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Implementing Home Health Monitoring for Chronic Disease Management in British Columbia

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A Provincial/Territorial Health Reform Analysis

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Abstract

Home health monitoring (HHM) enables health care providers to monitor a patient's health status remotely using digital technology. In 2013, the government of British Columbia partnered with a telecommunications provider and invested $52M in HHM programs for patients with complex care needs. Telehealth has evolved over the past two decades to improve access and delivery of care, with HHM emerging as a strategy for proactive chronic disease management. The goals of the provincial HHM initiative are to reduce acute care utilization, reduce health system costs and improve patient self-management of chronic conditions. Following a series of successful pilot projects, funding for expanded HHM initiatives was made available through a provincial Strategic Investment Fund and continued support from Canada Health Infoway. Evaluations of several HHM programs demonstrated high levels of patient satisfaction, reduced emergency department visits, health system cost savings, and improved patient self-care and quality of life. Optimizing referral rates and expanding HHM programs to include a wider range of chronic conditions are opportunities for future growth, with sustainability dependent on securing long-term funding sources.

La surveillance de la santé à domicile (SSD) permet aux prestataires de services de santé de surveiller la santé d'un patient à distance en utilisant une technologie digitale. En 2013, le gouvernement de Colombie Britannique a conclu un partenariat avec un fournisseur de télécommunications et investi $52M dans des programmes de SSD pour des patients à besoins de soins complexes. La télémédecine a progressé sur les vingt dernières années dans l'accès et la délivrance des soins, la SSD émergeant comme une stratégie de gestion proactive des maladies chroniques. Les buts de l'initiative provinciale de SSD sont de réduire l'utilisation des soins aigus, les coûts du système de santé et d'améliorer l'autogestion des maladies chroniques. Après une série de projets pilotes concluants, un Fonds d'Investissement Stratégique provincial a débloqué des fonds pour développer les initiatives de SSD, avec le support de Inforoute Santé Canada. Les évaluations de plusieurs programmes de SSD ont montré des niveaux élevés de satisfaction des patients, une baisse du nombre de visites aux urgences, des économies pour le système de santé et une amélioration de l'autogestion et de la qualité de vie des patients. L'optimisation des taux d'adressage et l'expansion des programmes de SSD à un plus large spectre de maladies chroniques présentent des opportunités de développement futur, étant entendu que la pérennité dépendra de financements stables à long-terme.

Key Messages

- Home health monitoring (HHM) reduces unnecessary hospitalizations and increases access to health care providers by leveraging digital technology to monitor health status in patients with chronic conditions.
- A strategic partnership between the government of British Columbia and a telecommunications provider led to establishment of a provincial Strategic Investment Fund in 2011, which was used to support the HHM program, among other initiatives.
- Several comprehensive HHM program evaluations, conducted using the Canada Health Infoway Benefits Evaluation Framework, demonstrated a high level of patient satisfaction, reduction in acute care utilization and improved quality of life.

Messages-clés

- *La surveillance de la santé à domicile (SSD) réduit les hospitalisations évitables et améliore l'accès aux soins en s'appuyant sur les technologies digitales pour surveiller l'état de santé des malades souffrant de maladies chroniques.*
- *Un parternariat stratégique entre le gouvernement de la Colombie Britannique un fournisseur de télécommunications a conduit à la mise en place d'un Fond provincial d'Investissement Stratégique en 2011, qui a été utilisé pour soutenir le programme SSD, entre autres initiatives.*
- *Les évaluations poussées de plusieurs programmes de SSD, conduites suivant le guide d'évaluation des avantages de Inforoute Santé Canada, ont démontré un niveau élevé de satisfaction des patients, des baisses de l'utilisation des soins aigus et une meilleure qualité de vie.*

1 BRIEF DESCRIPTION OF THE HEALTH POLICY REFORM

Home health monitoring (HHM), also known as remote patient monitoring or telehomecare, is a form of telehealth that enables patients to monitor their health status at home using digital technology. Information can be shared electronically in real-time with health care providers, allowing for timely clinical interventions to avoid unnecessary emergency department (ED) visits or hospitalizations (British Columbia Ministry of Health 2018). Interventions such as HHM have demonstrated impact on reducing hospital readmissions, decreasing length of stay and improving patient satisfaction with care (Isaranuwatchai et al. 2018).

Patients are referred to HHM programs from hospitals, community clinics or family practice. Eligibility criteria often include disease severity, cognition and ability to use technology. The monitoring period is around three months, and participants are temporarily provided with a computer tablet, weigh scale, blood pressure cuff and a pulse oximeter. Biometric and symptom data are monitored remotely by a nurse who contacts the patient over the phone to review the results and provide education. In response to concerning results, clinical interventions may include medication changes, referral to care providers, or ED visit if urgent care is required (Island Health 2018; Vancouver Coastal Health 2018).

