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HEALTH SYSTEM IMPACT FELLOWSHIP

CHSPRA

CIHR Health System Impact Fellowship

2017-19 Embedded Research Impact Casebook

Canadian Institutes of Health Research / Instituts de recherche en santé du Canada

Canada

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Table of Contents

Acknowledgements....2

Table of Contents....3

Background....5

Impact Synthesis....7

Impact Narratives....12

Dr. Melita Avdagovska - Charting the implementation and impact of the MyChart pilot: Implications for province-wide implementation of a patient portal....12

Dr. Sofia Bartlett - Utilizing a syndemic approach for population level prevention, care and treatment cascades of HCV and related epidemics....14

Dr. Monica Cepoiu-Martin - Assessing the AHS Enhancing Care in the Community (ECC) Program against the quadruple aim: An embedded training experience....16

Dr. Ivy Cheng - Improving Management of Palliative Oncology Patients and the Elderly Frail through the North Toronto Local Health Integrated Network....17

Dr. Jawad Chishtie - Developing a health services strategy and framework for equitable primary care services for the Ontario spinal cord injury population, using visual analytics....19

Dr. Aislinn Conway - Leveraging data to improve obstetric safety in Canada: a formative evaluation....20

Dr. Shelley Cook - Better Serving People with Multiple, Complex Needs in BC....22

Dr. Alisa Grigorovich - Preventing violence and enhancing safety by optimizing the use of remote monitoring technologies in rehabilitation settings....24

Rae L Jewett - Integrating Geography to Evaluate Health Inequalities Across Urban, Rural and Remote Canada....26

Daman Kandola - Use of emergency health services by stroke patients: What is known about when to seek emergency care & how transport decisions impact in-hospital care....27

Logan Lawrence - Enhancing evidence-informed decision-making capacity to improve access to collaborative care teams in Nova Scotia....28

Dr. Kiran Pohar Manhas - Embedding Shared Decision-Making and Patient Centered Care in Community Rehabilitation Programs in Alberta....29

Chantelle Recsky - Analyzing and mitigating technology-mediated adverse events in primary and community care....31

Danielle Rice - Measuring Access to Mental Health and Addiction Services in Canada 33

Dr. Matthew Russell - Service transitions for individuals with disabilities.....35

Iván Sarmiento - Development of a knowledge to action framework based on the promotion of intercultural dialogue between official and traditional health systems 37

Narhari Timilshina - Outcomes of patients who undergo concurrent chemotherapy and radiation therapy for locally advanced head & neck cancer: a population-based study.....39

Ting Yu - A Lean Transformation in an Emergency Department 41

Appendix.....42

Background

The Health System Impact (HSI) Fellowship provides highly qualified doctoral trainees and post-doctoral fellows studying health services and policy research (HSPR) and related fields a unique opportunity to apply their research and analytic talents to critical challenges and pressing problems faced by health system organizations.

The program is recognized for several distinctive features, including its emphasis on embedded research situated directly within a health system organization and focused on an impact-oriented program of work designed to address a pressing problem faced by the organization, its dual-mentorship model whereby fellows are mentored and supervised by a health system and academic leader, its leadership training program to expand fellow's skills and competencies, and its national cohort that connects fellows and mentors across the country. These innovative features come together in a one-year embedded fellowship for doctoral fellows and a two-year embedded fellowship for post-doctoral fellows who are committed to informing health system decision-making and solving pressing health system challenges. Overall, the HSI Fellowship supports embedded, impact-oriented scholarship that equips fellows with the competencies, experience, and networks to excel as the health system leaders of tomorrow. Since its inception in 2017, the program has funded 202 fellows who are embedded in 103 health system partner organizations and connected to 24 universities across Canada (see Figure 1).

The HSI Fellowship's underlying program logic posits that embedding PhD-trained scholars directly within health system organizations and focusing their efforts on impact-oriented projects identified as a priority by the organization will, consistent with integrated knowledge translation (IKT) theory, lead to the formation of trusted, sustained relationships and the co-creation of responsive, relevant, timely, and useful research that is more likely to inform the organization's policy and decision-making. In addition, capacity within the organization to conduct and/or use research for rapid learning and improvement will be enhanced.

Emerging evidence on the embedded research model suggests that three factors will be integral to its future and sustained success, including: 1) a cadre of researchers trained to possess the skills and competencies necessary to achieve impact, including a combination of research and professional skills (e.g., leadership, negotiation, interdisciplinary collaboration), 2) health system leaders who understand the value of research to solve system problems and prioritize embedded research within their organizations , and 3) incentive and reward systems (including publication outlets) that recognize and celebrate impact-oriented research.

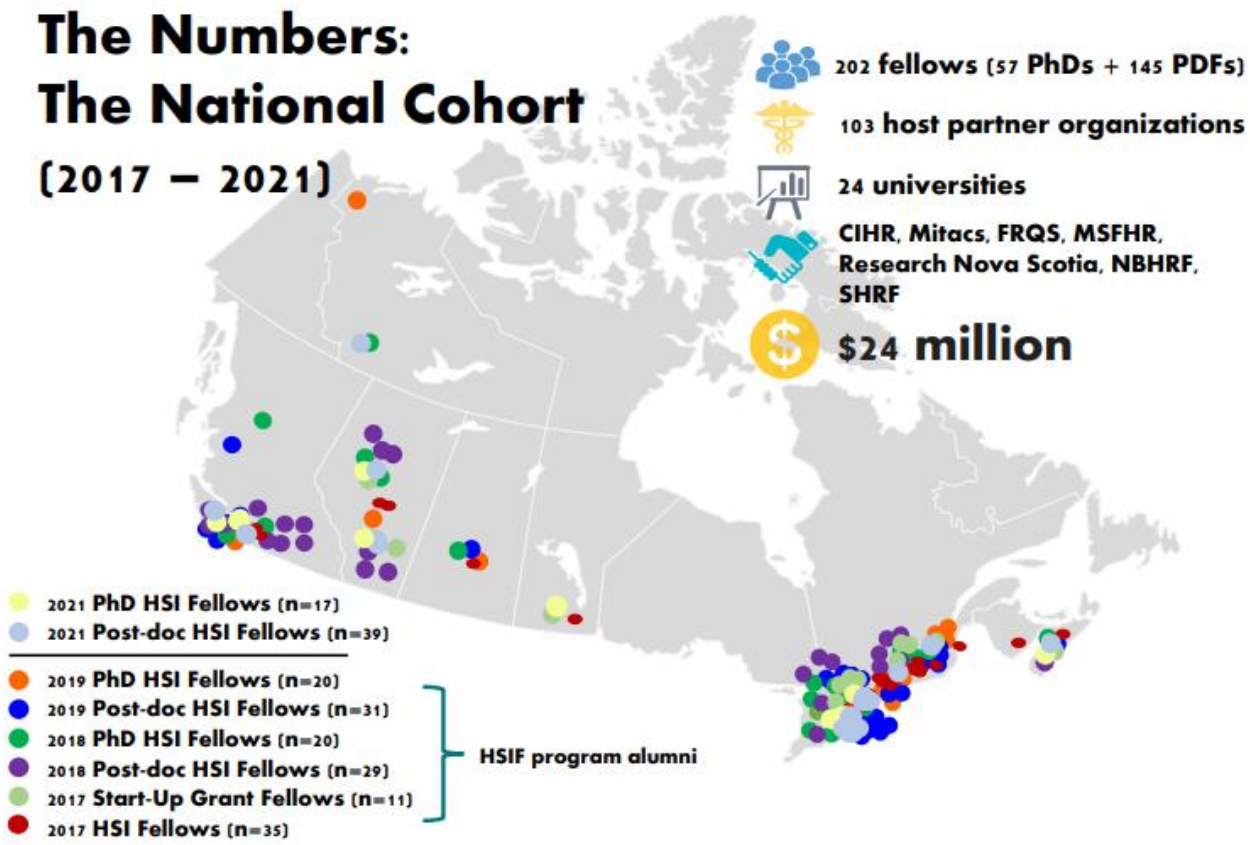
This Embedded Research Impact Casebook features impact narrative summaries written by HSI Fellows and their health system and academic mentors about the embedded research impacts catalyzed through their fellowship work. It is a CIHR-IHSPR priority to publish, showcase and

value the contributions and impacts of HSI Fellows while embedded within their health system organizations, and the commitment of the health system and academic mentors to embedded research. It is also, we hope, an opportunity to spark further interest in and commitment to embedded research, and to illustrate the many diverse, non-linear pathways to embedded research impact.

This Embedded Research Impact Casebook includes 18 impact narratives submitted by HSI Fellows from the 2017, 2018 and 2019 cohorts between March 2020 and August 2021, and an overall synthesis of types of impacts reported. The impact narratives were submitted within three months of fellowship completion, as an optional component of reporting requirements, and therefore reflect the more proximal impacts of the fellowship. To frame this work, fellows used the Impact Narrative tool created by the Canadian Health Services and Policy Research Alliance's (CHSPRA) Impact Assessment Working Group (please see the CHSPRA Appendix B for full tool).

