Global Telehealth 2015: Integrating Technology and Information for Better Healthcare
G. Gillis et al. (Eds.)

doi:10.3233/978-1-61499-505-0-23

Scaling Up the Use of Remote Patient Monitoring in Canada

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Abstract. Evidence supporting the use of remote patient monitoring (RPM) as a cost-effective means of keeping patients from being re-admitted to hospitals or making repeated emergency department visits is growing, especially for the treatment of chronic obstructive pulmonary disease (COPD) and congestive heart failure (CHF). A recent study funded by Canada Health Infoway, titled *Connecting Patients with Providers: A Pan-Canadian Study on Remote Patient Monitoring*, aimed to assess the current state of RPM solutions; to examine the evidence for patient and health system benefits achieved both in Canada and internationally; and to determine the critical success factors needed to support further investment and scaling-up of RPM solutions across the Canadian health care system. Break-even analysis of four different implementations reviewed in this study demonstrated that RPM programs can be viable and sustainable for large and small jurisdictions; however, more evidence is needed with regards to a number of potential applications for RPM beyond the management of COPD and CHF.

Keywords. Home monitoring, telehealth, telehomecare, cost effectiveness.

Introduction

As Canada's population continues to age and grow, we face increased challenges surrounding the management of chronic disease. Secondary prevention that helps to keep those with chronic conditions well and to avoid unnecessary hospital admissions and emergency department visits, benefits both the health system and patients and their families. While the topic has been near the forefront of policy discussions for some time, there are no easy solutions to these complex challenges.

Remote patient monitoring (RPM) is increasingly becoming an important part of the solution for certain serious chronic conditions. It has been touted as a game-changing model of health care delivery for many years, and recent evidence suggests that its use in Canada has the potential to deliver high quality, cost-effective care while improving patient-reported outcomes.

RPM is the delivery of health care to patients outside of conventional care settings (e.g., a patient's home), made possible by connecting the patient and a health care provider through technology. It involves the electronic transmission of patient data (e.g., symptoms, vital signs, outcomes) from a remote home location to the provider, as

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well as the supporting services and processes required to conduct data review, interpretation, coaching and potential alteration to the patient's course of care.

For instance, the Care Coordination/Home Telehealth (CCHT) program of the Veterans Health Administration in the U.S. currently manages more than 70,000 veteran patients using home telehealth technologies. The program has demonstrated successful outcomes. Through the end of fiscal year 2010, veterans reported patient satisfaction levels greater than 85 percent for home telehealth services offered through CCHT. In addition, the program was associated with a greater than 40 percent reduction in bed days of care, as compared with pre-enrollment figures, for the CCHT population receiving home telehealth [1]. Because the Department of Veterans Affairs operates a large integrated delivery system financed primarily by public money, lessons from the VHA's experience may be more applicable to other integrated delivery networks or government-sponsored systems [2].

This study explores the viability of operating remote patient monitoring programs in a Canadian context and discusses key ways in which they can be integrated into mainstream care delivery processes.

1. Methods

An independent, pan-Canadian study, funded by Canada Health Infoway, employed a mixed-methods approach including:

1. Analysis of detailed RPM program information, including utilization data, funding applications, pilot results, satisfaction surveys and evaluation findings,
2. A literature review consisting of meta-analyses, systematic reviews of peer reviewed RPM trials, and meta-reviews (reviews of reviews),
3. Interviews with over 20 key informants including policymakers, clinicians, researchers and vendors with extensive RPM and Telehealth experience,
4. A synthesis and review of available Canadian evidence from RPM program and pilot evaluations, and
5. A break-even or point-of-sustainability analysis (number of active patients needed in an RPM program in order to make its operation sustainable from a health system viewpoint) based on operational data from Canadian RPM programs, including detailed cost and benefit information from selected programs, to inform case studies and emerging solutions.

Final output included a review identifying critical success factors and requirements/recommendations to enable broad-scale deployment and fuller realization of benefits.

2. Results:

Canadian telehealth programs reported use of RPM by more than 2,500 Canadians in 2012 [3]. In Canada and internationally, the number and range of evaluations of RPM programs is growing quickly, with most published studies demonstrating reductions in emergency department visits and hospital readmissions, particularly for chronic obstructive pulmonary disease (COPD) and congestive heart failure (CHF) [4,5]. For

example, the analysis found that Canadians using RPM were less likely to be admitted to hospital or to visit the ER, with benefits valued at $21 million [6]. In addition, surveys of both patients and clinicians suggest consistently high levels of satisfaction, as well as improved ability of patients to self-manage [6].

