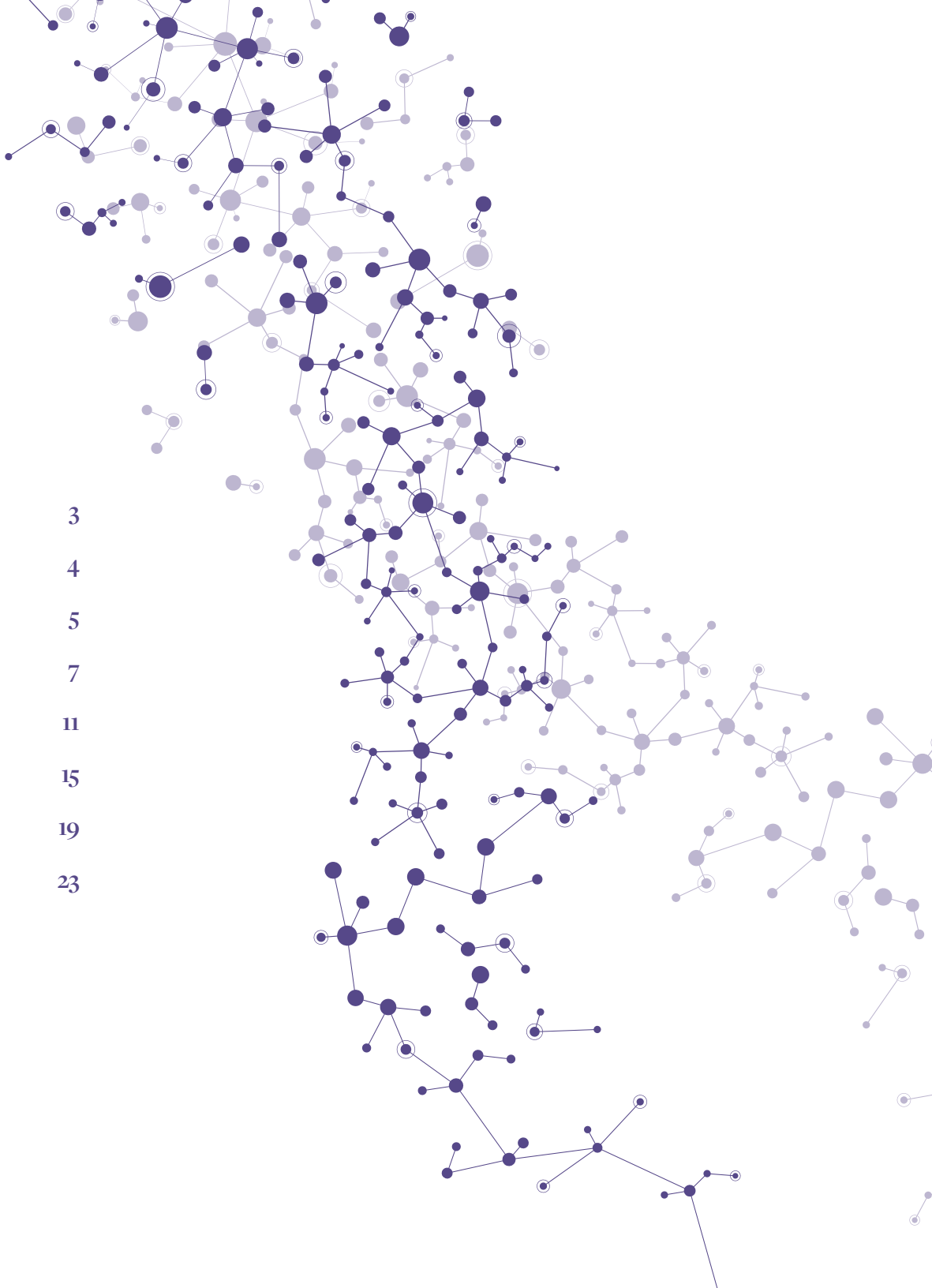
CENTRE FOR HEALTH EVALUATION & OUTCOME SCIENCES

Connecting the dots between research and the real world

Annual Report 2019–2020

CHÉOS
Centre for Health Evaluation
& Outcome Sciences

CONTENTS



WHAT WE DO

The Centre for Health Evaluation and Outcome Sciences (CHÉOS) produces high-quality evidence to make informed changes to the health care system. Bridging the gap between data, research, and care, CHÉOS is a collaboration between cross-disciplinary scientists and expert research staff evaluating the effectiveness of health interventions at the population level. From assessing the cost-effectiveness of a new drug or treatment option, to informing policy decisions that change how care is delivered, CHÉOS seeks to improve health outcomes for all.

Established in 1998, the Centre is jointly affiliated with the Providence Health Care Research Institute (PHCRI) and the University of British Columbia (UBC) Faculty of Medicine, and is housed in a teaching and research hospital in the heart of Vancouver, Canada.

CHÉOS
Centre for Health Evaluation & Outcome Sciences

PROVIDENCE HEALTH CARE
Research Institute
Pursuing **real life** health solutions.

THE UNIVERSITY OF BRITISH COLUMBIA
Faculty of Medicine

WHO WE ARE

Our Vision

Bridging evidence and care to transform the health system and improve health outcomes for all.

Our Mission

Through interdisciplinary collaboration and mentorship of emerging health researchers, we produce and translate high-quality evidence that informs health care from the individual to the system level.

Our Values

COLLABORATION

We forge meaningful partnerships with researchers, health care professionals, people with lived experience, community-based organizations, and system-level decision-makers.

ORGANIZATIONAL INTEGRITY

We strive to uphold the highest principles for the conduct of research that is designed to improve the well-being of all people.

SCIENTIFIC RIGOR

We identify and address relevant and meaningful research questions from many perspectives through the rigorous application of appropriate and innovative scientific methods at all stages of research.