Fellow spotlight: *Please click on the embedded link in each fellow's name to view their online profile.*

Figure 1 – The Pan-Canadian HSI Fellowship Cohort



Impact Synthesis – Executive Summary

The Canadian Health Services and Policy Research Alliance (CHSPRA) Informing Decision-Making Impact Framework (read here) provided a basis to assess and synthesize the diverse impacts reported in the impact narratives. The framework was developed specifically for the field of health services and policy research and aligns with the Canadian Academy of Health Sciences Return on Investment in Health Research framework and report (view here). It recognizes the complex and non-linear pathways from research to impact, the effect of external influences and context on the achievement of impact, and the complex and multi-dimensional nature of decision-making. The framework's theory of change is outlined in Box 1 and illustrated in Figure 2. Based on this framework, the Health System Impact (HSI) Fellowship directly and indirectly builds capacity and conditions for research impact via 1) a funding investment that 2) funds and trains embedded researchers with an enhanced skillset of research and professional competencies in their early career stage, which 3) enables the formation of trusted relationships between researchers and health system leaders, aligns research with the operational priorities of health system organizations, and fosters the co-development of relevant, responsive research and translatable findings; achieving this through embedded research capacity, commitment and partnership from health system leadership for research, and skilled researchers adept at working within health system organizations.

CHSPRA Informing Decision-Making Impact Framework: Theory of Change

How research achieves impact:
Co-identification of pressing problems that warrant research attention, coupled with targeted investment in health services and policy research and capacity building, produces the evidence and enabling conditions for the translation of research to potentially inform decision-making in the arena, which can contribute, over the longer-term, to improved system performance and health outcomes. Context and external influences play a mediating role along the full research pathways to impact.

Box 1

Impact narratives were submitted by 18 fellows (10 doctoral and eight postdoctoral) embedded in 15 different health system organizations spanning several sectors (such as healthcare delivery organizations, provincial departments of health, health authorities, not-for-profit organizations, public health, pan-Canadian health organizations) and five provinces (Alberta, British Columbia, Nova Scotia, Ontario, Quebec).

The priorities addressed in HSI Fellows' programs of work stem directly from the priorities identified by the host health system organizations. Overall, the programs of work covered a range of topic areas, which CIHR-IHSPR retrospectively categorized into the following seven thematic groups: Technology in care (three projects); Integration of care (three projects); Access and/or equity in care (two projects); Emergency services (two projects); Informing

decision-making (two projects); Cancer care and/or complex care (two projects); and an additional group of varied themes related to health (four projects), namely, population health, Indigenous health, mental health, and perinatal population and youth health. These programs of work used qualitative, quantitative and mix-methods approaches, and all were grounded in the theory and practice of iKT that included substantial engagement with the health system organization and its knowledge users from start to end.

Figure 2 – The HSPR Informing Decision-Making Pathways to Impact

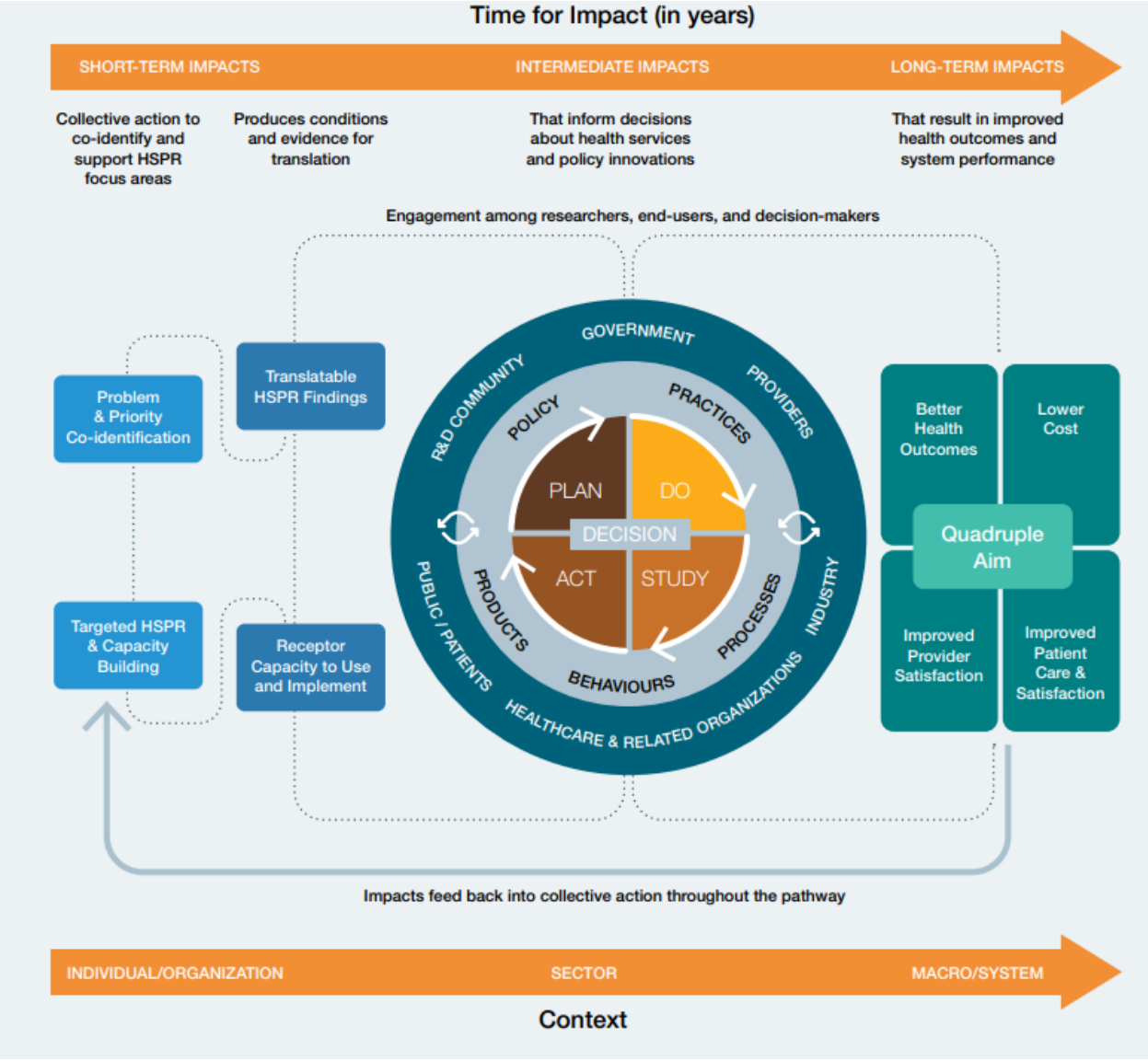


**Figure adopted from [CHSPRA's Making an Impact framework](#)©*

A synthesis of the submitted impact narratives reveals that the Fellowships have made notable and wide-ranging impacts, examples of which include:

- the development of national indicators;
- enhanced internal capacity within the organization to analyze, pivot and respond to evidence (reinforcing learning health systems);
- strengthening collaborations between the academic and health system communities and knowledge users;
- establishing novel data infrastructures (dashboards, tools, frameworks or other products);
- advancing real-word evidence (e.g., on cost-effectiveness of publicly funded drugs in Canada); and
- producing research-informed policy briefs and reports to senior executives in their health system organization or to the government.

Additional details of these and other impacts are featured in the 18 impact narratives and summarized in the *Appendix*. These impacts were achieved within relatively short timeframes (one-year PhD fellowships and two-year post-doctoral fellowships) and amidst external and internal contextual factors that influenced the capacity, resources and priorities of the participating organizations, such as the COVID-19 pandemic, changes in the executive leadership team of an organization, and delays in data access and ethics approvals.

The synthesis of impact narratives also sheds light into the novel and innovative non-linear and iterative pathways to impacts in an embedded research context. The pathway typically began with the Fellowship team (i.e., the Fellow, academic and health system mentors) meeting throughout the Fellowship application stage to understand the pressing priority challenge warranting research attention in the health system organization (i.e., the impact goal of the organization) and co-developing the research approach to tackle the challenge and develop evidence-informed solutions. Once the Fellowship was awarded and the Fellow was embedded directly within the health system organization, our analysis revealed that, as per the CHSPRA framework (Figure 2), the Fellowship pathway to impact involves:

> **1) Research capacity-building** within and beyond the organization through the development of and/or interactions with people, training, data infrastructure and related tools, and/or leveraging of research funds. For example, within the organization, capacity was increased via fellows' embedded role and their proximity to decision-making, their training and support of team members to enhance internal capacity to conduct and use research to inform decisions, by leading or contributing to successful grant applications to support additional research within the organization, and by developing data repertoires or data visualization methods for their organization (e.g.,

dashboards). Thus, the Fellowship overall contributed to enhancing internal receptor capacity to conduct and use research and research infrastructure in multi-faceted ways. Fellows also increased capacity-building beyond the organization by building or expanding bridges with the academic community, the health system organization, and knowledge users (e.g., providers, patients, policymakers), and catalyzing collaborations at the provincial, national and international levels.

2) Production of relevant, timely evidence aligned to the health system priorities and the production of conditions for translation, to support the organizations' goals to become learning health systems. For Fellows, this included their production of traditional academic outputs (e.g., peer-reviewed publications, novel frameworks, systematic reviews, cohort studies), whilst using co-creation methods to directly engage teams, knowledge users and senior leadership throughout the research process to ensure the production of relevant, responsive research and support of the role and value for evidence, and to poise the organization to act on the evidence. The onset of COVID-19 illustrated the agility and responsiveness of fellows and their Fellowship teams (Fellows and their supervisors) to work with the health system organization, to rapidly shift the Fellowship projects to address new priorities within the organizations related to the pandemic, infection control and risk mitigation, highlighting the capacity to pivot in terms of crises and respond to the crises with research and evidence.

