

## 2016 AbSPORU Studentship Award Recipients (13)

### Nancy J. Bedingfield – University of Calgary

**Project:** *Enhancing HPV Immunization in Alberta First Nations Communities: A Comparative Case Study Approach*



#### **Biography**

Nancy is a first year PhD student of Health Services Research in the Department of Community Health Sciences. She completed a Master of Science degree from the University of Alberta, School of Public Health, Global Health Stream in 2008. Her thesis work provided her with an incredible opportunity to learn about the people and the culture of Uganda. Her research project was qualitative and focused on understanding the psychosocial changes for patients and caregivers after the introduction of highly active anti-retroviral therapy.

Nancy comes to her Doctoral Studies with 15 years of experience as a Community Health Nurse. Her primary practice areas are tuberculosis care and postpartum care in the community. A deep knowledge of the health care system from the perspective of a front-line care provider is a great asset to Nancy as a health services researcher and will increase the knowledge translation potential of her work.

Nancy's research interests are motivated by her nursing experience. She would like her work to result in prevention and promotion programs that are designed with consideration of the social determinants of health in the communities most in need of these services. Nancy is especially looking forward to learning more about Indigenous understandings of health and how to combine Indigenous ways of knowing with current models of health services research to produce more culturally safe services.

#### **Project Summary**

An important priority of public health programs is the reduction of health inequity. If

prevention-oriented health programs are not designed collaboratively, with the intention of meeting the needs of communities facing barriers to accessing services, there is a possibility that public health programs could increase health inequities.

The EHVINA project (Enhancing HPV Vaccination in First Nations Populations in Alberta) is working to ensure that HPV vaccination in Alberta is successful in reducing the inequitable burden of HPV-related cancers in Alberta. This will be done by working with communities to gain a better understanding of current HPV vaccination rates and designing an intervention to increase these rates in grade 5 First Nations children, living on-reserve in Alberta.

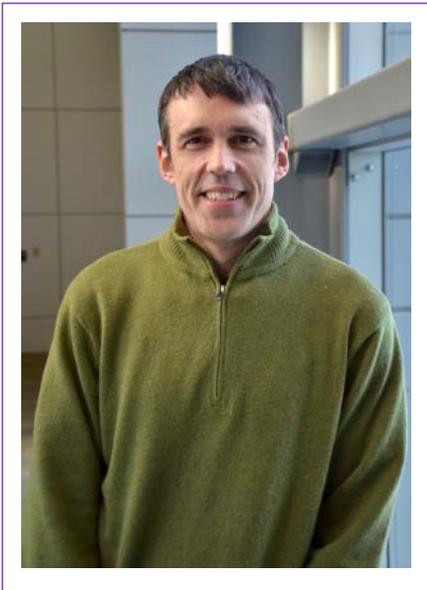
Nancy's work will use a comparative case study design, with mixed methods, to add to the EHVINA project by learning more about the unique context of each community. Increased knowledge of each Nation's strengths and health care needs will provide a foundation for the development of a community-tailored intervention to increase HPV vaccination rates. The comparison of the strengths and needs of different Nations will also result in knowledge that can be incorporated into service delivery for other programs.

This program of research will have short- and long-term deliverables. In the short-term deliverables that benefit community health needs are critical and will be developed in collaboration with community. Long term deliverables include increased cultural safety of vaccination services, increased HPV vaccination rates and decreased cervical cancer rates in First Nations communities in Alberta.

## Ian Blanchard – University of Calgary

**Project:** *An Assessment of the Impact of Time to Paramedic Treatment on Patient Outcomes in the Alberta Emergency Medical Services System: Building a Comprehensive Database and Identifying Patient Priorities in Outcomes.*

### Biography



Emergency Medical Services (EMS) systems have undergone a rapid development over the last four decades, both in terms of the system sophistication and the scope of practice of paramedics. Unfortunately, the science informing this change has not kept pace, especially in patient-oriented research.

Ian Blanchard has worked in EMS systems in Canada and the United Kingdom for twenty years, and is presently a paramedic researcher with Alberta Health Services (AHS) EMS, the provincial co-chair of the AHS EMS Research Committee, and the immediate past co-chair of the Canadian Emergency Medical Services Research Network - Réseau Canadien de Recherche en Soins Préhospitaliers (CERN-RCRSP).

