



Technology Adoption in Care Transitions

An overview of Canadian home and community care technology used in care coordination and integrated patient transitions

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Executive Summary

Care transitions involve the transfer of patients from one care setting to another. These are key episodes that can disrupt a patient's continuum of care, particularly in the home and community care (HCC) sector where patient transitions occur to, within, and from the various organizations that define the space.

Care transitions involve the transfer of patients from one care setting to another. These are key episodes that can disrupt a patient's continuum of care, particularly in the home and community care (HCC) sector where patient transitions occur to, within, and from the various organizations that define the space. With current population trends in aging leading to an increasing number of geriatric patients with complex conditions and multiple chronic illnesses being transitioned to HCC, this historically small sector of healthcare is experiencing rapid expansion. Ensuring safe and effective patient transitions and integrated care coordination in the HCC sector has emerged as a priority area.

In this report, the Home and Community Care Community of Action (HCC CoA) seeks to contribute to a greater understanding of available approaches towards patient transitions and care coordination within the HCC sector. Based on an extensive literature review process, this report identifies **1) key success strategies for a system framework** supporting patient transitions and integrated care coordination and **2) current or newly evolving technologies** that support implementation of a strategy for an organizational technology infrastructure targeting care transitions and care coordination.

The report also includes the results of a pan-Canadian survey conducted by the HCC CoA regarding the status of strategy and technology uptake in the home and community care sector. This data is further framed within the wider literature to demonstrate existing patterns in technology implementation within the care transitions and care coordination space as well as associated strengths and weaknesses. Ideally this report will serve as a discussion paper to inform decisions related to patient transitions and care coordination in the HCC sector.

The scope and importance of home and community care (HCC) is rapidly expanding. With many governments focused on moving towards integrated care models, HCC is poised to fill a more influential role in the delivery of healthcare within Canada. It is essential that HCC delivery organizations focus on the adoption of consistent processes and technologies to promote safe and quality patient care—particularly at points of patient transitions.

Introduction

Care transitions are “a set of actions designed to ensure the safe and effective coordination and continuity of care as clients experience a change in health status, care needs, health care providers or location (within, between or across settings).”¹ This includes transitions between multiple different care settings during the continuum of a patient’s care—whether due to an acute or chronic illness.²

Care transitions are historically known as key points in the care continuum during which a client is at a heightened risk of experiencing medical errors and/or adverse events as a result of the transfer of care and accountability between multiple disciplines and caregivers.^{2,3} This is in part due to communication breakdowns, where ineffective communication of patient information and care needs (e.g. unclear or conflicting medical instructions) contributes to reduced coordination and continuity of care.^{4,5}

As the costs of a standard hospital stay are estimated to range from \$4,000 to \$11,000, with increasingly reduced capacity within acute care in general, it is within the interests of the Canadian health care system to focus on supporting effective transitions to reduce Emergency Department visits and hospital readmissions.^{7,8} Supporting effective care transitions is a priority for healthcare organizations across Canada.

While there are no validated tools that exist to directly track and measure care transitions and continuity of care,⁹ currently measurable consequences of improper inter-setting care transitions include preventable emergency department visits or high hospital readmission rates.

A key solution is effective care coordination, defined as “deliberately organizing patient care activities and sharing information among all of the participants concerned with a patient’s care to achieve safer and more effective care.”¹² Care coordinators are essential for tracking and supporting patients and families during the course of their care transition as well as connecting them to services based on needs and preferences.¹¹

Leveraging digital health technologies can enable and support effective care transitions and care coordination. But what technologies are available today? What can be implemented within the context of the home and community care sector?

Leveraging digital health technologies can enable and support effective care transitions and care coordination.