3) Informing decision-making about health services and policy innovation and supporting decision-makers at the organizational, provincial, and national levels in the uptake of research evidence for improved health system performance or outcomes. For instance, Fellows directly and indirectly informed the decisions and thinking of health system decision-makers, administrators, and policy-makers, through their work in developing new national indicators, informing service delivery models, and producing and submitting research-informed reports, policy briefs or reports to their organizations, provincial governments, Ministries, and others. A number of these informing decision-making efforts led to the indirect or direct improvement of health system performance and health outcomes, such as improving hospital Emergency Department overcrowding flow strategies or improving care of frail elderly in palliative care.

4) Enhancing sustainability of embedded research in learning health systems. Through the Fellows' relationships with health system leaders and their operational teams, their connections and relationships with the academic community, their enhanced insight on policy challenges and the organizational context of and factors influencing decision-making, their ability to adapt research skills to address real-world challenges, and their development of enriched core competencies (read more here), Fellows become poised to transition post-fellowship to professional and leadership roles within the health

system and contribute to further advancement of learning health systems. Indeed, CIHR-IHSPR's analysis of the career trajectories of HSI Fellows (forthcoming) shows that the majority of Fellows continue their professional careers in research (embedded or academic) or senior management in the academic, public (e.g., provincial, government or health authorities) or health care delivery sectors (manuscript in preparation). Further, a number of Fellows from the larger cohort of the Health System Impact Fellowship program were hired by their health system organization (approximately 15% of 69 Fellows studied, manuscript in preparation) and many organizations have continued to engage in the Health System Impact Fellowship program through subsequent applications to bolster internal embedded research capacity.

Illustrative examples of the various types or pathways to impacts, derived directly from the narratives, are available in the *Appendix.*

Impact Narratives

Dr. Melita Avdagovska -
Charting the implementation and impact of the MyChart pilot: Implications for province-wide implementation of a patient portal

Fellow name | profile: Dr. Melita Avdagovska	**Type of fellowship:** Doctoral
Health system organization: Alberta Health Services	**Health system supervisor:** Dr. Tim Graham
Academic institution: University of Alberta	**Academic supervisor:** Dr. Devidas Menon

Impact Summary

With the increased shift to patient-centered care, patient portals have become more prevalent, enabling patients' access to important personal health information and facilitating communication with providers. In Alberta, where there is a major province-wide implementation of an electronic medical record (EMR) underway, Alberta Health Services is piloting a patient portal[1,2] (MyChart) to 1) determine whether it helps facilitate partnerships between patients and providers and improves health outcomes, and 2) identify ways of improving its effectiveness prior to province-wide deployment. Alberta Health Service's impact goal for the Health System Impact Fellowship was to understand the perceptions of patients, healthcare providers, and clinic managers who were part of the MyChart proof of concept, in order to improve its uptake across clinics and enhance its impact throughout the province.

The Health System Impact Fellowship study was designed to help Alberta Health Services refine its patient portal to improve uptake, impact and enhance patient and family health care experiences. The research focused primarily on building meaningful relationships with the host agency, clinic managers, healthcare providers, and patients in order to foster uptake and use, and represented the first undertaking of Alberta Health Services to solicit the views of all end users of MyChart. The study provided Alberta Health Services and the users of MyChart with opportunities to reflect on the impact of the MyChart portal and inform improvements and are, as a result, better positioned to take up the evidence.

Overall, the research revealed that users are interested in the MyChart portal, but there are areas that need improvement prior to province-wide implementation. Because Alberta Health Services, healthcare providers, and patients were engaged in and sensitized about the significance of this study, the grounds for the effective uptake of the evidence have been prepared [3]. The study will inform optimal approaches for implementation and adoption of patient portal systems within existing institutional decision-making processes and provincial legislation constraints. Moreover, the study will contribute to the organizational goals of Alberta Health Services to provide patients access to important personal health information and delivering patient-centered care[4].

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[4] Avdagovska M, Menon D, Stafinski T. 2020. Capturing the Impact of Patient Portals Based on the Quadruple Aim and Benefits Evaluation Frameworks: Scoping Review. J Med Internet Res. 2020;22(12):e24568. doi:10.2196/24568.

Dr. Sofia Bartlett - Utilizing a syndemic approach for population level prevention, care and treatment cascades of HCV and related epidemics

Fellow name | profile: Dr. Sofia Bartlett	**Type of fellowship:** Postdoctoral
Health system organization: British Columbia Centre for Disease Control	**Health system supervisor:** Dr. Naveed Z Janjua
Academic institution: University of British Columbia	**Academic supervisor:** Dr. Mel Krajden

Impact Summary

This Health System Impact Fellowship program of work evaluated the impact of the introduction of new medications, called Direct Acting Antivirals (DAAs), in British Columbia (BC), used for treating hepatitis C virus (HCV) infection. The program of work created the only provincial level HCV care cascade and measured progress towards HCV elimination targets in BC. Using a linked administrative health data platform, consisting of provincial level laboratory, prescription drug dispensing and medical billing data, the embedded research demonstrated that the introduction of DAAs has led to large improvements in the care cascade in BC. However, it also showed that without additional programming and coordinated efforts to sustain HCV treatment rates, elimination goals may not be met and could result in increased costs and projected savings to BC's healthcare costs not being realized[1]. Several disparities in the HCV care cascade were also uncovered, demonstrating that specific population groups do not have equal access to care and have not benefitted from the introduction of these new medications equitably[2,3].

The BC Centre for Disease Control's impact goal for the Health System Impact Fellowship was to embed capacity directly within the organization to analyze the impact of new, expensive medications that had recently become available in Canada to treat hepatitis C virus infection in order to support the BC Ministry of Health's objective of understanding whether their investment in these medications was paying off. The DAA medications are among the most expensive public funded therapeutics in Canada and demonstrating their efficacy in relation to uptake has important policy implications for provincial and territorial governments.

Despite availability of DAAs, which cure >95% of people treated, death and illness from HCV is increasing in Canada. All Canadian provinces now cover HCV treatment with DAAs through provincial drug coverage programs with no eligibility restrictions, and the Government of Canada has endorsed global targets aiming to end the HCV epidemic by 2030. However, only one province (Prince Edward Island) has a provincially coordinated and funded HCV elimination program, and inequities in access to health care are hampering the potential of DAAs to prevent HCV related morbidity and mortality through this short duration curative therapy.

Constructing a population-level HCV care cascade in BC has demonstrated the impact of the absence of HCV elimination programs in Canada. This embedded program of work led to the only provincial HCV care cascade in Canada in the DAA era, providing crucial data to guide community advocacy and lobbying efforts aimed at driving policy change to support HCV elimination in Canada. This program of work has further demonstrated the utility of using linked administrative health data platforms to improve surveillance and monitoring of

infectious and chronic diseases such as HCV, providing critical evidence of the impact of embedding learning within the health system.

References

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Dr. Monica Cepoiu-Martin - Assessing the AHS Enhancing Care in the Community (ECC) Program against the quadruple aim: An embedded training experience

Fellow name | profile: Dr. Monica Cepoiu-Martin	**Type of fellowship:** Postdoctoral
Health system organization: Alberta Health Services	**Health system supervisor:** Dr. Verna Yiu
Academic institution: University of Calgary	**Academic supervisor:** Dr. William Ghali

Impact Summary

The impact goal of the Health System Impact Fellowship was focused on developing evaluation and monitoring measures for programs included in Phase 1 of the Enhancing Care in the Community (ECC) initiative. This multi-phase provincial strategy was initiated in 2017 by the health system organization, Alberta Health Services (AHS), with the overarching goal of achieving the right balance between community, acute and specialty care in the province. AHS is committed to creating a learning organization, where ongoing evaluations allow decision makers to improve or eliminate initiatives that are not reaching their goals and learn from those that perform well.

Our approach to fulfilling the AHS' commitment to creating a learning organization follows the patient centered-care paradigm, where better health outcomes, increased provider satisfaction and lower costs merge to enhance the experiences that patients and their families have while navigating the healthcare system. The Fellow, Dr. Cepoiu-Martin, worked closely with AHS decision makers to define and refine high-level measures that reflect changes in these quality improvement areas. Additionally, the Fellow was interested in a "bottom-up" approach to quality improvement and worked closely with AHS staff providing care to cancer patients in the community to shed light on their challenges and accomplishments. This approach allows AHS to align innovations and resources with the direction set by the ECC strategy, while fostering local ownership and increasing the community stakeholders' engagement in the process of change.

Working closely with the AHS team, the Fellow contributed to the development of the ECC "Big Dot Measures" dashboard, an evaluation tool designed to graphically summarize AHS data on various health system level measures and identify trends in these measures. This tool is intended to support AHS decision makers, and it was created using visual analytics methods. Further, Monica planned and executed an evaluation study of the Community Paramedics Program (CPP), a community-based initiative developed and implemented by the AHS Mobile Integrated Health (MIH) unit. To identify the impact of this program on specific system and patient outcomes measures over time, both qualitative and quantitative analytical approaches were used. The study's findings will be translated into system level decisions to help guide the province wide expansion of the initiative.

Dr. Ivy Cheng - Improving Management of Palliative Oncology Patients and the Elderly Frail through the North Toronto Local Health Integrated Network

Fellow name | profile: Dr. Ivy Cheng	**Type of fellowship:** Postdoctoral
Health system organization: Sunnybrook Hospital	**Health system supervisor:** Dr. Andy Smith
Academic institution: University of Toronto	**Academic supervisor:** Dr. Ross Baker

Impact Summary

The key impact resulting from the Health System Impact Fellowship is improved care for the frail elderly and patients with palliative needs at Sunnybrook Hospital. The fellowship comprised a series of embedded projects designed to assist Sunnybrook achieve its strategic plan objectives, integrate the hospital's emergency department with community providers, and advance its work in one of the priority populations identified by the newly emerging Ontario Health Teams (the frail elderly with palliative needs).

