Sunitinib for mRCC. The success has led to its implementation with other agents and disease sites.

57. TITLE: Glucopsychosine, a lipid derived from bovine milk, increases cytosolic calcium to induce calpain mediated apoptosis of acute myeloid leukemia cells.

AUTHORS: L. Angka; E. A. Lee; S. G. Rota; T. Hanlon; P. A. Spagnuolo.

ABSTRACT: Acute myeloid leukemia (AML) is a devastating disease with only 5-35% of adult patients surviving past 2 years. To identify potential novel AML therapeutics, we created and screened a unique library consisting of food-derived bioactive compounds with previously unrecognized anti-cancer activity. Here, we identified glucopsychosine (GLU), a lipid derived from bovine milk, as a novel anti-AML agent. GLU induced death of AML cell lines (IC50: 5-10μM) and primary AML patient samples but had no effect on cells obtained from normal marrow. Given the in vitro effects, GLU was next evaluated in leukemia mouse models. GLU decreased tumor weight up to 4-fold compared to control without evidence of weight loss or changes in serum levels of alkaline phosphatase or creatine kinase. Mechanistically, GLU increased intracellular calcium levels and induced calpain-mediated apoptosis. Co- incubation with verapamil-hydrochloride, a surface calcium channel blocker; MDL, a calpain inhibitor; or culturing cells in calcium-free media abolished GLU induced increases in intracellular calcium and cytotoxicity. This suggests that calpain and extracellular calcium are functionally important for GLU induced AML cell death. Interrogation of publically available data sets shows that surface calcium channels are significantly (>1.25 fold, $p<0.001$) under-expressed in AML cells compared to normal, suggesting that regulation of calcium through these channels is critical to regulating AML cell viability. In summary, glucopsychosine is a novel therapeutic that selectively induces calpain mediated apoptosis and may be useful in future AML treatments.

58. TITLE: Functional requirement and regulation of SIRT2 during oligodendrocyte development and myelination.

AUTHORS: Merlin P. Thangaraj, Laboratory of Molecular Cell Biology, College of Pharmacy and Nutrition, Neuroscience Research Group, University of Saskatchewan; J. Ronald Doucette, Department of Anatomy and Cell Biology, College of Medicine, Neuroscience Research Group, University of Saskatchewan, Cameco Multiple Sclerosis Neuroscience Research Center; Shaoping Ji, Laboratory of Molecular Cell Biology, College of Pharmacy and Nutrition, Neuroscience Research Group, University of Saskatchewan; Adil J. Nazarali, Laboratory of Molecular Cell Biology, College of Pharmacy and Nutrition, Neuroscience Research Group, University of Saskatchewan, Cameco Multiple Sclerosis Neuroscience Research Center.

OBJECTIVES: The myelinating ability of oligodendrocytes (OLs) is crucial for the proper repair of central nervous system (CNS) lesions in multiple sclerosis (MS), making it imperative we learn more about what controls this aspect of their function. Sirtuin2 (SIRT2) is a histone deacetylase, predominantly expressed in OLs and is upregulated during active myelination. The RNA binding protein Quaking (QKI) is known to regulate the expression of several myelin transcripts for proper myelination. In addition, SIRT2 protein is absent in *Quaking viable (Qk^{qk})* mutant mice. We seek to study the role of SIRT2 in myelination and the molecular mechanism by which QKI regulates SIRT2 expression in OL and myelin.

METHODS: The role of SIRT2 in myelination was examined *in vivo* using *Sirt2* null (*$Sirt2^{-/-}$*) mice by quantitative real-time PCR (qRT-PCR), immunohistochemistry and ultrastructural analysis by electron microscopy. The post-

transcriptional regulation of SIRT2 by QKI was investigated by *in silico* analysis using RBPDB (RNA Binding Protein Data Base), and *in vitro* using CG4 oligodendroglial cells by RNA co- immunoprecipitation.

RESULTS: Loss of *Sirt2* leads to hypomyelination and reduction in the number of myelinated axons. In addition, expression of myelin structural genes, *Mbp* and *Plp* were significantly decreased in *Sirt2*$^{-/-}$ mice. Prediction of QKI binding sites in the 3′UTR of *Sirt2* mRNA revealed the presence of two quaking response elements (QREs). RNA co-immunoprecipitation experiments confirmed that all three transcripts of *Sirt2* were bound and stabilized by QKI protein.

CONCLUSIONS: Together, these findings suggest that expression of *Sirt2* is regulated by QKI for proper OL development and that *Sirt2* plays a critical role in the myelination of axons in CNS. We anticipate this research to advance our knowledge in developing cellular and pharmacological therapies for MS.

59. TITLE: A novel role for the liver X receptors in bone marrow derived endothelial progenitor cells.

AUTHORS: Adil Rasheed; Carolyn L. Cummins, Leslie Dan Faculty of Pharmacy, University of Toronto.

ABSTRACT: The liver X receptors (LXRα/LXRβ) are nuclear receptors known for their effects on cholesterol homeostasis and suppression of inflammation, making them attractive targets for the treatment of atherosclerosis. Studies using bone marrow transplants and LXR agonists have found that activation of LXR in bone marrow cells (BM) is important for decreasing atherosclerotic plaque development. This beneficial effect has primarily been ascribed to LXR's effects on the monocyte population. However, hematopoietic stem cells (HSCs) in the bone marrow differentiate to multiple cell types (in addition to monocytes) one of which is the endothelial progenitor cells (EPCs). EPCs are important for vascular repair by enhancing re-endothelialization. Defects in the endothelium are central to the pathogenesis of numerous vascular complications and as such we hypothesize that the vasculoprotective effects of LXR activation in the BM also extends to EPCs; where LXRs help mediate external factors known to negatively affect EPCs, while preserving differentiation of HSCs towards EPCs. Using wildtype and LXRα/β-/- mice, we show that LXRα/β-/- mice have decreased numbers of EPCs, with increases in circulating inflammatory cells. In cultured EPCs, activation of LXRs (with 1μM GW3965) increased expression of the LXR target genes, ABCA1 and ABCG1, and altered expression of lineage markers (CD144 and VEGF), as well as inflammatory factors known to affect EPC health/function (Il-1). Taken together, these results suggest that LXRs play a novel role in preserving the integrity of EPCs in the bone marrow and may provide an important pharmacologic target for the treatment of vascular defects.

61. TITLE: 5-HETE induces cellular hypertrophy in the human ventricular cardiomyocyte RL-14 cells through modulating the expression of cytochrome P450 and its associated arachidonic acid metabolites.

AUTHORS: Zaid H. Maayah; Ayman O. El-Kadi, Faculty of Pharmacy and Pharmaceutical Sciences, University of Alberta.

OBJECTIVES: Recent studies have established the role of midchain-ydroxyeicosatetraenoic acids (HETEs) in the development of cardiovascular disease. Among these midchains, 5-HETE has been reported to have vasoconstrictive and pro-inflammatory action. However, whether 5-HETE can induce cardiac hypertrophy has not been reported before. Therefore, the overall objectives of the present study are to elucidate the potential cardiac hypertrophic effect of 5-HETE in the human ventricular cardiomyocyte RL-14 cells and explore the mechanism(s) involved.

METHODS: Human ventricular cardiomyocyte cell line RL-14 was used. The cells were treated with increasing concentration of 5-HETE (2.5, 5, 10 and 20 μM). Thereafter, the cardiac hypertrophy markers, β-myocin heavy chain (β-MHC), α-myocin heavy chain (α -MHC), atrial natriuretic peptide (ANP) and brain natriuretic peptide (BNP) were determined using real-time polymerase chain reaction (RT-PCR). The role of CYP epoxygenases, ω-hydroxylases and soluble epoxide hydrolase in 5-HETE mediated induction of cellular hypertrophy were determined at mRNA, protein and activity levels using RT-PCR, Western blot analysis and liquid chromatography-electron spray ionization-mass spectrometry, respectively.

RESULTS: Our results showed that 5-HETE significantly induced the cellular hypertrophy in RL-14 cells as evidenced by increase in cardiac hypertrophy markers, β-MHC, α-MHC and BNP genes expression. The 5-HETE-induced cellular hypertrophy was associated with proportional increase in CYP4A11, CYP4F11, CYP2J2 and EPHX2 gene expression at mRNA and protein levels. Moreover, 5-HETE significantly increased the formation of the cardiotoxic metabolite, 20-HETE and the degradation products of the cardioprotective metabolites, 8,9-, 11,12- and 14,15-dihydroxyeicosatrienoic acid (DHET) metabolites.

CONCLUSIONS: The present work provides the first evidence that 5-HETE induces cellular hypertrophy in the human ventricular cardiomyocyte by modulating the expression of cytochrome P450 and its associated arachidonic acid metabolites. Support: This work was supported by a grant from the CIHR to A.O.S.E. Z.H.M. is the recipient of University of Alberta PhD recruiting scholarship.

62. TITLE: Development of a rapid ESI-MS/MS method to characterize docetaxel loaded PLGA and PLGA- PEG nanoparticles.

AUTHORS: Pedram Rafiei; Deborah Michel; and Azita Haddadi, Division of Pharmacy, College of Pharmacy and Nutrition, University of Saskatchewan.

OBJECTIVES: Docetaxel is an antineoplastic agent widely used in cancer chemotherapy. However, its conventional application in chemotherapy is accompanied with concerns about drug's biodistribution, pharmacokinetics, and pharmacodynamics. Polymers such as poly (lactide-co-glycolide) (PLGA) provide nanoparticulate delivery vehicles that can favourably modify drug's pharmacokinetic characteristics. Drug-payload of nanoparticles is an important characteristic that needs to be determined. The majority of studies have used liquid chromatography to determine loading characteristics of nanoparticles. Herein, a rapid ESI-MS/MS method for quantitative analysis of docetaxel in polymeric matrices of PLGA and PLGA-PEG nanoparticles through direct injection to mass spectrometer has been developed and validated.