EQUITY, DIVERSITY, AND INCLUSION

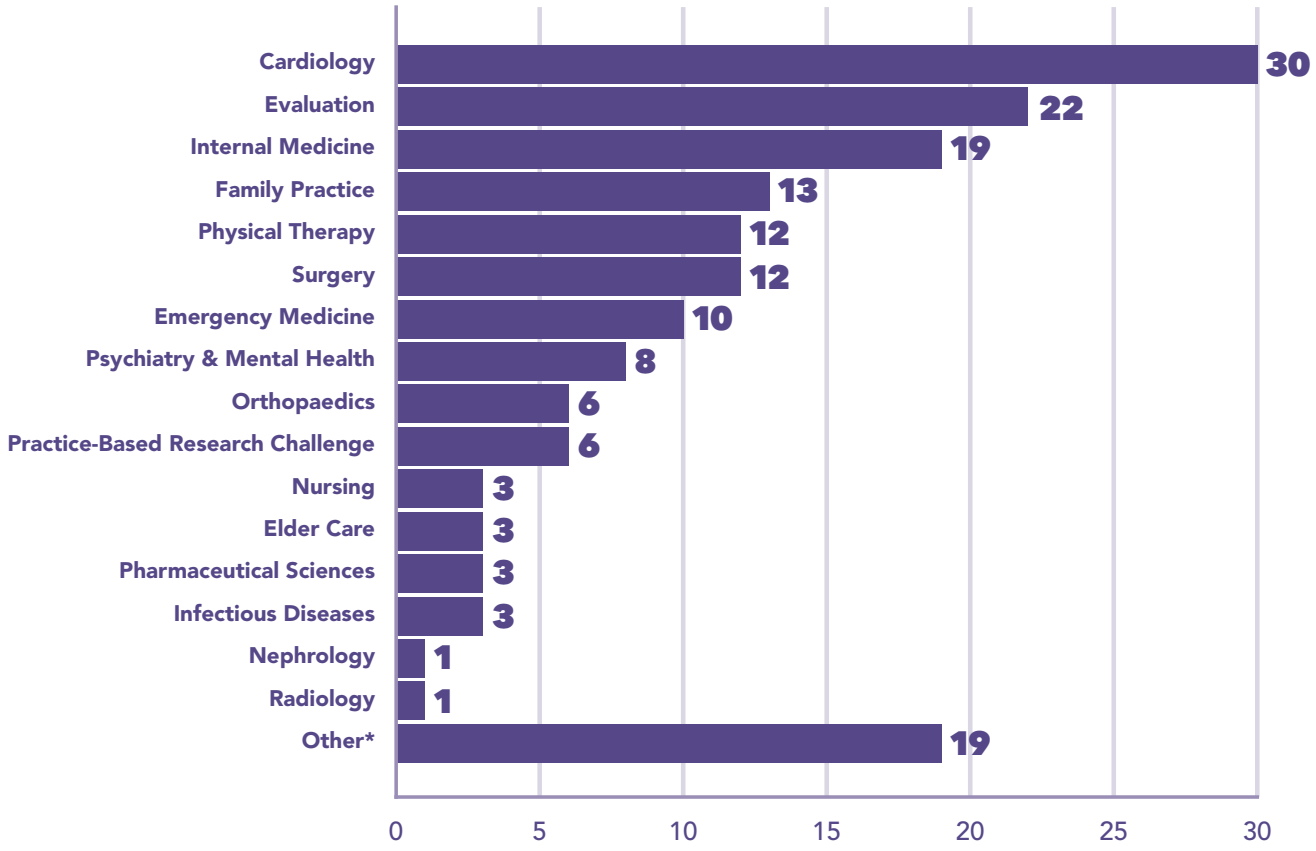
We are dedicated to the promotion and practice of equity, diversity, and inclusion in our workplace and in the research that we conduct.

2019 SNAPSHOT

What services does CHÉOS provide?

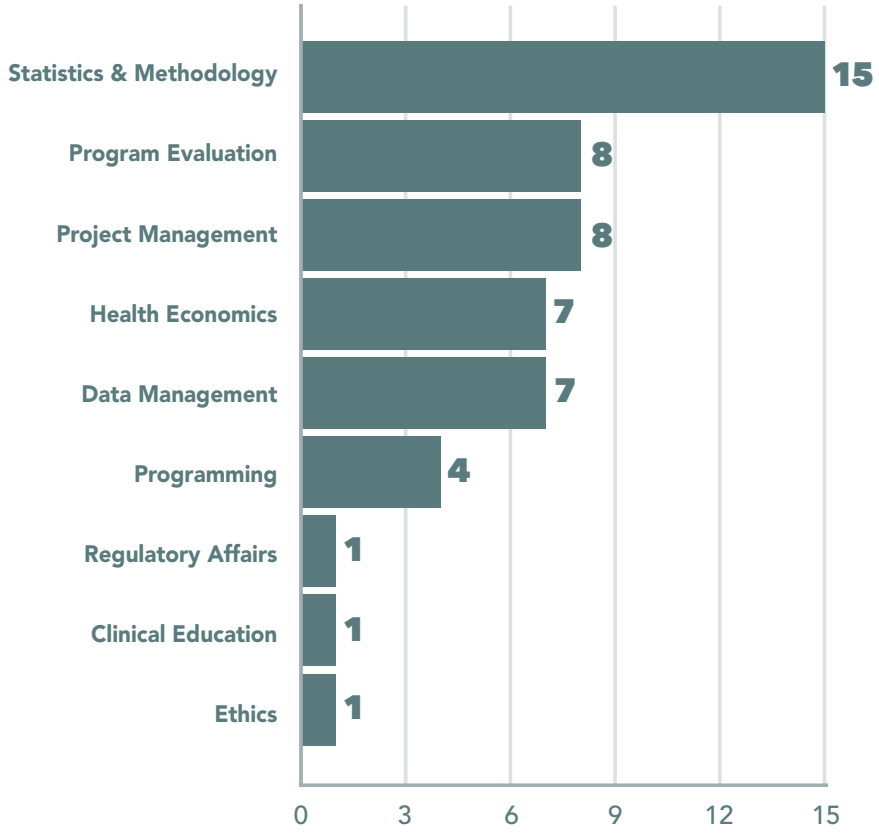
CHÉOS is uniquely positioned to offer services and support to help turn good ideas into great research projects. In 2019, our expert support staff assisted with projects in a wide range of specialty areas.