The problem facing patients and families is that care is often fragmented and inefficient. The health care providers for a patient do not communicate with one another optimally. For example, the family physician does not know when their patient has been discharged from a hospital. The patient does not receive a timely follow-up. As a result, this fragmentation can lead to sub-optimal care and poorer patient outcomes. In turn, this can lead to more patient visits to the hospital, community clinics, or the doubling of tests. For patients with palliative needs, there can be a lack of planning and communication on how and where they want to be cared for in the last months of life. As a result, patients are dying in hospital when they would want to be at home, hospice or palliative care unit. Other patients have received life support when they did not want to be resuscitated. Many of our elderly patients want to be back in the community or their own home; however, because there are limited community resources, they end up staying in the hospital for months to years waiting for these supports.

To address these challenges, the first project of the Health System Impact Fellowship aimed to advance coordinated care by helping patients to be managed by a single team, rather than by separate people (for example: family doctor, home care nurse, community supports or different hospitals). The Fellowship team created a patient electronic health record (EHR) that can be shared by all the partners. This EHR, called the BetterCare Plan, contains the patient's emergency contact information, healthcare providers' contact information, relevant health issues, medications, needs and advance care plan and goals of care. The second project aimed to help patients with palliative needs receive care where they want to be cared for – either at home, hospice or a palliative care unit. The team worked with the hospital and community to create options for palliative patients to avoid hospitalization and to stay in their community as long as possible. The third project aimed to support the creation, efficiency and growth of reintegration centers, such as Pine Villa. These reintegration centers accept patients who require increased supports from the hospital (e.g., rehabilitation, nursing home, or personal support worker) and serve as a "care bridge" until they can go back into the community. Using research skills and experience as a practicing emergency physician, Health

System Impact Fellow Dr. Ivy Cheng helped Sunnybrook to improve care for the elderly frail and patients with palliative needs and advance progress towards its strategic plan. In addition to her embedded program of work, she was invited to participate and co-lead committees, such as the BetterCare Phase 6, North Toronto Local Health Integrated Network Palliative Care Journey, Senior Strategy and Social Holds. Additionally, she was invited to advise on the senior outpatients Cipriano Clinic, helped with the Emergency Department for One Team Ministry of Health application, evaluated Pine Villa and collaborated with Telemedicine Impact Plus. As an embedded researcher, Dr. Cheng incorporated evidence and experience as a physician within her Health System Impact Fellowship embedded projects in pursuit of the hospital's impact goals. The fellowship experience helped Dr. Cheng to focus her clinical and research skills to the system challenges facing large academic health care centers in developing closer links with community-based providers to address gaps in the current patterns of care delivery.

Dr. Jawad Chishtie - Developing a health services strategy and framework for equitable primary care services for the Ontario spinal cord injury population, using visual analytics

Fellow name | profile: Dr. Jawad Chishtie	**Type of fellowship:** Doctoral
Health system organization: Ontario Neurotrauma Foundation	**Health system supervisor:** Dr. Tara Jeji
Academic institution: University of Toronto	**Academic supervisor:** Dr. Susan Jaglal

Impact Summary

Ontario Neurotrauma Foundation (ONF) is a non-profit organization funded by the Ontario government that works to prevent neurotrauma and ensure Ontarians with neurotrauma lead productive lives. ONF prioritizes primary, preventive care for minimizing morbidity due to complications, but persons with spinal cord injury (SCI) are underserved at the primary care level and inappropriate use of emergency department by persons with SCI has been reported in up to 50% cases. Therefore, ONF identified building internal capacity in the strategic use of data to identify and address gaps in primary care for its Health System Impact Fellowship impact goal.

To address ONF's impact goal, and in collaboration with his academic and health system supervisors, the Fellow developed a conceptual framework to study gaps in primary care services using SCI datasets and developed new visual analytic strategies to enhance ONF's understanding of the data. Use of these methods will allow ONF to conduct exploratory research using advanced machine learning and visualization methods to study other gaps in services and compare patient outcomes.

Additionally, the Fellow initiated the creation of a cross-provincial team of Health System Impact Fellows with a shared interest in visual analytics, called Visual Analytics Mindshare. Together, the team identified a gap in literature regarding the use of visual analytic tools and techniques in health services and population health research and conceptualized a scoping review to synthesize the evidence. The scoping review was published in the Journal of Medical Internet Research in December 2020[1].

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[1] Chishtie J*, et al.* Interactive visualization applications in population health and health services research: a systematic scoping review. JMIR Preprints. 27/01/2021:27534

Dr. Aislinn Conway - Leveraging data to improve obstetric safety in Canada: a formative evaluation

Fellow name | profile: Dr. Aislinn Conway	**Type of fellowship:** Postdoctoral
Health system organization: BORN Ontario	**Health system supervisor:** Dr. Mark Walker
Academic institution: CHEO Research Institute	**Academic supervisor:** Dr. Jeremy Grimshaw

Impact Summary

Dr. Aislinn Conway's Health System Impact (HSI) Fellowship at BORN (Better Outcomes Registry and Network), Ontario, focused on leveraging data to inform the development of obstetrical safety indicators for Ontario, that have the potential to be implemented across Canada. This research advanced BORN's impact goals of facilitating high quality care to the perinatal population in Ontario, providing scientific and technical leadership for Ontario's perinatal, child and youth health system through the support of research and innovation, and mobilizing information and expertise to optimize care and contribute to a high-performing healthcare system.

The Fellow's program of embedded research included exploring the theme of variability in rates of caesarean deliveries in pregnant individuals classified as low risk. This work had direct knowledge impact within the organization, including contributing to the decision to focus on adopting a new indicator measuring rates in this population for the Maternal Newborn Dashboard. The Fellow's program of embedded research also included a review of four BORN evidence summaries, which informed decisions around establishing operational cycles (which the Fellow is currently co-planning in her new role at BORN) to promote continuous quality improvement for the BORN Maternal Newborn Dashboard (MND) and the NICU (neonatal intensive care unit) dashboard. The evidence summaries will be updated more frequently to ensure that indicators continue to be informed by the best available systematic reviews, national and international guidance and other sources of evidence.

The Fellow used several approaches to generate and translate evidence, including ensuring the research was addressing key priorities of the organization at the outset and throughout the Fellowship, through regular meetings with the health system and academic supervisors and her mentor to discuss the priorities and approach, which facilitated adaptability and pivoting during the COVID-19 crisis; and ongoing knowledge mobilization activities to share the research and build capacity within the organization.

In addition to knowledge impact and informing decision-making around obstetrics safety, the Fellowship also built research and receptor capacity for research use/consideration in and beyond the organization. For example, the Fellow was invited to present the project (outcomes, methods, challenges, practical tips) to several groups within the organization, including a Maternal Newborn Outcomes Committee and Perinatal and Pediatric Epidemiology Research Interest Group, and external to the organization at the University of Ottawa and a national conference. f to increase research knowledge and capacity (e.g., methods, challenges and practical tips) around scoping reviews for the identification of indicators. This research and enhanced embedded research capacity will continue, as the Fellow has been hired by the organization in a Knowledge

Translation Specialist position to build on the fellowship work and create additional impact. In this new role, Dr. Conway is now part of the core implementation team planning for the adoption of the new obstetrics safety indicator for the Maternal Newborn dashboard.

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Dr. Shelley Cook - Better Serving People with Multiple, Complex Needs in British Columbia

Fellow name | profile: Dr. Shelley Cook	**Type of fellowship:** Postdoctoral
Health system organization: Community Living British Columbia (CLBC)	**Health system supervisor:** Zainum Bahadshah
Academic institution: University of British Columbia – Okanagan	**Academic supervisor:** Dr. Rachelle Hole

Impact Summary

The Health System Impact Fellowship generated research and evidence-informed recommendations for Community Living BC (CLBC), the host partner organization, which helped to inform policy and practice at CLBC, build capacity and raise awareness around people with an Intellectual and/or Developmental Disability (IDD) and Multiple, Complex Needs (MCN). As a first example of such impacts, a plain-language Summary Report was produced at the request of and for executives at the CLBC to document the Fellowship findings and recommendations; this is expected to help inform future policy and practice at CLBC long after the completion of the Fellowship. Second, a Data Innovations project will be established at the CLBC, stemming from the Fellowship's research and recommendations, with focus on understanding the cross-system interactions of people with IDD/MCN. Third, as an inaugural research Fellow embedded for the first at the CLBC, Shelley's work reinforced and heightened a level of awareness, accountability and the conversation related to the needs of people with multiple complex needs, which reinforced a cultural shift within CLBC, ensuring that the Fellowship's impacts are broad and long lasting.

Dr. Cook's embedded fellowship work focused on enhancing the knowledge and expertise of the health and social needs, and related support requirements of people with an IDD who fall within the MCN framework developed by CLBC. The Health System Impact Fellowship was part of CLBC's ongoing commitment and impact goal to better serve this population through enhanced leadership, staffing, programming, engagement, and research. The intent and impact goal of the HSIF was to inform policy and practice for people with an IDD/MCN.