In 2013, the British Columbia (BC) Ministry of Health (MOH) partnered with health authorities and TELUS, a telecommunications provider, to implement HHM programs in select patient populations with chronic diseases. The initial phase focused on patients with heart failure at risk for repeated hospitalizations, later expanding to include those with chronic obstructive pulmonary disease (COPD) (Interior Health 2018; Island Health 2018). In June 2016, BC Health Minister Terry Lake announced HHM funding of up to $52M to "advance access for British Columbians with complex care needs using technology to help manage their health conditions" (Government of BC 2016).

2 HISTORY AND CONTEXT

Proactive chronic disease management to improve quality of life, reduce disease complications and decrease acute care utilization has been a high priority within the BC health system over the past decade (BC MOH 2011). Heart failure and COPD are among the leading causes for hospitalization, associated with high health care costs due to increased acute care utilization to manage exacerbations (Isaranuwatchai et al. 2018).

In the mid-2000s, telehealth emerged as a key strategy to improve delivery of health care services in BC, particularly in rural and remote communities, amid significant provincial and federal investment in technology and information management through the eHealth strategy (BC MOH 2005). The historic signing of the Transformative Change Accord in 2005 by the federal and provincial governments, committing to close the health equity gap

between First Nations and other BC residents, further prompted the provincial government to expand telehealth services (BC MOH 2005). The first HHM programs for heart failure patients were piloted in 2006 in two BC health authorities, Interior Health and Island Health, later expanding into other communities with funding support from Canada Health Infoway (BC MOH 2013).

In 2011, the BC government signed a 10-year Telecommunication Services Master Agreement (TSMA) with TELUS to provide telecommunication services to public sector partners at the cost of approximately $1B (Government of BC 2011a). This agreement included establishment of a Strategic Investment Fund (SIF) towards information technology (IT) initiatives (Government of BC 2011b). Approval of SIF funding for HHM projects led to adoption of the TELUS Remote Patient Monitoring (RPM) platform in 2013, starting with Island Health and Interior Health Authorities (Interior Health 2018).

3 GOALS OF THE REFORM

3.1 Stated

The stated goals of the HHM program are to reduce acute care utilization (i.e., emergency department visits, hospital admissions), reduce associated health system costs, and improve patient self-management of chronic conditions and quality of life (Government of BC 2016; BC MOH 2018). This reform aligns with the Ministry of Health objective to "improve patient health outcomes and reduce hospitalizations for seniors through effective community services" (BC MOH 2016).

3.2 Implicit

Fulfilling the contractual obligations of the TSMA was an implicit goal for this reform, as highlighted upon closer examination of the TSMA and Strategic Relationship Agreement between the BC government and TELUS. The SIF, established under the TSMA and jointly administered by both parties, earmarked funds for "strategic, ambitious IT projects" and included an expiry clause for unallocated SIF dollars (Government of BC 2011b). At the time the agreement was signed in 2011, HHM was already designated as a project to receive SIF funding, with a stipulation that this occur within nine months of the signing date (Government of BC 2011b, 14). The significant investments from Canada Health Infoway in HHM and other digital health projects in the province may have incentivized the provincial government to provide additional financial support to demonstrate sustained benefits in the HHM program (Canada Health Infoway 2013).

4 FACTORS THAT INFLUENCED HOW AND WHY

4.1 The issue came onto the government's agenda

In the years preceding the HHM initiative, chronic diseases and an aging population were increasingly recognized by the Ministry of Health as significant drivers of health care demand (BC MOH 2011). In September 2006, the BC government launched the Conversation on Health, a year-long public engagement process on health system priorities and sustainability to inform health service delivery plans. Input from these discussions on a wide variety of topics, including community-based care, technology, and access to care, generated political momentum to invest in innovative strategies (BC MOH 2007).

In partnership with Canada Health Infoway, the province invested $150M toward the eHealth strategy to improve health system efficiency and sustainability through technology and information systems. Telehealth was one of the foundational eHealth projects to improve health care access in rural communities, paving the way for early HHM pilot projects (BC MOH 2005; 2013). The BC eHealth Steering Committee included a physician lead, Dr. Kendall Ho, with extensive research experience in digital health and HHM implementation (BC MOH 2005). Strong medical leadership in digital health development and a growing body of literature supporting use of HHM influenced policy development in this area.

4.2 The final decision was made or not made

Findings from the initial HHM pilot projects demonstrated high levels of patient satisfaction, reduced hospitalizations, and improved heart failure self-management, substantiating the value proposition of the program in patients with complex care needs (BC MOH 2013). In his announcement of the $52M of funding allocated to HHM expansion across the province, Health Minister Terry Lake referenced the favourable results in the 2013 pilot phase of the project (Government of BC 2016).

The provincial government structure—a Liberal majority from 2001 to 2017—was an important institutional factor. Stability in government enabled a consistent focus on key strategic priorities, including expansion in eHealth and technology infrastructure. Industry interest from TELUS in expanding its health technology business, in concert with a long-term partnership with the provincial government, were also pivotal factors in the decision to fund the HHM program.