He is also an Adjunct Assistant Professor with the Department of Community Health Sciences, in the Cumming School of Medicine at the University of Calgary and a member of the O'Brien Institute for Public Health. Most recently, he has become a PhD student with the Department of Critical Care, in the Cumming School of Medicine, under the supervision of Dr. Christopher Doig and Dr. Eddy Lang.

Mr. Blanchard's broad career goals are to create a productive research program in Alberta EMS that has a particular focus on patient-oriented research, to build capacity in the paramedic profession to lead and collaborate on EMS research, to promote the tenets of evidence-based medicine in EMS and improve the ability of paramedics to critically appraise the research literature, and to improve the validity and reliability of EMS and paramedic data, especially in patient-prioritized outcomes. Ian can be reached at [ian.blanchard@ahs.ca](mailto:ian.blanchard@ahs.ca).

## **Project Summary**

EMS is the safety net of the health care system; responding to myriad conditions from cardiac arrest to assistance in lifting patients who have fallen. EMS systems around the world, including Alberta, are in crisis. Delays in offloading EMS patients at the hospital due to limited bed space and gridlock in emergency departments mean paramedics are continuing to care for their patients in hospital hallways, instead of being available to respond to the next emergency call.

Solving hospital capacity is not a quick fix, but in the meantime the EMS system must still be available for emergencies, especially conditions or injuries that require time-sensitive treatments. Very little patient-oriented research has been conducted to understand the optimal paramedic treatment, how quickly this treatment should be applied, and to whom.

This research proposal will take an important first step at understanding how a patient's condition and the timing and type of treatment paramedics provide, impacts their health outcome from the emergency. This information will be critical to health system leaders to determine to what extent, if any, patients are being put at risk from delays in offloading patients at the hospital or non- transportation of patients to the hospital. In addition, it will assist the EMS system in getting the right care, to the right patient, at the right time by creating a database that links EMS and health system data, testing this database to ensure research-quality data, and by engaging EMS patients to determine the most important health outcomes.

## **Maoliosa (Mo) Donald – University of Calgary**

***Project Title: Enhancing Patient Self-management of Chronic Kidney Disease: Identification and Testing of Optimal Strategies***

## **Luiza R. Grazziotin Lago – University of Calgary**

**Project:** *Incorporating Colorectal Cancer Patient Preferences into Health Technology Assessment*



### **Biography**

Luiza Grazziotin is a first-year health economics Ph.D. student in the Department of Community Health Sciences at the University of Calgary. Luiza earned a M.Sc. in Cardiovascular Sciences and a B.Sc. in Pharmacy from the Federal University of Rio Grande do Sul, located in Porto Alegre, Brazil. Her doctoral research is focused on strengthening oncology drug reimbursement decision-making by explicitly incorporating patient preferences into the process. Luiza developed a foundational expertise in Health Technology Assessment (HTA) during her Master's degree, completing a one-year HTA specialization course concurrently.

She was subsequently recruited for an internship at the Institute for Clinical Effectiveness and Health, a leading HTA research organization in South America. This internship provided many opportunities for Luiza to learn about health economics and HTA from an international perspective. Luiza also worked as a Research Associate at a hospital based HTA unit where she gained practical experience in health services research by developing, coordinating and conducting HTA projects, systematic reviews and observational studies.

Luiza's research experience has provided her in-depth knowledge of HTA in oncology and to work directly with oncology patients and caregivers. Moreover, her research interests also include examining new HER-2 testing strategies in breast cancer patients and cost-effectiveness analysis in oncology drugs.