To achieve this, the Health System Impact Fellowship team (i.e., the Fellow, and her academic, and host supervisors) used an iterative approach to develop a program of research with input from the Advisory Committee, composed of key personnel within the CLBC, health, and the social services sectors, as well as those with lived experience. The resulting program was composed of a three-pronged set of research and related activities and outputs, including: original, empirical research utilizing qualitative[1,2,5,6] and/or quantitative methods[3]; a broad review of the relevant research literature (Scoping Review)[4]; and other activities, such as participating in and/or helping lead planning, organizational, and/or other activities related to MCN individuals as new opportunities arise[7,9,10,11,12,13]. Overall, the embedded program of research resulted in key academic and knowledge mobilization deliverables including a full research report [1] (on risk factors of health inequities for people with IDD/MCN and recommendations for improved service and policy outcomes); two summary reports[2,8]; presentations[7,9]; media interviews[10,11,12]; and publications.

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2. Barriers and Enablers to Cross-System Collaboration & Integration of Services for People with an IDD and Complex Needs - Summary of Findings & Recommendations (2021).
3. Discussion Brief - Defining 'Complex' Needs & Recommendations for Data Matching/Linkage Studies with Data Innovations BC (2020).
4. Cook, S. & Hole, R. (2021). Trauma, Intellectual and/or Developmental Disability, and Multiple, Complex Needs: A Scoping Review of the Literature (in progress - *Research in Developmental Disabilities*).
5. Cook, S. & Hole, R. (2020). "Appropriately homeless and needy": Examining street homelessness through the lens of Bourdieusian social capital theory. *Journal of Human Behavior in the Social Environment*, 30(7), pp. 816-834.
6. Barriers and Enablers to Cross-System Collaboration & Integration of Services for Individuals with an IDD and Complex Needs (in progress/ anticipated publication 2021).
7. Presentation (PPT) - Lead presenter for provincial relaunch of MCN Community of Practice - 'Complicated versus Complex' (Feb 18th, 2020).
8. Summary Report - HSIF Findings & Recommendations (2019-2021).
9. Presentation (PPT) - IIASSID European Conference (May 2021 online) - Presenting on the findings from 'Trauma, Intellectual and/or Developmental Disability, and Multiple, Complex Needs: A Scoping Review of the Literature.'
10. Media Interview - December 21, 2020 (Tori Marlan, Capital Daily News, Victoria, BC).
11. Media Interview - January 25, 2021 (CBC Radio - Daybreak).
12. Media interview - January 27th, 2021 (Oldies 1150 am - The Morning Show with Phil Johnson, Kelowna, BC).
13. Posted multiple articles (grey and academic literature) and other material (PowerPoint 'Complicated versus Complex') on MCN Hub accessible to service providers and policy makers from across BC.

Dr. Alisa Grigorovich - Preventing violence and enhancing safety by optimizing the use of remote monitoring technologies in rehabilitation settings

Fellow name | profile: Dr. Alisa Grigorovich	**Type of fellowship:** Postdoctoral
Health system organization: Toronto Rehabilitation Institute, University Health Network	**Health system supervisor:** Dr. Pia Kontos
Academic institution: University of Toronto	**Academic supervisor:** Dr. Milos Popovic

Impact Summary

The intended impact of Dr. Grigorovich's Health System Impact Fellowship included research and knowledge translation to inform the systematic implementation of technologies for violence prevention in rehabilitation settings. This aligned with TRI-UHN's impact goal to optimize safety across its five sites by developing and evaluating a protocol for the effective use of remote monitoring technologies to prevent violence, and to use formative research and stakeholder engagement advance the goal. The key deliverables of this work included two published academic journal articles, one academic article in preparation,[1-3] and one policy submission developed for an organizational stakeholder (The Alzheimer's Society of Canada)[6].

With the onset of COVID-19 and the resulting rapidly shifting priorities in the organization, the Fellow was presented with the opportunity to support a new priority emerging within the organization: to improve infection and control measures for persons living with dementia in congregate care settings, who are at greater risk of negative outcomes. The resulting impacts of these new Fellowship goals included: the co-development of a Dementia Isolation Toolkit to support the compassionate and effective isolation of persons living with dementia in congregate care settings; and in two relevant successful research grants, including a Tri-Council grant on which the Fellow is a co-Principal Applicant, to evaluate the implementation and impact of the toolkit on quality of care and reducing the moral distress of care providers in three long-term care homes in Ontario.[3-5] The Dementia Isolation Toolkit includes a plain-language ethical framework to support care decision-making, information and worksheets for creating person-centred isolation care plans, and communication tools for enhance the understanding of COVID-related restrictions for persons living with dementia. This toolkit is a novel intervention that has since been implemented in practice within the host organization, and it is currently being evaluated and translated more broadly across the health system[4-5]. Further, to support its broader dissemination, the Fellowship team co-developed a website that archives the tools as well as other resources that are under development. The toolkit has already been downloaded >6000 times by stakeholders in Canada and internationally.

To achieve the Fellowship deliverables and impacts, the fellow identified and consulted key informants across the organization involved in violence prevention, conducted literature review and policy analyses, and led a mixed methods research study. The key informant consultations were critical for the development of a feasible and relevant research study protocol, for obtaining institutional permissions to access relevant administrative data and organizational policies and documents, and for collectively identifying knowledge translation strategies and opportunities for the dissemination and uptake of research findings at the health

system organization and more broadly. The process of engaging these key informants and participating in the identified organizational activities facilitated research recruitment and relationship-building to facilitate the change in program focus during the pandemic, and also enabled the Fellow to further develop her professional skills and competencies in leadership, negotiation, and change management.

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6. Member, Alzheimer Society of Canada, Resident-to-resident Aggression in Long-term Care Expert Group; supported Alzheimer Society of Canada's submission to the House of Commons Standing Committee on Health, Report on violence facing health care workers in Canada, 42nd Parliament, 1st Session, Canada Parliament, https://www.ourcommons.ca/DocumentViewer/en/42-1/HESA/meeting-151/evidence,

Rae L Jewett -
Integrating Geography to Evaluate Health Inequalities Across Urban, Rural and Remote Canada

Fellow name | profile: Rae L Jewett	**Type of fellowship:** Doctoral
Health system organization: Canadian Institute for Health Information	**Health system supervisors:** Jean Harvey and Dr. Laura Faye
Academic institution: University of Toronto	**Academic supervisor:** Dr. Michael Widener

Impact Summary

The Canadian Population Health Initiative branch of the Canadian Institute for Health Information (CIHI) was motivated to embed Rae L Jewett as a Health System Impact Fellow to advance CIHI's program of work on rural and remote communities and to build additional capacity for health geography knowledge and skills across the organization. Rae's unique combination of skills in health services research, quantitative geodemographics and critical socio-cultural training specific to Canadian health systems made them an ideal fit for this role. The specific goals for Rae evolved during the course of the fellowship to contribute to CIHI's COVID-19 response. Here, a new COVID-19 impact goal was identified to generate evidence on COVID 19 interventions for rural and remote communities.

Rae's fellowship work began with a geospatial analysis to explore the impact of CIHI's data policies and classification of geographic data using the Statistics Canada Remoteness Index. Rae's specific impact goals were to provide health geography expertise on this project, including the evaluation of geodemographic classification tools (such as Statistics Canada's Remoteness Index), geospatial software and data, representative cartography, spatial statistics, and distinction in rural Canadian health contexts. Overall, Rae's work helped to directly inform CIHI's plans for using the Remoteness Index and similar indices for health inequalities analysis at the pan-Canadian level.

Rae's fellowship work pivoted in the early-acute response to COVID-19, to support CIHI's COVID-19 response. CIHI focused on developing a database of Canadian COVID-19 interventions and policies at the federal/provincial and territorial level. It was out of this project that a need was identified to understand Canadian rural COVID-19 health system priorities and interventions. Rae's research facilitated a deeper understanding of Canada's COVID-19 response for rural and remote communities, particularly regarding which interventions are best classified as an emergency response and which might uncover opportunities for lasting rural health system development beyond COVID-19.

Rae's main finding highlights the role of virtual care and broadband infrastructure in improving equity and outcomes during COVID-19 (and beyond the pandemic), which has received renewed attention from the policy and research community. Rae's work will play an important role in helping CIHI understand opportunities to support research and policy in this area with trusted data and reporting. This work helps to identify some common priorities during COVID-19 across diverse rural Canadian communities, which will lay a foundation and rationale for more in-depth analytical work and help to inform future directions for research and CIHI's COVID-19 research and analysis efforts.

Daman Kandola -

Use of emergency health services by stroke patients: What is known about when to seek emergency care & how transport decisions impact in-hospital care

Fellow name | profile: Daman Kandola	**Type of fellowship:** Doctoral
Health system organization: Northern Health Authority	**Health system supervisor:** Dr. Jessica Place
Academic institution: University of Northern British Columbia	**Academic supervisor:** Dr. Davina Banner

Impact Summary

The impact goal for the Health System Impact Fellowship was to help Northern Health (a geographically large and varied health region consisting of a mix of small urban, rural, and remote settings and unique population dispersion patterns) better understand the service delivery of stroke care in northern British Columbia, including why (or why not) people call an ambulance when they, or someone in their care, is having a stroke, and how calling an ambulance affects the medical care they receive in hospital. This impact goal was prioritized because despite evidence that arriving by ambulance improves the likelihood and timeliness of receiving evidence-based stroke care and leads to improved patient outcomes, there is clear variation in care provision within the Northern Health region relative to other health authorities in BC, including fewer patients arriving by ambulance for acute stroke. It was prioritized using an integrated knowledge translation lens that involved insight and feedback from a multi-stakeholder advisory board that included a patient partner with lived experience of stroke and survivorship.

