



## Context

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Hospital readmission is common, costly, and potentially avoidable.<sup>1</sup> In Ontario, over one-third of patients discharged from internal medicine wards are readmitted to hospital within 90 days.<sup>2</sup> This may be due to a service gap between primary care, acute care, and home care programs. The Ontario Ministry of Health and Long-Term Care estimates that these readmissions cost over \$700 million per year.<sup>2</sup>

Readmission contributes to emergency department overcrowding and a high prevalence of patients waiting in the hospital to be transferred home with the help of clinical and community support services.<sup>3</sup> Although several post-discharge interventions have been proposed to alleviate the cycle of rehospitalization, few have shown real and meaningful reductions in the frequency of readmissions or other unfavourable post-discharge outcomes such as emergency department visits, long-term care admission, and death.<sup>4</sup>

The concept of virtual wards as a new model of care was pioneered in 2004 by Geraint Lewis in the United Kingdom.<sup>5</sup> The aim of virtual wards is to reduce hospital readmissions by providing short-term transitional care to high-risk and complex patients in the community who have recently been discharged from hospital.<sup>3</sup> Patients are referred to a virtual ward based on the use of a mathematical model that predicts risk of readmission, and they are provided with home-based care by a multidisciplinary team. A Canadian-led research team has developed a tool, known as the LACE index, to help clinicians predict the likelihood of unplanned

readmission or death within 30 days after hospital discharge.<sup>1</sup> Results from a recent study indicate that the LACE index can help identify patients who may benefit from more intensive post-discharge interventions.<sup>6</sup> Patients are discharged from the virtual ward when their health and social care management have been optimized, and ongoing care by their family physician and community-based teams has been fully established, sufficiently reducing the risk of rehospitalization.

Virtual wards are of interest in Canada due to issues related to access of care, the continuity of care following discharge, and the cost of rehospitalization.

## Objectives

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The purpose of this report is to provide information regarding the development and evaluation of virtual wards in Canada.

The following questions will be addressed:

1. What is a commonly used definition of virtual health care services in Canada?
2. If health organizations are using the term, what is the context in which they are using it?
3. What practices are currently in operation that use innovative technologies to support community-based patient care through the virtual ward concept?

### Findings

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It is not intended that the findings of this environmental scan provide a comprehensive review of the topic. Results are based on a limited literature search and on personal communications with key informants gathered as of August 16, 2011.

The original virtual ward concept involves the use of predictive mathematical modelling to identify those in the community who are at a high risk of future emergency hospitalization, and the creation of a multidisciplinary team to deliver preventative care to the selected patients in their own homes.<sup>5</sup> The Ontario Ministry of Health and Long-Term Care defines the virtual ward as “an innovative service model that delivers high quality coordinated care to patients in the community, after they have been discharged from hospital. It combines the best aspects of hospital care and management, outside the walls of the hospital. It is designed to provide for safe and seamless transition of patients between acute and primary care.”<sup>7</sup>

There are three virtual ward programs currently in operation in Canada. Table 1 presents the details of the specific virtual ward programs. One virtual ward is a collaborative initiative of the Toronto Central Community Care Access Centre and several hospitals affiliated with the University of Toronto.<sup>7</sup> The team contacts patients identified using the LACE index within 24 to 48 hours of discharge, and works with the patient and patient’s family doctor to develop an individualized care plan.<sup>3</sup> Patients at home benefit from a interdisciplinary team, a shared set of notes, a single point of contact with around-the-clock availability, and coordination of specialist primary and home-based community care for two to eight weeks after discharge.<sup>8</sup> The virtual ward team meets daily to exchange information on each patient’s medical

concerns, living situation, and social circumstances. The typical caseload is 40 patients at a time. The virtual ward is being formally evaluated in a randomized trial funded by the Canadian Institutes of Health Research (CIHR).<sup>9</sup> The primary outcome measure is readmission or death within 30 days after hospital discharge. Other outcome measures include emergency department visits and long-term care admission up to one year after discharge. The investigators hypothesize that the virtual ward will reduce readmissions by one-third.<sup>10</sup> The expected study completion date is May 2013.