### **Project Summary**

The high cost of cancer drugs has increased pressure on healthcare decision-makers to make informed choices that reflect the best value when considering drug reimbursement or coverage. While there are many stakeholders in the healthcare system, the patient perspective is central to defining value. However, it is challenging to define how patient

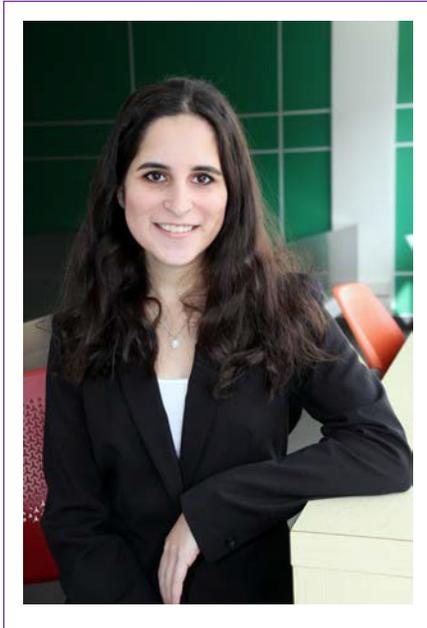
preferences can be considered quantitatively and explicitly in health technology assessment decision-making processes regarding oncology drug reimbursement and coverage. This research proposal will address this issue by developing a framework containing recommendations on how patient preferences could be incorporated into decision-making, what methodology should be used and how much weight should be accorded to patient preferences.

My proposed research will design specialized surveys that employ qualitative methods to elicit patient preferences for different colorectal cancer treatments. These results will be used to design a patient based-value framework for health technology assessment of oncology drugs. The analysis will reveal how patient preferences vary according to patient demographics, stage of disease, treatment experience and quality of life. Although colorectal cancer patient preferences and treatments will be used as the case example to develop and test the methods, once established, the aim is that the framework could be generalized to other cancer types.

This project aligns with the need to improve and enhance patient engagement, to incorporate patient preferences and values in a clear, impactful manner in drug reimbursement decisions in Canada.

## Maryam Kebbe – University of Alberta

**Project:** *Investigating and Addressing Health and Lifestyle Behaviors of Adolescents with Obesity in Pediatric Weight Management*



### Biography

Maryam Kebbe has a Bachelor of Science in Life Sciences and advanced French as a second language (Summa Cum Laude) from the University of Ottawa. During her undergraduate degree, Maryam engaged in diverse opportunities that encouraged her to explore a variety of career paths, from *medicine* (e.g., shadowing physicians and volunteering in clinic and hospital settings) and *civil service* (e.g., working as a regulatory information and affairs officer at Health Canada where she notably created the Drug Product Database bilingual system to meet the needs of both English and French populations) to *academia* (e.g., contributing to and participating in qualitative and quantitative research projects and working/volunteering as a teaching assistant and tutor).

With her passion for academia and research interests in mind, which include (i) patient-oriented, pediatrics, and health research, (ii) nutrition and obesity, and (iii) communication and languages, she is currently completing her Ph.D. in Medical Science (Pediatrics) at the University of Alberta. As a graduate student, her focus is on the lifestyle behaviors of adolescents with obesity, particularly in relation to nutrition, physical activity, sedentary behavior, and sleep.

### Project Summary

Obesity in adolescence is difficult to manage successfully. It is important to understand how adolescents' lifestyle habits influence their weight and health in order to provide them with the best care possible. Ms. Kebbe's research includes three related studies to explore this topic:

Study 1 is a review of the published literature; she will examine the barriers to and enablers

of healthy nutrition, physical activity, sedentary behavior, and sleep patterns in adolescents with obesity.

Study 2 is a qualitative study that includes 1-on-1 interviews with adolescents with obesity from weight management clinics in Edmonton (English) and Ottawa (French). She will explore their perspectives on factors that make it easy or difficult for adolescents with obesity to make and maintain healthy lifestyle habits.

Study 3 involves prioritizing the barriers and enablers identified by adolescents in studies 1 and 2 to inform the development of a bilingual clinical tool (Conversation Cards for Adolescents) designed for adolescents with obesity. The tool will be designed to help adolescents become aware of and improve their lifestyle habits following consultation with health care providers.

Together, the results of this research will be directly relevant to health services offered to adolescents with obesity. Study findings, including the new clinical tool upon its development, will be shared with health care providers who work in the field of weight management for adolescents.

## **Nathan McClure – University of Alberta**

**Project:** *Generating Evidence and Advice for Minimally Important Differences on EQ5D and Patient-Reported Outcome Measures*

### **Biography**



I graduated with an MPH in Applied Biostatistics at the University of Alberta, where I developed a strong interest in patient-reported outcome measures and the EQ-5D health-related quality of life measure. I came into public health with a background in basic sciences having previously completed a BSc in Biology at the University of British Columbia and an MSc in Mathematical Biology at Queen's University.