NUMBER OF SERVICE REQUESTS BY AREA OF SPECIALTY IN 2019/20

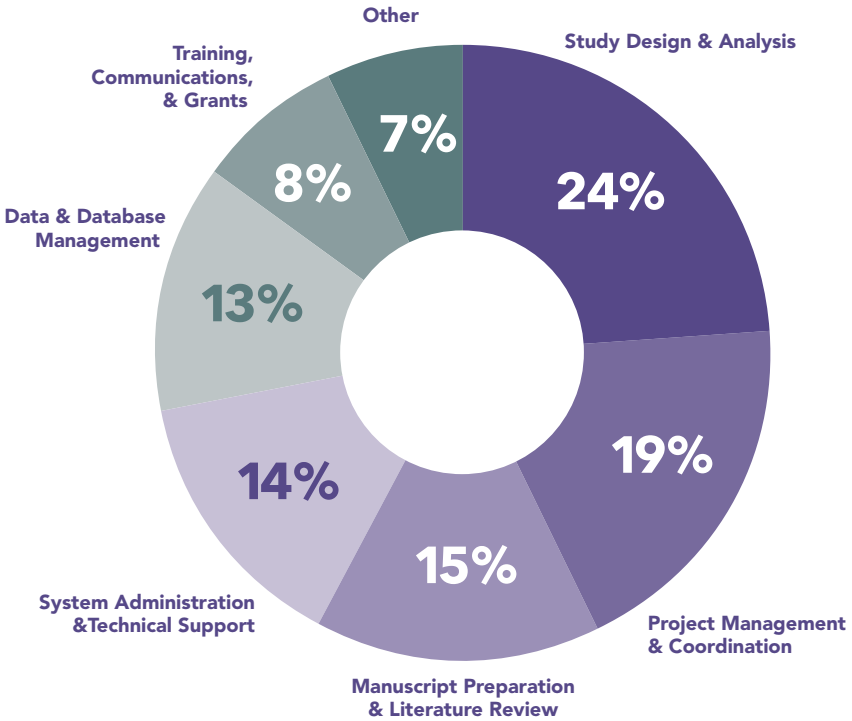


**Includes all other specialties or areas that requested services.*

NUMBER OF STAFF BY DEPARTMENT WHO PROVIDED SERVICES IN 2019/20



PROPORTION OF CHÉOS SUPPORT BY SERVICE TYPE IN 2019/20



COLLABORATIONS

Over the past year, CHÉOS Scientists have partnered with a number of external organizations to push the boundaries of health research. These collaborations have expanded the scope of CHÉOS' work, while providing our partners with expert clinical research knowledge.

1 KNOWLEDGE TRANSLATION WITH THE YWCA

As part of her ongoing work in fetal alcohol spectrum disorder (FASD), **Dr. Amy Salmon** partnered with the YWCA to lead knowledge translation activities for the United Families for our Future project. Funded by the Public Health Agency of Canada and based at YWCA's Crabtree Corner in Vancouver's Downtown Eastside, the goal of this project is to create an evidence-based, culturally safe, and trauma-informed resource on FASD. The project hosted a conference in early 2020, which brought together researchers, individuals living with FASD, and community members to discuss the impact of FASD in Vancouver, while working towards awareness and prevention. This partnership reflects an ongoing relationship between Dr. Salmon and the YWCA. Dr. Salmon, Program Head of Knowledge Translation at CHÉOS, has been able to lend a participatory community research lens to the FASD prevention activities undertaken by the YWCA.

Dr. Elaine Cheung of Northwestern University in Chicago

2 FEELING THE BURNOUT: RESEARCH INTO MORAL DISTRESS WITH A NORTHWESTERN UNIVERSITY PSYCHOLOGIST

In an ongoing collaboration, CHÉOS Scientist **Dr. Peter Dodek** and social psychologist Dr. Elaine Cheung of Northwestern University in Chicago are studying the development of moral distress and burnout in medical trainees and practicing physicians. Moral distress occurs when external constraints force someone to act against their conscience, while burnout is a related syndrome resulting from emotional exhaustion and

depersonalization at work. Moral distress may lead to burnout, and both conditions can negatively impact job retention and quality of patient care. To understand the development of these conditions, Drs. Dodek and Cheung have conducted surveys of UBC medical students and Canadian critical care physicians, along with a longitudinal study of residents in different specialties in B.C. In mid-2019, Dr. Cheung visited CHÉOS to speak about this collaboration and her broader research program as part of the Work in Progress Seminar Series.

Dr. Beth Snow (R) with Dr. Amy Salmon, Program Head, Knowledge Translation

3 TRANSFORMING SYSTEMS: A PARTNERSHIP ACROSS HEALTH AUTHORITIES

The Clinical & Systems Transformation (CST) Project aims to transform health care by standardizing clinical practice and creating a shared electronic health record known as CST Cerner. As the Program Evaluation Lead for the project, CHÉOS Scientist **Dr. Beth Snow** has been evaluating the implementation of CST Cerner across several local health authorities. CST Cerner was rolled out at PHC sites in November 2019 and the Burnaby Centre for Mental Health & Addiction in December 2019. Dr. Snow and her team evaluated the impact of these rollouts, along with prior implementations at Lions Gate Hospital, Squamish General Hospital, Pemberton Health Centre, and Whistler Health Care Centre. As the Program Head for Evaluation at CHÉOS, Dr. Snow has used her evaluation expertise to assess the extent to which CST Cerner achieved its goals related to patient safety and quality.

Drs. Karin Humphries and Annalijn Conklin with project participants and organizers

4 MUSIC AND MEDICINE: INDIGENOUS WOMEN FOR HEART HEALTH

Indigenous women are 76 per cent more likely to die of cardiovascular disease than non-Indigenous Canadian women. CHÉOS Scientists **Dr. Annalijn Conklin** and **Dr. Karin Humphries** have partnered with Dr. Jeff Reading, the BC First Nations Health Authority Chair in Heart Health and Wellness, and Elder Roberta Price, Elder in Residence with VCH's Aboriginal Wellness Program, to begin addressing this disparity. Together, they have formed a collaboration with local urban Elders to lay foundations for the future co-development of novel, arts-based prevention approaches for cardiovascular health. Supported by MSFHR, the group worked collaboratively to identify priorities for research and program development, while planning culturally empowering methods to promote heart health among Indigenous women.