To help Northern Health address its impact goal, we quantitatively examined a dataset of stroke patients (784 cases) to determine what percentage of the stroke patient population uses ambulance as a mode of arrival to hospital and whether the mode of arrival affects receipt of emergency stroke treatment, including brain scan and clot-busting stroke drugs. To understand the decision-making process surrounding the use of ambulance as a means of transport, we undertook qualitative interviews with 12 stroke survivors and five caregivers, including a mix of those who called an ambulance and those who did not. As we finalize the reporting of the results, we are developing tailored knowledge translation tools for a diverse audience including healthcare decision-makers, providers, and patients. These include lay language summaries, executive summaries, briefing reports, academic publications, conference presentations, and infographics.

The results of this study are important for people at risk for stroke, their caregivers, and the general public to understand why it is critical to call an ambulance when a stroke is happening. This research is also important for health organizations including Northern Health and the Heart and Stroke Foundation, which can use evidence from this work to better understand the populations they serve, refine their health services, and tailor public awareness campaigns. Through this fellowship, Northern Health was able to work with a Ph.D. trainee to leverage the use of research skills to address an important strategic priority. The fellowship also aligned with and contributed to a strategic partnership between Northern Health and the University of Northern British Columbia designed to stimulate innovation and transformation in both organizations in order to foster innovation in health services and policy and create opportunities for collaborative research.

Dr. Logan Lawrence - Enhancing evidence-informed decision-making capacity to improve access to collaborative care teams in Nova Scotia

Fellow name | profile: Dr. Logan Lawrence	**Type of fellowship:** Doctoral
Health system organization: Nova Scotia Department of Health and Wellness, Primary and Acute Care Branch	**Health system supervisor:** Denise MacDonald-Billard (formerly Dr. Charmaine McPherson)
Academic institution: Dalhousie University	**Academic supervisor:** Dr. Janet Curran

Impact Summary

The HSI fellowship contributed to the advancement of evidence-informed options for enhancing access to primary health care and strengthening existing services, as well as building understanding of the department's capacity to make evidence-informed decisions. This resulted in research-based products (e.g., internal reports) that built a solid foundation for strengthening primary health care services. In the process of this work, the fellow also exposed colleagues to the value of a research lens in policy work, such as how systematic approaches can be used to frame and respond to policy challenges.

The impact goal of the Nova Scotia Department of Health and Wellness (DHW) Primary and Acute Care branch for the HSI Fellowship was to harness the capacity of the fellow and enhance its own internal analytic capacity to improve its work objective to meeting the primary health care needs of Nova Scotians. The impact goal relates to the Government of Nova Scotia's commitment to increasing access to primary health care services, and to determining how health system resources can be used more effectively. Over the past few years, the government has invested millions of dollars to strengthen Collaborative Family Practice Teams (CFPTs) to develop other initiatives in order to better meet the primary health care needs of communities. The DHW is thus currently working hard with partners to determine the effectiveness of these strategic investments and develop recommendations for achieving government priorities in primary health care.

The fellowship contributed new analytic capacity to DHW, resulting in 1) researching and writing reports to shape thinking, and tailoring them in order to best communicate relevant information to senior decision makers, and 2) lending a critical and scientific perspective to discussions around how problems are framed and what work is best suited to achieve our goals. The core outputs of this work included an options paper on evidence-informed decision making and how it could be strengthened at DHW (shared with a deputy minister), a report and presentation on an alternative model for primary health care delivery, contributions to a 'white paper' on the state of primary health care in Nova Scotia and how it could be strategically enhanced, and a policy primer for new analysts to be aware of the different perspectives for framing and strengthening their work. Additionally, the fellow represented the DHW for the Atlantic Collaborative on Chronic Disease, giving a critical perspective to the collaborative's early activities and aligning it with Nova Scotia's priorities.

Dr. Kiran Pohar Manhas - Embedding Shared Decision-Making and Patient Centered Care in Community Rehabilitation Programs in Alberta

Fellow name | profile: Dr. Kiran Pohar Manhas	**Type of fellowship:** Postdoctoral
Health system organization: Alberta Health Services	**Health system supervisor:** Tracy Wasylak
Academic institution: University of Alberta	**Academic supervisors:** Dr. Sunita Vohra & Dr. Karin Olson

Impact Summary

The Health System Impact Fellow, Dr. Kiran Pohar Manhas, used embedded research and shared decision-making approaches to evaluate Alberta Health Services' Rehabilitation Model of Care (RMoC) and inform its early adoption and spread through the province. Alberta Health Service's (AHS) Community Rehabilitation team leveraged the learnings and the fellow's embedded research capacity to inform the resources the team develops, the messages they deliver, and the actions that they take. In brief, the impacts stemming from the Fellowship ranges from : a collaborative goal setting guide developed for RMoC spread to 160+ sites provincially (including pediatric sites), a family experience and child health outcome survey in the RMoC spread provincially, quicker data publication on Tableau (data visualization tool), more frequent return of qualitative comments to teams, increased opportunities for personalized training with Tableau, more flexibility in data collection strategies, and current conversations amongst stakeholders on how to incorporate research in facilitated communication amongst, and between, teams to foster communities of practice. Additionally, AHS receptor capacity to seek out, use and consider research evidence was enhanced as a result of the embedded fellowship. The Fellowship team and the research they conducted raised awareness on the value of scholarly study in the rehabilitation sector at AHS from front-line staff to leadership, who gained detailed exposure to analytics, quality improvement, and the interpretation of research findings.

Alberta Health Services (AHS) introduced a novel Rehabilitation Model of Care (RMoC) in April 2017 to promote equity, patient-centered care and standardized collection of patient-reported measures[1]. AHS sought a Fellow to address the specific research needs on the RMoC early-adoption and spread, which aligns with AHS' Health & Business Plan and Patient First Strategy to advance patient-centred care, as well as the organization's commitment to iterative learning and improvement of its initiatives and programs. As 18 early-adopter community-rehabilitation teams partook in a 1.5-year change-management process, AHS undertook a research effort through the fellowship to support the evaluation and spread of RMoC through embedding shared decision-making.

Shared decision-making is important to realize patient-centered care and involves collaborative decision-making where providers and patients share their experience and preferences[2,3]. Using an iterative approach (including a pilot study), the Health System Impact fellowship team (including Fellow, supervisors) and AHS knowledge users developed a research program to understand shared decision-making at diverse

community-rehabilitation sites in Alberta (both sites that had, and had not, adopted the RMoC), and to understand early-adopters' experience of RMoC implementation. We worked with 24 sites (n=358 patients; n=111 providers). Findings from non-RMoC sites gave AHS comparable baseline metrics for future evaluations and demonstrated the need for RMoC-related changes[4,5]. Findings from early-adopter sites revealed the challenges and successes of RMoC implementation to develop targeted strategies for future RMoC-adopting teams[4,5]. Deliverables included a full report; infographic; presentations (formal; one-on-one); and manuscripts for peer review.

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Chantelle Recsky - Analyzing and mitigating technology-mediated adverse events in primary and community care

Fellow name | profile: Chantelle Recsky	**Type of fellowship:** Doctoral
Health system organization: Vancouver Coastal Health	**Health system supervisor:** Lorraine Blackburn
Academic institution: University of British Columbia	**Academic supervisor:** Dr. Leanne Currie

Impact Summary

The Health System Impact Fellowship program of work helped the health system organization, Vancouver Coast Health (VCH), better understand the unintended harm related to our use of technology in the primary and community health care setting, and thereby supported their key organizational priority of improving primary and community care services. Health information technologies that support the provision of care are central to achieving this mandate, yet these technologies can also inadvertently impede our efforts. For example, one barrier we face is that the clinical information required for coordinating and delivering client care exists in disparate electronic clinical information systems. This creates the potential for missing information, breakdowns in the continuity of care, and may even cause harm to clients.

To address this issue, the Health System Impact Fellow worked directly with the members of the clinical informatics team to develop a process for identifying and analyzing reported safety events related to technology in primary and community care. The planning for this project was highly collaborative and supported by two departments within VCH that actively collaborate on projects to drive safety and improvement in the organization. The outcome is that we now have a process to monitor all voluntarily reported safety events from community and primary care settings in which technology was a factor. A team of interprofessional clinical informaticists reviews the details of each voluntary report and analyzes the sociotechnical factors that were related to the safety event. Major events are investigated using a systematic approach. Immediate feedback regarding the safety and operation of clinical computer systems is given to the clinical area from which each report was generated. Data are also collated and tracked over time to monitor for trends and used to inform decision-making concerning the ongoing enhancement of our primary and community care services.

In leading this work, the Health Systems Impact Fellow used hands-on learning approaches to work with the Community Clinical Informatics team teach them about technology-mediated adverse events, build the team's capacity to identify and analyze patient safety concerns, and use data to drive improvements in care delivery. As a result of the Health Systems Impact Fellowship, VCH Community Clinical informatics now has a process for addressing voluntarily reported safety events concerning technology. These data are being collected and analyzed on an ongoing basis and used to inform decision-making concerning the informatics applications that support client care in primary and community care. The fellow has also established a feedback loop to share knowledge gleaned from analyzing voluntarily-reported safety events to educate clinicians and clinical leaders about the use of health information technology to promote safer care in their practice. As a result of this work, the VCH informatics team has developed a new area of knowledge around

sociotechnical systems and safety concerns related to technology. Not only do they draw on this knowledge base when responding to reported events, but this also informs their thinking in the planning and implementation phases of their work in supporting our HIT systems. Additionally, this project has helped VCH to increase its capacity as a learning health organization, leverage its own data to inform decision-making related to HIT on an ongoing basis.

