DETERMINING THE IMPACT OF TELEHEALTH ON RURAL AND REMOTE HEALTH CARE SERVICE DELIVERY IN CANADA

A Thesis

Submitted to the Faculty of Graduate Studies

In Partial Fulfillment of the Requirement

For the Degree of

Master of Public Policy

in

Health Systems Research

University of Regina

By:

Kimberly Anne Hill

Regina, Saskatchewan

March 2014

UNIVERSITY OF REGINA

FACULTY OF GRADUATE STUDIES AND RESEARCH

SUPERVISORY AND EXAMINING COMMITTEE

Ms. Kimberly Anne Hill, candidate for the degree of Master of Public Policy in Health Systems Research**,** has presented a thesis titled, ***Determining the Impact of Telehealth on Rural and Remote Health Care Service Delivery in Canada,*** in an oral examination held on March 25, 2014. The following committee members have found the thesis acceptable in form and content, and that the candidate demonstrated satisfactory knowledge of the subject material.

External Examiner:	*Dr. Bonnie Jeffery, Faculty of Social Work
Supervisor:	Dr. Gregory Marchildon, Johnson-Shoyama Graduate School
Committee Member:	Dr. Lihui Zhang, Johnson-Shoyama Graduate School
Committee Member:	*Dr. Haizhen Mou, Adjunct
Chair of Defense:	Dr. Raymond Blake, Department of History

*via Video Conference

ABSTRACT

There are disparities in health status and outcomes between rural and remote residents and their urban counterparts, and these disparities are caused in part by inequitable access to health services. For decades provincial and territorial decision makers have implemented numerous health human resource policies, most commonly financial incentives, to attract health providers to rural and remote areas to alleviate the inequity of access. The effect of these policies has been temporary in that health providers responding to these incentives rarely established permanent practices in rural and remote communities. In addition, these policies rarely address the fact that specialized health services and infrastructure are highly concentrated in urban centres. In recent decades, decision makers have explored the use of information and communication technology via provincial and regional telehealth programs to provide more specialized health services that were previously unavailable in underserviced communities.

Using the widely adopted Triple Aim framework developed by the Institute for Healthcare Improvement, three modes of telehealth (telemedicine, health help lines, and online mental health therapy) are evaluated for their ability to simultaneously improve population health through improved access and improve the patient experience in rural and remote areas while maintaining or decreasing the per capita costs of health care. The analysis showed that telehelath does have the ability to improve access to health services, but low utilization, especially among provinces with high percent rurality, would indicate that its impact on access has been minimal. Additionally, there is evidence that health help lines may actually increase disparities by increasing the number of unnecessary visits to physicians and emergency departments. Data on changes in health status as a

result of telehealth use is not available, and health outcomes have only been assessed as part of pilot projects and thus are not generalizable to telehealth as a whole. To date studies evaluating the cost savings of telehealth have been flawed and thus no determination could be made regarding telehealth's ability to decrease the cost of care of rural and remote residents.

Although telehealth has had minimal impact on improving access to care of rural and remote residence, research does demonstrate its promise in delivering care at a distance. Policies are in place to enable its use more broadly, but most jurisdictions lack implementation strategies that elicit the growth of telehealth. Jurisdictions must work together to collectively define telehealth, determine its goals and objectives, and then assign appropriate modes of telehealth to meet the needs of the population being served. Additionally, provincial and territorial telehealth programs would benefit from rigorous program evaluations and academic research to ensure effective service provision. Most importantly, provincial telehealth programing would benefit from the creation of a centralized governance structure whereby economies of scale can be leveraged in the procurement of technology, provision of consistent training and technical support, and coordination of care across the province or territory. Telehealth programing is a mechanism by which provincial and territorial health ministries can use to improve service provision in rural and remote areas, but more work is needed to translate telehealth's potential benefits into realized gains for rural and remote residents.

ACKNOWLEDEMENTS

I would first like to take the opportunity to thank my thesis supervisor, Dr. Gregory Marchildon, for his patience, guidance, and support through the research and writing process of this thesis. Thank you for encouraging me to think and work outside my comfort zones and for pushing me forward when my anxiety and tentativeness were holding me back. Most of all, I thank you for giving me the unbelievable opportunity to learn from you – the lessons I learned will be ones I take forward personally, professionally, and academically.

Funding for this research was generously provided by the Western Regional Training Centre for Health Services Research and the Faculty of Graduate Studies and Research at the University of Regina.

A heartfelt thank you goes to Mr. John Schinbien and his most helpful network of telehealth program administrators across Canada. I truly appreciate that you were so forthcoming with your time and were willing to aid in my quest to acquire the most timely and accurate information available on telehealth programming across the country. Thank you for filling in the blanks when there appeared to be black holes in the data. Your generosity of time and encouragement will not be forgotten.

DEDICATION

I wish to thank my friends, and most importantly my family, for the support and encouragement they provided during my graduate work. You gave me the courage to change my course in life, and the strength to follow through. I would not have been successful without you – thank you.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ABBREVIATIONS

AB	Alberta
BC	British Columbia
CA	Census agglomeration area
CCOHTA	Canadian Coordinating Office for Health Technology Assessment
CDO	care delivery organizations
CDR	child development and rehabilitation
CHA	Canada Health Act, 1984
CHF	congestive heart failure
CHI	Canada Health Infoway
CHIPP	Canada Health Infrastructure Partnership Program
CIA	Central Intelligence Agency
CIHI	Canadian Institute for Health Information
CMA	census metropolitan areas
COACH	Coach: Canada's Health Informatics Association
COPD	chronic obstructive pulmonary disease
DBS	deep brain stimulators
Derm	dermatology
DIT	diffusion of innovation theory
ECG	electrocardiogram
ED	emergency department (hospital)
Endocrin	endocrinology

GP	general practitioner
HHL	health help line
HMO	health management organization
HRMC	Howard Research and Management Consulting Inc.
ICT	information and communications technology
ICU	intensive care unit
km	kilometers
KO	Keewatinook Okimakanak
LHINs	Local Health Integration Networks
MB	Manitoba
MH	mental health
na	not available
NB	New Brunswick
NL	Newfoundland and Labrador
NLCHI	Newfoundland and Labrador Centre for Health Information
NORTH	Northern Ontario Remote Telecommunication Health
NPs	nurse practitioners
NS	Nova Scotia
NSTHN	Nova Scotia Telehealth Network
NT	Northwest Territories
NU	Nunavut
Ob/Gyn	obstetrics and gynecology
OCBT	online cognitive behavioural therapy

OHIP	Ontario Health Insurance Plan
OMHLTC	Ontario Ministry of Health and Long-Term Care
ON	Ontario
ONIP	Ontario Network Infrastructure Program
Optho	ophthalmology
OT	occupational therapy
OTN	Ontario Telemedicine Network
PACS	picture archive and communications systems
PE	Prince Edward Island
POA	pre-operative assessment
Psych	psychiatry
PT	physiotherapists
PWC	Price Waterhouse Coopers
QC	Quebec
QUILTS	Quality Improvement of Literacy, TeleCare and Self Help Collaborative
Rehab	rehabilitation
Respir	respiratory
RHAs	regional health authorities
Rheum	rheumatology
RNs	registered nurses
S&F	store-and-forward
SK	Saskatchewan
THC	telehomecare

tPA	tissue plasminogen activator
UIHN	University Integrated Healthcare Network
WRHA	Winnipeg Regional Health Authority
YT	Yukon

Chapter 1: Introduction

Health care delivery in Canada is primarily the responsibility of the provinces and territories, with the exception of First Nations people and Inuit, military personnel, veterans, inmates at federal penitentiaries, and eligible refugee claimants whose health benefits are financed and administered by the federal government (Marchildon 2013). The Canadian health care system provides health care to eligible residents based on five principles entrenched in the Canada Health Act, 1984 (CHA): public administration, comprehensiveness, universality, portability, and accessibility. In return for federal transfer funding, provincial governments are expected to abide by these principles. Under the CHA, provincial health plans "must provide for insured health services on uniform terms and conditions and on a basis that does not impede or preclude, either directly or indirectly, whether by charges made to insured persons or otherwise, reasonable access to those services by insured persons" (Wilson and Rosenberg 2004, 139). What remains unclear, however, is the precise definition of the term 'reasonable access', as major disparities in access to health care exist between residents of urban and non-urban communities.