5 CHÉOS AND UBC OKANAGAN: EXPLORING EXERCISE AND TYPE 2 DIABETES

CHÉOS Clinical Trials Program Head **Dr. Joel Singer** and statistician **Dr. Terry Lee** have partnered with Drs. Jonathan Little and Mary Jung from the School of Health and Exercise Sciences at UBC Okanagan (UBCO), whose research laboratories are studying how changes to diet and exercise habits can improve the health of people living with, or at risk of, type 2 diabetes. Drs. Singer and Lee have provided methodological support to the UBCO group in the form of study design, statistical analysis, and randomization services. This ongoing collaboration continues to uncover the links between exercise, diet, and diabetes, while providing non-pharmacological pathways to improve health in those at risk of developing diabetes.

6 MICHAEL SMITH FOUNDATION FOR HEALTH RESEARCH SCHOLARS AT CHÉOS

Three CHÉOS Scientists were announced as recipients of scholar awards from the Michael Smith Foundation for Health Research (MSFHR): **Drs. Sarah Munro**, **Joseph Puyat**, and **Wei Zhang**. The MSFHR Scholar Awards are aimed at health researchers in B.C. who are in the first five years of their appointment at an academic institution. The funding is intended to help researchers foster their independent research career and develop new research programs. Dr. Munro's scholar project will focus on the implementation of shared decision-making (SDM) in health care, Dr. Puyat's project will address the increasing burden of depression in the Canadian population, while Dr. Zhang's project will develop methods of accurately estimating the effect of health care services on work productivity. One additional CHÉOS researcher, Erika Ono—who is supervised by CHÉOS Scientist **Dr. Amy Salmon**—received a MSFHR trainee award for her project entitled A Principles-Focused Evaluation of The BC Children's Hospital Self-Injurious Behaviours Clinic. Congratulations to all recipients!

7 FROM THE WEST COAST TO THE UK: AN INTERNATIONAL PROM PARTNERSHIP

Drs. Rick Sawatzky and Jose Valderas (University of Exeter) received a 2019 UBC Partnership Development Fund Grant for a collaborative initiative between CHÉOS, Trinity Western University School of Nursing, and The Health Services & Policy Research Group of the University of Exeter. The funding supported multiple events and joint research projects on the routine use of patient-reported outcome measures (PROMs) in frail elderly patients. Building upon an initial workshop in Vancouver, the team presented at an international symposium in Leeds, UK, on June 14, 2019 following the Annual PROMs UK Conference. "This is truly a unique opportunity to lay the groundwork for long-lasting and fruitful cooperation between our two centres," commented Dr. Sawatzky, who serves as the Program Head for Patient-Report Outcomes at CHÉOS.

Project partners at the signing of the memorandum of understanding

8 CHÉOS AND THE WORLD'S LARGEST GENOMICS ORGANIZATION

This year marked the culmination of a collaboration between CHÉOS and BGI, the world's largest genomics organization, on a project to research the health economics of personalized medicine. CHÉOS Scientists and staff led the health economic assessment of sequencing-based non-invasive prenatal testing (NIPT), resulting in three publications. The first was a focus group study that provides a case study of the qualitative research process by assessing the attitudes of pregnant women and their partners towards prenatal screening and diagnosis and developing the attributes that can be used in discrete choice experiments (DCE) measuring preferences. Based on the first study findings, a second publication estimated public preferences and willingness to pay for prenatal screening and diagnosis using a DCE, and found that the two most important attributes were the false negative rate and miscarriage risk. This showed that improvement in the overall detection rate and safety can increase public acceptability of these programs. Finally, the team conducted a cost-effectiveness analysis of using NIPT for Down Syndrome in population-level prenatal screening. **The study found that NIPT was beneficial over current testing but, due to cost, was more appropriate as a second-tier screening test rather than a universal test.** Findings from this collaboration have important implications for guiding the design and implementation of prenatal screening programs in B.C. and elsewhere, as well as the development of future technologies.

"Having many different types of researchers to collaborate with allows us to address more complex problems, and in a more complete way, than we would be able to do in isolation."

– DR. WEI ZHANG, PROGRAM HEAD, HEALTH ECONOMICS

RESEARCH HIGHLIGHTS

Below are some abbreviated selections from *The Evidence Speaks*, a monthly website series that summarizes some of the latest in CHÉOS research. These highlights demonstrate the breadth and diversity of the studies carried out by our Scientists in the past year.

Barbic SP, Chan N, Rangi A, Bradley J, Pattison R, Brockmeyer K, Leznoff S, Smolski Y, Toor G, Bray B, Leon A, Jenkins M, Mathias S. **Health provider and service-user experiences of sensory modulation rooms in an acute inpatient psychiatry setting.** *PLoS One.* 2019 Nov 21;14(11):e0225238.

This study analyzed the health provider and inpatient service user perceptions on the use of sensory modulation rooms (SMRs) in acute psychiatric units. Through conducting interviews with nine health providers and ten service users, the researchers determined that there are several key themes associated with SMRs, the most prevalent being that the room helped service users feel empowered and able to practice self-management strategies as needed. The majority of service users also felt that the SMR helped them regulate their emotions, particularly anxiety or stress, and provided an alternative management strategy to restraint, medication, and/or seclusion. **The findings from this study illustrate the potential for using SMRs to improve patient and clinician experiences, while helping patients feel more empowered, hopeful, and in control of their own health.** However, to truly see the benefits of SMRs in this setting, additional education on the use and benefits of SMRs is necessary to ensure health providers can confidently educate patients on how the rooms can be incorporated into their care.

Grunau B, Kawano T, Scheuermeyer FX, Drennan I, Fordyce CB, van Diepen S, Reynolds J, Lin S, Christenson J. **The Association of the Average Epinephrine Dosing Interval and Survival With Favorable Neurologic Status at Hospital Discharge in Out-of-Hospital Cardiac Arrest.** *Ann Emerg Med.* 2019 Jun 24 epub ahead of print.