During my studies, I have interned for the Global Malaria Programme, World Health Organization, and have also completed a practicum for the Canadian Public Health Service working for the Department of Health and Social Services, Government of the Northwest Territories. Most recently, I worked as an analyst for Emergency Medical Services at Alberta Health Services.

My interest in patient-oriented research stems from a desire to capture how changes in health have positive or negative impacts on a patient's quality of life. In turn, I want to study applications that combine the patient's perspective with societal values to inform care and decision-making. Over the past year, I have worked with the Alberta PROMs and EQ5D Research and Support Unit to help end-users in the interpretation of health-related quality of life scores. This motivated me to pursue a PhD with the objective of generating evidence and advice for minimally important difference on the EQ5D health utility score and patient-reported outcome measures. Outside of school, I enjoy skiing, hiking and camping in the Rockies!

### **Project Summary**

Self-reported measures of health-related quality of life (HRQL), often referred to as patient-reported outcome measures (PROMs), are emerging as important tools to achieve triple aims

of better care (quality), better health (outcomes), and lower costs (or cost containment). However, in most health systems, the application of PROMs is nascent, and there are many unanswered questions. The minimally important difference (MID) represents the smallest change or difference in a PROM score that is considered meaningful to the patient. In this regard, the MID differs from statistical significance, where the latter attempts to quantify the role that chance plays in the observed change, it is not necessarily reflective of the value that the patient places on that change.

While statistical significance has played a major role in the advancement of medical research and the quality of care we benefit from, looking forward it is important to consider other criteria that seek to empower the patient's and general public's perspective to support informed decision-making in advancing care and policy development.

The EQ5D is the most commonly used measure of HRQL in the world, providing a health utility score that is calculated from a health questionnaire with self-reported responses to five dimensions of health: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. The health utility score essentially represents the Canadian population's preference for the reported health state. Presently, the Alberta-wide adoption of the EQ5D in patient reported outcome measurement and its roll-out in primary care makes studying the MID of the EQ5D a relevant and timely objective.

## Alexandra J. Neville – University of Calgary

**Project:** *Understanding the Roles of Parent Behaviours and Mental Health in Pediatric Chronic Pain*



### Biography

Alex is a Master's student in the Clinical Psychology program at the University of Calgary, under the mentorship of Dr. Melanie Noel. She earned her BA in Psychology from the University of Guelph. After graduating, she spent four years as a clinical research assistant at Toronto's Hospital for Sick Children where she investigated the impact of childhood cancer diagnosis on children and their families.

Alex has a particular interest in understanding the individual perspectives and experiences of children living with chronic pain and is committed to including the voices of patients and families in research. Her project aims to investigate the ways in which parents' mental health and behaviors influence children's chronic pain symptoms,

which may have important implications for informing family-based interventions to reduce children's pain. Her research takes place in the Alberta Children's Pain Research Lab, which is supported and located within the clinical milieu of the Vi Riddell Pain Rehabilitation Centre at the Alberta Children's Hospital.

### Project Summary

Chronic pain is prevalent in adolescence, is associated with high societal and economic costs and higher risk of mental health disorders into adulthood. High rates of post-traumatic stress disorder (PTSD) symptoms have been found among youth with chronic pain and their parents. Moreover, among children with chronic pain and their parents, higher PTSD symptoms have been linked to worse child pain outcomes. It has been proposed that children's and parents' distress and mental health symptoms may influence how parents respond to their children's pain.



## Alberta **SPOR SUPPORT** Unit

Specifically, the ways in which parents talk to their children about pain may be a mechanism through which child and parent PTSD influences children's pain symptoms. The current research will investigate whether child and parent PTSD symptoms influence parent responses to their child's pain which, in turn, exacerbate children's pain. Using a prospective controlled design, youth with and without pain will participate in diagnostic interviews, a structured experimental pain and interaction task involving parents and a series of patient oriented self-report measures. Understanding the roles of parent behaviours and mental health in children's pain experience will inform the refinement and development of family-based interventions to reduce children's pain and improve their health outcomes into adulthood.