Health Canada distinguishes between financial and physical accessibility, however, under the CHA, accessibility is defined financially as the provision of health services without direct or indirect charge. This is to say, that residents will be provided hospital and physician services regardless of their ability to pay. Additional non-Medicare benefits, such as the provision of pharmaceuticals and out-patient rehabilitation services, are administered at the discretion of each provincial jurisdiction (Health Canada 2011).

The CHA was introduced, at least in part, as a response to the concern that user fees and other billing practices were limiting access. Physical accessibility, on the other hand, carries the much more nebulous definition of delivery of services "where and as available" (Health Canada 2000, 7).

The "where and as available" clause allows provincial governments the ability to choose which services they wish to provide over and above the basic hospital and physician services, and states nothing about the quantity or location of such services. In fact, for populations residing in rural and remote communities[1], physical access to medical services within their community has been steadily decreasing as a result of the centralization of health services in more urban centres, as well as failed human resource recruitment and retention strategies. This reduction in access to health services in sparsely populated areas has contributed to health disparities between rural and remote residents and their urban counterparts.

1.1 Research questions

The provision of health services through telehealth has been identified as a solution to the inequitable access to health care among residents of rural and remote communities; however, little research exists on the outcomes of telehealth programs. The two research questions addressed in this thesis are as follows. What impact has telehealth had on improving access to health services in rural and remote communities in Canada? Has there been an improvement in health status and health outcomes as a result of the

[1] There is no single definition of rural and remote areas, but Statistics Canada most commonly defines rural and remote areas as the population residing outside census metropolitan areas (CMA) and census agglomeration areas (CA) (du Plessis et al 2002). CMAs and CAs are "area[s] consisting of one or more neighbouring municipalities situated around a major urban core" (Statistics Canada 2009) with a population $\geq$ 100,000 of which more than 50,000 live in the urban core in the case of a CMA and a population of > 10,000 in relation to CAs (Statistics Canada 2012). This definition of rural and remote areas has been chosen for the purpose of this thesis.

adoption of telehealth in rural and remote communities based on the three case studies presented here?[2]

To answer these questions, three modes of telehealth used in the direct provision of health services were assessed as to their ability to achieve the goals of the Triple Aim. The Triple Aim was selected as the conceptual framework for this thesis because the goals of telehealth and those of the Triple Aim are aligned.

1.2 Conceptual framework

The Triple Aim Framework, developed by the Institute for Healthcare Improvement (an independent non-profit organization based in Cambridge, Massachusetts), seeks to improve the health care system by developing and implementing health policies that adhere to three simultaneous goals: "improving the experience of care, improving the health of populations, and reducing per capita costs of health care" (Berkwick, Nolan and Whittington, 759). In recent years the United States, Australia, England, New Zealand, Northern Ireland, Scotland, Singapore, Sweden, and several jurisdictions in Canada have adopted the Triple Aim as a framework for health care reform. Adoption of the Triple Aim requires decision makers to balance each of the three aims, recognizing that improvement in one area may have negative tradeoffs on the others, and thus careful policy development is required. The success of the Triple Aim is dependent on identifying a specific population of concern, recognizing policy constraints, and having an entity that has the authority to assume the responsibility for the goals of the Triple Aim for the identified population (Berwick, Nolan and Whittington 2008).

[2] Due to the complexity of the jurisdictional issues and the ability to obtain reliable data, telehealth use by Registered Indians on reserves was not addressed in this analysis.

Decision makers are accustomed to weighing the tradeoffs of implementing new policies or policy instruments. Traditionally, health policy makers treated the three arms of today's Triple Aim framework as tradeoffs when addressing policy problems. For example, improving population health or the quality of care usually implied that the cost of health services would increase, whereas the Triple Aim suggests that if policy makers are resourceful and creative, improvements in population health and quality of care are possible without an increase in cost per capita of care. The problem with the Triple Aim is that it provides a description of the ideal state rather than prescribed instruction as to how decision makers are to balance the three aims of the framework. Additionally, the framework fails to acknowledge that administrative costs associated with adopting the Triple Aim are likely to be incurred.

Telehealth is a policy lever that can be further developed to meet the goals of the Triple Aim with respect to improving the access to health care for those residing in rural and remote areas. Current applications of telehealth are being used to: ensure that appropriate care is available 24 hours a day, 7 days a week, thereby reducing the need for costly emergency services; increase access to specialty services within the community, allowing for diagnosis and treatment of illnesses before they become emergent; and provide more frequent follow-up care, resulting in earlier intervention and improved management of chronic illness.

Telehealth has the ability to prevent, diagnosis and treat illness at a distance, and is a prime example of the Triple Aim being operationalized. Population health is improved through access to prevention services and better management of chronic diseases, and the patient experience is improved by allowing rural and remote residents to gain access to

medical services while remaining in their communities. In addition, telehealth provides greater quality of care through continuing education initiatives and mentorship programs for providers. The adoption of telehealth can decrease the cost per capita by ensuring that rural and remote residents are in better health and are able to seek medical care when symptoms first occur rather than when illnesses become emergent.

1.3 Thesis Objective

The objective of this thesis is to determine whether telehealth can decrease the inequity of access to medical care and improve health outcomes and health status in rural and remote areas of Canada. The remainder of chapter one identifies the disparities between rural and remote residents and their urban counterparts; describes two factors that contribute to these disparities that telehealth can alleviate; and articulates the policy problem and solutions previously tried or considered. Using the Triple Aim framework, three telehealth modes are assessed with respect to their ability to provide care or health information that might not otherwise be available to those living in rural and remote areas. The first mode is the provision of health care from a distance using telemedicine. The second telehealth mode is the provision of medical information and advice to patients through nurse operated health help lines. The third mode is the online delivery of mental health services. The final chapter addresses the policy and research implications associated with the adoption of telehealth initiatives that could improve health service delivery among residents of rural and remote Canada. Included in this discussion are recommendations for how to further increase the adoption of telehealth into mainstream service delivery so that the inequity of health services can be decreased and health outcomes among residents of rural and remote Canada can be improved.

1.4 Disparities among rural and remote residents and their urban counterparts

1.4.1 Health disparities among rural and remote residents in Canada

Numerous health disparities have been identified between rural and remote residents and those living in urban settings. Several studies have shown that individuals residing in rural and remote areas have a shorter life expectancy at birth, higher rates of all-cause mortality and, in particular, more deaths from circulatory disease, accidental injury, respiratory disease and, in younger men, suicide (Romanow 2002, Pong, DesMeules and Legace 2009, DesMeules et al. 2012, Brannen et al. 2012). Rural residents also have a greater prevalence of chronic illness such as diabetes and arthritis (CIHI 2006). The more rural the area the greater the health disadvantages appear to be (DesMeules et al. 2012).