This secondary analysis of the 2015 study 'Trial of Continuous or Interrupted Chest Compressions During CPR' was conducted to shed light on epinephrine dosing recommendations in out-of-hospital cardiac arrest. The analysis used data from over 15,000 patients who received out-of-hospital CPR and at least three doses of epinephrine. The primary outcome was survival with favourable neurological status at hospital discharge. The median epinephrine dosing interval was 4.3 minutes and approximately 2 per cent of patients survived with favourable neurological status. Patients receiving epinephrine at increased frequency were more likely to survive to hospital discharge and were

more likely to be discharged with favourable neurological status. In patients who received epinephrine at an interval of less than 3 minutes during CPR, about 5 per cent survived with favourable neurological status while for longer intervals, this outcome occurred less often. **These findings suggest that current recommendations about epinephrine dosing for out-of-hospital cardiac arrest may be sub-optimal.** A prospective study specifically designed to answer this question is needed for a more definitive conclusion.

Chiu JA, Shergill M, Dhingra V, Ronco JJ, LeBlanc A, Pamplin C, McKeown S, Dodek PM. **Variation in the Management of Pain, Agitation, and Delirium in Intensive Care Units in British Columbia.** *Am J Crit Care.* 2020 Mar 1;29(2):122-9.

This research documented current practice in managing pain, agitation, and delirium (PAD) in B.C. intensive care units (ICUs) and identified opportunities for improvement. A 13-item online survey was used to gather insights into current PAD assessment and management practices in the ICU from the person most informed about PAD practices at each site. **The results of the survey revealed that there is a wide variation in self-reported practices for PAD assessment and management in ICUs in B.C.**; for example, only half of the participating ICUs had a unit-specific pain algorithm. In conjunction with gaps between practice and evidence-based guidelines, this variation indicates that there is room for improvement in the processes of care.

Black AT, Ali S, Baumbusch J, McNamee K, Mackay M. **Practice-Based Nursing Research: Evaluation of clinical and professional impacts from a research training program.** *J Clin Nurs.* 2019 Apr 2 epub ahead of print.

This mixed-methods evaluation study investigated the clinical and professional impact of a research training program on nurses' and other clinicians' evidence-based practice (EBP) and interest in conducting research. The researchers used surveys and interviews to evaluate participants' experience with a research training program. **The evaluation revealed that partaking in the research training program can have a positive impact on participants**, including reduced barriers to EBP, enhanced appreciation for EBP and research, and increased interest in further education. The study concludes that the evaluation shows benefits to not only the participants, but also to their patients, employers, and the health care system overall.

Conklin AI, Yao CA, Richardson CG. **Chronic sleep disturbance, not chronic sleep deprivation, is associated with self-rated health in adolescents.** *Prev Med.* 2019 Jul;124:11-6.

This analysis aimed to determine the effect of sleep deprivation and disturbance on the self-rated health of young people. The results show that young people who reported chronic sleep disturbance were more likely to report non-excellent health than those who did not. This effect was seen in both young men and women but was more pronounced in young men. No effect of chronic sleep deprivation on self-reported health was found in this study. **The study suggests that sleep quality matters more than sleep quantity for the overall health of young people in B.C.** While further study is needed to understand the relationship between sleep disturbance and deprivation and health, this analysis will help inform public health efforts to improve sleep quality and quantity in young people as well as assessment of their overall health.

Zhang W, Wong CH, Chavannes M, Mohammadi T, Rosenfeld G. **Cost-effectiveness of faecal calprotectin used in primary care in the diagnosis of inflammatory bowel disease.** *BMJ Open.* 2019 Apr 14;9(4):e027043.

This study aimed to compare a standard blood test to the addition of fecal calprotectin (FC) for the diagnosis of inflammatory bowel disease (IBD) in a primary care setting among adult patients presenting with gastrointestinal symptoms. The primary outcome measures included costs, cost-effectiveness, and quality-adjusted life years (QALY). The study determined that, while FC testing is expected to cost more than the standard blood test, it reduced the time to IBD diagnosis by 40 days compared to blood testing alone. As a result, screening adults using an FC test may be a cost-effective method of diagnosing IBD in primary care settings in Canada. **Following the publication of this study, the Ministry of Health approved FC testing as an insured benefit for patients with IBD in the province.**

Dodek P, Norena M, Ayas NT, Dhingra V, Brown G, Wong H. **Moral distress in intensive care unit personnel is not consistently associated with adverse medication events and other adverse events.** *J Crit Care.* 2019 July 2 epub ahead of print.

This study examined the association between moral distress in intensive care unit (ICU) personnel, medication errors, and adverse events across 13 ICUs over 2 years. **The results revealed that there were no consistent relationships between moral distress in ICU personnel and errors or adverse events related to medications.** However, these results may be associated with hypervigilance and distraction. The researchers also analyzed the association between moral distress and other adverse safety events, such as unplanned extubations and hypoglycemia, but found no consistent relationships.

Magee C, Norena M, Hubley AM, Palepu A, Hwang SW, Nisenbaum R, Karim M, Gadermann A. **Longitudinal Associations between Perceived Quality of Living Spaces and Health-Related Quality of Life among Homeless and Vulnerably Housed Individuals Living in Three Canadian Cities.** *Int J Environ Res Public Health.* 2019 Nov;16(23):4808.

This research assessed the association between perceived quality of life and both mental and physical health-related quality of life (HRQoL) in a prospective cohort study at baseline and four annual follow-up points. At baseline, there were 595 homeless and 595 vulnerably housed participants living in Ottawa, Vancouver, and Toronto. Results show that participants' perceived quality of life was positively associated with mental and physical HRQoL, controlling for housing status, health, and socio-demographic variables. **These findings indicate that policies aimed at increasing HRQoL among homeless and vulnerably housed populations should prioritize improving the perceived quality of their living spaces.**

Veljkovic A, Daniels T, Glazebrook M, Dryden P, Penner M, Wing K, Younger A. **Outcomes of Total Ankle Replacement, Arthroscopic Ankle Arthrodesis, and Open Ankle Arthrodesis for Isolated Non-Deformed End-Stage Ankle Arthritis.** *J Bone Joint Surg Am.* 2019 Sep 4;101(17):1523-9.