METHODS: An emulsion solvent evaporation technique was used to fabricate various drug-loaded PLGA nanoparticle formulations. Poly (ethylene glycol) (PEG) surface-modified PLGA nanoparticles were also prepared through the same method. Assay for quantification of docetaxel was validated over a range of 3.9-1000 ng/ml and 125-16000 ng/ml. Samples were direct injected to the instrument through an isocratic elution (0.1% formic acid in methanol) and detection was performed on the mass spectrometer with multiple reaction monitoring mode via positive electrospray ionization (ESI) source. The run and retention time were 2 and 0.6 minutes respectively. Prepared nanoparticles were then fully characterized in terms of drug loading characteristics as well as the entrapment efficiency.

RESULTS: Assay method demonstrated acceptable level of accuracy and precision and was successfully applied for quantitative analysis of docetaxel in polymeric nanoparticles of PLGA and PLGA-PEG. PLGA nanoparticles

exhibited a range of drug loading from 0.12% to 0.56% and entrapment efficiencies of 37% to 47%. In case of PLGA-PEG nanoparticles, drug loading and encapsulation efficiencies were found to be as high as 0.889% and 96.1% respectively.

CONCLUSIONS: Direct injection approach significantly reduced the run and retention time allowed the analysis of a high number of samples in a short period of time. Validation results demonstrate that an accurate, reproducible, and selective assay was obtained throughout a wide linear calibration range.

63. TITLE: Six2 gene is differentially expressed in the epithelia and mesenchyme of the developing secondary palate.

AUTHORS: Dennis O. Okello; Paul Pown Raj Iyyanar; Tara M. Smith; Adil J. Nazarali, Laboratory of Molecular Cell Biology, College of Pharmacy and Nutrition, University of Saskatchewan.

OBJECTIVES: Secondary palate (SP) clefting is one of the most common congenital abnormalities in humans. This condition leads to psychosocial challenges in adolescence if left untreated. At the moment, surgical repair remains the only intervention for correcting this abnormality. Environmental and genetic factors have both been implicated in the pathogenesis of the cleft SP. Maternal use of the anticonvulsant drugs valproic acid and phenytoin, has been shown to cause SP clefting in the new born. However, the molecular mechanisms involved in this drug-induced manifestation are poorly understood. Development of the SP in mice begins around embryonic day (E) 11.5 and is complete by E15.5 when palatal shelves fuse. Sine oculis-related homeobox 2 (Six2) is a member of the vertebrate Six genes family which encode homeobox proteins that are transcription factors. Six2 is a downstream target of Hoxa2, a gene that has been found to play a role in mouse SP development. The objectives are to determine the temporal and spatial expression of Six2 gene in developing SP of wild-type and Hoxa2 null mice.

METHODS: Western blot analysis and immunohistochemical assays were used respectively, to determine Six2 protein content and distribution in the developing palatal epithelia and mesenchyme. Six2 mRNA was quantitated using qRT-PCR.

RESULTS: Six2 protein and mRNA are up-regulated in the absence of Hoxa2 and exhibit a temporal distribution pattern from the time of palatal shelf outgrowth (E12.5) to fusion (E15.5). The domain of Six2 expression reduces from E12.5 to E.15.5 with peak expression occurring between E12.0 and E13.5. Six2 protein exhibits a spatial expression pattern in both the palatal epithelium and mesenchyme.

CONCLUSIONS: We show novel palatal expression profile of Six2 that exhibits an anterior to posterior (A-P) differential expression pattern with expression increasing in the anterior to posterior direction in the developing palate. (Funded by NSERC)

64. TITLE: The effect of obesity on active chemerin in human plasma and serum.

AUTHORS: Jay Toulany, College of Pharmacy, Faculty of Health Professions; Yan Wang, College of Pharmacy, Faculty of Health Professions; Catherine Brown, Clinical Research Unit, Center for Vaccinology, IWK Health Centre; Kathryn Slayter, Division of Infectious Diseases, Department of Medicine, Capital Health; Shelly McNeil, Canadian Center for Vaccinology, IWK Health Centre; Kerry B. Goralski, College of Pharmacy, Faculty of Health Professions, Department of Pharmacology, Faculty of Medicine, Dalhousie University.

OBJECTIVES: Prochemerin is an adipose-secreted molecule that is cleaved by extracellular proteases to active chemerin. Plasma and serum total chemerin (prochemerin + active chemerin) is increased in obese humans suggesting that chemerin may have a pathogenic role in obesity. The effect of obesity on the production of active chemerin is unknown, given a lack of assays that specifically measure active chemerin in biological fluids. Objectives include: 1) To develop a cell-based bioassay to measure active chemerin in human plasma and serum and 2) determine if obesity specifically increases the formation of active chemerin in fasted and fed states.

METHODS: The study involved a clinical population of four normal weight (body mass index (BMI) 20-25) and obese (BMI >30) subjects. Two baseline blood samples were collected after an overnight fast and prior to breakfast. Seven additional blood samples were collected in the post-prandial period. A cell- based reporter-gene assay that quantitatively measures chemerin activation of the chemokine-like receptor 1was used to determine the active chemerin concentrations in plasma and serum samples.

RESULTS: The average active chemerin concentration over all time points was higher ($P<0.001$) in obese vs. normal weight subjects in serum (8.50 ± 0.59 nM vs. 6.52 ± 0.34 nM) and plasma (6.28 ± 0.59 nM vs. 3.93 ± 0.71 nM). The baseline and postprandial plasma and serum active chemerin concentrations were similar. Plasma and serum active chemerin concentrations more strongly correlated to waist to hip ratio ($r = 0.827$ and 0.877) compared to BMI ($r = 0.568$ and 0.693).

CONCLUSIONS: Central obesity contributes to elevated active chemerin concentrations in human plasma and serum supporting the potential for modified chemerin signalling and function in obese individuals with central obesity.

65. TITLE: Cloning and characterization of a new mouse long noncoding RNA mHotairm1that regulates expression of Hoxa1 and Hoxa2.

AUTHORS: Ran Bi; ShaopingJi; Adil J. Nazarali, Laboratory of Molecular Cell Biology, College of Pharmacy and Nutrition, and the Neuroscience Research Group, University of Saskatchewan.

OBJECTIVES: Hox genes are transcription factors that control vertebrate morphological diversity along the anterior-posterior (AP) axis. There are 39 Hox genes organized into four gene clusters (HoxA-D) in vertebrates. Hoxa1 is important in hindbrain, inner ear and cardiovascular development whereas Hoxa2 determines the areas of skeletogenesis in the second branchial arch mesenchyme and is involved in hindbrain, palate and ear development. Hox genes are regulated by epigenetic activators of the Trithorax group (TrxG) and epigenetic repressors of the Polycomb group (PcG). However, the precise mechanism and role of long non coding RNA (lncRNA) in the regulation of Hoxa1 and Hoxa2 are not known. Objective is to clone a newly identified lncRNA (mHotairm1) between the intergenic region of Hoxa1 and Hoxa2 and characterize its role in Hoxa1 and Hoxa2 gene regulation.

METHODS: A new lncRNA transcript (mHOTairm1) was cloned from mouse RNA located in the intergenic region of Hoxa1 and Hoxa2. The lncRNA shared some similarity with the human Hotairm1 sequence. Capture hybridization analysis of RNA targets (CHART), glutathione S-transferase (GST) fusion protein pull down and chromatin immunoprecipitation (ChIP) experiments were carried out to determine the functional role of mHotarim1.

RESULTS: mHotarim1 was found to regulate the expression of Hoxa1 and Hoxa2 in NIH 3T3 cells by recruiting TrxG complex MLL1/WDR5 to chromatin. Interestingly, only ubiquitylated WDR5 was present in cell nucleus and able to interact with MLL1 and mHotairm1.

CONCLUSIONS: We have cloned a new lncRNA mHotairm1 that recruits MLL1/WDR5 to Hox target genes and demonstrate for the first time the importance of ubiquitylated WDR5 in lncRNA mediated histone methylation and Hoxa1 and Hoxa2 gene regulation. This study could provide potential epigenetic drug targets or diagnostic marks in human diseases. (Funded by NSERC)

66. TITLE: Utility of using a new HPLC method for determination of dronedarone in rat tissues.

AUTHORS: Yousef A. Bin Jardan; Dion R. Brocks, Faculty of Pharmacy and Pharmaceutical Sciences, University of Alberta.

OBJECTIVES: Dronedarone is a benzofuran derivative of amiodarone that is used for the treatment of cardiac arrhythmias. Although it was originally thought to possess a superior toxicity profile to amiodarone, recent reports have arisen that describe similar types of toxicities. There were several cases reports showing that dronedarone is associated with serious side effects like toxic hepatitis and pulmonary toxicity in human. Little to no peer-reviewed published information is available on the tissue uptakes of dronedarone. Therefore, we validated a high-performance liquid chromatographic method for quantification of dronedarone in rat tissues.

METHODS: For method validation, drug-free tissues were homogenized in distilled water (1:3 w/w). Dronedarone and internal standard (IS, ethopropazine) were added and extracted using liquid-liquid extraction with hexane. Chromatography was carried out using a C18 column (150 mm*4.6 mm with 5 µm). The mobile phase consisted of acetonitrile: [25 mM KH_2PO_4: 3 mM sulfuric acid: 3.6 mM triethylamine] in a combination of 48:52 v/v. This was pumped isocratically at 1 mL/min. UV Detection was performed at 254 nm for IS, and subsequently changed to 290 nm for dronedarone at 7 min. The assay was tested using 2 Sprague Dawley rats administered 65 mg/kg of dronedarone base orally. At 6 h post-dose, the animals were euthanized, and liver, heart and lung collected.

RESULTS: The components eluted within 16 min. The peaks were symmetrical with no interference from endogenous compounds in tissues. The mean calibration curves were linear (>0.999) over the range of 250-10,000 ng/g tissue in liver, heart and lung. The intraday CV was < 11% and mean percentage error < 8%. The validated lower limit of quantitation was 250 ng/g tissues.

CONCLUSIONS: This adopted chromatographic method was successfully capable of determining dronedarone concentrations in rat tissues (liver, heart and lung). The data showed that the lung has the highest concentration of dronedarone (94000ng/g tissue) compared to liver (8790 ng/g tissue) and heart (4400 ng/g tissue).