Health status is not the only difference between rural and remote residents and their urban counterparts. The type of health services accessed and the frequency of use also differ between the two groups. Rural and remote residents are less likely to have a regular family doctor and have lower physician consultation rates than those living in urban centres. Additionally, rural residents use emergency departments more often for ambulatory care sensitive conditions and have a higher relative risk of being hospitalized (Shan, Gunraj and Hux 2003, Pong et al. 2011, CIHI 2012a). Differences in service utilization, like the differences in health status, increase with greater rurality (Pong et al. 2011).

1.4.2 Geographic and health human resource factors that contribute to health care disparities in rural and remote communities

It would be logical to assume that the intent of the right to ‘reasonable access’ codified in the CHA was not only to ensure the ability to receive insured health care

services, but also to ensure reasonable physical proximity of that care to consumers. Canada spans 9,984,670 square kilometers (including inland water), second only to Russia in area, and has a population of approximately 34.5 million people with a mean population density of 3.5 people per square kilometer (CIA 2013). Table 1.1 provides population density information for the eight countries with the largest land area. This large geography and low population density have implications for the health of residents in rural and remote areas, and results in a number of challenges for governments and providers of health care. Table 1.2 provides national, provincial and territorial population counts, and population density to demonstrate the variation of population density between Canadian provinces, while Figure 1.1 illustrates how some provinces and territories may experience greater challenges due to the fact that a greater proportion of their population lives in rural areas. In 2005, 21 percent of the Canadian population lived in a rural area, but were served by only 16 percent of family physicians and a mere two percent of specialists (Society of Rural Physicians of Canada 2012).

Table 1.1: Population density and percentage of population living in rural areas for the eight largest countries determined by area in square kilometers (km)

Country	Population Density (per km^2)	% of Population Living in Rural Areas	Area (km^2)	Total Population
Australia	2.88	11	7,741,220	22,262,501
Canada	3.46	19	9,984,670	34,568,211
Kazakhstan	6.51	41	2,724,900	17,736,896
Russia	8.33	27	17,098,242	142,500,482
Argentina	15.33	8	2,780,400	42,610,981
Sudan	18.72	60	1,861,484	34,847,910
Brazil	23.61	13	8,514,877	201,009,622
United States of America	32.23	18	9,826,675	316,668,567

Source: Adapted from CIA 2013.

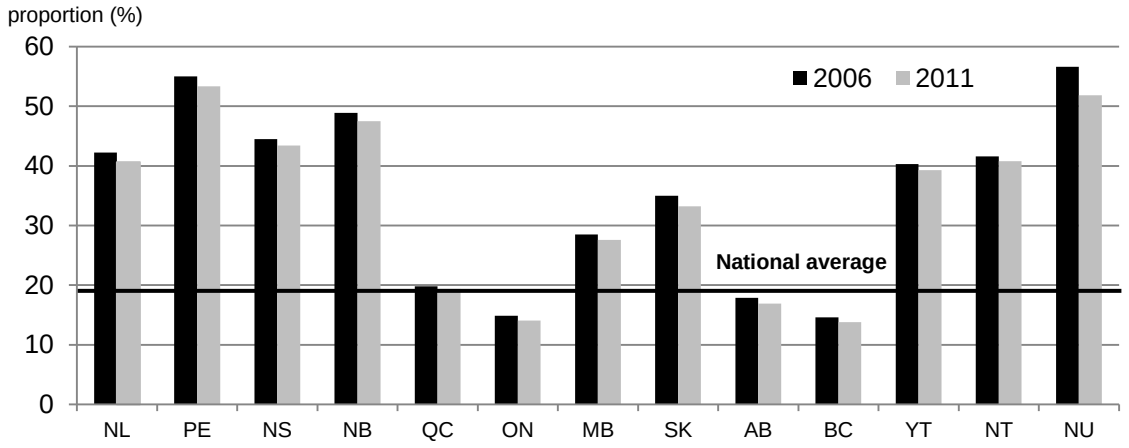
Note: Percentage of the population living in rural areas was defined as the percentage of the total population not living in urban areas as defined by the submitting country

Table 1.2: Population, and population density per square kilometer for Canada, provinces and territories, 2011 census		
	Population	Population density per km^2
Canada	33,476,688	3.7
British Columbia*	4,400,057	4.8
Alberta*	3,645,257	5.7
Saskatchewan*	1,033,381	1.8
Manitoba*	1,208,268	2.2
Ontario*	12,851,821	14.1
Quebec*	7,903,001	5.8
New Brunswick	751,171	10.5
Nova Scotia	921,727	17.4
Prince Edward Island	140,204	24.7
Newfoundland and Labrador	514,536	1.4
Yukon	33,897	0.1
Northwest Territories	41,462	0.0
Nunavut	31,906	0.0

Source: Statistics Canada 2012

Note: * excludes census data for one or more incompletely enumerated Indian reserves or Indian settlements

Figure 1.1: Proportion of the population living in rural areas, provinces and territories, 2006 and 2011

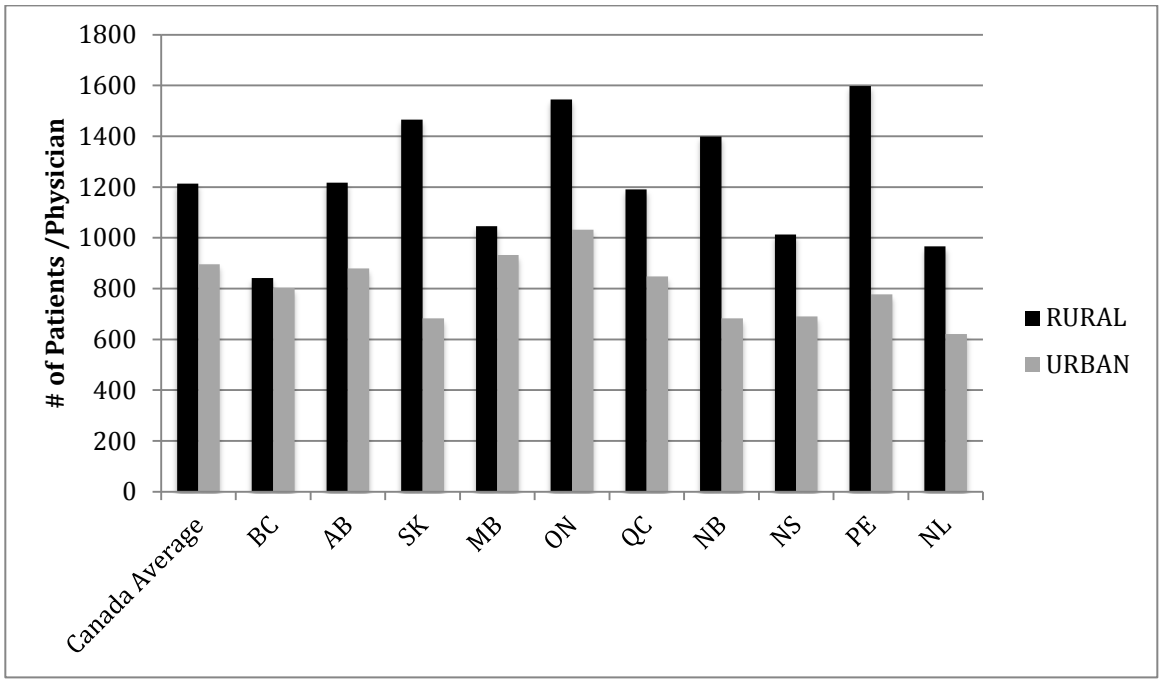


Source: Statistics Canada 2012

Note: Although the proportion of the population residing in rural communities may seem small in some provinces (i.e. Ontario), caution should be taken in making direct comparisons between the provinces as the actual number of residents living in rural communities may actually be quite large (Romanow 2002).