This study compared clinical outcomes of total ankle replacement (TAR) involving the HINTEGRA prosthesis, arthroscopic ankle arthrodesis (AAA), and open ankle arthrodesis (OAA) in patients with isolated, non-deformed end-stage ankle arthritis. Using data from the Canadian Orthopedic Foot and Ankle Society (COFAS) Prospective Ankle Reconstruction Database, the researchers analyzed 238 ankles in 229 patients who underwent TAR, AAA, or OAA. Patients who underwent AAA and OAA had comparable clinical outcomes to TAR. Furthermore, the rate of component revision was similar across the groups, although patients who underwent TAR required a greater number of additional procedures. **The study concluded that AAA and TAR involving the HINTEGRA prosthesis were not significantly different with regard to short-term outcomes, but patients should be counseled on the reoperation rates for TAR.**

Puyat J, Kazanjian A. **Physician Incentives and Sex/Gender Differences in Depression Care: An Interrupted Time Series Analysis.** *Health Equity.* 2020 Mar 13;4(1):23-30.

This study investigated sex and gender differences in depression care and the impact of physician incentives in B.C. The study used indicators that measure receipt of counseling/psychotherapy (CP), minimally adequate CP (MACP; defined as at least four CP sessions), antidepressant therapy (AT), and minimally adequate AT (MAAT; defined as at least 84 days of AT). Based on deidentified data, the mean number of individuals diagnosed with depression each year was 106,277. On average, 65 per cent of those diagnoses were female and 35 per cent were male. Before physician incentives were introduced in the province in 2008, the percentage of individuals with depression who received CP and MACP was higher in males than in females, whereas the percentage who received AT was higher among females. Following the introduction of the incentive, these differences remain unchanged, highlighting that **sex and gender differences in depression care persist despite physician incentives.**

TOP STORIES

CHÉOS research has impact from coast to coast and around the globe. Take a look at some of our Scientists' notable accomplishments from 2019 to see how their work is changing the world around us.

Canadian Government Approves Injectable Opioid Treatments

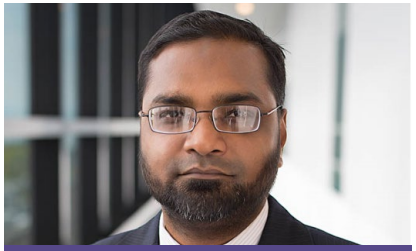
In May 2019, Health Canada announced its approval of the use of injectable hydromorphone (HDM) for the treatment of severe opioid use disorder across the country, a direct result of work by CHÉOS Scientists and staff in the Study to Assess Longer-Term Opioid Maintenance Effectiveness (SALOME). SALOME, led by **Dr. Eugenia Oviedo-Joekes**, demonstrated that HDM is as effective as diacetylmorphine (pharmaceutical-grade heroin) at treating long-term, chronic opioid dependence. Later cost-effectiveness analyses showed that, compared to methadone alone, injectable treatments increase quality of life and save cost overall. Beyond the direct effect of the treatments, Dr. Oviedo-Joekes has also explored the experiences of patients receiving injectable treatments, and the structures and characteristics of care that make these programs effective. In a recent research project, Heather Palis a CHÉOS trainee supervised by Dr. Oviedo-Joekes, interviewed patients about their experiences. They noted the importance of a strong relationship and a sense of mutual trust between participants and their health care providers, and meaningful engagement in the process of shared decision-making about their care.

Dr. Ehsan Karim

Using Machine Learning to Change the Future of Medicine

Dr. Ehsan Karim is a leading researcher in the implementation of machine learning in health care, a field that could fundamentally change how we conduct research in the future. Clinical trials, the gold standard in medical research, generally take place in a controlled environment and can be limited in duration, scope, and adaptability. Machine learning, which uses computer models that learn and improve based on new data, is able to reach beyond these limitations to generate unique insights and make predictions about the future. Dr. Karim has spent much of his career applying these insights to multiple sclerosis (MS), where he uses observational data going back to the early 1990s to assess the longitudinal effects of various treatments. While most of these treatments originally underwent testing using small-scale clinical trials, the data inputted into machine learning tools come

from thousands of real-world cases. He is then able to assess these therapies to determine their effectiveness in practice. In 2019, Dr. Karim presented to attendees of LifeSciences BC Access to Innovation, discussing how this technology could be put to work in B.C.'s health care system to improve a range of issues, from public health outcomes to patient-specific care plans.



CHÉOS Trainee Mohammad Atiquzzaman

NSAIDs Increase Heart Risk in Osteoarthritis

Research led by CHÉOS Trainee Mohammad Atiquzzaman and supervised by **Dr. Aslam Anis**, suggests that nonsteroidal anti-inflammatory drugs (NSAIDs) may contribute to cardiovascular disease risk in people living with osteoarthritis (OA). People living with OA are at an increased risk of cardiovascular disease compared to the general population, but the underlying mechanism behind this elevated risk is not clear. Many people living with OA use NSAIDs to help control pain and inflammation related to their disease, and preliminary research suggests these medications could play a part in their increased cardiovascular disease risk. The study team, which also included CHÉOS Scientists Hubert Wong and Ehsan Karim, used provincial administrative data to identify how much of the increase in risk related to OA is due to NSAID use alone. Overall, the study found that approximately 41 per cent of the increased risk of cardiovascular disease among people with OA could be attributed to their use of NSAIDs. The project is the first longitudinal study to evaluate how NSAID use affects the relationship between OA and cardiovascular disease in a large population-based sample.

Dr. David Barbic on Global News

9 in 10 Bystanders Can't Recognize Cardiac Arrest

Research from the CHÉOS Emergency Medicine Program found that only 1 in 10 bystanders can correctly identify a cardiac arrest, and only about 4 in 10 can recognize an overdose. Being able to identify these events quickly and correctly is extremely important: for every minute CPR or defibrillator application is delayed, the chance of survival with good outcomes after a cardiac arrest decreases by 12%; for opioid overdose, bystander CPR and naloxone significantly decrease mortality. The study, which was led by **Dr. David Barbic**, surveyed people throughout B.C. about their knowledge and willingness to intervene. Respondents also viewed two video clips of these events and were asked to identify the emergency from a list of options. Speaking about the study, Dr. Barbic noted that the results show that many people are willing to intervene but they don't have the necessary training to know when their help is needed. This means we need to think about more focused ways of educating people on how to recognize these emergencies, he said. The study was supported by the St. Paul's Hospital Foundation.