### **Julia Poole – University of Calgary**

***Project: An Innovative Clinical Treatment for Primary Care Patients with Depression***

## **Yanjun Shi – University of Lethbridge (1<sup>st</sup> UofL Recipient)**

**Project:** *Patient Engagement in Gauging the Relational Gap in Addiction Treatment*



### **Biography**

“At first, I was advised to apply for the neuroscience program, but I took a few turns and graduated with a psychology major. I went on to study foreign languages including French and Spanish before taking a few neuroscience courses as part of my psychology major. With my language background, I worked with Dr. Fangfang Li, whose research focused on language acquisition and speech development, and completed my

undergraduate thesis with her supervision.”

Following the completion of her BA, Shi’s passion for counselling was rekindled when she met Lee. “If it hadn’t been for Bonnie opening the door for me to CCT and involved me in her research project on immigrant families and culture, I wouldn’t be able to get into counselling psychology at all,” she says. “I’m thankful to both Bonnie and Fangfang; they both gave me a reference to this studentship and they are both my very significant mentors.”

Although Shi hasn’t yet decided what her next steps will be after finishing her master’s, she did share some of her long-term goals. “Eventually, I want to help improve the knowledge exchange between Canada and China in mental health and counselling. When I lived in China, counselling services were hard to find,” she says. “I think I can help out and contribute in developing counselling psychology in my home country.”

### **Project**

Shi is currently in her first year of a Master’s of Education in Counselling Psychology with a focus on mental health and addiction. Her thesis project will be carried out in conjunction with her supervisor Dr. Bonnie Lee’s principle research study, which involves comparing the outcomes of Couples Congruence Therapy (CCT) and treatment-as-usual (TAU) approaches within two Alberta Health Services sites for couples coping with alcohol and/or gambling

addiction. The participating couples have at least one partner who has an alcohol and/or gambling addiction. Shi's study, called Patient Engagement in Gauging the Relational Gap in Addiction Treatment, is aimed at learning patient perspectives on couple's therapy in addiction treatment. The benefit of couple's therapy in aiding addiction recovery is well supported by research evidence, but it is not widely implemented in addiction services. By studying the participating couples in Lee's principal project, Shi hopes to better understand the counselling needs for couples with addiction problems.

Research shows that many people who have addiction problems also have family and couple relationship difficulties, says Shi. In couples where one partner has an addiction, the non-addicted partner also deals with a great deal of social and psychological distress. It is not uncommon for couples who go into couple's therapy to present with addiction-related problems.

In her study, Shi will use surveys post-treatment to look at the couple's motivations, expectations and past experiences of couples seeking counselling and addiction services. She will also conduct interviews with the couples after they have completed CCT and TAU to explore their treatment experiences. "I'm expecting to find out if there is strong need for better access and greater implementation of couples therapy in addiction services. Then I want to find out what these participating couples found helpful or beneficial and effective during treatment for their addiction recovery and couple relationship recovery," she says.

The patient-engagement portion of Shi's study involves recruiting four to six former patients who have accessed Alberta Health Services addiction services and have sought couples counselling while coping with addiction problems. These people will serve as a kind of advisory board, giving input on the design of Shi's survey questionnaire and interview questions. The patient advisors will also review the executive summary of the findings and give feedback to the U of L to pursue undergraduate studies.

## **Sabine Soltani – University of Calgary**

**Project:** *The roles of attention and transdiagnostic risk factors in co-occurring anxiety and pediatric chronic pain: A longitudinal eye tracking study*



### **Biography**

Sabine's interest in psychology was sparked by psychology classes she took while completing her BA in Communications Studies in 2007. After working in communications for several years, Sabine returned to school and earned her BA in Psychology (First Class Honours) in 2014. In 2016 she successfully completed her MA in Clinical Psychology at the University of Regina and is now pursuing her doctorate at the University of Calgary.

Sabine's research has broadly focused on attentional biases, cognitive factors, and dispositional constructs underlying psychopathology. Her clinical experience working with individuals with chronic pain fueled her interest in the complex interplay of bio-psycho-social factors and how they influence and maintain the experience of chronic pain.

Her dissertation research focuses on the role of cognitive-affective mechanisms underlying the co-occurrence of chronic pain and anxiety disorders in youth.