Home and Community Care

Care transitions to, from and between settings in the home and community care sector are one area in which ineffective care transitions can be targeted. The Canadian Government defines Home and Community Care Services as services provided to “help people [...] receive care at home, rather than in a hospital or long-term care facility, and to live as independently as possible in the community.”¹³ Home and community care services can also act as a conduit for transitions to expanded community care services, such as long-term care facilities. Home and community care is carried out slightly differently in each province and territory, with some regions using government resources (e.g. Northwest Territories) and others (e.g. British Columbia) delivering home care through private service provider organizations.¹⁴

Supporting effective patient transitions and care coordination are particularly important within the home and community care sector due to fragmentation of the home and community care setting and demographic and medical trends.

Fragmentation of the home and community care setting

The home and community care sector includes a vast array of “quasi-independent institutions and service providers.” This has led to both horizontal and vertical fragmentation due to lack of system integration.¹⁵ For example, once discharged from acute care, a patient may receive home care from one or more agencies, seek outpatient rehabilitation at one or more facilities, and fill their prescriptions from one or more pharmacies at the same time—all while being overseen by their general practitioner. The ability to integrate all these services at point-of-care transitions is key to being able to support effective care transitions.

By far the biggest challenge now facing home and community care is integrating services and delivery to improve care coordination and patient transitions to the home and community sector. Currently, some health care systems, such as Polikum health centres in Germany, are driving change by moving towards models of integrated care. These centres provide a range of multi-disciplinary services in one location, allowing patients to see a variety of healthcare practitioners at one visit and reducing acute care costs by as much as 50%.¹⁶ Integrated care models are increasing in prevalence internationally and locally, such as in the province of Ontario, where the Hip and Knee Replacement bundle was launched in 2018.¹⁷

Demographic and medical trends

Increased longevity with higher medical acuity, desire to live in place, and the sheer volume of baby boomers are collectively forcing healthcare systems to look at new models of care delivery. In the next two decades, the number of Canadians 65 years and older is expected to double.¹⁸ Of these seniors, 70% will have one or more chronic conditions across Canada.¹⁹ Complicating this aging trend is the large number of seniors supported by informal caregivers who are also getting older, with about 1 in 4 (26.1%) experiencing distress while caring for their loved ones.²⁰ Many acute care facilities are increasingly focused on providing emergency and inpatient care to patients with higher acuity health care needs. Concurrently, the home and community role is evolving to care for more clients with complex chronic conditions living at home. Patients 65 and older made up 21% of emergency department (ED) visits in 2014 - 2015, with most spending 17.1 hours or less in the ED and 24% being admitted.²¹

This puts a considerable amount of pressure on the entire continuum of care, requiring streamlined processes, particularly at points of transition.

The increasing prevalence of digital technology, which is now dominating every sector of the economy, has the potential to transform home and community care. Never before has digital technology been so readily available and innovative than it is today. The integration of emerging technologies has the potential to transform patient transitions and support care coordination within the home and community care sector. Home Care Ontario states that “the goal of front-line Home Care Providers is to maximize patient well-being and support them to remain as independent as possible in the community”²² —a task that would be greatly enabled through leveraging technology solutions.



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Strategies to Support Effective Care Coordination and Patient Transitions

Prior to exploring technologies relevant to effective care coordination and patient transitions, the Home and Community Care Community of Action began an exploratory phase to define key systems-level themes that exist within the care transitions literature. 90 articles were reviewed, of which 38 were analyzed for relevant key themes. Below, key success strategies required for the design of a systems framework supporting integrated care coordination and patient transitions are listed, alongside current or newly evolving technologies that could support implementation of the strategy.

Key Success Strategies

	DESCRIPTION/GOAL	SUPPORTING TECHNOLOGIES
Population health management	The goal of population health management is to reduce health inequities or disparities among different population groups by linking the level of care with the needs of population groups.	Population-level big data, ²³ structured and unstructured data analytics, ^{24,25} telemedicine, ²⁶ patient registries. ²⁷
Aligned financial incentives	Includes the establishment of joint health sector responsibility to support accessibility and management of financial resources across the care continuum.	Risk adjustment tools, performance analytics, resource allocation and utilization reporting. ²⁸
Governance (shared accountability)	Includes the development and enforcement of a strategic vision and accompanying strategic priorities that supports shared accountability and legal obligation for performance and continuous quality improvement.	Collaboration tools (e.g. email, teleconferencing, instant messaging, project management). ²⁹
Integration of care delivery, processes, and data	Aims to achieve seamlessly coordinated care for populations in different care sectors through supporting real-time connectivity and continuity of care, focusing on data collection, standardization and improved access to clinical data and health utilization analytics, and streamlining overall processes and practices between care delivery partners.	Workflow management systems, ³⁰ data visualization tools/business intelligence tools and dashboards, ^{31,32} secure clinical communication platforms, ³³ virtual care/wards. ^{34,35}