Danielle Rice - Measuring Access to Mental Health and Addiction Services in Canada

Fellow name | profile: Danielle Rice	**Type of fellowship:** Doctoral
Health system organization: Canadian Institute for Health Information	**Health system supervisor:** Jean Harvey
Academic institution: McGill University	**Academic supervisor:** Dr. Brett Thombs

Impact Summary

The Health System Impact Fellowship focused on advancing CIHI's commitment to the Shared Health Priorities work, which supports the development and reporting of national indicators specific to mental health and addiction services. The Shared Health Priorities involves a set of six indicators that stem from a committed investment of $5.0 billion in 2017 from federal, provincial and territorial Health Ministers to improve access to evidence-based services for mental health and addictions conditions. Since developing new mental health and addictions indicators requires methodological and subject matter expertise, one of CIHI's impact goals for embedding a Health System Impact Fellow within the organization was to facilitate capacity building and new knowledge specific to the mental health and addictions priority area. The Health System Impact Fellow, Danielle Rice, scoped the evidence and conducted stakeholder interviews, which helped to inform the development of the first ever "Early Identification of Mental Health or Addictions Issues for Early Intervention in Youth Age 10-25" national performance indicator.

Mental health conditions and problematic substance use often begin during childhood and adolescence. Early diagnosis and intervention are essential to facilitate effective symptom management and improve quality of life, while mitigating the impact these conditions have on health service use. In 2017, the federal, provincial and territorial health ministers agreed on the importance of promoting mental wellness and addressing gaps in mental health services. The Health Ministers committed an investment of $5 billion to improve the access to evidence-based services for mental health and addictions conditions. To measure the impact of this investment, a set of six indicators (the Shared Health Priorities) specific to mental health and addictions were identified based on comprehensive public and stakeholder consultation, in collaboration with the Mental Health Commission of Canada. The Shared Health Priorities involve a partnership with CIHI to support the development and reporting of these indicators over the next 10 years. The "Early Identification of Mental Health or Addictions Issues for Early Intervention in Youth Age 10-25" is one of the mental health and addiction indicators selected for ongoing reporting. This indicator, however, has not been previously measured.

Given the absence of existing indicators for measuring the Early Identification of Mental Health or Addictions Issues for Early Intervention in Youth Age 10-25, CIHI sought to integrate a research trained fellow into the development team for this new indicator. As part of the one-year Health System Impact Fellowship, the fellow helped to map the available evidence to measure early identification and intervention among children and youth to inform the development of this national health system performance indicator. The fellow also conducted stakeholder interviews to gather the input required to identify and clarify the concepts associated

with the proposed indicator. Overall, the contributions from this Fellowship helped to fulfill CIHI's commitment to the Shared Health Priorities work, which will impact the future collection of Canadian data to improve access to mental health and addiction services. CIHI integrated novel research methods and generated the evidence necessary to support the development of a new indicator that will be collected over the next 10 years. The fellowship substantially advanced this program of work by having clinical and research expertise integrated into the conceptualization of the indicator and considered in the interpretation of literature findings.

Dr. Matthew Russell - Service transitions for individuals with disabilities

Fellow name | profile: Dr. Matthew Russell	**Type of fellowship:** Postdoctoral
Health system organization: PolicyWise for Children & Families	**Health system supervisor:** Dr. Xinjie Cui
Academic institution: University of Calgary	**Academic supervisors:** Dr. Suzanne Tough and Dr. Jennifer Zwicker

Impact Summary

Prior to the Health System Impact Fellowship, PolicyWise for Children & Families help establish the Child and Youth Data Laboratory (CYDL)[1]. PolicyWise worked with the Government of Alberta to create a linked cross-ministry population-based dataset that represented the health and social service use of Albertan children and young adults (aged 0 to 30) that used services between 2005/2006 and 2010/2011 in Alberta [1]. The CYDL team had finished data validation and was ready for a wide variety of research. One priority goal of CYDL was to learn more about service transitions (i.e., changes in services, including the start of supports in early childhood and the child-to-adult transition) for vulnerable children and young adults with disabilities [1]. Understanding service transitions in Canada is critical as many negative outcomes (i.e., lack of access to services, loss of access to services, homelessness, dependence on income supports and corrections involvement) have been associated with child and young adults with disabilities in the transition[2-6]. The fellow used CYDL and BC administrative data to understand service transitions for children and youth with disabilities.

The Fellowship team (including the fellow, supervisors, and other health system staff) used an iterative approach to understand Government of Alberta priorities and determine how to frame a cross-ministry administrative data analysis accordingly. The identified priority focus was on children and young adults with disabilities around two critical service periods: identification and entry into early childhood supports, and the transition from child-to-adult services[2-10]. This was priority focus as many negative outcomes (i.e., lack of access to services, loss of access to services, homelessness, dependence on income supports and corrections involvement) have been associated with child and young adults with disabilities in service transitions. Informed by previous literature and methods, the fellow met with stakeholders in the ministries to discuss how to frame the analysis according to the structure of government programs and data collection around the programs. The fellow iteratively met with both the fellowship team and stakeholders in the ministries to narrow down the analysis to topics most related to impactful issues. The fellow also received substantial input on how to present the findings to increase their impact.

As a result of this project, extensive reports were created on each of the two service transitions[2, 8], an academic publication was created on topics for each of the two service transitions[6, 9], and findings and designs of this project were used when a call was made by the Government of BC to do a basic income review (our team was asked to present data on individuals with disabilities)[3-5]. In this review, we referenced the CYDL findings and reports[2, 8], and used the learnings about how to work with similar administrative data (and input from stakeholders in the ministries in BC) to perform many BC analyses. The findings were submitted to the Government of BC as three reports as part of the basic income review to help refine disability policy in

BC[3-5] and relates to one manuscript in review[11], two manuscripts in advanced preparation[12, 13] and one planned review manuscript based on the findings presented in the three BC reports. In addition to reporting and publication impacts, many of the findings from CYDL and the BC project have been shared directly with stakeholders in the ministries as part of the engaged research process. While changes in policy take time, one immediate benefit is that the findings supported recent policy changes and reviews surrounding disability supports in BC[3-5] on transition supports to various high-risk disabilities, which was communicated to stakeholders in the ministries. Finally, the fellow's research led to increased use of academic research (i.e., publication) in the health-system organization and improved methods to parse administrative data that has been shared with others in the field [6, 9-11].

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Iván Sarmiento - Development of a knowledge to action framework based on the promotion of intercultural dialogue between official and traditional health systems

Fellow name | profile: Iván Sarmiento	**Type of fellowship:** Doctoral
Health system organization: Community Information and Epidemiological Technologies Canada (CIETcanada)	**Health system supervisor:** Dr. Anne Cockcroft
Academic institution: McGill University	**Academic supervisor:** Dr. Neil Andersson

Impact Summary

Iván's Health System Impact (HSI) Fellowship impacted three overlapping scenarios: the fellow's career development, the mission and goals of Community Information and Epidemiological Technologies Canada (CIETcanada), and the communities participating in the research projects associated with the fellowship. Initially, Iván worked on his doctoral project to study the impact on maternal health of a program to support Indigenous traditional midwives and their interaction with the official health system in four municipalities of Guerrero, Mexico. Under the direction of Dr. Anne Cockcroft, CIETcanada, a leading Canadian not-for-profit health development agency concerned with Indigenous health, supported the HSI Fellowship project by sharing its expertise in the application of methods for Indigenous health research: fuzzy cognitive maps, narrative evaluations of impact, and large-scale cluster randomised controlled trials. Working with these methods, the fellow enhanced his core competencies and contributed to extending their applicability. This was possible thanks to a fruitful collaboration with Participatory Research at McGill (PRAM), a research group directed by Iván's academic supervisor, Dr. Neil Andersson. Thanks to the Fellowship, Iván advanced in his doctoral project and had the opportunity to consolidate methodological contributions, particularly in fuzzy cognitive mapping with Indigenous communities.

Working with CIETcanada allowed the involvement of the Fellow in other projects in Africa and North America. Iván contributed to increasing the impact of CIETcanada's programs and furthered its international recognition. At the end of the Fellowship, Iván was recognised as a valuable adviser on intercultural methodologies across several international projects in Nigeria, Botswana, Uganda, Guatemala, and Canada. The participatory approach of Iván's HSI Fellowship benefited Indigenous communities in Mexico, offering them tools to model and represent their knowledge on maternal health to other stakeholders. A similar benefit occurred among the communities participating in the different projects supported by the Fellow.

During his Fellowship, Iván led a manuscript describing the work with Indigenous groups in Guerrero to disseminate the concept and practice of intercultural dialogue[1]. The paper, published in BMJ Global Health, shared the practice and learnings of the research team in Guerrero working with traditional midwives to promote safe birth in their communities. With this publication, the Fellow contributed practical ideas on addressing the challenge of respecting and working with different ways of understanding reality.

The overall aim of this Fellowship was to move research's centre of gravity from universities in high-income settings toward places and situations where it is urgently needed, such as among physically and socially remote people. A long history has placed the Western culture in a dominant position over Indigenous cultures. Health actions emerging from Western biomedical perspectives tend to perpetuate this power asymmetry, usually ignoring the cultural content relevant to Indigenous groups. The Fellow and his supervisors perceive the fellowship as a success in achieving this overall aim. Indeed, Iván's HSI Fellowship catalysed a collaboration between CIETcanada and Participatory Research at McGill. He strengthened his core competencies by applying participatory methodologies in his PhD project in Mexico and others in Africa and North America. He offered new tools for modelling stakeholder knowledge using fuzzy cognitive mapping. His methodological advances supported Indigenous communities to contribute their expertise to programs to alleviate maternal and reproductive health challenges. His overall contribution advanced the concept and application of intercultural dialogue in health research.