In higher-income OECD countries such as Canada, health care delivery is physician-centred, and although there has been movement to adopt other provider models, physicians are still required to supervise the provision of care. Physician services have always been less accessible in rural and remote areas, which is not surprising when one considers the needs of rural and remote communities and the needs and choices of physicians. There are a number of reasons why so many physicians avoid practice in rural or remote communities. Some communities are too small to support a family physician, let alone a group practice or specialty care, given the dominant fee-for-service remuneration model in Canada. Moreover, most medical students come from urban centres, and receive education and complete residencies in urban institutions that provide more opportunity to practice, network and access a wealth of treatment and diagnostic resources. Small town family physicians have larger practices, are often required to work longer hours, provide more on-call coverage, and struggle more with achieving a work-life balance than their urban counterparts. Figure 1.2 demonstrates the difference in practice size between rural and urban general practitioners (GPs). The reality is that personal factors rank at or near the top when physicians are deciding where to practice, and policy makers cannot transplant the attributes that make urban settings attractive to physicians to small towns (Barer and Stoddart 1999).

Figure 1.2: Patient to physician ratio between rural and urban areas by province in 2005



Source: Society of Rural Physicians of Canada 2012

Note: Data was not available for the Yukon, Northwest Territories, and Nunavut.

Professional practice considerations also weigh heavily when determining practice location. Remote practitioners often find it difficult to find colleagues who can provide relief for vacations and professional development. As a result, physicians in these settings often suffer exhaustion and pursue practices in less demanding locations. Additionally, physicians often experience a lack of professional support – the ability to consult with colleagues regarding difficult cases or participate in continuing medical education activities. Given the shortage of physicians in Canada, there are always urban alternatives. Even if the Canadian market became saturated with primary care physicians, graduates would always have the ability to practice in an urban setting simply by deciding to practice in another country (Barer and Stoddart 1999).

Managing health human resources in rural and remote communities continues to be a challenge for provincial governments. Governments continue to provide financial incentives to physicians to commit to rural and remote communities for set periods of time, in the hope that clinicians will form attachments to the community and stay even after they complete their contractual commitment. Unfortunately, this strategy is rarely successful (Barer and Stoddart 1999).

Although physicians are positioned at the top of the hierarchy among health professionals providing medical services in rural areas, there are other health disciplines that can play an important role. Unfortunately, there is little information or research available on other health professionals working in rural and remote communities. In 2000, there were approximately 41,500 registered nurses (RNs) working in rural areas of Canada, representing 18 percent of all employed RNs. Historically, the nurse-to-population ratio in rural areas of Canada has been lower than the ratio in urban centres

and has tended to decrease as one moves from east to west across the country (CIHI 2002).

There are also substantive differences between the "average" nurse working in a rural and remote community compared to the "typical" urban nurse. Nurses in rural areas are less likely to have completed a bachelor's degree, and be employed full time (CIHI 2002). In recent years provincial governments have encouraged local health integration networks (LHINs)[3] and regional health authorities (RHAs)[4] to employ nurse practitioners (NPs) as a means of mitigating the doctor shortages in underserviced areas. Nurse practitioners are RNs with additional education that allows them to assume some of the responsibilities of a GP such as health assessment, diagnosis and management of illnesses and injuries, ordering and interpretation of certain diagnostic tests, and prescription of a limited range of medications. In 2004 there were 878 NPs licensed in Canada (CIHI 2005), however there is no information on how many of these NPs work in rural areas.

Aside from physicians and nurses, physiotherapists are the only group of health professionals for which national and provincial geographical practice location could be obtained. Over a five-year period spanning 2007 through 2011, 88.9 to 90.2 percent of physiotherapists (PTs) in Canada, were located in urban communities, although the 2011 survey showed variation among the provinces (CIHI 2012b). Table 1.3 demonstrates the percentage of PTs practicing in urban versus rural and remote regions of Canada from 2007 to 2011. Table 1.4 exhibits the percentage of PTs practicing in rural and remote regions in the various provinces and territories in 2011. Attracting and retaining health

[3] LHINs plan, integrate and fund local health services. Ontario is the only province that has implemented LHINs

[4] RHAs are the governing bodies designated to provide health services in specific geographical locations.

human resources in rural and remote communities, whether it is physicians, nurses, or other health disciplines, is a difficult proposition. Predominantly rural RHAs are not just competing with larger urban centres, but are also challenged by migration of health providers between provinces (Romanow 2002, Pitblado 2012). The ability of providers to move to more attractive practice locations in provinces or regions with the ability to pay higher salaries contributes to disparities in the health status of individuals who reside in rural and remote areas.

Table 1.3: Percentage of physiotherapists in urban, rural and remote regions of Canada, 2007 to 2011

	2007	2008	2009	2010	2011
Urban	89.9	89.5	90.2	88.6	89.2
Rural	4	4.2	4.1	4.0	4.1
Remote	3.7	3.6	3.4	4.1	3.9
Undetermined	2.4	2.6	2.3	3.3	2.7

Source: Adapted from CIHI 2012b

Note: Data for Nova Scotia was not available for years 2007, 2008, 2009, and for Yukon 2008

Table 1.4: Percentage of physiotherapists in urban and rural/remote regions by province or territory of registration, 2011

	Urban	Rural/ Remote	Undetermined
BC	87.1	7.2	5.6
AB	85.9	8.4	5.5
SK	83.1	9.5	6.9
MB	85.6	12.0	2.1
ON	92.8	5.1	1.9
QC	91.7	8.0	0.3
NB	76.0	23.7	0.2
NS	76.7	22.4	0.9
PE	90.3	9.7	0
NL	84.1	12.7	3.2
YU	100	0	0

Source: Adapted from CIHI 2012b.

Note: Data is not available for the Northwest Territories and Nunavut as there is no licensing authority in these jurisdictions

1.5 Problem definition

Physical accessibility of health care in rural and remote areas has long been a challenge. This problem worsened in the 1990s when provincial governments were forced to make significant cuts to health care spending in order to reduce long-accumulated provincial debt. These funding cuts led to closures of hospitals, centralization of services, and a lack of investment in new technology (James 1999). As a result there was greater difficulty attracting and retaining health practitioners, and physical accessibility became a growing problem, particularly in rural and remote communities. The Commission on the Future of Health Care in Canada, led by Roy Romanow, devoted an entire chapter of its report to rural and remote communities and found there to be an "inverse care law" whereby those in poorer health and in greater need had less services available and had greater difficulty accessing care (Romanow 2002). The report also highlighted the fact that rural and remote residents carry the burden of financing the potential high costs of seeking health services in larger urban centres, and often have little or no social support while undergoing investigations or treatments away from home. During this time period confidence in the public system was beginning to wane, and there were serious concerns voiced by the general public regarding physical accessibility and quality of care in rural and remote areas (Wilson and Rosenberg 2004).