	DESCRIPTION/GOAL	SUPPORTING TECHNOLOGIES
Single point of access for clinicians to patient information	Provides clinicians with a common communication and collaboration platform, allowing for a common understanding of a patient's status, goals and care plan across care partners, thereby supporting joint decision-making and health care system transparency.	Shared/centralized EHRs, ^{36,37,38} cloud computing, ^{39,40} blockchain, ^{41,42} provincial portals and repositories. ⁴³
Spread and scale of well-defined guidelines and processes	A common culture that is facilitated by tools for the whole circle of care such as standardized clinical documentation templates or care coordination communication strategies allows for the creation of shared spaces between care delivery partners.	Standardized clinical order sets, ^{44,45} standardized assessment tools. ⁴⁶
Collaborative culture	A collaborative culture that successfully supports innovative and integrated care through encouraging cross-functional changes across partnerships, enables people to work together in flexible but organized projects to create an infrastructure in which collaboration is valued and rewarded but also retains a commitment to quality patient care.	Secure task/project management applications, collaboration tools (e.g. email, teleconferencing, instant messaging, project management). ⁴⁷
Patient and caregiver engagement	Patients and their caregivers are taking ownership of their health and are advocating for the supports they need as integral members of the circle of care. They need to have access to their own personal health information, access to the support services provided within the community as well as opportunities for collaboration with professionals to ensure safe transitions that accounts for unique needs.	Patient and caregiver portals, ^{48,49,50} mobile applications, ^{52,52} medical devices and the Internet of Things, patient satisfaction tools, virtual care/wards/reality, ^{46,47} Personal Health Records, ⁴⁸ unstructured data mining and collection, ⁴⁹ social networking and remote training and supervision, ⁵⁰ chatbots, ⁵¹ sensors and precision medicine. ⁵²
Performance measurement/ quality and economic outcomes	Evidence-based key performance metrics and an alignment with patient, clinical and economic outcomes are essential when introducing new solutions to an integrated care delivery model. Benefits to the system and patient must be demonstrated in order to drive change and acceptance.	Electronic PROMs/PREMs/care transition scales data collection systems, ^{53,54} performance dashboards, ⁵⁵ business intelligence and analytics tools, global trigger tools.

These are key areas in which the described technology solutions could be leveraged to improve the effectiveness of care coordination and patient transitions based on organizational needs.

Care Transitions and Coordination Technology Uptake

An environmental scan was completed across two surveys to determine the national state of patient transitions and care coordination across Canada as well as identify any strategies or technologies used to support transitions. The surveys received a total of 31 responses, with the respondent population spread across five provinces and ranging from front-line clinicians to executive leaders and academics. Survey weaknesses and limitations include the small sample size and an Ontario-heavy respondent pool that may not reflect a comprehensive cross-Canada view of the state of technology uptake.