Practice Change to Reduce Emergency Wait-Times

Dr. Frank Scheuermeyer led a research project that points to the need for standardizing the way emergency departments treat atrial fibrillation, a common heart arrythmia. When a patient presents with atrial fibrillation, a physician will choose one of two methods: an electrical or chemical treatment. If the first fails, they will move on to the other method. Both treatment strategies have over 90 per cent success rates, but physicians disagree on which should be administered first; in Western Canada, an electrical-first strategy is generally used, whereas Eastern Canada uses a chemical-first approach. Using a six-centre randomized trial which included St. Paul's and Mount St. Joseph's Hospitals, Dr. Scheuermeyer's team found that both methods were equally safe, but providing electrical stimulation first, rather than the chemical method, results in earlier patient discharges. Median length of stay was 1.2 hours shorter in the electrical-first group meaning that standardizing the treatment to electrical-first could have a significant positive effect on emergency department wait times. Length of stay in Canadian emergency departments is a growing concern: in 2016–17, it was up 11 per cent from the year before and almost 17 per cent from 5 years prior.

Dr. Karin Humphries

Sex, Gender, and Heart Health

Dr. Karin Humphries has spent much of her career understanding how sex and gender affect cardiovascular disease risk, diagnosis, and care. Recently, Dr. Humphries collaborated with CHÉOS emergency medicine researchers to investigate whether these factors also affect risk from cardiac arrests that occur outside of the hospital. They found that bystanders were less likely to use a defibrillator on women compared to men after cardiac arrest in public locations. In a separate publication, they found that the sex or gender of victims did not affect how or when bystanders performed CPR, but women were less likely to be transported to hospital by ambulance compared to men. Both of these findings could have significant impacts on survival after out-of-hospital cardiac arrest. Dr. Humphries also co-authored an editorial with cardiologist and CHÉOS Scientist Dr. Nathaniel Hawkins, which called for more research into sex differences in complications and adverse events after the implantation of pacemakers, devices that reduce deaths from heart failure and arrythmias. Men and women are at increased risk from different types of complications related to these devices.

“Mentoring the next generation of health researchers is one of the ways CHÉOS aims to make a lasting impact. Answering the pressing questions of today is vitally important, along with fostering the development of tomorrow’s leaders.”

– DR. ASLAM ANIS, DIRECTOR

PUBLICATIONS

The work of our Scientists is often found in the pages of top journals. Below is an alphabetized list of the top 30 CHÉOS publications according to the rating of the journal in which they appear.*

1. Atiquzzaman M, **Karim ME**, Kopec J, **Wong H**, **Anis AH**. Role of Nonsteroidal Antiinflammatory Drugs in the Association Between Osteoarthritis and Cardiovascular Diseases: A Longitudinal Study. *Arthritis Rheumatol*. 2019 Nov;71(11):1835-43.

2. **Barbour SJ**, Djurdjev O, **Gill JS**, Dong JJ, **Gill J**. A propensity score matched analysis shows no adverse effect of early steroid withdrawal in non-diabetic kidney transplant recipients with and without glomerulonephritis. *Kidney Int*. 2019 Aug;96(2):460-9.

3. **Barbour SJ**, Coppo R, Zhang H, Liu Z-H, Suzuki Y, et al; International IgA Nephropathy Network. Evaluating a New International Risk-Prediction Tool in IgA Nephropathy. JAMA *Intern Med*. 2019 Jul;179(7):942-52.

4. Bartos JA, **Grunau B**, Carlson C, Duval S, Ripeckyj A, et al. Improved Survival with Extracorporeal Cardiopulmonary Resuscitation Despite Progressive Metabolic Derangement Associated with Prolonged Resuscitation. *Circulation*. 2020 Mar;141(11):877-86.

5. Benjafield AV, **Ayas NT**, Eastwood PR, Heinzer R, Ip MSM, et al. Estimation of the global prevalence and burden of obstructive sleep apnoea: a literature-based analysis. *Lancet Respir Medicine*. 2019 Aug;7(8):687-98.

6. Bevilacqua MU, Hague CJ, Romann A,…**Levin A**. CT of Kidney Volume in Autosomal Dominant Polycystic Kidney Disease: Accuracy, Reproducibility, and Radiation Dose. *Radiology*. 2019 Jun;291(3):660-7.

7. Daya MR, Leroux BG, Dorian P, Rea TD, Newgard CD,… **Christenson J**, **Barbic D**, et al.; Resuscitation Outcomes Consortium Investigators. Survival After Intravenous Versus Intraosseous Amiodarone, Lidocaine or Placebo in Out-of-Hospital Shock-Refractory Cardiac Arrest. *Circulation*. 2020 Jan;141(3):188-98.

8. Ding Y, Park E, Nagarajan M, **Grafstein E**. Patient Prioritization in Emergency Department Triage Systems: An Empirical Study of the Canadian Triage and Acuity Scale (CTAS). *Manuf Serv Oper Manag*. Epub 2019 Apr 8.

9. Dragojlovic N, van Karnebeek CDM, Ghani A, Genereaux D, Kim E,…**Lynd LD**. The cost trajectory of the diagnostic care pathway for children with suspected genetic disorders. *Genet Med*. 2020 Feb;22(2):292-300.

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*Journals were ranked using SCImago Journal Rank (SJR), a measure that accounts for both the number of citations received by the journal and the importance of journals where citations occur. Case reports, editorials, commentaries, and letters to the editor are not included.

CHÉOS Scientists Dr. John Gill, nephrology and transplantation researcher, and Dr. Anita Palepu, whose research is with marginalized populations.

JOINING THE TEAM IN 2019

We welcomed six new Scientists and one new research associate to the CHÉOS team in 2019. These researchers specialize in a wide range of areas, including cardiology, orthopaedics, and internal medicine.