67. TITLE: Evaluation of dendritic cell uptake and expression of maturation markers: Two important factors for targeted nanoparticle vaccine delivery system.

AUTHORS: Sheikh Tasnim Jahan; Azita Haddadi, College of Pharmacy and Nutrition, University of Saskatchewan.

OBJECTIVES: A therapeutic vaccine aims in stimulating a patient's immune response to work smarter to fight cancer cells. This in-vivo stimulation of dendritic cells (DCs) will help to identify antigens as non- self.

However, it is challenging to reach DC site and stimulate DCs to obtain specific immune response. A promising therapeutic tool will be a structurally modified nanoparticulate delivery system capable of packaging and protecting antigen-adjuvant complex from degradation. FDA approved (poly-lactide-co- glycolide) meets the criteria to carry this targeted cargo to DCs due to their low immunogenicity, low toxicity, biocompatibility and biodegradability. A structurally modified nanoparticle delivery system will be developed in order to be efficiently endocytosed by DC specific receptor, CD205. This uptake will be assessed by incorporating a suitable fluorescent dye (coumarin 6) in the formulations. Following DC uptake, the nanoparticle's ability to mature the DCs will also be evaluated in terms of expression of maturation markers.

METHODS: PLGA nanoparticles (with or without fluorescent dye) were prepared by emulsification- solvent evaporation technique. Ovalbumin loaded nanoparticles were prepared by double emulsification-solvent evaporation method. The DC targeting ligand was attached on the nanoparticle surface through covalent binding in presence of the spacer molecule and physical adsorption method. Formulations included several categories such as: plain, ligand modified, ovalbumin loaded, ovalbumin- adjuvant loaded nanoparticles.

RESULTS: The PLGA nanoparticles had suitable physicochemical characteristics for in-vitro biological experiments. DC uptake study shows that when ligand is covalently attached, higher uptake of nanoparticles was observed compared to ligands that are adsorbed. This indicates the strong bond between activated nanoparticle and ligand selective for CD205 receptor. While evaluating maturation of DCs, structurally modified nanoparticles showed upregulation of maturation markers such as CD40, CD86 and major histocompatibility (MHC)-II molecules.

CONCLUSIONS: Therefore, our goal is to design a nanoparticle vaccine delivery system which will be structurally modified to effectively stimulate the DCs to present the epitopes to obtain an antigen specific immune response in-vivo.

68. TITLE: Targeted chemotherapy: An innovative approach against HER2 positive breast cancer.

AUTHORS: Sams Mohammad Anowar Sadat; Azita Haddadi, College of Pharmacy and Nutrition, University of Saskatchewan.

OBJECTIVES: Overexpression of Human epidermal growth factor receptor (HER2) occurs in around 30% of breast cancers. This overexpression is a key biomarker for earlier pathogenesis and suitable to target by receptor specific ligand based anticancer drug delivery system. The main purpose of this study is to formulate Trastuzumab modified HER2 specific drug delivery system. Physicochemical characterization has been applied to see the effect of delivery systems against HER2 specific breast cancer cells.

METHODS: Emulsification-solvent evaporation technique has been employed to prepare Docetaxel loaded Poly(D,L-lactic-co-glycolide) (PLGA) nanoparticles. Trastuzumab was covalently attached with freeze dried nanoparticle which was pre-activated with homo-bifunctional spacer, bis(sulfosuccinimidyl) suberate (BS3). Physicochemical characterization of all nanoparticle formulations was done in terms of particle size, zeta potential, polydispersity index, and antibody quantification.

RESULTS: Low molecular weight ester-terminated PLGA nanoparticles were found to be in lower size range compared to carboxylic-ended PLGA nanoparticles. Depending on drug to polymer ratio, the size of drug loaded nanoparticles was observed to be below 200nm before freeze-drying and below 1000nm after freeze-drying,

where no cryoprotectant was used in the formulation. In the next step, 0.1% to 10% sucrose was used as a cryoprotectant. The results showed an improvement in the particle size (200 to 400 nm), surface charge (-5 to -25 mV) and polydispersity index (0.16 to 0.86) after freeze-drying. Different amounts of BS3 were used with optimized 10% cryoprotectant to prepare plain nanoparticles for binding with Trastuzumab. No significant difference was observed in terms of size, surface charge and polydispersity index for using different amount of BS3 in the formulations. Size of the nanoparticles was found below 900nm after the covalent attachment between the antibody and crosslinking agent embedded on the nanoparticle surface.

CONCLUSIONS: The size, surface charge, polydispersity index of nanoparticles were found within the desired range to functionalize with Trastuzumab. 10% cryoprotectant has been optimized in all the formulations to preserve the nanoparticles for developing a targeted delivery system suitable for receptor-mediated endocytosis.

69. TITLE: Pharmacy student perspectives on the effectiveness of a skills-based simulated practice course in preparation for Early Experiential.

AUTHORS: Debra M. Moy, B.Sc.(Pharm), ACPR., M.Ed.; Suzanne Singh, B.Sc.(Pharm), ACPR., Pharm.D., Leslie Dan Faculty of Pharmacy, University of Toronto.

OBJECTIVES: Medication Therapy Management 3, is a Year 2 course in the winter term where students practice clinical skills in simulated encounters with Standardized Patients (SPs), in preparation for their Early Practice Experiential (EPE-2) during the summer. The study objective is to determine student perceptions on the effectiveness of MTM3 in preparing them for EPE-2.

METHODS: A 15-item survey was administered just prior to the start of the Year 3 to all students (n=224). Students received an email invitation outlining the purpose and process for survey completion, followed by the survey link with four subsequent reminders. Responses were anonymous and collated via Survey Monkey.

RESULTS: The survey response rate was 57.1%. Students completed EPE-2 in various practice settings (Community/Family Health Team: 59.2%, Hospital/Long Term Care: 40.8%). Most students (84.4%) agreed, or agreed strongly, that MTM3 increased their level of confidence, and that interacting with SPs enhanced their comfort-level in patient interactions (79.5%) in EPE-2. Therapeutic topics addressed during MTM3 were commonly encountered during EPE-2 (79.6% agree or strongly agree). Students indicated that they used the skills learned in MTM3 at their practice site including: gathering patient information (66% often or always) and applying communication skills (80.2% often or always). Skills from MTM3 used less often during EPE-2 included: providing patient follow-up (27.6% often or always) and making recommendations to patients (52% often or always). Students indicated a lack of confidence in the following areas that they had not yet had exposure to in the curriculum: adapting or renewing prescriptions (77.4% not, or somewhat, confident), legal requirements related to influenza immunization and smoking cessation prescribing (86.8%), and advising on minor ailments.

CONCLUSIONS: Students perceived that MTM3 helped them develop the skills and confidence needed for their EPE-2 rotations. Areas identified where students lacked confidence, such as expanded scope activities, were considered for further curricular integration.

70. TITLE: The use of pharmacy student feedback in influencing and evaluating the design of a skills-based simulated practice course module on Expanded Scope of Practice.

AUTHORS: Debra M. Moy, B.Sc.(Pharm), ACPR., M.Ed.; Suzanne Singh B.Sc.(Pharm), ACPR., Pharm.D., Leslie Dan Faculty of Pharmacy, University of Toronto.

OBJECTIVES: Student feedback revealed that Year 2 students lacked confidence in expanded scope skills needed for practice. This was addressed in Medication Therapy Management 4 (MTM4), a Year 3 course designed to help students develop these skills, in preparation for their Advanced Pharmacy Practice Experiences (APPEs). The study objective is to determine student perceptions on the effectiveness of teaching methods (workshops, lectures and simulations using Standardized Patients) used in the MTM4 Expanded Scope of Practice Module.

METHODS: A 10-item survey was administered to all Year 3 students (n=224) after the conclusion of MTM4. Four questions focused on student understanding of and confidence related to expanded scope of practice. Students received an email invitation outlining the purpose and process for survey completion, followed by the survey link with four subsequent reminders. Responses were anonymous and collated via Survey Monkey.

RESULTS: The survey response rate was 68.8%. Students indicated the lecture portion of the Expanded Scope of Practice Module to be somewhat, or very, helpful in gaining an understanding of advising on minor ailments (94.4%), adapting/renewing prescriptions (89.7%), and advising on public health services related to influenza immunization and smoking cessation (90.4%.). A workshop on collaborating with Registered Pharmacy Technicians to deliver expanded scope services was found to be very, or somewhat, useful (71.9%) by students. Students desired more opportunities to practice expanded scope skills within the course. Students also indicated interest in practicing additional skills, such as medication reconciliation (86.3%) and learning how to implement cognitive services in community practice (82.8%), which were not included in MTM4.

CONCLUSIONS: Students perceived that the teaching methods used within the MTM4 Expanded Scope of Practice module helped them develop skills and confidence in anticipation of their APPEs. Areas identified by students for further skill development, such as medication reconciliation, were considered for further curricular integration.

71. TITLE: Formative Assessment for Critical Thinking Skills (FACTS) in a large group: An OBGYN course experience.

AUTHORS: Ferreira Ema, University of Montreal, Faculty of Pharmacy, CHU Sainte-Justine, Mother and Child University Hospital Center; Martin Brigitte, CHU Sainte-Justine, Mother and Child University Hospital Center; Morin Caroline, CHU Sainte-Justine, Mother and Child University Hospital Center; Leclerc Gilles, University of Montreal, Faculty of Pharmacy.

OBJECTIVES: The study focuses on the impact of team learning on the development of clinical reasoning skills (learning), student-professor and student-student interactions as well as the classroom and overall student experience.

METHODS: To assess the impact of the model on student learning, student performance and psychometric performance of items were calculated at three different times: 1) during the second year of the program (A2012 - H2013) with multiple-choice questions (MCQ); 2) in the days preceding the learning team meeting with the same MCQ; 3) at the end of the third year course with an exam including MCQ and a clinical note. The classroom and

overall experiences were assessed through an electronic survey administered immediately after the delivery of the course.