Little has changed since the 1990s as rural and remote communities continue to experience inequitable access to health care services. A small-sample study by Wong and Regan (2009) found that many of the concerns raised over a decade earlier by residents of rural and remote communities remain. Focus groups comprised of residents of rural communities revealed the belief that access to health care is limited by the lack of local

availability, and by the cost and safety concerns associated with travel to urban centres for services that are unavailable in their communities. Seeking health services in urban centres often results in high out of pocket expenses for travel (accommodation, gas, food, parking, etc.), days away from their place of employment, and expensive child or elder care. The financial hardship incurred as a result of health-related travel may result in many residents having to choose between medical treatment and basic necessities, even before having to pay for services and therapies that may not be covered by provincial health insurance.

Additionally, those who come from remote areas often face hazardous driving conditions in the winter months. In some cases access to and from their communities is restricted during certain times of the year, making access to health services extremely difficult. Transportation mortality rates have been reported to be twice as high for rural residents compared to their urban counterparts (Neudorf et al. 2009).

Rural and remote residents experience significant redundancies in the care they receive. Even when health services are available in their communities, the services are often not taken advantage of when care is managed by specialists in urban centres who tend to refer to local health care professionals they know personally. Physicians often prefer diagnostic tests to be done at the facility associated with their practice, and as a result patients are often travelling to urban facilities for laboratory and diagnostic tests that could be or have already been performed locally. Similarly, patients are often required to see an urban physician every three months for prescription renewals for medications that do not require close monitoring or dosage changes instead of seeing a local practitioner or pharmacist.

Based on the study by Wong and Regan (2009), even when care is available in the community, it is of lesser quality than that which is provided in urban centres. The turnover of providers negatively affects the continuity of care. There is little time to develop a relationship with the provider before he or she decides to leave for a more desirable practice location. As a result, patients have little confidence in the provider's advice, feel less comfortable seeking care, and are less likely to follow the prescribed treatment plan. These issues are of particular importance for those who have chronic illnesses or co-morbidities, as they require more frequent medical care that often necessitates coordinated treatment plans. The inaccessibility of health care in underserviced areas may contribute to the poorer health of the residents in these communities and result in greater use of more expensive modes of treatment and health care services in the long run.

1.5.1 Previous policies implemented to manage access inequities

Provincial governments and RHAs have sought out a variety of policy options to address some of the disparities in health status, service provision and utilization between rural and remote areas and urban centres. Recommendations made in the early to mid-2000s included: changes to the funding models and financial incentive programs for rural practitioners; changes to medical education programs to increase exposure to rural practices; and increased use of technology to deliver health care services to those living outside urban centres (Romanow 2002, Hay, Varga-Toth and Hines 2006).

In addition to financial incentives, several unsuccessful policy options have been considered or implemented. For example, policy makers considered increasing medical school enrolment in order to saturate the market in the attempt to direct family physicians to rural communities (Fooks and Maslove 2004). Such a step, however, is very expensive

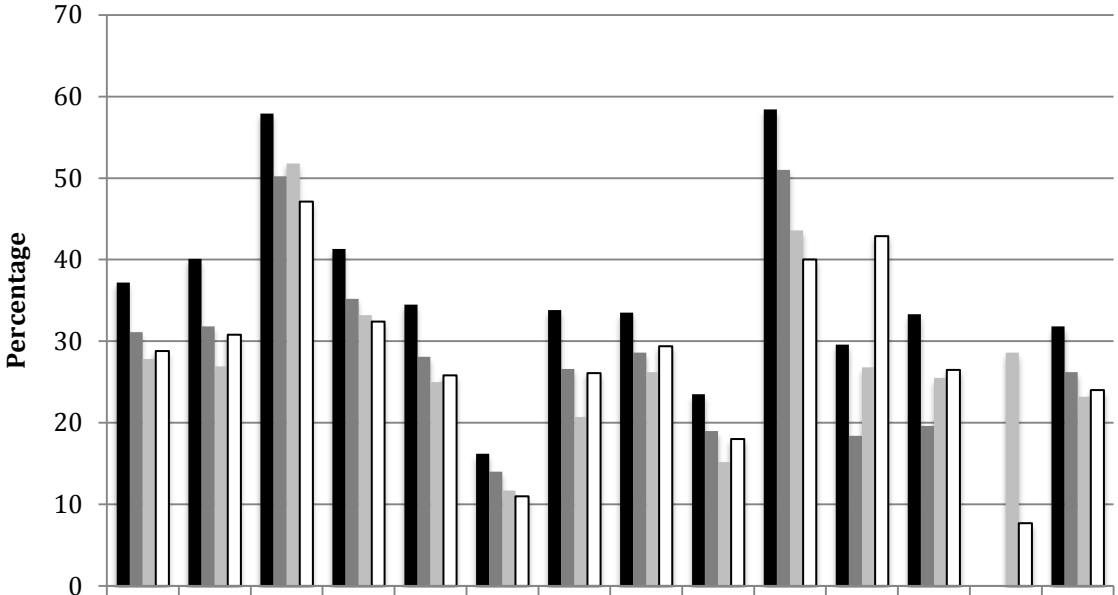
and inefficient since there is no guarantee that physicians will not seek opportunities in other jurisdictions or even other countries when urban practice opportunities are unavailable. An example of such a failure was seen in British Columbia in the late 1980s and early 1990s. At that time, the province had a surplus of family practitioners in the southwest even while rural and remote areas suffered from a lack of basic medical services (Barer and Stoddart 1999).

To reverse this trend, medical schools in British Columbia have implemented rural training sites, anticipating that graduates will be more likely to choose rural practice if they have previous experience working in a rural environment (Bilbey and Lalanie 2011). Similar logic was used when the Northern Ontario School of Medicine was launched in September 2005 jointly at Laurentian University and Lakehead University in Thunder Bay and Sudbury respectively. To date, no research has been published on the numbers of graduates who have established rural practices from either initiative.

Another approach includes limiting where newly trained physicians establish their practices by putting a geographic restriction on their billing number (Pong 2008). In this case the provider's reimbursement is restricted to certain areas – the government will only pay for services provided in a specific geographical location. Policy makers saw this as a way to funnel new graduates, and those physicians who were relocating medical practices to their jurisdictions, to underserviced areas. Unfortunately, the practice has been largely unsuccessful. As a result of several legal challenges arguing that such policies are a violation of the Canadian Charter of Rights and Freedoms, the idea for the most part has been abandoned (Barer and Stoddart 1999, Fierlbeck 2011).

In recent years, governments have relied heavily on foreign trained doctors to alleviate the strain of insufficient numbers of health professionals in rural communities (Barer and Stoddart 1999, Fierlbeck 2011). Figure 1.3 provides the percentage of international medical graduates that comprise the total physician workforce in each province and territory, as well as nationally, over three decades. Unfortunately, as foreign trained physicians obtain landed immigrant status and have restrictions on their medical licenses lifted, they too migrate to attractive urban settings, contributing to the imbalance in supply and demand between urban and rural areas (Fooks and Maslove 2004). Given the difficulty in recruiting and retaining physicians to rural and remote areas, the provinces began to employ other health professionals to perform primary care, and to incorporate information and communication technology (ICT) in health care delivery (Fooks and Maslove 2004, Fierlbeck 2011), in addition to developing programs to assists with travel when residents require specialty care in urban centres.

Figure 1.3: Percentage of total workforce that are international medical graduates, by jurisdiction, Canada, 1980, 1990, 2000, 2010



	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL	YT	NT	NU	CAN
1980	37.2	40.1	57.9	41.3	34.5	16.2	33.8	33.5	23.5	58.4	29.6	33.3		31.8
1990	31.1	31.8	50.2	35.2	28.1	14	26.6	28.6	19	51	18.4	19.6		26.2
2000	27.8	26.9	51.8	33.2	25	11.7	20.7	26.2	15.2	43.6	26.8	25.5	28.6	23.2
2010	28.8	30.8	47.1	32.4	25.8	11	26.1	29.4	18	40	42.9	26.5	7.7	24

Source: CIHI 2011

Note: Data is not available for Nunavut for 1980 and 1990.