Overall, several trends were noted regarding technology adoption:

1

Use of technology across Canada to support care transitions

The environmental scan found that 77% of the survey respondents stated that their organization/ jurisdiction/province leveraged technology to support care coordination and patient transitions to/within/from the home and community care setting. The technologies listed ranged from shared EHR solutions to telemedicine to mobile technologies. Shared EHR solutions can include accessing an overarching solution that spans multiple institutions, such as the Nova Scotia Secure Health Access Record (SHARE) system, or can include joining or accessing another institution's existing EHR, such as Providence Care's adoption of Quadramed in partnership with Kingston General Hospital and Hotel Dieu Hospital.^{56,57} They can improve health information exchange and continuity of care at transition points—although little data was found regarding implementation of shared EHR solutions in relation to the home and community sector.^{58,59,60} Additionally, telemedicine can be leveraged to support continuity of care at a reduced cost, and is being leveraged extensively throughout Canada to provide monitoring and/or follow-ups for patients post-discharge.^{61,62,63,64} In a similar vein, mobile technologies can provide an array of services to support patients post-discharge, particularly in relation to achieving self-management.^{65,66,67} As health information and communication technologies are evolving at an unprecedented rate, the survey also asked respondents about knowledge of care transitions and care coordination technologies that may be newly emerging or in development. Based on the results, awareness of new innovative technologies available on the market that target the above areas was low, with only 7% of respondents cognizant of this information.

2

Strengths of technology solutions

Key strengths of technologies designed to support care transitions included the desire for a secure means through which to access patient information, auto-population of data and portability. Many others referred to aesthetics, including ease of use and intuitive usability of the system. Access to incoming patient information allows for planning and coordination of client care prior to admission—however, discharge summaries and instructions may not be easy to access or interpret.⁶⁸

The ability to view discharge information as well as additional pertinent clinical information is a strength in ensuring successful care transitions to/within/from the home and community care setting. Auto-population of patient data to outgoing referrals or from external sources into the organizational EHR improves efficiency and accuracy of incoming patient information, reducing the need for transcription.³⁷ For example, the Manitoba eReferral system allows for data to auto-populate outgoing referrals and in Ontario, the InterRAI assessment, can be integrated within organizational EHRs, allowing for auto-population of data.^{69,70}

However, it should be noted that auto-population must be implemented with processes in place to ensure validity of incoming/outgoing data. Related to this, the portability of patient records was identified as a strength of technology solutions to support care transitions and care coordination. The ability for healthcare data to be easily transferable from one system to another is an evolving priority in the healthcare system, with some strides being made towards achieving this goal.⁷¹ Lastly, usability of the system was rated highly across multiple categories. Ensuring ease of use, intuitiveness and a user-centered design that is grounded in the processes local to the facility is essential to improve user satisfaction and reduce patient safety errors.⁷²

3

Challenges related to healthcare technology solutions

The primary barrier to new technology implementation to address care transitions identified in the survey is financial limitations. Quantifying overall technology spending in healthcare is a challenge, due to the complexity of contributing factors and the varied nature of implementations across Canada. However, while spending on technologies may be expensive in the short-term, it may have the potential to reduce future costs in the long-term—although evaluating the overall post-implementation effect on cost may sometimes be a challenge.⁷³

Following cost, interoperability was identified as an area of concern in the survey. This is consistent with a study conducted by the Bipartisan Policy Center, which found that approximately 70% of the clinicians that they surveyed believe that the lack of interoperability hindered effective electronic health information exchange in 2012.⁷⁴ The Healthcare Information and Management Systems Society defines interoperability as “the ability of different systems, devices or applications to connect, in a coordinated manner, within and across organizational boundaries to access, exchange and cooperatively use data amongst stakeholders, with the goal of optimizing the health of individuals and populations.”⁷⁵ Some examples of interoperability standards include ICD-10, HL7, FHIR and ISO - all of which standardize and support communication of data between systems and

therefore supports continuity of care during transitions.⁷⁶ There are varied approaches to addressing interoperability challenges, such as Ontario's implementation of the proprietary InterRAI tool as a intermediary between organizations, or alternatively, the adoption of technology solutions that include open application programming interfaces (APIs) that could be leveraged for integration purposes.^{47,77}