Dr. Christopher B. Fordyce

MD, MHS, M.Sc., FRCPC, Scientist

Dr. Christopher Fordyce is a Clinical Assistant Professor within the Division of Cardiology at UBC and Director of the Cardiac Intensive Care Unit at Vancouver General Hospital. His clinical and research interests lie predominately in cardiac critical care, including myocardial infarction and cardiac arrest, as well as non-invasive testing for stable coronary disease and antithrombotic therapy in atrial fibrillation. As a Scientist in the Cardiovascular Health Program at CHÉOS, Dr. Fordyce has a number of ongoing research projects. Through funding from MSHFR's 2019 Health Professional-Investigator Program, Dr. Fordyce is leading a study to better understand the medical journey of patients after out-of-hospital cardiac arrest, and to identifying areas where care can be improved. The study utilizes a database that is first-of-its kind in North America, linking between eight different databases that collect information from 9-1-1 calls through to community care settings.

Dr. Nathaniel Hawkins

MBChB, MD, MPH, Scientist

Dr. Nathaniel Hawkins is a Clinical Assistant Professor at UBC and holder of UBC's Dr. Charles Kerr Distinguished Scholar in Heart Rhythm Management. During his cardiology fellowship in Liverpool, he completed a Masters of Public Health focusing on the epidemiology of cardiovascular disease, population modelling, and health systems. He holds dual training and certification in Heart Function and Heart Rhythm management, providing an innovative perspective on the integration of technology with chronic disease management. His research is focused on improving quality of life and outcomes for patients with heart failure by addressing comorbidities, using implantable and external devices, remote monitoring, and improving systems of care. One example of Dr. Hawkins' recent work is a publication that aimed to understand the treatment, outcomes, and impacts of cardiology follow-up for atrial fibrillation patients discharged from the emergency department.

Dr. Tara Sedlak

MD, FRCPC, MBA, Scientist

Dr. Tara Sedlak is a Clinical Associate Professor in the Division of Cardiology at UBC. She practices General Cardiology at Vancouver General Hospital and BC Women's Hospital and is the director of the Leslie Diamond Women's Heart Health Clinic. Her research interests include causes of myocardial infarction and chest pain in women with normal coronary arteries, and therapeutic strategies in microvascular coronary dysfunction and coronary vasospasm. She is currently the chair of the advocacy working group for the Canadian Women's Heart Health Alliance. In a series of ongoing projects, Dr. Sedlak is analyzing sex differences in coronary artery disease (CAD), understanding the usefulness of current risk prediction tools, and developing an improved sex-specific algorithm for the prediction of CAD for both males and females using information available from routine office visits.

Dr. Karen Tran

MD, FRCPC, MHS, Scientist

Dr. Karen Tran is a General Internist in the Division of General Internal Medicine at UBC, and a Clinical Assistant Professor with the Department of Medicine. Dr. Tran currently works as a General Internist on the Clinical Teaching Unit and Hypertension Clinics at Vancouver General Hospital and with Obstetrical Medicine at BC Women's Hospital. She is a certified hypertension specialist by the American Society of Hypertension, and is a member of Hypertension Canada Guideline committee for blood pressure measurement and resistant hypertension. Her research interests include accurate blood pressure monitoring and hypertensive disorders of pregnancy. Her recent research has sought to understand how home blood pressure monitoring can improve how we care for pregnant women who develop hypertension during their pregnancies, and ultimately lead to improved cardiovascular outcomes.

Dr. Andrea Veljkovic

MD, MPH, BComm, FAOA, FRCSC, Scientist

Dr. Andrea Veljkovic is a Clinical Associate Professor in the Department of Orthopaedics at UBC and the Fellowship Director for Adult Foot & Ankle Reconstruction. She is the Research Director for the UBC Orthopaedic Residency Program as well as the Canadian Foot and Ankle Society. Dr. Veljkovic's research and clinical interests include joint preservation techniques and arthroscopy, early knee and ankle arthritis epidemiology, and foot and ankle surgery clinical outcomes. Some of her recent work involves patient outcomes following ankle reconstruction or replacement, an area in which she has collaborated with CHÉOS Scientists Drs. Kevin Wing and Jason Sutherland. She has published over 60 scientific papers and has lectured extensively. She maintains a sport knee and sport foot and ankle affiliation with the UBC varsity sport teams.

Dr. Kevin Wing

B.Sc., MD, FRCSC, Scientist

Dr. Kevin Wing is a full-time academic adult foot and ankle surgeon and a Clinical Professor in the Department of Orthopaedics at UBC. He is the past president of the Canadian Orthopaedic Foot and Ankle Society, as well as the British Columbia Orthopaedic Association. From 2012 to 2016, Dr. Wing was the Program Director for the Adult Foot and Ankle Reconstruction Fellowship at UBC. He is a founding member of the Canadian Orthopaedic Foot and Ankle Society research team, evaluating the outcomes from the surgical treatment of end-stage ankle arthritis. His research interest is in how we evaluate patients' health states both before and after foot and ankle surgery. Dr. Wing, along with his co-authors, has numerous publications exploring the change in self-reported outcomes for patients undergoing foot and ankle surgery. These clinically relevant studies have had an impact at the local, national, and international level.

Dr. Beena Parappilly

PhD, MSN, BSN, Research Associate

Dr. Beena Parappilly is a Registered Nurse with over 25 years of experience in various health care settings in B.C., and is currently the Clinical Nurse Specialist for the Medicine Program at PHC. In this role, Dr. Parappilly provides leadership for improving safety and quality of patient care, promoting evidence-based practice, and mentoring frontline nurses to conduct research activities. Her research interests include stroke prevention and managed alcohol programs. She is a co-author on the *Canadian Stroke Best Practice Recommendations for Transitions and Community Participation Following Stroke*, a comprehensive set of evidence-based guidelines addressing issues faced by people following an acute stroke. In recent publications, Dr. Parappilly investigated the experience of patients with severe alcohol use disorder on a managed alcohol program (MAP) and nurse perceptions of MAP at St. Paul's Hospital.

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