The South East Toronto Family Health Team is piloting a virtual ward to care for patients who are being discharged from the Toronto East General Hospital.<sup>7</sup> Patients over the age of 65 years are identified using the LACE index. One of the main goals of the virtual ward is to assist the growing population of patients who do not have access to a family physician in the community.<sup>11</sup> Patients meet with a primary care physician’s assistant the day before discharge. The assistant then phones the patient daily for approximately eight weeks following discharge. The team offers individualized medical care, referrals to appropriate community support services, and patient education to improve self-management. Home care services from the Toronto Central Community Care Access Centre are arranged for the patient as needed. The virtual ward team is currently working on gaining access to shared electronic medical records between the Toronto Central Community Care Access Centre, the South East Toronto Family Health Team, and the Toronto East General Hospital. Patients with chronic obstructive lung disease, diabetes, or congestive heart failure receive telehomecare equipment from the Ontario Telemedicine Network for up to six months.<sup>12</sup> This enables the virtual ward team to remotely monitor vital signs to assess the need for home visits and incorporate self-management into daily

care. Several outcomes such as rates of readmission or death, patient satisfaction, and chronic disease quality improvement measures are being collected for evaluative purposes. The virtual ward is also working with the Ministry of Health and Long-Term Care's Health System Accountability and Performance Division to obtain evaluation support for the program.<sup>12</sup>

The Enhanced Home-Based Community Care Virtual Ward Project is currently in early development in Manitoba. The virtual ward team is based at a primary care centre in North East Winnipeg. Currently, ten patients with a history of repeated admissions to Concordia Hospital have been selected for complex case management at home. Another ten patients living in the community who are considered good candidates for the virtual

ward have been selected for admission when vacancies occur. The team meets regularly and communicates using dedicated BlackBerries. Virtual ward patients are contacted by phone, and home visits are arranged as required. An electronic alert system is automatically activated if any of the virtual ward patients presents to the emergency department. The project is currently examining the approaches to risk prediction that exist in the United Kingdom and Canada to identify applicability and feasibility for similar risk prediction algorithms in the Winnipeg Regional Health Authority.

St. Mary's Hospital in Quebec has expressed an interest in the development of a virtual ward, particularly for use in patients with mental illness.

Table 1: Virtual Wards in Canada		
VIRTUAL WARD COLLABORATION	PROGRAM	EVALUATION
Toronto, Ontario		
<ul style="list-style-type: none"> <li>• St. Michael's Hospital</li> <li>• Women's College Hospital</li> <li>• University Health Network</li> <li>• Toronto Central Community Care Access Centre</li> <li>• Sunnybrook Health Sciences Centre</li> <li>• Toronto Central Local Health Integration Network</li> <li>• Ontario Ministry of Health and Long-Term Care<sup>7,9,10</sup></li> </ul>	<p><i>Target population:</i> post-discharge patients who are considered to be at high risk of readmission, according to the lace index<sup>5</sup> (a score of 10 or higher)</p> <p><i>Team members:</i></p> <ul style="list-style-type: none"> <li>• physician</li> <li>• nurse practitioner</li> <li>• care coordinators</li> <li>• pharmacist</li> <li>• clerk</li> </ul> <p><i>Services provided:</i></p> <ul style="list-style-type: none"> <li>• telephone support</li> <li>• dietary and medication counselling</li> <li>• education to improve self-management of chronic disease</li> <li>• medication reconciliation</li> <li>• home safety assessments</li> <li>• home visits by physician, nurse, and care coordinator</li> <li>• care coordination with other</li> </ul>	<p>A randomized controlled trial is being conducted to assess the efficacy of the virtual ward. Approximately 1,500 patients will be randomized to the virtual ward or usual care with a primary outcome measure of readmission or death within 30 days after hospital discharge. Other outcome measures include emergency department visits, and long-term care admission up to one year after discharge.</p>