Clinical adoption was also identified as a barrier. Due to the varied nature of technology solutions currently available on the market, this barrier could refer to clinical adoption challenges at the care provider level or at the patient level—which is particularly marked in the geographically wide home and community care sector. Rates of technology adoption can vary across multiple factors, including type of technology, implementation strategy, location, tool reliability, workflow match.⁷⁸ Use of guidelines, such as the Registered Nurses' Association of Ontario's *Adopting eHealth Solutions: Implementation Strategies*, can provide information in the planning process to support clinical and patient adoption.⁷⁹ Poor usability can also have a significant negative impact on the adoption rate of health technologies.⁸⁰ Many healthcare technology vendors are now incorporating human factors and user-centered design elements during the development process to improve and align usability with the needs of the users.⁸¹

4

Care transition strategy prioritization

Respondents were asked to identify and rank their organization's priorities based on the strategies listed above. Based on the results, the strategies that are perceived to be the most important are:

- 'Integration of care delivery, processes and data'
- achieving a 'collaborative culture'.

This was followed by:

- 'A single point of access for clinicians to patient information'
- 'Spread and scale of well-defined guidelines and processes'
- 'Patient and caregiver engagement'
- 'Performance management/Quality and economic outcome'

Last were:

- 'Aligned financial incentives'
- 'Population health management'
- 'Governance and shared accountability'

Conclusion

Publicly funded home care services in Canada only began in 1970 within the province of Ontario.⁸² Since then, the sector has expanded and diversified rapidly to match the evolving needs in healthcare. Care transitions and care coordination are significant areas in which improvements are needed to reduce adverse consequences and improve outcomes. In this report, strategies designed for the creation of a systems framework related to patient transitions and care coordination were presented, as well as suggestions for associated technologies. Results of a survey regarding patient transitions and care transitions were also presented, then contextualized within the literature.

Looking forward, there are many opportunities for further research regarding patient transitions and care coordination to/within/from the home and community care sector. Technology implementation in this sector within Canada has only recently begun to evolve, leaving many opportunities for experimentation to achieve safe and effective care transitions.

“In many cases, home health care is at the bottom of the pecking order, not yet fully integrated into our overall care delivery system. But the opportunities are vast. Home care is well positioned to take a central role in keep patients healthy at home, helping to bring care from the doctor’s office or hospital into the day-to-day lives of patients and, in essence, becoming the quarterback of health care.”

JOSEPH KVEDAR, MD, FOUNDER AND DIRECTOR, CENTER FOR CONNECTED HEALTH

APPENDIX A

Survey Template

Below are the questions that were included in the online survey. Please note that logic was built into the online survey platform, causing some questions to not be displayed depending on question results.

NUMBER	QUESTION
1	What is your name, organization and role? What province are you located in? If you would prefer not to answer, feel free to leave these questions blank.
2	What technology solutions does your organization use to support integrated care coordination and patient transitions? Please provide a description of the technology solution(s).
3	How do these technologies support integrated care coordination and patient transitions?
4	The Home & Community CoA is focusing on 9 different strategies as part of their study, to the best of your knowledge, how is your organization leveraging your technology solution to support these strategies?
4A	Population Health Management
4B	Aligned financial incentives
4C	Governance and shared accountability
4D	Integration of care delivery, processes and data
4E	A single point of access for clinicians to patient information
4F	Spread and scale of well-defined guidelines and processes
4G	Collaborative culture
4H	Patient and caregiver engagement
4I	Performance measurement/Quality & Economic Outcomes
5	Are any of these technologies implemented in a limited number of settings or do they extend widely over your jurisdiction/province?

NUMBER	QUESTION
6	What technology solutions have you seen in the marketplace that offer features and functionalities that enable your organization to facilitate patient transitions and care coordination? What are these features and functionalities? What gaps do these features and functionalities fill?
7	What are the barriers/limitations of adopting these technologies? (ie. finance, workflow, governance, interoperability)
8	What benefits have been realized and sustained from the implementation and adoption of the above-mentioned technologies?
9	Are there any lessons learned or challenges that have been experienced by the organization or jurisdiction or that continue to be experienced?
10	Are there policies or legislation in place within your province that support technology implementation in care transitions to the home and community care setting?
11	How is patient privacy maintained and/or data sharing security enabled between organizations or jurisdictions during care transitions in context of the technology?

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