RESULTS: Partial analysis of scores and psychometric indices acknowledges the necessity of knowledge recall and the benefits of team-based learning (result to follow). According to students (n=64, 33,3%), the FACTS model in a OBGYN course during the third year of a PharmD program (A2013, n=192), stimulated the participation in class (50.9%), the interaction between students (62.3%) and with the professors (54.7%) and the interest in the topic (54.7%). The workload (80.8 %) and the time allocated (73.5%) to the preparation, the quality of intervention in class by the professors (69.2%) were also appreciated by students. The students consider themselves more confident to prioritize clinical problems (63.5%), in applying the principles of pharmacotherapy (44.2%), in adapting their interventions to context (48.1%), in writing clinical notes (51.9%) and to make clinical decisions (51.9%).

CONCLUSIONS: The FACTS model seems to improve the large group classroom experience. It could be used in other classes of the Pharm.D. program to improve quality of learning and classroom experience.

72. TITLE: Improving pharmacy students' preparedness for clinical rotations and pharmacy practice.

AUTHORS: Leclerc Gilles; Pinard D'Amour Geneviève-Anne; Ferreira Ema, Faculté de pharmacie, Université de Montréal.

OBJECTIVES: Program evaluation indicates that there is a gap between academics and clinical practice. These inputs called for specific curricular changes and educational interventions to improve student preparedness for clinical rotations and pharmacy practice.

METHODS: Program evaluation data were collected through focus groups (graduate students, preceptors) and feedback from faculty. Program modifications were discussed, proposed and approved by Students, Faculty and University committees.

RESULTS: In pharmacotherapy, data analysis showed more prevailing weaknesses in endocrinology and in infectious diseases. These weaknesses were linked primarily to course sequence for endocrinology as students were not prepared for the second year. The lack of knowledge recall and integration by students was observed mainly in antibiotherapy. In 2013, infectious disease courses were changed from 8 credits in the fall of the 2nd year to 4 courses spread between the 2nd and 3rd years. The endocrinology course was moved from 3rd year to the winter semester of the 2nd year. To improve knowledge integration, skill labs and OSCE exams were planned as a continuum that culminate by a revise 3rd year skill lab delivered by small group problem-based learning (from 1 to 2 credits) and by the introduction of a three-part recapitulative exam held at the end of the third year of the PharmD before the APPE year.

CONCLUSIONS: The program evaluation lead to a revision of course sequence and to educational interventions aiming to foster knowledge recall, consolidation and integration throughout the program, to engage student more actively in the monitoring of their professional development, to strengthen student level of professional confidence, to confirm student preparedness for clinical rotation and to enable data collection for continuous quality improvement of the program. Quality improvement of curriculum must rely on efficient and reliable data input to guide the implementation of program tailored changes and also on efficient and reliable assessment

mechanism of the impact of curricular changes and educational interventions on student learning and preparedness for Clinical Rotations and Pharmacy Practice.

73. TITLE: The deconstruction of a course's examinations to determine if course objectives are met.

AUTHORS: Cheryl Kristjanson; Drena A Dunford, Faculty of Pharmacy, University of Manitoba.

OBJECTIVES: The purpose of this poster is to outline a process to analyze student performance on clinical exams to inform future course construction, teaching methodologies, feedback and assessment strategies. Specific items assessed: (1) whether the intended curriculum matched the exam questions both in content and cognitive level, (2) relative distribution and weighting of questions per objective, (3) frequency distribution of marks students attained per objective and (4) which objectives students mastered / struggled with and why?

METHODS: We utilized a participatory action research model including both quantitative and qualitative methodologies. We applied the ICE framework (Fostaty Young S, Wilson R. 2000) to examine the relationship between student success on clinical pharmacy exams, course objectives and the assessment questions. Quantitative methods were used to conduct a content validity test to determine whether the course objectives matched assessment questions and frequency distribution analysis to determine how well the students learned those objectives. The qualitative portion of the study included a guided self-reflection an instructor to determine what future pedagogy and assessment design changes should be made.

RESULTS: Objectives were weighted more than others in regards to the number of questions and the relative weighting of the marks and cognitive level. The qualitative reflection on the frequency distribution and design of the questions revealed students mastered questions where there was a variety of possible responses or the instructor identified specific teaching strategies that supported student learning. Questions where students struggled were most often taken directly from the readings, addressed content that received less time in lectures or were questions that the instructor found difficult constructing.

CONCLUSIONS: The instructor has identified that the construction of an assessment blueprint prior to designing an exam and analyzing student performance afterwards provides important information to inform future course design, delivery and assessment. Analyzing exam results ensured a structured approach to include or drop questions. It also provided specific information to the instructor on the mastery level of the class and the cognitive deficits of struggling students.

74. TITLE: Revising the blueprint for the Dalhousie College of Pharmacy's Multiple Mini Interview Assessment of Applicant's Non-academic Attributes.

AUTHORS: Anne Marie Whelan, College of Pharmacy, Department of Family Medicine, Dalhousie University; Rita Caldwell, College of Pharmacy.

OBJECTIVES: One component of Dalhousie's College of Pharmacy admissions process is the use of Multiple Mini Interviews (MMIs) to assess the non-academic attributes of applicants. The blueprint (description of the attributes assessed and point values for each) for this assessment had been determined in the early 2000s. With the changes in the scope of pharmacy practice and pharmacy curricula, it was recognized that this blueprint should be re-evaluated to determine if the most important attributes were currently being assessed. Thus, the objective of this project was to update and revise the blueprint for assessing non-academic attributes.

METHODS: A literature search was performed to determine non-academic attributes assessed by other pharmacy programs. The author of one identified article was contacted for more information. A questionnaire was drafted and pilot tested, with final changes made in response to feedback. The questionnaire was administered via Dalhousie University's online survey tool "Opinio". An email inviting participation in the project was sent to 777 stakeholders (College faculty/staff, students, stakeholders (e.g.in pharmacy practice, industry, government)) on January 21, 2013 with two follow-up reminders. Data was analyzed using SPSS.

RESULTS: There were 367 (47.2%) useable responses. Respondents ranked (from 1=most important to 12=least important) the following non-academic attributes as the most important ones to assess during the MMI: 1) commitment to care; 2) critical thinking, problem solving, creativity; 3) ethical reasoning/integrity; 4) responsibility; 5) interpersonal skills; 6) oral communication skills; 7) maturity; 8) motivation to be a pharmacist; 9) conflict resolution; 10) team player; 11) self-awareness; and 12) management skills. A further analysis found that both nonstudent respondents and student respondents ranked commitment to care as most important and conflict resolution, team player, self- awareness and management skills as least important.

CONCLUSIONS: Based on the survey results a new blueprint for attributes to assess during the admissions process was finalized. This new blueprint was used for the first time in 2014 admissions cycle.

75. TITLE: Effect of guided peer evaluation on students' self-efficacy toward reflection.

AUTHORS: Chowdhury F. Faruquee; Dr. Ken Cor; Dr. Lisa M. Guirguis, Pharmacy Practice division, Faculty of Pharmacy and Pharmaceutical Sciences, University of Alberta.

OBJECTIVES: Self-reflection is the process of reviewing and analyzing an event to inform future performance and has been shown to improve patient care and reduce medical errors. Students often lack the self-efficacy (SE) for effective professional self-reflection. We hypothesized that pharmacy students' SE towards writing and evaluating reflections would increase after a guided peer evaluation of self-reflection task.

METHODS: A single group pre and post design was used. First year pharmacy students in a communication skill course wrote a reflection on a "patient interview" task. The course instructor guided students as they assessed a draft of a peer's reflection and provided verbal and written feedback. Students used feedback to improve their assignment before submission. Prior to guided evaluation of peer reflection and after the assignment was returned, students completed an online questionnaire designed to measure SE toward writing and evaluating reflections. The questionnaire contained 12items measuring task SE toward writing reflections and evaluating reflections with a six point Likert scale ("not sure at all" to "extremely sure"). Exploratory factor analysis revealed two distinguishable factors: SE toward writing a reflection (four items) and SE toward evaluating a reflection (eight items).

RESULTS: Pre and post-test surveys were completed by 119 students (response rate = 90.2%). Paired t- tests comparing pre and post test scores for the two scales revealed significant increases in self efficacy: SE toward writing reflections (Dif = 0.34, $t = 3.85$, $p < 0.05$, two tailed) and SE toward evaluating reflections (Dif = 0.50, $t = 6.07$, $p < 0.05$, two tailed).

CONCLUSIONS: Our evaluation revealed improvements in SE beliefs toward writing and evaluating reflections. Future evaluation would benefit from including a control group to be able to make inferences about whether the intervention was the primary driver of these effects.

76. TITLE: Mentoring for publication in a master's program in hospital pharmacy.

AUTHORS: Julie Méthot, B.Pharm., Ph.D., Institut universitaire de cardiologie et de pneumologie de Québec (IUCPQ), Faculté de pharmacie, Université Laval; Louise Mallet, B.Sc.(Pharm), Pharm.D., CGS, FESCP, Faculté de pharmacie, Université de Montréal, Centre hospitalier de santé McGill.

OBJECTIVES: In 2011, a 1-credit course on writing a scientific publication and on the peer-review process for scientific articles was launched. This course is given to the residents enrolled in the master's degree program in hospital pharmacy in the Université de Montréal's Faculty of Pharmacy. To pass the course, the residents have to submit an article to a peer-reviewed journal. The objective is to To describe the experience of publishing an article in a structured communication course given to the residents in the Université de Montréal's Faculty of Pharmacy.

METHODS: Data pertaining to the communication course were compiled in 2011-2012 and 2012-2013. These data concerned the number of teams, the selected journals, and the type and number of articles published.

RESULTS: Two cohorts of residents (n = 63) successfully completed the communication course. Twenty- four manuscripts were written by groups of two or three students. The results concerning the articles accepted and published are available for the 2011-2012 cohort. Eight articles were published in five different journals. The manuscripts were published in the following journals: *Pharmactuel* (n=4), *Canadian Journal of Hospital Pharmacy Journal* (n=1), *Canadian Pharmaceutical Journal* (n=1), *Pharmacotherapy* (n=1) and *British Journal of Anesthesia* (n=1). Three manuscripts are currently in press. The publication rate for the first cohort is presently 61.5%.