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Narhari Timilshina -

Outcomes of patients who undergo concurrent chemotherapy and radiation therapy for locally advanced head & neck cancer: a population-based study

Fellow name | profile: Narhari Timilshina	**Type of fellowship:** Doctoral
Health system organization: Ontario Health -Cancer Care Ontario	**Health system supervisor:** Dr. Kelvin Chan
Academic institution: University of Toronto	**Academic supervisor:** Dr. Shabbir Alibhai

Impact Summary

Narhari's HSI Fellowship focused on the evaluation of treatment outcomes for locally advanced head and neck cancer (HNC) using population-based databases from Ontario. Embedded within the Provincial Drug Reimbursement Program (PDRP) of Ontario Health-Cancer Care Ontario, the impact goal for the fellowship was to support PDRP's efforts to generate and implement real world evidence (RWE) to improve current understanding of the impact of publicly funded cancer drugs in Canada. Specifically, the embedded research project aimed to characterize the real-world survival outcome of patients undergoing concurrent chemotherapy and radiation therapy compared to radiation alone for HNC. In addition to leading the embedded research study and advancing the organization's impact goal, the Health System Impact Fellowship enabled Narhari to enhance his applied research skills and develop new professional skills and a greater understanding of the application of health services research in the policy context.

The overall survivorship for HNC patients was generally poor; more than half of HNC patients die within 5 years[1-3]. Published randomized control trials demonstrated that concurrent chemotherapy combined with radiotherapy is superior to radiotherapy alone; however, there is a gap in the literature about the optimum benefits of concurrent chemotherapy for advanced HNC treatment, and the survival benefits of implementing routine practice[4-5]. Recognizing this evidence gap, Narhari worked closely with the Ontario Health- Cancer Care Ontario team and his Fellowship supervisors to inform the study's conceptual design (a retrospective cohort study) and research questions, and also developed a methodological and analytical framework to assess survival outcomes using multiple administrative databases.

Using multiple population-based data sources, Narhari developed algorithms to identify a cohort of patients who received curative concurrent chemotherapy with radiation *vs.* radiation alone among all HNC, treatment type (curative or palliative) and surgery prior to radiation for HNC between 2005-2016 in Ontario. Narhari led all statistical analyses for the project and developed the manuscript for publication. He presented key findings to supervisors and Ontario Health-Cancer Care Ontario teams, which will be useful for policy makers for treatment decisions making plan in Ontario. While leading the embedded project work and in participating in multiple Ontario Health-Cancer Care Ontario initiatives, Narhari enhanced his research and analytical skills, including the evaluation of health-related policies and provincial level drug approval program, analysis of real-world data for cost effectiveness analysis, and critical thinking on new cancer drug

approval process. Also, he developed professional skills such as project management, interdisciplinary work, networking, dialogue and negotiation and has greater understanding of the application of health services research in the policy context.

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Ting Yu -
A Lean Transformation in an Emergency Department

Fellow name | profile: Ting Yu	**Type of fellowship:** Doctoral
Health system organization: Centre intégré universitaire de santé et de services sociaux (CIUSSS) de l'Ouest-de-l'Île-de-Montréal	**Health system supervisor:** Dr. Renée Proulx
Academic institution: Concordia University	**Academic supervisor:** Dr. Kudret Demirli

Impact Summary

Emergency department (ED) crowding is associated with significant risk of adverse outcome for patients, and managing ED crowding is a priority for many health care organizations, including the CIUSSS de l'Ouest-de – l'Île-de-Montréal, one of the largest integrated health and social services centers in Quebec. The specific impact goal of the CIUSSS was to make better decisions in the ED in order to provide better emergency care. Additionally, the organization wanted to develop the embedded research project as a model of interdisciplinary work for future project activities within the organization. Ultimately, the Health System Impact Fellow, Ting Yu, completed a systematic evaluation of ED operations that generated new insight and knowledge for the organization regarding how to improve ED care, developed and applied a new methodology to improve ED operations through identification of the patient demand and efficient use of resources, and developed a new computer simulation model that can be used for evaluating the impacts of future system changes such as increasing or reducing the number of health care operators.

Targeting the ED of St Mary's Hospital Centre, an installation of the CIUSSS, the Fellow applied a structured process improvement method based on Lean concepts to improve ED operations with the hope of mitigating ED crowding. Working closely with the clinical, research and administrative departments of St Mary's Hospital Centre, the fellow evaluated the entire system by accessing multiple time-points in the ED flow from patient arrival to departure, forecasted the patient demand, proposed potential collaboration patterns between ED and its support departments, and identified appropriate demand-oriented staffing levels and other supplies (e.g., hospital stretchers). Additionally, a preliminary computer simulation model was developed to imitate the flow of ED patients and evaluate the potential results. The preliminary results have shown that with these improvements, the average ED visit time would be significantly reduced by up to 50%.

The work of this Fellowship identified a series of structured improvement activities to alleviate ED crowding, as well as an ED simulation model to test system changes and to evaluate the resulting impacts without affecting patients or requiring additional investment (i.e., by ensuring positive patient outcomes and cost-effectiveness), thus assisting managers to make better and evidence-based decisions. The Fellowship is regarded as a demonstration of how scholarly activities can be embedded in a positive way into health care delivery institutions and facilitate interdisciplinary and interdepartmental collaboration and knowledge sharing.

Appendix

Pathways to Impact, as reported through the HSIF 2017-19 Impact Narratives

CAPACITY-BUILDING within the health system organization

- Advancement of the organization towards a Learning Health System, including through:
    - Enhanced internal capacity within the organization to analyze and respond, e.g., for visual analytics
    - New internal research, knowledge and expertise on the issue
    - Advancing the mission and goals of host organization, including their commitment to embedded research, evidenced through subsequent Health System Impact Fellowship applications
    - Increased embedded research capacity that aligned with and contributed to a strategic partnership between the health system organization (and the academic institution
- Indigenous communities participating in the research project and in a new model for intercultural dialogue

CAPACITY-BUILDING beyond the health system organization

- Fostering partnerships and collaborations at the inter-institution and inter-departmental levels, and between the health system organization, clinics, providers, patients
- Engaging partners on their perspectives on use and impact of tools and products (e.g., patient portal)
- Strengthening international and national collaborations on priority areas for the health system organization
- Spur conversations amongst stakeholders on how to incorporate research suggestions for facilitated communication with teams to foster communities of practice

CAPACITY-BUILDING via Training

- Enhancing the fellow's personal insight on applied, systems-relevant challenges
- Supporting the fellow's career development and enriched core competencies[1]
- Involvement and leadership on various committees

[1] For more details on the core competencies identified by the CHSPRA Training Modernization group as critical in the training of HSPR graduates, please see https://cihr-irsc.gc.ca/e/49883.html

CAPACITY-BUILDING via Data Infrastructure or other tools

- Establishing new data, tools, frameworks or other products, including:
    - Establishing a Data Innovations project
    - Establishing a new tool/model – computer simulation of ED flow that can be used in other hospitals
    - Developing a dashboard/evaluation tool to visualize health system organization data
    - Developing an innovative toolkit on Dementia Isolation, implemented at TRI-UHN, and currently being evaluated for translation broadly in the health system
    - Generating a new framework and tool to improve understanding of gaps in primary care for people with spinal cord injury
    - Evaluating and revealing interest (and areas of improvement) on a patient portal; the insight is expected to inform and enhance province-wide roll out of the portal

CAPACITY-BUILDING via Funding

- Leveraging of funds through further research funding applications and awards

PRODUCING TRANSLATABLE RESEARCH EVIDENCE

- Developing a novel process to monitor and address technology-related adverse events in primary care
- Advancing real-word evidence on cost-effectiveness of publicly funded cancer drugs in Canada
- Informing the use of Statistics Canada's Remoteness Index for health inequalities analysis
- Generating new insight of the COVID-19 interventions and responses in rural and remote communities, to inform in-depth future work
- Internal use of systematic reviews and purchase of research software to facilitate the review and future reviews (new internal research tools and approaches)
- Raising awareness of health needs of people with complex needs
- Implementing a dissemination strategy to share and communicate the research findings with various audiences and stakeholders within and beyond the organization

INFORMING DECISION-MAKING

- Informing the development of new national indicators and service delivery models (e.g., new indicator measuring safety in obstetrics care)
- Informing community advocacy efforts and driving policy change, via new insight and evidence generated

- Producing and submitting research-informed policy briefs and reports to executives and teams within the health system organization, to the Government (e.g., in British Columbia), and to charities (e.g., Alzheimer's Society of Canada)
- Reports of increasing interest from within the Ministries to use evidence to inform their decisions
- Supporting decision-makers in Alberta's health system and their use of resources, via project findings and novel dashboard
- Informing decisions around establishing operational cycles to promote continuous quality improvement and updated dashboards

QUADRUPLE AIM – Improving health system performance and/or health outcomes

- Systematic evaluation of Emergency Department (ED) overcrowding, leading to new insight about the ED system and flow strategies to improve quality
- Improving care for frail elderly with palliative care needs
- Evaluation of the impact of the introduction of new expensive medications
- Creation of British Columbia's only provincial-level care cascade for hepatitis C virus