A literature search and detailed review of four Canadian case studies uncovered a number of significant benefits related to the use of RPM. A recent 21-month evaluation of 60 patients with COPD in the province of Quebec revealed a 50% reduction in hospital length of stay and 37% decrease in number of visits to hospital emergency departments [4]. A separate RPM program developed by the University of Ottawa Heart Institute (UOHI) has cut hospital readmission by 54% for CHF patients [7].

A break-even analysis was conducted on four programs of different size and targeting different patient populations. As expected there was large variability in terms of the number of enrolled patients needed in order for programs to be 'sustainable' (about 60 to over 300). Ultimately, the break-even point is dependent on the nature of services, patient population, and specific metrics and assumptions used to calculate costs and benefits, which varied with each program and was not always consistently reported in studies. This aligns with other findings in the literature, where the economic savings from telemonitoring solutions compared to usual care for CHF patients across 10 studies ranged from 1.6-68.3% and showed significant differences according to what variables were used [8]. Nevertheless, this calculation offers a directionally valid assessment of the benefits gained through RPM implementation.

The study also found substantial room for growth and maturation of RPM use across Canada. Each of the four programs for which detailed case studies were conducted is serving 16-52% more patients than their program-specific 'break-even' point.

3. Discussion

Despite results supporting a number of benefits related to the use of RPM, this evidence is still fairly limited, especially as it relates to large-scale deployment and in a Canadian context. 2,500 enrolled patients represent a very small fraction of the Canadian population affected by chronic disease. Furthermore, RPM use is growing in areas as diverse as asthma, mental health, post-surgical care, rehabilitation and hypertension as new applications continue to be discovered and technology continues to evolve. For these applications, factors such as clinical and administrative processes and workflows, start-up and operational costs, and especially health outcomes need further study since the lack of evidence is a significant barrier to larger-scale, health system-wide investments. Nonetheless, the case analysis suggests that long-term sustainability and potential for growth is a realistic goal for programs large and small.

What can jurisdictions and/or health systems do to increase the chance of success for these programs? The case studies reviewed along with Canadian and international literature suggest a number of key success factors for moving past the pilot stages and growing RPM into a mainstream care delivery mechanism:

a) engagement of and collaboration with clinicians and patients in the development of RPM programs in order to ensure buy-in and a clear value proposition for key stakeholders;

b) integration into established clinician pathways and processes in order to facilitate patient referrals;
c) selection and recruitment of suitable patients (some patients are too ill to participate, while others may not require active monitoring); and
d) ongoing measurement of impacts and outcomes attributed to RPM in order to grow the evidence base and strengthen business cases for increased investment.

All of these elements are needed to ensure strong value for RPM investments and to facilitate the scaling up of these programs over time.

Conclusion

While there have been some mixed outcomes reported in international studies, Canadian evidence suggests that for a targeted segment of the population, RPM presents a cost-effective, innovative solution that transforms the health care delivery model by bringing care into the home and significantly improves patient-reported outcomes such as satisfaction and quality of life. While start-up costs for most programs may be high, this analysis provides evidence to suggest that long-term sustainability is a realistic goal for a variety of RPM programs.

Overall, the study found that continued growth and sustainability of RPM programs in Canada will be dependent on consistent engagement and collaboration with providers, recruiting and retaining the patients who are most likely to benefit from the intervention, and providing integrated and coordinated care while consistently measuring and demonstrating benefits.

References

[1] U.S. Department of Veterans Affairs, VHA Office of Telehealth Services, *What Is Telehealth?*, U.S. Department of Veterans Affairs, Washington, D.C., 2011.
[2] A. Broderick, *The Veterans Health Administration: Taking home telehealth services to scale nationally*, Commonwealth Fund, 2013.
[3] Canadian Telehealth Forum, *2013 Canadian Telehealth Report*, COACH, 2013.
[4] *Home Telemonitoring for Chronic Disease Management: An Economic Assessment*, HEC Montreal, August 2012.
[5] Darkins A, Ryan P, Kobb R, Foster L, Edmonson E, Wakefield B, Lancaster AE. *Care Coordination/Home Telehealth: the systematic implementation of health informatics, home telehealth, and disease management to support the care of veteran patients with chronic conditions*. Telemed J E Health. Dec 2008.
[6] Canada Health Infoway. *Telehealth Benefits and Adoption – Connecting People and Providers across Canada*. Toronto, ON, 2011.
[7] Ernst & Young LLP, *Connecting Patients with Providers: A Pan-Canadian Study on Remote Patient Monitoring*, Canada Health Infoway, June 2014.
[8] E. Seto. *Cost Comparison Between Telemonitoring and Usual Care of Heart Failure: A Systematic Review*. Centre for Global eHealth Innovation, University Health Network, Toronto, ON. Telemedicine and e-Health, 14(7) (2008), 679-686.