### **Project Summary**

Chronic pain is highly prevalent in childhood, typically peaks in adolescence, and is associated with devastating effects at the individual, family, and societal level. Chronic pain often persists into adulthood, making it a lifelong problem for many youth. Unfortunately, treatments for chronic pain only work for a small percentage of youth and children who also have anxiety. Research has shown that anxiety often co-occurs with chronic pain, and that the two conditions may be maintained by similar cognitive (e.g., attention biases) and emotional (e.g., anxiety sensitivity) factors; however, no research has examined factors underlying these two conditions in youth.



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The aim of this research study is to examine the roles of modifiable cognitive (attention) and emotional (anxiety-related variables) factors in influencing the co-occurrence of anxiety and chronic pain in adolescence. 120 youth (60 with chronic pain; 60 healthy) will come to the research lab at two time points to complete questionnaires and an eye-tracking task to examine attention biases to pictures of children in pain. The results of this research will inform the development of tailored interventions for children with co-occurring anxiety and chronic pain to improve their recovery and prevent problems from persisting into adulthood.

## Alex Su – University of Alberta

**Project:** *The immediate effects of scoliosis-specific 3D autocorrection exercises on the apical vertebral translation and coronal balance in adolescents with idiopathic scoliosis*



### Biography

Alex is a first-year graduate student working on his MSc in Rehabilitation Science in the Faculty of Rehabilitation Medicine. His educational background consists of a BSc in Biological Sciences and Chemistry. His career aspiration is to become a Clinical Scientist in Physical Therapy and some of his key interests include pediatrics and neurology.

During his undergraduate degree, through volunteering and courses, he pursued his research interests by conducting neurophysiology research, involvement in biomechanics research, and conducting and presenting spine-related clinical research projects.

Outside of academics, he has been a strong proponent of community involvement and had opportunities to take on an executive role in student leadership, coaching high school football, and volunteering at The Steadward Centre to assist individuals with impairment.

In his spare time, his hobbies and interests include watching and playing hockey and basketball, writing poetry, and listening to and playing music. One of my goals is to learn the cello within the next five years.

Alex notes: a question I've been asked a lot from others is, "why did you choose research?" I believe a sound understanding of the current research and its issues within my field will help me better advocate for collaborative and multidisciplinary approaches to remove barriers and improve quality of care. With this foundation, I hope to greater apply quality scientific research, emphasize patient-related outcomes and patient-oriented research, and help improve scientific communication to the public.

### Project Summary



## Alberta **SPOR SUPPORT** Unit

Adolescent Idiopathic Scoliosis (AIS) is a 3D structural deformation of the spine with torsion and rotation of the spine with marked lateral curvature that occurs without known reason in otherwise healthy individuals. Additionally, scoliosis impacts quality of life and activity, can cause pain, and hinders self-image. AIS is a lifelong progressive condition that impacts 2-3% of adolescents worldwide and can occur equally in both genders, but females are eight times more likely to reach curve severities requiring treatment.

Currently, the protocol for the treatment of AIS is to observe smaller curves, brace moderate curves, and consider surgery for larger curves. Non-surgical treatments aim to promote symmetrical spinal growth and prevent curve progression and is most effective when implemented before the rapid adolescent growth period.

Exercise is an increasingly requested method to treat AIS but there is limited understanding of how exercise achieves its results and which exercises provide the best spinal corrections. The development of an award-winning ultrasound imaging protocol from our research team has allowed safe non-invasive examination of the 3D alignment of the spine.

My project will use this space-locating assisted ultrasound imaging to quantify the changes that scoliosis-specific exercises have on the apical vertebral translation (lateral deviation of the spine) and coronal balance (head-pelvis alignment) in a total of eleven positioning's and exercises, in standing, lying, and sitting positions. The results of this project will create an evidence base to help clinicians and knowledge users decide which exercises will give the best corrections.

## Colin Weaver – University of Calgary

**Project:** *Using Primary Care Electronic Medical Record Data to Predict Use and Repeated Use of Acute Health Care Services*



### Biography

Colin Weaver is a Master's student in Community Health Sciences. He has a Bachelor's degree in Statistics and has worked in multiple roles at the University of Calgary, including two years at the University of Calgary's Health Technology Assessment Unit.