CONCLUSIONS: The pharmacy scientific communication course has enabled all the residents to experience writing a scientific article, to receive peer-review comments for improving their article, and to submit it to a peer-reviewed journal. We hope that this experience will inspire this new generation of pharmacists to publish in scientific journals.

79. TITLE: Implementing PBL in various forms in a new post-baccalaureate PharmD course.

AUTHORS: Jill J. Hall, Faculty of Pharmacy and Pharmaceutical Sciences; Clarissa Chow, Faculty of Pharmacy and Pharmaceutical Sciences; M. Ken Cor, Faculty of Pharmacy and Pharmaceutical Sciences; Genevieve Gauthier, University of Alberta, Faculty of Education, University of Alberta.

OBJECTIVES: "Advanced Pharmacotherapy" is a course developed for the new post-baccalaureate Doctor of Pharmacy program at the University of Alberta. To introduce a new instructional approach to students, various forms of problem based learning (PBL) techniques were chosen to promote critical thinking and self-directed learning skills. Case content and structure were developed using a systematic process of consulting therapeutic and education experts for 3 PBL variations: a modified form of 'traditional' PBL (mPBL), case-based learning, and therapeutic-controversy based learning. As PBL requires active participation from students, our study evaluated students' experience of the different types of PBL in this doctorate level course.

METHODS: A mixed-methods approach was used to generate data for analysis. Weekly surveys containing 5-point Likert scale items as well as open-ended questions were used after each case. In addition, a focus group with all students (N=10) was conducted following completion of the course to generate rich qualitative data.

RESULTS: Content analysis of the focus group data revealed that the mPBL approach generated the greatest depth and breadth of knowledge and instilled the necessary 'process' perceived to be required to solve patient cases or problems. Students commented on how mPBL provided the opportunity to discuss their synthesized learning, serving to solidify learning and garner valued clinical pearls for practice from the facilitator. Alternatively, the two other forms of PBL were perceived as not generating the expected process oriented skills and did not enable a synthesis of information. Students' comments indicate a sense of conflict with their appreciation for the more familiar didactic nature of modified case-based learning and their belief that it provided a more superficial learning experience.

CONCLUSIONS: Students had a clear preference for mPBL. Survey data revealed themes relating to facilitator engagement, therapeutic knowledge depth and breadth, and process of care in their experience of this PBL-based course, which have implications for course re-design for future offerings.

80. TITLE: The effect of repeating undergraduate pre-Pharmacy core courses on probability of success in a Pharmacy program: A Bayesian network perspective.

AUTHORS: Robert D. Renaud, Faculty of Pharmacy, University of Manitoba, Faculty of Education, University of Manitoba; Sheryl A. Zelinitsky, Faculty of Pharmacy, University of Manitoba; Cheryl Kristjanson, Faculty of Pharmacy, University of Manitoba.

OBJECTIVES: Given that our earlier work showed that the number of pre-Pharmacy core course repeats (CCR) significantly predicted Pharmacy GPA, the objective was to examine, with a Bayesian network model (BNM), the probability of academic success in a Pharmacy program based on CCR and other background variables.

METHODS: Data consisted of 18 background variables and yearly GPA for 362 students over seven consecutive academic years. A BNM was created to determine which background variables were most influential toward the probability of success in a Pharmacy program.

RESULTS: Incoming GPA and number of CCRs had the greatest influence on overall Pharmacy GPA (mean GPA of year 1 to year 4). Among students with very high incoming GPA (>4.25), the probability of experiencing academic difficulty across the Pharmacy program for those with no CCR was 2.4%, and 1 CCR was 16.7%. Among those with lower incoming GPAs (<4.00), the likelihood of difficulty across the Pharmacy program was somewhat higher for those who had either no CCR (7.3%) or 1 CCR (7.7%), but increased substantially for students who had 2 or more CCRs (23.1%). This interaction shows that the effect of CCRs depends on the level of a student's incoming GPA.

CONCLUSIONS: Supporting our previous research, students with CCRs did not perform as well in the Pharmacy program. As opposed to standard analyses of background variables and their effects on variances, BNM provided a more effective approach to identifying interactions and a more intuitive interpretation by determining the influence of CCRs on the probability of success in the program. In sum, this study demonstrates a more practical way to identify students who are more likely to experience difficulty in a Pharmacy program.

81. TITLE: Implementation of a multi-cohort project-based learning course on community services realized through local partnerships.

AUTHORS: Chantal Pharand, Faculté de pharmacie, Université de Montréal, Hôpital du Sacré-Cœur de Montréal; Pierre-Marie David, Faculté de pharmacie, Université de Montréal; Caroline Robitaille, Faculté de pharmacie, Université de Montréal; Aude Motulsky, Faculté de pharmacie, Université de Montréal, Centre universitaire de

santé McGill; Johanne Collin, Faculté de pharmacie, Université de Montréal; Marie-France Beauchesne, Faculté de pharmacie, Université de Montréal, Centre hospitalier universitaire de Sherbrooke; Michelle Normandeau, Faculté de pharmacie, Université de Montréal, Direction de santé publique de l'Agence de la santé et des services sociaux de Montréal; Nancy Sheehan, Faculté de pharmacie, Université de Montréal, Centre universitaire de santé McGill; Françoise Crevier, , Faculté de pharmacie, Université de Montréal.

OBJECTIVES: The main objective is to present a brief assessment of the implementation of a project- based learning course on community services addressing local community problems through partnership with the community. This course was developed and implemented in 2010 by the Faculty of Pharmacy at the Université de Montréal, in the new first professional degree Doctor of Pharmacy program (Pharm.D.). The main objectives of these courses are, among others to: a) develop an open-mind towards the situation of people from various socioeconomic backgrounds; b) exercise leadership; c) collaborate in interdisciplinarity with healthcare professionals in the community.

METHODS: Two-credit courses for first and second-year pharmacy students were designed and developed to take better advantage of a "project-based learning" approach, and implemented in collaboration with local community health partners. The courses last for two trimesters and are mandatory for all 200 each student cohort. Each team's goal was to create, develop and implement a project that had to: a) generate a social or community impact, b) be deployed in the community; c) respect 1 of 2 imposed themes (e.g. obesity or stress on the first year). Three mentors and 2 faculties guide the students in their projects.

RESULTS: Student achievement of curricular outcomes was measured using teacher evaluation. A 360- degree assessment and auto-evaluation was also implemented. Projects were generally very welcomed by community partners. Students demonstrated leadership and confidence in collaborating with community members.

CONCLUSIONS: The students developed new skills and strengthened their competencies, namely leadership and critical thinking. The Faculty of pharmacy took a greater place in local communities providing health services. This innovative course should be better assessed using professor assessment, self-evaluations, partner evaluation, and students' perception.

82. TITLE: Service-Learning as a strategy to enhance student understanding of the profession and patient centred care.

AUTHORS: Angela Kim-Sing, Pharm.D., Faculty of Pharmaceutical Sciences, University of British Columbia; Allyson Rayner, MA, Community Learning Initiative, University of British Columbia; Jason Penner, MA Candidate, Faculty of Education, University of British Columbia; Paulo Tchen, MBA, Faculty of Pharmaceutical Sciences, University of British Columbia; Jas Jawanda, B.Sc.(Pharm), Faculty of Pharmaceutical Sciences, University of British Columbia.

OBJECTIVES: To pilot a service-learning course in pharmacy as a strategy to enhance professionalization and student understanding of patient centred care.

METHODS: Ten students were enrolled in the course and eight students participated in this study. Data collection was limited to the written reflections and focus groups. Analysis of the data was a qualitative thematic analysis using NVIVO 10 software.

RESULTS: Five inflection points for student learning were identified which resulted in two key outcomes observed: (1) students had a deep understanding of patient centred care, and (2) students understood the role of

the pharmacist in the current climate. These outcomes were understood through Kolb's experiential learning model and Vygotsky's theory on the zone of proximal development.

CONCLUSIONS: Incorporating service-learning is an excellent way of improving student's academic experience. The community oriented coursework gave meaning to patient centred care and interprofessional collaboration, and enhanced student understanding of the profession.

83-1. TITLE: Creating a program evaluation plan for advanced pharmacy practice experiences.

AUTHORS: Daniel Chan, B.H.Sc., B.Sc.(Pharm), Pharm.D. student; Andrea Cameron, B.Sc.(Pharm), MBA, Leslie Dan Faculty of Pharmacy, University of Toronto.

OBJECTIVES: Program evaluation provides evidence-based decision making to enhance a program's quality and effectiveness. In 2011, the Leslie Dan Faculty of Pharmacy introduced the new entry to practice Doctor of Pharmacy (PharmD) degree, which included significantly more time in experiential learning than the previous Bachelor of Science in Pharmacy degree. While the Faculty of Pharmacy's previous experiential program had some individual aspects of program evaluation, there was no systematic model/methodology implemented to ensure comprehensiveness. The objective is to design a systematic and sustainable program evaluation plan for advanced pharmacy practice experiences (APPE) in a new entry to practice PharmD program.

METHODS: The APPE program evaluation was developed using the Association of Faculties of Pharmacy of Canada (AFPC) "A Program Evaluation Guide for Canadian Faculties of Pharmacy", initially presented by I. Price at the AFPC conference on June 4, 2010. The guide was followed and steps were adapted for the context of the APPE program.

RESULTS: Initial components of the APPE program evaluation have been designed. A detailed program logic model has been completed to describe the APPE program's inputs, activities and outcomes, and their relationships. A stakeholder diagram has been generated to identify and prioritize stakeholders. Overarching program evaluation goals specific to the APPE program are complete. Ongoing work consists of identifying areas of priority within the program logic model, developing evaluation questions, identifying key performance indicators, setting goals for indicators and identifying sources of information. Future steps will include selecting evaluation tools, implementation of program evaluation, analysis and application of program evaluation results, and determining the overall ongoing management of the program evaluation.

CONCLUSIONS: The AFPC's guide for building a program evaluation has been successfully applied to the University of Toronto's APPE program. Completion of this program evaluation will provide a systematic and comprehensive evaluation of the APPE program and direct quality improvement activities. The plan will be sustainable, requiring occasional modifications.

83-2. TITLE: Creating a framework for program evaluation of advanced practice experiences.