Table 1: Virtual Wards in Canada		
VIRTUAL WARD COLLABORATION	PROGRAM	EVALUATION
	health care providers including family doctor, social supports, addictions counselling, lab work, and specialists	
<ul style="list-style-type: none"> <li>• Toronto East General Hospital</li> <li>• South East Toronto Family Health Team</li> <li>• Toronto Central Community Care Access Centre</li> <li>• Ontario Telemedicine Network<sup>7,11-13</sup></li> </ul>	<p><i>Target population:</i> post-discharge patients over the age of 65 who are considered to be at high risk of readmission, according to the LACE index* (a score of 10 or higher)</p> <p><i>Team members:</i></p> <ul style="list-style-type: none"> <li>• physician</li> <li>• physician’s assistant</li> <li>• nurse practitioner</li> <li>• case navigator</li> <li>• pharmacist</li> <li>• dietician</li> <li>• mental health addictions counsellor</li> </ul> <p><i>Services provided:</i></p> <ul style="list-style-type: none"> <li>• telephone support</li> <li>• home visits</li> <li>• medication reconciliation</li> <li>• dietary and medication counselling</li> <li>• care coordination with other community supports including social supports, lab work</li> <li>• mental health and addiction supports</li> <li>• education to improve self-management of chronic disease</li> <li>• remote monitoring of vital signs using telehomecare equipment</li> </ul>	The evaluation data being collected includes 30-day and 90-day readmission rates, mortality, patient satisfaction, and chronic disease quality improvement measures collected from the Ontario Telemedicine Network.
<b>Winnipeg, Manitoba</b>		
<ul style="list-style-type: none"> <li>• Primary Care Clinic</li> <li>• Concordia Hospital</li> </ul>	<p><i>Target population:</i> 10 patients with a history of repeated admissions have been selected for complex case management at home. 10 patients in the community who are considered good candidates for the virtual ward have been selected for admission into the virtual ward when vacancies occur.</p>	Development of evaluation indicators is currently in progress.

Table 1: Virtual Wards in Canada		
VIRTUAL WARD COLLABORATION	PROGRAM	EVALUATION
	<p><i>Team members:</i></p> <ul style="list-style-type: none"> <li>• family physician</li> <li>• primary care nurse</li> <li>• home care case manager</li> <li>• home care nurse researcher</li> <li>• mental health and palliative nursing as required</li> </ul> <p>A pharmacist may be added to the team in the future.</p> <p><i>Services provided:</i></p> <ul style="list-style-type: none"> <li>• telephone support</li> <li>• home visits by various team members</li> </ul>	

\*The components of the LACE index are length of hospital stay, acuity of illness at time of admission, Charlson comorbidity score (a measure of the number and severity of coexisting medical conditions), and emergency department visits six months prior to hospitalization.<sup>1</sup>

## Conclusion

Virtual wards serve as a communications hub for health professionals involved in the care of complex patients by establishing linkages between different health care disciplines and institutions. By providing timely, collaborative, coordinated multidisciplinary care to targeted patients in their own homes, virtual wards have the potential to reduce hospital readmissions and improve patient outcomes. There are currently three virtual ward programs in Canada that vary in patient selection methods, team members, and patient monitoring techniques. Two virtual wards located in Ontario are currently collecting information on patient outcomes for evaluative purposes. One is conducting a randomized trial to evaluate the impact of virtual wards on readmission, death, emergency department visits, and long-term care admission. One virtual ward in Manitoba is in the process of investigating the feasibility of risk prediction algorithms for the Winnipeg Regional Health Authority. St. Mary’s Hospital in Quebec has expressed an interest in the development of a virtual ward, particularly for mental health patients.

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