Colin's thesis examines the identification of individuals in primary care practices at high risk of acute care visits. The ultimate goal is to identify individuals before they require acute care such that they may be provided appropriate and timely primary care.

His interests include statistics, primary care, addressing social determinants of health, ensuring the economic sustainability of our health care system, and producing research that has an impact on policy and clinical practice. Colin also loves to cook, bike, hike, cross-country ski, and play board games.

### Project Summary

The goal of this research is to identify patients in primary care practices who are at high risk of frequent acute care use in the future. This identification is the first step in preventing acute care use; appropriate interventions for these high-risk individuals could then be considered to prevent their need for acute care.

Preventing acute care use may improve individual health and wellbeing while reducing overall health care costs. Those requiring acute care are often sicker and being in acute care is stressful to the patient and their family.

We will use Alberta primary care electronic medical record data from the Canadian Primary



Care Sentinel Surveillance Network, which includes demographic, clinical, laboratory, and medication data. This will be linked to hospital and emergency department administrative health data from Alberta Health Services. The performance of multiple machine learning statistical techniques on our data will be compared, and the best one will be used to predict acute health care use.

We will consult with clinicians, decision-makers, and other experts in primary care to design the project and conduct the analysis in a way that can directly impact how primary care providers deliver care. By connecting with the Canadian Primary Care Sentinel Surveillance Network we will be able to share knowledge gained with practicing family doctors across the country in a unique and efficient manner.

## Danielle Whittier – University of Calgary

**Project:** *Prediction and Systematic Prevention of Fragility Fractures at the Hip using HR-pQCT as a Novel Method for Diagnosis of Osteoporosis*

### Biography



Leading up to graduate studies, Danielle has had a dynamic career path. She completed her Bachelor's degree in Engineering Physics at Queen's University. Upon graduation she returned to Calgary, her hometown, where she pursued a career in operations & management consulting at a boutique consulting firm. During this time, she helped major commodity-based facilities across Canada implement operational changes to improve efficiencies and to cut costs. Although she gained valuable experience through this role, she wished to seek out a career that better aligned with her personal interests.

As an avid skier and mountaineer, Danielle soon found her passion in bone & joint health. More specifically, she saw an opportunity to apply engineering principles to solve challenging problems faced in musculoskeletal healthcare. As a result, she joined the Bone Imaging Laboratory at the University of Calgary to pursue her Master's in Biomedical Engineering. Since commencing her studies in May 2016, Danielle has collaborated with clinical researchers to successfully author three abstracts which have gone on to be accepted at local, national, and international conferences.

Today, she strives to bring a patient-oriented approach to her research and the laboratory setting. Her thesis project will investigate the correlation between hip fractures and bone microstructure in hopes of developing better screening techniques for osteoporosis. By taking on a patient-oriented approach in the early stages of this project she in hopes to better align research outcomes with patient interests.

## **Project Summary**

Hip fractures caused by osteoporosis have a devastating impact; over one third of individuals who suffer a hip fracture die within the following year. For those who survive, quality of life is drastically reduced. Unfortunately, it is very difficult to predict who will have a fracture with current clinical bone imaging methods. This is because they are low-resolution and only provide a two-dimensional image, which cannot directly measure bone strength.

Alternatively, emerging three-dimensional (3D) imaging methods can show bone structure at very high resolutions and presents a promising way to accurately assess bone fragility beyond clinical methods used today. This research project will use state-of-the-art 3D imaging techniques to determine how bone microstructure affects individual bone strength. We will determine what specific features of bone microstructure underpin bone fragility by comparing the bone structure of hip fracture patients to healthy individuals.

By working with the patients involved in this study we will identify gaps in patient care where screening for osteoporosis could have occurred before such a fracture occurred. With their help, we will propose systematic changes to healthcare practices that will ensure at-risk individuals are appropriately screened and treated for osteoporosis as early as possible. Improvements will be tested and implemented in collaboration with the Fracture Liaison Services (FLS), recently established in Alberta. This project provides an exceptional opportunity to make an important leap towards the development of better screening tools and practices to ultimately reduce the impact of fragility fractures on our health care system.