AUTHORS: Daniel Chan, B.H.Sc., B.Sc.(Pharm), Pharm.D. student; Andrea Cameron, B.Sc.(Pharm), MBA, Leslie Dan Faculty of Pharmacy, University of Toronto.

OBJECTIVES: Program evaluation is an essential component to provide evidence to enhance a program's quality and effectiveness. In 2011, the Leslie Dan Faculty of Pharmacy introduced the new entry to practice Doctor of Pharmacy (PharmD) degree, which included more experiential learning than the previous Bachelor of Science in

Pharmacy degree. While the faculty's previous experiential program had some individual aspects of program evaluation, there was no systematic methodology implemented. The objective is to design a systematic and sustainable framework for program evaluation of advanced pharmacy practice experiences (APPEs) in a new entry to practice PharmD program.

METHODS: A review of internal faculty resources, published literature using search terms "program evaluation", "pharmacy" and "experiential" in Ovid's International Pharmaceutical Abstracts and PubMed, and conference materials from the Association of Faculties of Pharmacy of Canada (AFPC) was undertaken. Framework would be created by consensus between authors based on literature identified and further reviewed by the Office of Experiential Education (OEE) department and senior leadership.

RESULTS: Two relevant articles and the AFPCs "A Program Evaluation Guide for Canadian Faculties of Pharmacy", initially presented by I. Price at the AFPC conference on June 4, 2010, were evaluated. The authors adapted AFPC's program evaluation guide to create the framework for program evaluation of APPEs. Framework components include: detailed program logic model, which describes the APPE program's inputs, activities, outputs and outcomes, and their theoretical relationships; stakeholder diagram to identify and prioritize stakeholders; and overarching program evaluation goals specific to the APPE program evaluation. Work to apply and implement the framework materials is ongoing within the OEE and faculty.

CONCLUSIONS: Completion of this framework will provide a systematic and comprehensive plan for program evaluation of the APPE program and direct quality improvement activities. The framework will be sustainable, requiring occasional modifications.

84. TITLE: IPE learning activity: Pharmacy students & pharmacy technician students.

AUTHORS: Nancy L. Kleiman, University of Manitoba; Debra Chartier, Robertson Technical College; Drena A. Dunford, University of Manitoba; Rose Dick, Robertson Technical College; Sheila R. Ng, University of Manitoba.

OBJECTIVES: The development of an inter-professional opportunity that includes 1st and 2nd year University of Manitoba pharmacy students and Pharmacy Technician students from Robertson College. The goal for both groups of students is to gain experience working in a simulated community pharmacy environment both uni-professional and inter- professionally. The goals of both programs are to incorporate what the students have learned in the classroom and to be able to apply that learning to real life experiences in a community pharmacy.

METHODS: Students will be divided into groups with each lab station representative of a community pharmacy environment. The lab stations will consist of one or two 2nd year pharmacy students and one or two pharmacy technician students who have volunteered for this pilot project. The pharmacy technician students in each lab station will be required to gather relevant patient information, prepare prescriptions and carry out other duties within their scope of practice. The pharmacy students will be required to review the patient information gathered, review the prescription for accuracy, review the prescription for drug therapy problems and provide education to the patient(s). The patient(s) will be represented by 1st year pharmacy students and will be required to provide requested information, ask for information on over the counter medications and ask random questions that may be encountered in a community pharmacy.

RESULTS: A debrief at the completion of the activity will be done to determine if the learning objectives have been met and the activity was of value to the participants.

CONCLUSIONS: The development of inter-professional activities for pharmacy students and pharmacy technician students is a required component of the accreditation process for both programs. This pilot project, if successful, will provide on-going opportunities for both groups to practice working inter- professionally and to develop team skills that will be used in practicums and future practice.

85. TITLE: Opportunities to enhance institutional experiential education in British Columbia: Learner perspectives.

AUTHORS: Michael Legal; Donna Rahmatian; Kyle Collins; Marguerite Billingsley; France Carriere; Patricia E. Gerber; Angela Kim-Sing; Peter J. Zed; Peter S. Loewen, Faculty of Pharmaceutical Sciences, The University of British Columbia.

OBJECTIVES: It is a challenge to provide sufficient quantities of high quality institutional experiential placements for learners. In recent years, this issue has become increasingly acute in pharmacy due to curricular and program changes in Canada. In British Columbia a comprehensive multi-stakeholder engagement project was undertaken to identify solutions. This report describes the learner engagement portion of the project. The objective is to characterize the perspectives of pharmacy learners in relation to experiential education in the institutional environment.

METHODS: The perspectives of undergraduate students, pharmacy practice residents and post graduate doctor of pharmacy students were gathered through focus groups and one on one structured interviews. Focus groups and interviews were recorded and the resulting transcripts were analyzed using qualitative methods and iterative coding to identify major themes.

RESULTS: A total of 50 learners participated. Learners felt that the undergraduate program emphasizes community practice and that there is a lack of exposure to hospital practice. Undergraduate students reported being anxious prior to their hospital placements and spent much of their time on rotation learning to adapt to the practice environment. They felt that an early hospital experiential placement towards the end of second year would be beneficial. They also suggested updating course and practice lab content to include: hospital terminology, abbreviations, interpretation of labs, systematic approach and chart note writing. Learners viewed precepting as added work for pharmacists and expressed a desire for preceptors to be afforded more time “just to teach”. Precepting models which incorporate peer, tiered or group learning were viewed positively. Learners expressed frustration at a mismatch in expectations between preceptors, learners, and the Experiential Office.

CONCLUSIONS: This project highlighted some key challenges faced by learners and suggests some possible solutions. These solutions will need to be part of a comprehensive institutional experiential education strategy.

86. TITLE: Institutional pharmacists’ perspectives on precepting: A comprehensive province-wide study.

AUTHORS: Michael Legal; Donna Rahmatian; Kyle Collins; Patricia E. Gerber; Angela Kim-Sing; Peter J. Zed; Peter S. Loewen, Faculty of Pharmaceutical Sciences, The University of British Columbia.

OBJECTIVES: It is a challenge to provide sufficient quantities of high quality institutional experiential placements for learners. In recent years, this issue has become increasingly acute in pharmacy due to curricular and program changes in Canada. In British Columbia a comprehensive multi-stakeholder engagement project was undertaken to identify solutions.This report describes the pharmacist engagement portion of the project. The objective is to

characterize the perspectives of institutional pharmacists, identify potential solutions to capacity challenges and to find ways to better support preceptors and learners.

METHODS: Pharmacist perspectives were gathered using a mixed methods approach. An online survey was deployed to all hospital pharmacists in BC. In addition, focus groups and structured interviews were conducted across the province. The survey utilized a combination of likert, ranking, multiple-answer, and open field responses. Focus groups and interviews were recorded and the resulting transcripts were analyzed using qualitative methods and iterative coding to identify major themes.

RESULTS: A total of 233 pharmacists responded to the survey and over 200 participated in the focus groups and interviews. Pharmacists indicated that teaching is an important professional role and they appear to be intrinsically motivated to precept. Workload, lack of time to teach, inadequate staffing, lack of faculty support and unprepared learners were major barriers. Participants identified a need to strengthen the curriculum to increase learner exposure to institutional practice and to enhance their practice-readiness. Human resource support was the most desirable solution for workload issues. Multi- learner models were viewed favourably as a capacity solution but increased teaching workload and limited physical space were concerns. A more robust relationship with the faculty was also desired.

CONCLUSIONS: This project highlighted some key challenges faced by preceptors and suggests some possible solutions. These solutions will require collaboration and commitment by all parties to ensure success.

87. TITLE: Exploring innovative institutional learner-preceptor models across health disciplines: A systematic review.

AUTHORS: Allison Gamble; Kieran Shah; Stacey Tkachuk; Michael Legal; Peter S. Loewen; Peter J. Zed, Faculty of Pharmaceutical Sciences, The University of British Columbia.

OBJECTIVES: It is a challenge to provide sufficient quantities of high quality experiential placements for learners in hospital settings. In recent years, this issue has become increasingly acute due to curricular and program changes in Canada. Most placements in institutional pharmacy employ the traditional 1:1 (learner-to-preceptor model). Drawbacks of this model are an inability to adapt to increasing numbers of learners in the system and lack of opportunities for peer-learning. Novel (>1:1) models may offer a solution. The objective is to conduct a systematic review of the literature encompassing multiple health disciplines' experience with novel learner-preceptor models and to compare the advantages and disadvantages of these models. This systematic review will be valuable both to Canadian pharmacy programs, and to other health discipline faculties facing institutional experiential placement shortages.

METHODS: Eight health and education literature databases were searched. Search terms related to the type of learner, health discipline (pharmacy, medicine, nursing, occupational therapy (OT), physiotherapy (PT), dietetics, dentistry, speech therapy or audiology), institutional/hospital experience, and preceptor model. Data from included studies were synthesised descriptively, and the advantages/disadvantages of different models of were summarized in a narrative format.

RESULTS: Seventy-three articles were included in the final review. Sixty-four articles related to nursing, OT or PT education, while 4 articles related to pharmacy, 2 to dietetics, 2 to speech therapy while 1 was interprofessional. Eight learner-preceptor models were identified: 1:1, 2:1, 3:1, greater than 3:1 (up to 10:1), 2+:2+ (collaborative

learning groups), 1:2 (shared precepting), 1:'0' (interprofessional precepting), and tiered (or 'learner-as-preceptor').

CONCLUSIONS: Each model offers unique advantages and disadvantages. While no model was superior to the others, the 2:1 model may facilitate peer learning and increase institutional placement capacity, without substantially increasing preceptor workload. To our knowledge this is the first review of its kind to include pharmacy models.

88. TITLE: A comprehensive framework for university-health authority engagement around experiential education.

AUTHORS: Michael Legal; Donna Rahmatian; Kyle Collins; Patricia E. Gerber; Angela Kim-Sing; Peter S. Loewen; Peter J. Zed, Faculty of Pharmaceutical Sciences, The University of British Columbia.