1.5.2 Telehealth as a means of decreasing health disparities in rural and remote communities

The use of ICT via telehealth programs is seen as a way to ensure that residents of rural and remote areas of Canada have access to health services that are unavailable in their communities. Defining telehealth is difficult and akin to trying to define what is meant by 'reasonable access' to health care under the CHA. For the purpose of this thesis telehealth is defined as the use of ICT to diagnosis, treat and prevent illness at a distance.

Telehealth provides three types of services to consumers and providers of health care by:

1) Educating patients and providers through patient portals and websites, that give customized health information, and through the provision of continuing education events for health care providers;
2) Facilitating health management and administration through such applications as e-booking of appointments and e-prescribing as well as allowing administrators to respond to public health and emergency management situations; and
3) Enhancing care in rural and remote communities using remote monitoring and telemedicine for specialty care (Pappas and Car 2011).

Telehealth can use the simplest of ICT, such as POTS (plain old telephone system) or more complex technology that integrates audio-visual, store-and-forward (S&F), web portals, and data messaging systems, although the mode of communication depends on the availability of infrastructure and the ability of that mode to address the policy concern (Razibul Islam, Begum and Shawkat Ali 2009, Miller and Wood 2011, COACH 2013).

Those who promote the use of telehealth in health care delivery cite a number of potential benefits of these programs. Proponents believe that such programs can: increase access to specialist services; allow for closer monitoring of patients and more rapid intervention; reduce travel costs and time for patients and clinicians; increase patient engagement in health promotion, prevention and treatment; facilitate practitioners sharing their knowledge and expertise and encourage mentorship relationships; and allow for better management of health human resources and resource gaps (Praxia Gartner 2011).

Telehealth is not new in Canada. The first Canadian telehealth initiative occurred in 1958 when radiological images were transmitted using closed-circuit television from a Montreal hospital to the radiologist's home for interpretation. In the 1960s, satellite technology launched several pilot projects, but the projects did not survive due to the cost of technology at the time. Numerous other pilot projects continued up until the 1990s but rarely became part of regular practice due to the lack of technological infrastructure and its expense. There was one notable exception. Newfoundland's Telehealth and Education Research Authority's audio based network was one of the few initiatives that were able to sustain operation beyond the research phase because it served both educational and health sectors and did not rely on expensive infrastructure (Canadian Society of Telehealth 2007). Despite the limited success of pilot projects, all jurisdictions in Canada implemented telehealth programming to delivery of health services.

Chapter 2: Telemedicine

2.1 Background

Many of the barriers that preclude residents of rural and remote areas from accessing medical care can potentially be alleviated using telemedicine. Telemedicine is a telehealth modality primarily used by physicians to diagnosis, treat and follow patients at distance. The literature commonly uses the terms telehealth and telemedicine interchangeably, but for the purpose of this thesis telehealth is being defined as the use of ICT to diagnosis, treat and prevent illness at a distance; whereas telemedicine is a specific telehealth modality that uses audio visual technologies to deliver health care remotely.

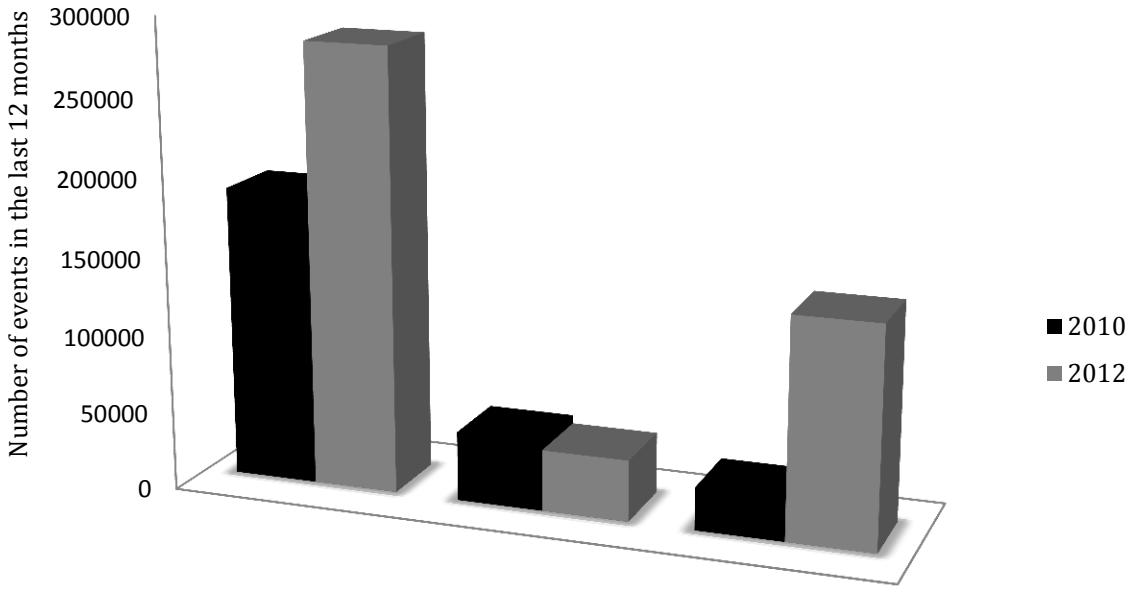
A typical telemedicine unit is comprised of peripheral devices and sensors that acquire vital signs and other biofeedback, digital camera and or video camera, computers, monitors, and communication/transmission modules that are used to send data to alternate sites (Razibul Islam, Begum and Shawkat Ali 2009). The use of these technologies allows clinicians to diagnose, treat or follow patients without the need for either the patient or the practitioner to travel from their home communities. Additionally, telemedicine can be used for peer-to-peer consultation, professional development events and to provide health education sessions for preventative care to both patients and providers. These educational sessions ensure that both patients and clinicians have access to the latest health information, procedures or treatment protocols. For residents of rural and remote areas of Canada, telemedicine increases access to medical care and health information that may otherwise not be available, and, as a result, may improve health status and health outcomes in rural and remote communities.

Telemedicine in Canada, like Medicare in general, is currently provided by or funded by each provincial government (Ho and Jarvis-Selinger 2006), although some initiatives are heavily subsidized by federal government grants and programs. The backbone of most programs is the use of videoconferencing supplemented by diagnostic peripherals (stethoscope, otoscope and exam cameras) to provide clinical consultation to patients at a distance. Additionally, videoconferencing is used for case reviews, medical rounds, and other educational events that aid in the provision of care to rural and remote areas. Store-and-forward (S & F) technology is often used for the assessment of radiology, pathology, wound care, ophthalmology, electrocardiogram, electroencephalogram, and electromyography tracings and dermatology as these clinical areas can be assessed using still photography or video and do not require physical examination of the patient. The advantage of S&F solutions is that images or video can be transmitted to specialists in urban centres and reviewed at the convenience of the consulting physician. Although not widely implemented in Canada, telemonitoring is used to manage chronic diseases such as diabetes, chronic obstructive pulmonary disease (COPD), and congestive heart failure (CHF). Clinical data, such as, blood glucose levels, and blood pressure readings, are transmitted for review and an action plan is devised by a care team and relayed back to the patient and the patient's local provider (Canadian Society of Telehealth 2007, Praxia Gartner 2011). The incorporation of electronic health records into clinical practice allows practitioners in one location to link into laboratory information systems, radiological information systems and picture archive and communications systems (PACS), among others, in other regions when providing services at a distance.