5 HOW THE REFORM WAS ACHIEVED

Implementing HHM programs requires substantial capital for technology infrastructure, support services including scheduling and training, operational funding and change management. A treasury-based policy instrument was used to achieve this program reform. The province began to fund HHM projects through the SIF starting in 2013, with oversight from

the SIF Executive Governance Committee comprised of government and TELUS representatives (BC MOH 2018; 2011b). Several HHM programs across multiple health authorities also received funding support from Canada Health Infoway.

In the initial implementation phase in 2013, the Ministry of Health partnered with two health authorities in a limited production roll-out of the TELUS RPM platform in patients with heart failure, before moving into a second phase to include patients with COPD (Island Health 2018; Interior Health 2018). Program funding also supported clinical trial research using HHM technology to support patient transitions from hospital back to community (Government of BC 2016). In October 2017, the SIF Executive Governance Committee approved a funding extension for HHM initiatives until July 2021. The committee also requested development of an operational mandate, governance structure and evaluation framework to guide comparisons across health authorities and evaluate impacts of provincially-funded HHM programs (BC MOH 2018).

6 EVALUATION

The impact of HHM on heart failure patients in the initial phase was assessed by surveying patients and comparing health system utilization in the year prior to HHM and up to 12 months after enrolling in HHM (Beach et al. 2015). Among the 192 participants, health system utilization decreased by 76% and self-reported health status improved (Beach et al. 2015). Three HHM projects funded by Canada Health Infoway published comprehensive evaluations using the Infoway Benefits Evaluation Framework to assess program impact on health care quality, access, and productivity. The three evaluations addressed different evaluation questions using a mixed-method qualitative and quantitative approach in a pre-post design.

The Island Health evaluation of heart failure and COPD patients noted a 92% patient satisfaction rate, 81% reduction in ED visits, and 92% reduction in acute care utilization among program participants. Acute care costs avoided as a result of HHM after accounting for program costs was $3,252 per client, 12 months post-HHM (Island Health 2018). The Interior Health evaluation noted similarly high levels of patient satisfaction—a 71% reduction in ED visits and an 83% decrease in hospital admissions within three months post-HHM. Cost avoidance was not calculated (Interior Health 2018). An interim evaluation of the TEC4Home COPD project found over 90% patient satisfaction, 47% decrease in ED visits, 88% decrease in hospital admissions within three months post-HHM, and improved quality of life and self-care (Vancouver Coastal Health 2018). The lower impact on ED visits in COPD compared with heart failure patients may be the result of the tendency of severe COPD exacerbations to require urgent care.

Overall, evaluations of HHM programs for heart failure and COPD patients in BC have demonstrated improved quality of life, decreased acute care utilization, and cost savings. However, it should be noted that the significant reductions in ED visits and acute care

utilization in these evaluations are reflective of a small subset of heart failure and COPD patients. Identifying eligible patients with complex care needs who were able to use the technology was a common challenge across programs. The Island Health evaluation noted only 4% of patients hospitalized with COPD or HF were referred to the HHM program. Factors contributing to low referral rates included lack of program awareness by providers, patient concerns with using technology, and complexity of the referral process (Island Health 2018). These findings point to opportunities for optimizing the referral process, promoting HHM program use and further engaging clinicians and patients.

In response to variability in how HHM evaluations were being conducted across health authorities, the BC Ministry of Health's Virtual Care Strategy Branch proposed a common evaluation framework to assess SIF-funded HHM initiatives to allow for more effective comparison of project impacts (BC MOH 2018). The framework includes measures to assess the impact of HHM programs on health outcomes, sustainability of outcomes, impact on the health system and user experience. It is unclear if this framework has been widely adopted as a list of SIF-funded projects and evaluations has not been published.

The COVID-19 pandemic has put pressure on the health system to deliver care in innovative ways, creating opportunities for HHM to be expanded to different patient populations, including cancer care, palliative care and COVID-19 monitoring. To support future growth and uptake of HHM programs, health systems must ensure adequate funding is directed from acute to community care to sustain delivery of more accessible and efficient care.

7 STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS

Table 1: SWOT analysis of HHM in BC from a policymaker perspective

Strengths	Weaknesses
• Cost-effectiveness demonstrated in pilot program evaluations. • High levels of patient satisfaction and improved quality of life. • Increases access to care provider and reduces acute care utilization.	• Significant capital investment and operational funding required for sustainment. • Reliance on custom software hosted by third party and cost to expand programs. • Short-term measure for limited chronic conditions.

Strengths (Cont'd)	Weaknesses (Cont'd)
• Increases nursing efficiency and ability to take on greater caseloads. • Technology provided to patients does not require internet connectivity.	• Patient eligibility limited by ability to use technology and cognition. • Low referral rates to HHM programs due to lack of program awareness and patient hesitation with technology.
Opportunities	**Threats**
• Expand HHM services to include a wider range of chronic conditions. • Develop new partnerships with primary care networks to increase potential referrals and program uptake. • Leverage funding from Canada Health Infoway to support HHM initiatives. • Establish clinical standards and best practices for HHM.	• Long-term funding source required for program sustainability. • Suboptimal program utilization due to low referral rates. • Shortage of community care nurses. • Diversion of health authority resources from community to acute care.

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