OBJECTIVES: It is a challenge to provide sufficient quantities of high quality experiential placements for learners in hospital settings. In recent years this issue has become increasingly acute due to curricular and program changes in Canada. It is critical to develop approaches that address capacity challenges and ensure healthy and adaptable experiential programs in the future. The objective of this project was to develop a methodologically rigorous and exhaustive multi-stakeholder engagement framework.

METHODS: A comprehensive, province wide, mixed-methods research based approach was employed to ascertain the perspectives of preceptors, learners and health authority pharmacy leaders. It was important to use a number of approaches so that participants from a variety of settings could be engaged. Qualitative methods based on "grounded theory" were employed to ensure that the stakeholder feedback itself generated the hypotheses (rather than approaching the project with pre- existing hypotheses to prove or disprove). It was also important for the process to be viewed as transparent and accessible. To facilitate openness, a project website was created. The website featured a blog detailing the project activities and discussion topics relating to experiential education. The website also served as a repository for project materials, such as the site visit timeline and focus group questions. A project lead was hired to oversee the stakeholder engagement process. The key engagement activities included site visits, one-on-one interviews, focus groups and electronic surveys.

RESULTS: Participants provided positive comments, indicating that they appreciated the degree to which they had been engaged and that they felt the process was transparent. The poster outlines the framework employed in this successful engagement initiative.

CONCLUSIONS: The engagement framework described here facilitated a broad conversation around institutional experiential education in our province and allowed diverse perspectives to be heard. This framework can serve as a model approach for other jurisdictions to follow.

89. TITLE: The path forward: Solutions from a province-wide university-health authority engagement initiative.

AUTHORS: Michael Legal; Donna Rahmatian; Kyle Collins; Patricia E. Gerber; Angela Kim-Sing; Peter S. Loewen; Peter J. Zed, Faculty of Pharmaceutical Sciences, The University of British Columbia.

OBJECTIVES: It is a challenge to provide sufficient quantities of high quality experiential placements for learners in institutional settings. In recent years, this issue has become increasingly acute due to curricular and program

changes in Canada. There is a critical need to develop approaches that address these challenges and ensure healthy and adaptable experiential programs in the future.

METHODS: A comprehensive and rigorous methodology was employed to engage preceptors, learners and health authority leaders in British Columbia. Root causes for capacity challenges were identified and potential solutions articulated. Local feedback was combined with recommendations from the literature and best practices from across North America.

RESULTS: Several broad areas of solutions were identified: health authority- faculty partnership, novel learner-preceptor models, direct faculty support for preceptors and learners, learner preparation, and enhanced experiential office. Formal, mutually beneficial partnerships between the faculty and health authorities will ensure preceptors and sites are equipped to provide optimal experiences for learners, while the faculty will benefit from a reliable supply of placements. The faculty will promote the use of pairs, small tiers and facilitated multi-placements for junior learners. Dedicated clinical faculty or protected teaching time for preceptors will address workload concerns and teaching support needs. A comprehensive preceptor development program that leverages technology and preceptor networks will ensure preceptors have the skills to teach. The addition of an early hospital practice experience and inclusion of acute care content in the curriculum will improve the preparedness of learners. Creation of a user friendly “preceptor portal” on the Faculty’s website will provide an enhanced customer oriented approach.

CONCLUSIONS: While these solutions will require substantial investment and the commitment of all parties involved, the result will be a modern, collaborative, and adaptable institutional experiential program. These solutions could have broad applicability to other jurisdictions in Canada.

90. TITLE: Blended placements: Maximizing the experience of rural Alberta placements.

AUTHORS: Marlene Gukert, B.Sc.(Pharm); Cheryl Cox, BSP, MBA, Faculty of Pharmacy and Pharmaceutical Sciences, University of Alberta.

OBJECTIVES: The Experiential Education Program at the UofA Faculty of Pharmacy and Pharmaceutical Sciences promotes “blended placements” to optimize learning experiences for students and preceptors outside of the urban centres across Alberta. The objectives are to: (1) Enhance care provider’s understanding of patient’s needs across levels of care and optimize opportunities to provide seamless care, (2) enhance communication between health care providers including inter-professional communication, (3) build a collaborative preceptor network, and (4) enhance community engagement opportunities for the student.

METHODS: For their fourth year placements; students can complete both placements; institutional and community practice in the same rural town. Students are in the town for 16 weeks. When the student is completing their community placement, starting the second week, they spend one day a week at the institutional placement and vice versa when they are completing their institutional placement. For planning purposes the Faculty arranges a discussion with preceptors from both practice sites prior to the start of the placement. Preceptors complete a Student Performance Assessment as a means of communication and assessment between sites.

RESULTS: Overall students and preceptors find the extended period of time positive. Although preceptors often know each other, the Faculty is integral in organizing the placement. Having a student in common has increased

communication and collaboration between preceptors. Students provide care in a seamless manner by attending discharge planning and then providing patient follow up in the community. Students are able to have more insight regarding medical conditions during hospital admissions and then better able to provide community care. Physician relationships are built over a longer period of time and increased collaboration results. In addition students have increased associations with the community.

CONCLUSIONS: Providing students with an opportunity to have an extended amount of time in a community provides them with a greater sense of being an active member of the community and medical network as well as experience many seamless patient care opportunities. Blended placement activities with introductory; first and second year placements; are being considered.

91. TITLE: An interdisciplinary program to develop students' professional identity.

AUTHORS: Patricia Gerber, Faculty of Pharmaceutical Sciences, The University of British Columbia; Anita Parhar, Faculty of Medicine, The University of British Columbia; Gurdeep Parhar, Faculty of Medicine, The University of British Columbia.

OBJECTIVES: Interprofessional education (IPE), which asserts that if students of different health professions learn together they will be better prepared to deliver collaborative patient care, has been identified as integral in pharmacy education. One of the key interprofessional relationships is that between the pharmacist and the physician. For quality IPE to occur, students must explore their professional identity and understand the potential contributions that each profession makes to patient care. The objective is to provide a program for first year pharmacy and medical students that can optimize students' awareness and understanding of their own and of the other professionals' identity, roles, skills, and responsibilities.

METHODS: Fifteen volunteer pharmacy students were paired with 15 volunteer medical students enrolled in the first year of their programs. Students participated in five 2-hour workshops designed to build on their understanding of their own and of each other's professions, explore their emerging identities and roles, and discuss how the various healthcare settings influence their ability to enhance quality of care. Each student pair collaborated on educational tasks such as brainstorming exercises, interacting with a patient, and discussing scenarios.

RESULTS: At the beginning and end of the program, students' understanding of the physicians' and pharmacists' roles from each of their perspectives was ascertained. Results indicate that considerable gains in student understanding of their own and of the other profession's identity as well as of the importance of collaborative practice were made through this series of workshops. Students recommended incorporating this program into the pharmacy and medical curricula and expanding it to involve all first year pharmacy and medical students.

CONCLUSIONS: Via this collaborative interprofessional experience we increased pharmacy and medical students' awareness and understanding of their own and each other's professional identities and of the contributions that each discipline makes to patient care. This project has implications for the IPE component of the UBC Entry-to-Practice PharmD Program curriculum currently under development.

92. TITLE: Clinical teaching models in pharmacy experiential education.

AUTHORS: Artemis Diamantouros, Leslie Dan Faculty of Pharmacy, University of Toronto, Department of Pharmacy, Sunnybrook Health Sciences Centre; Minh-Hien Le, Leslie Dan Faculty of Pharmacy, University of

Toronto, Department of Pharmacy, Sunnybrook Health Sciences Centre; Andrea Cameron, Leslie Dan Faculty of Pharmacy, University of Toronto; Zubin Austin, Leslie Dan Faculty of Pharmacy, University of Toronto.

OBJECTIVES: Experiential education in pharmacy remains a fairly novel field that has not been widely studied. Introduced in 2011, the Combined Bachelor of Science in Pharmacy (BScPhm) / Doctor of Pharmacy (PharmD) degree program and its Advanced Pharmacy Practice Experience (APPE) rotations are new to the Leslie Dan Faculty of Pharmacy and the pharmacist preceptors. The APPE rotations do not have a defined structure for conducting rotations which can lead to variable clinical teaching models and different roles for the student as part of the clinical team. The objectives are: (1) to gain insight into the various models for clinical teaching used by pharmacists in the APPE rotations and the experiences of both preceptors and students involved, and (2) to explore preceptors' experiences with preceptor training and development.

METHODS: Semi-structured interviews were conducted with preceptors and students involved in APPE rotations from January 2012 to May 2013 inclusive. Interviews were conducted until a saturation of themes was achieved.

RESULTS: 27 preceptors and 10 students were interviewed. While open to other models, most preceptors used a one-on-one clinical teaching model, stating that taking multiple students at once is limited by space and time constraints. Students preferred the one-to-one model. Those that had experienced peer or near peer teaching felt it could be a positive experience but highly dependent on the dynamic between individuals involved. Preceptors encouraged self-directed learning but indicated that the level of independence given was variable and dependent on the level of the student. Preceptors requested clarification on expectations of students on rotation and training on providing feedback.

CONCLUSIONS: In pharmacy experiential education, the prevailing model remains the one-to-one teaching model with growing experience with near peer teaching models and peer to peer teaching. All interviewees felt there are advantages and disadvantages to each model and agreed that the experience in rotations is variable and depends on the level of the student as well as the dynamic between preceptor and student.

93. TITLE: Intravaginal gel for the targeted delivery of siRNA to T-cells as a potential strategy for HIV-1 prevention.

AUTHORS: Sidi Yang; Jijin Gu; Emmanuel A. Ho, Laboratory for Drug Delivery and Biomaterials, Faculty of Pharmacy, University of Manitoba.

OBJECTIVES: The goal of this study is to develop and characterize a T-cell targeted nanomedicine for the active delivery of small interfering RNA (siRNA), which targets the viral genes or host factors involved in HIV-1 infection. This drug delivery system is designed for intravaginal administration as a potential pre- exposure prophylaxis to help women defend against HIV-1.