There are three applications for telemedicine: clinical, educational, and administrative. Clinical events are those in which telemedicine technologies are used by clinicians to provide consultations to patients or other clinicians for the purpose of case management whereas educational events pertain to the provision of distance education to health care professionals "as well as to patients and their families in support of care plans and health wellness" (COACH 2013, 23). Administrative events include any non-clinical or non-educational use of videoconferencing equipment for program management and public health purposes, for example provincial H1N1 planning (COACH 2013). Prior to 2004, clinical applications of telemedicine in Canada were minor in comparison to its educational and administrative role, likely due to the limitations of the available technology (Noorani and Picot 2001, Ho and Jarvis-Selinger 2006, COACH 2011). Jurisdictions where governance of telemedicine has been assumed by provincial or territorial authorities have seen telemedicine expand in both coverage and service offerings (Canadian Society of Telehealth 2007).

Over the last five years the use of telemedicine in Canada has grown at a rate of over 35% annually, and it is estimated that in the next five to ten years there could be over a million telemedicine events per year. The uptake of telemedicine has grown considerably in Canada with an estimated 187,385 clinical events taking place in 2010 (94,000 in rural areas) (Praxia Gartner 2011) and 293,023 clinical events occurring in 2012 (COACH 2013), although there is considerable variation among the provinces and territories. Figure 2.1 provides the number of telemedicine events for each application in 2010 and 2012.

Figure 2.1: Telemedicine use in Canada by application for 2010 and 2012

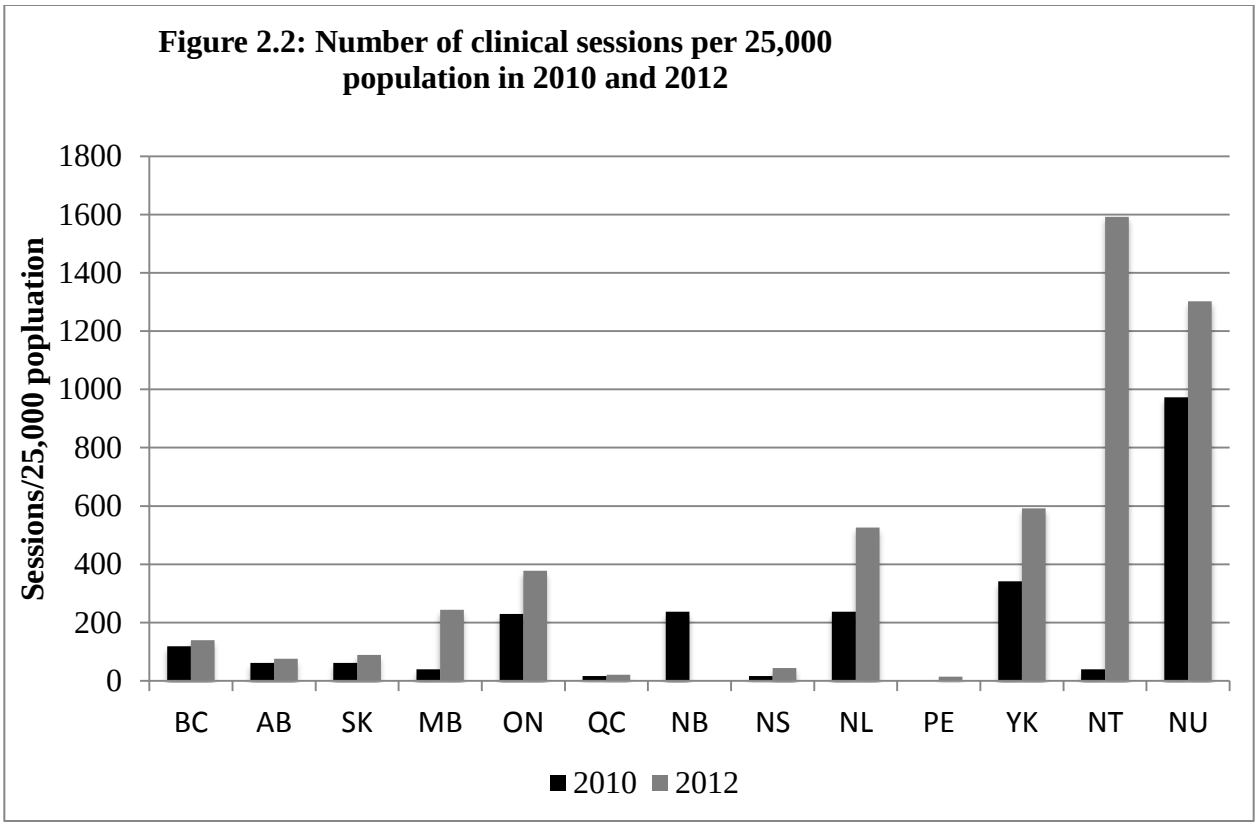


	Clinical	Educational	Administrative
2010	187385	44600	27538
2012	283023	39249	140303

Source: Praxia Gartner 2011, COACH 2013

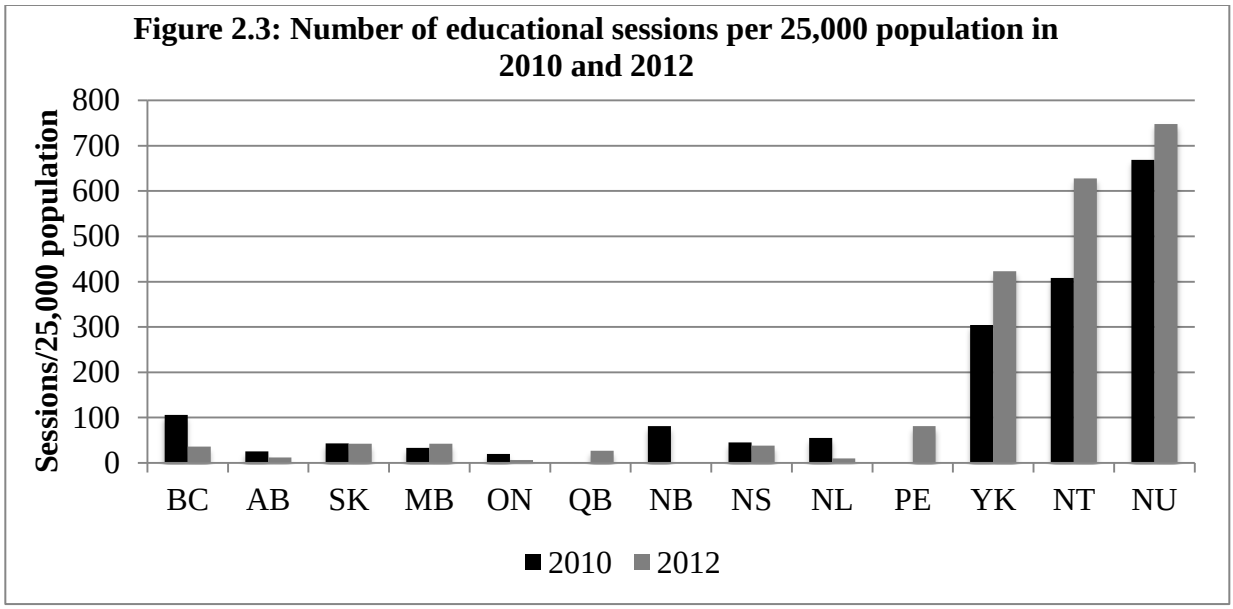
Note: 2010 data for Prince Edward Island were unavailable, 2012 data was unavailable for New Brunswick. Administrative use for 2012 may be inflated due to different definitions of administrative by the reporting jurisdictions.