METHODS: siRNA was first condensed by polyethyleneimine (PEI) and then encapsulated into nanoparticles (NPs) by a double-emulsion evaporation method using the biodegradable di-block copolymer, poly(lactic-co-glycolic acid)- polyethylene glycol (PLGA-PEG). NPs were conjugated to anti- human anti-CD4 antibody via the activation of N-Hydroxysuccinimide and 1-ethyl-3-(3- dimethylaminopropyl)carbodiimide. Resulting antibody-conjugated NPs (NPs-Ab) were then formulated into a 1% HEC vaginal gel.

RESULTS: NPs-Ab showed a uniform particle size of 225.0±4.9 nm, a zeta-potential of -35.09±2.22 mV, an encapsulation efficiency of 63.0±5.7% and an antibody conjugation efficiency of 37.7±4.2%. NPs showed a sustained release profile, with approximately 40% of siRNA released over 13 days. The NPs-Ab achieved >1.5-fold

increase in the intracellular accumulation of siRNA in the T-cell line Sup-T1 compared to unconjugated NPs. 1% HEC gel loaded NPs-Ab showed a non-Newtonian shear-thinning behavior and the viscosity of the NPs-Ab loaded gel was comparable to the over-the-counter lubricant gel products. Both of the blank NPs (1000 μg/mL) and the 1% HEC placebo gel (200 mg/mL) had no significant impact on the viability of a vaginal epithelium cell line (VK2/E6E7) after 24 h exposure.

CONCLUSIONS: We have developed a novel intravaginal nano-based drug delivery system for the active delivery of siRNA to T cells. The NPs-Ab have desirable particle size for intravaginal delivery and sustained drug release. NPs-Ab can significantly increase the intracellular delivery of siRNA into T cells when compared to unconjugated NPs. NPs-Ab can be potentially formulated into a gel dosage-form that is comparable to marketed vaginal gel products.

94. TITLE: Silver-cross-linked wound-dressing-matrix (WDM) for potential use in antimicrobial wound dressings.

AUTHORS: In Whang; Dr. H. Burt

OBJECTIVES: Recent research in the Burt laboratory has shown that a wound-dressing-matrix (WDM) containing silver nitrate can be further heat-cured to provide cross-linked, water-insoluble films which release silver ions and silver nanoparticles on exposure to water. These films may have potential as part of an inexpensive burn wound dressing kit for use in remote areas of Africa, where immediate health care is generally not available. The project objective was to investigate how conditions for film cross- linking, namely silver content, heat-curing temperature and heat-curing time, might influence WDM film properties.

METHODS: Cross-linked WDM films were placed in water and silver ion/nanoparticle release over time was measured using atomic absorption spectroscopy. The distribution of silver in the cross-linked WDM films was studied using x-ray diffraction and scanning electron microscopy (SEM). Selected films were then incubated in nutrient media containing *E. Coli* in order to characterise antimicrobial activity.

RESULTS: All the films exhibited an initial burst phase of silver ion/nanoparticle release into water; however, increases in silver content, curing temperature and curing time reduced the initial release of silver from the cross-linked films. After the burst phase, all the films exhibited gradual release of silver over at least two weeks. Results from x-ray diffraction and SEM confirmed the presence of silver nanoparticles in the films. An x-ray diffraction experiment involving *in-situ* heating at 140oC of a WDM film containing 5% silver nitrate provided direct evidence of silver nanoparticle generation in the films as a function of time. As heat-curing time increased, more silver ions were reduced to silver nanoparticles, which correlated with increased cross-linking of WDM. When selected films were incubated in *E. Coli* bacteria broth, the films with higher silver nitrate content showed greater antimicrobialactivity.

CONCLUSIONS: The research has shown that it is possible to modulate silver release from cross-linked WDM films and that, under the optimum conditions, the films remain water-insoluble and show good antimicrobial activity for a period of at least two weeks. Importantly, such films could provide a component for the targeted burn wound dressing materials since they may be less expensive than current commercial silver-based wound dressings while also providing for less frequent dressing changes. This research, using silver as both a WDM cross-linker and an antimicrobial agent, sets the foundation for more detailed assessments aimed at practical implementation.

95. TITLE: DEXEL-RH pilot study: Oral versus intravenous DEXamethasone in the prevention of hypersensitivity reactions to paclitaXEL.

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OBJECTIVES: To assess the feasibility of a randomized, double-blind, parallel, controlled trial comparing dexamethasone orally (PO) versus intravenously (IV) in the prevention of hypersensitivity reactions to paclitaxel taken every two to three weeks.

METHODS: This pilot study was conducted at the Notre-Dame Hospital (Montreal, Canada). Patients were randomly assigned between February 2013 and July 2013 to receive dexamethasone 20 mg orally 12 hours and 6 hours before chemotherapy or dexamethasone 20 mg intravenously 30 minutes prior to chemotherapy in a double-blind, double-dummy design. Patients also received diphenhydramine 50 mg and famotidine 20 mg intravenously 30 minutes before chemotherapy. The primary outcome was the quality of life. The secondary outcomes were acute hypersensitivity reactions to paclitaxel, use of rescue medication as a treatment for an acute hypersensitivity reaction and adverse effects to dexamethasone. Data were collected for the first two cycles.

RESULTS: Sixteen patients were assigned in the PO group and fourteen in the IV group. There was no clinically significant difference between groups regarding quality of life or adverse effects related to dexamethasone. Acute hypersensitivity reaction was observed for two patients in the PO group and for none of the patients in the IV group. No emergency medication was used.

CONCLUSIONS: This pilot study confirmed that a prospective, randomized, double-blind, double-dummy clinical trial comparing PO and IV dexamethasone in the prevention of hypersensitivity reactions to paclitaxel is feasible. A larger clinical study is needed to assess quality of life of both regimens as well as safety and efficacy of intravenous dexamethasone.

96. TITLE: The LXR-dependent regulation of heme-oxygenase-1, a self-defence strategy for the vascular wall against oxLDL-induced damages.

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OBJECTIVES: Low density lipoproteins (LDL) oxidation is a major event in atherosclerotic plaque formation. Heme oxygenase (HO)-1, a key component of the cellular anti-oxidant system, is a positive target gene of oxidized (ox)LDL in the vasculature. The molecular mechanisms at the basis of such a regulation have, however, never been elucidated. The cholesterol sensors, Liver X-Receptors (LXR) and are activated by oxidized cholesterol derivatives (i.e oxysterols), such as the 27- and 24S- hydroxycholesterol (OH-Chol). Considering that oxLDLs are enriched in oxysterols, we sought to test the hypothesis that "*LXRs mediate the oxLDL-dependent activation of HO-1 expression in cell models of the human vasculature*".

METHODS: Endothelial (HUVEC) and smooth muscle (CASMC) vascular cells, as well as PMA-derived THP-1 macrophages were cultured in the absence or presence of oxLDL (1-50µg/µL), 24SOH- (10µM), 27OH-Chol (10µM) and/or the synthetic LXR ligands T0901317 (0.01-10µM) and GW3965 (10µM) for 6 to 24 hours. HO-1 mRNA and protein were analyzed using quantitative RT-PCR and immunoblotting, respectively. The formation of LXR - DNA complexes with the human *HO-1* gene promoter was determined using electrophoretic mobility shift assays (EMSA) and transient transfection of luciferase reporter genes.

RESULTS: In HUVECs and CASMCs, oxLDLs caused significant HO-1 mRNA and/or protein accumulations. HO-1 expression was also increased in 24S-, 27OH-Chol, GW3965- and T0901317-treated HUVECs, and the synthetic LXR ligands also leaded to a significant increase in HO-1 transcript levels in CASMCs. While, oxLDLs also activated HO-1 mRNA expression in THP-1 macrophages, no changes were observed with LXR activators. GW3965 had a negative impact on HO-1 mRNA expression in oxLDL-pretreated THP-1 cells. EMSA and transient transfection assays revealed the presence of a functional LXR response element located at position -3054bp in the human HO-1 promoter.

CONCLUSIONS: These data illustrate a plausible contribution of LXRs in the oxLDL-dependent activation of HO-1 expression in endothelial and smooth muscle cells; but they also evidence the cell-type specific nature of this regulation. Furthermore, our results also point out LXR as a novel pharmacological target to activate the anti-oxidant defense in the vasculature in order to prevent atherosclerosis.

97. TITLE: The Contribution of Non---Prescription Medications to Potentially Inappropriate Prescriptions in 2 Family Medicine Teaching Clinics.

AUTHORS: Kevin Hamilton, Shawn Bugden, Christine Davis, Jamie Falk, Alex Singer, Sheryl Zelenitsky, University of Manitoba, Faculty of Pharmacy; University of Manitoba, Faculty of Medicine, Winnipeg, Manitoba, Canada.

OBJECTIVES: NSAIDs, antiplatelets and anticoagulants (NAA) are among the top offenders for preventable drug---related ER visits, hospitalizations and deaths. Although over the counter (OTC) NSAIDs and ASA also contribute to this preventable risk, it is unclear how well these medications are documented in primary care clinics. If OTC NSAID and ASA use is overlooked, the overall risk of bleeding may be underestimated. Our objective was to assess the presence of NAA---related potentially inappropriate prescriptions (PIPs) in primary care and to assess the contribution of OTC products to this risk.

METHODS: A literature review was conducted to determine PIPs associated with an increased risk of bleeding associated with NAAs. Data were collected through a retrospective electronic/paper chart review for all patients prescribed an NAA in two family medicine clinics in Winnipeg, Manitoba from June 2012 to June 2013.

RESULTS: Of the 567 patients included in the review, ASA was taken by 117 patients (20.6%) while OTC NSAIDs were taken by 36 (6.3%). OTC NSAIDs were never documented within the “medication” section of the electronic record, whereas ASA was only documented in 38 (32.5%) cases. One---hundred and eighteen out of 148 patients (79.7%) taking either OTC NSAIDs or ASA were identified as having at least one PIP. Although these non---prescription medications contributed to an increase in bleeding risk, it was unknown whether these PIPs were addressed by the clinics or the community pharmacy.

CONCLUSIONS: Many patients at increased risk may be placed at even greater risk by the use of OTC NSAIDs or ASA. Because OTC medication use was documented in such a way that it was difficult to ascertain, we expect this estimate may be an underrepresentation of the true risk. The documentation of these commonly taken medications is essential to provide the prescriber with all the required information when making therapeutic decisions.