A pan-Canadian survey evaluated the number of clinical and educational sessions per 25,000 population over a twelve-month period in 2010 and 2012, and showed a significant difference in usage among provinces for clinical (Figure 2.2) and educational sessions (Figure 2.3) but, in the majority of cases, usage increased from 2010 to 2012 for both clinical and educational sessions (COACH 2013). Unsurprisingly, given their remoteness, the territories are the most intensive users of telemedicine per 25,000 population. What is most interesting is that provinces like Saskatchewan, New Brunswick, and Quebec that have a greater percentage of their population living in rural areas, and thus likely have a greater need for telemedicine services, actually provide fewer clinical sessions (Table 2.1). The examples above are not explicitly isolated to rural and remote residents; however, approximately 50% of clinical telemedicine services in 2010 were delivered to residents in rural and remote areas indicating that they have seen an increase in access to care in their communities (COACH 2011, Praxia Gartner 2011).



Source: COACH 2013

Note: Data reflects the answers to the 2010 and 2012 COACH surveys. Data was not provided from Prince Edward Island for 2010 and New Brunswick did not report data for 2012.



Source: COACH 2013

Note: Data reflect the answers to the 2010 and 2012 COACH surveys. Data was not provided from Prince Edward Island for 2010 and New Brunswick did not report data for 2012.

Table 2.1: Percentage rurality in Canada by province/territory & total number of clinical sessions done in the last 12 month period per 10,000 population

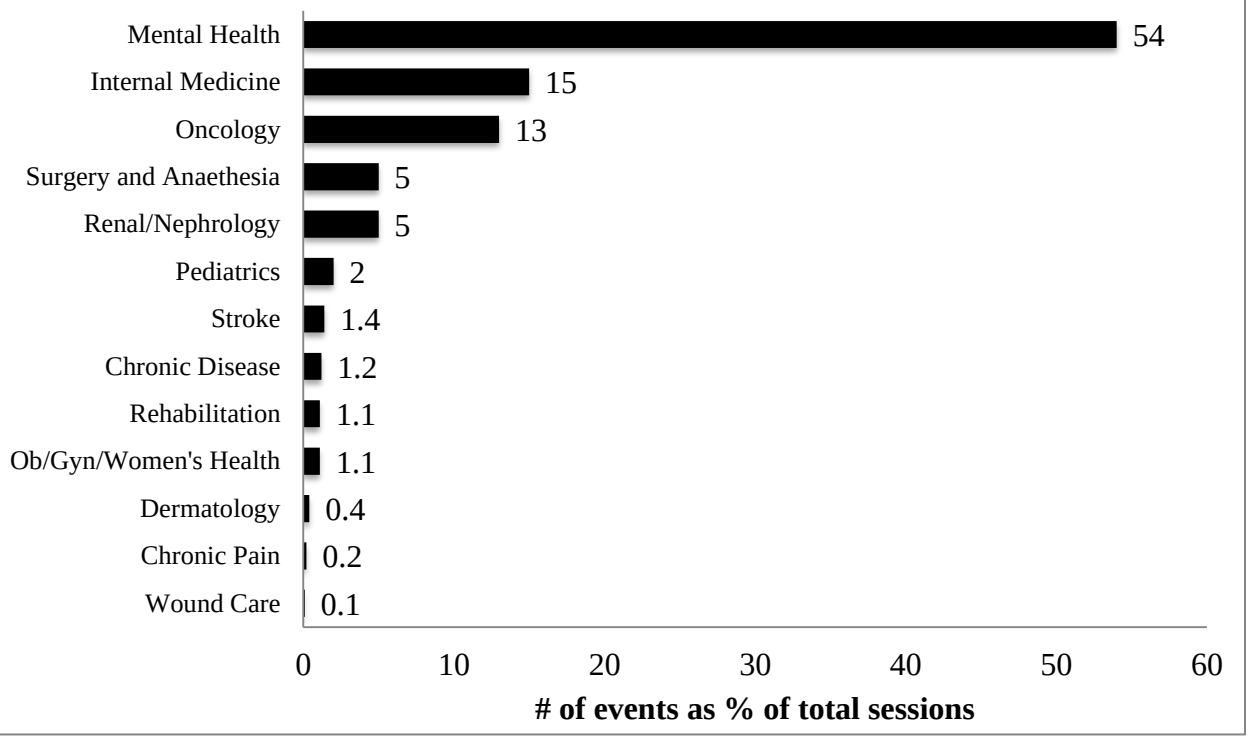
Province	% Rurality	Total # Clinical Sessions/10,000
Nunavut	100	389
Yukon	55	137
Northwest Territories	55	176
Saskatchewan	30	25
Manitoba	30	56
Nova Scotia	30	33
New Brunswick	30	18
Newfoundland and Labrador	30	167
Quebec	21	6
Alberta	24	24
British Columbia	14	48
Ontario	13	92

Source: Adapted from COACH 2011, Praxia Gartner 2011

Note: Rurality refers to a measure of how rural the province or territory is and is usually determined by calculating the percentage of a jurisdiction that resides outside CMAs and CAs as defined by Statistics Canada.
Data from Prince Edward Island was not available.

Most clinical telemedicine sessions involve video-consultation with specialty services located in urban centres. A multitude of specialist services (Appendix 2.1) are available through telemedicine, but mental health, internal medicine, and oncology services dominate usage in Canada, accounting for about 73% of clinical telemedicine sessions (Praxia Gartner 2011). Figure 2.4 provides the proportion of clinical telemedicine services by medical specialty. Ontario has the most comprehensive telemedicine program offering 68 of the 79 clinical services surveyed and accounted for 72% of the clinical sessions conducted in 2012, followed by British Columbia and Manitoba with 53 and 51 available clinical services respectively. Although residents of the territories use telemedicine more often, there are fewer clinical specialty services available. Similar findings are seen for provincial use of telemedicine for educational purposes. Currently only British Columbia, Ontario, New Brunswick, and Nova Scotia have implemented telehomecare (THC) and telemonitoring programs, although other jurisdictions are in the process of establishing similar programs for chronic disease management, most notably for CHF and diabetes. Other notable differences between the provinces include the availability of medical peripherals such as exam cameras, stethoscopes, and otoscopes for clinical consultations (COACH 2011). Table 2.2 documents the medical peripherals used by provincial and territorial telemedicine programs in Canada.

Figure 2.4: Proportion of clinical telemedicine sessions by medical specialty in 2010



Source: Praxia Gartner 2011

Abbreviations: Ob/Gyn: obstetrics and gynecology

Note: Data for Prince Edward Island were unavailable. Mental health services include: addictions, forensic mental health, general mental health services, psychiatry, psychology and psychometry. Distribution of clinical services varies among provinces/territories

Table 2.2: Medical peripherals available in Canadian jurisdictions

Jurisdiction	Exam Camera	Stethoscope	Otoscope	Ophthalmoscope	Ocular Camera	Endoscope	Home Telehealth Monitors	Other
BC	x	x	x		x	x	x	x*
AB	x	x						x**
SK	x	x						
MB	x	x	x					
ON	x	x	x		x		x	
QC	x	x	x	X	x	x	x	x ***
NB	x	x	x	X			x	
NS	x							
NL	x							
PE		x						
YT	x							
NT								
NU	x	x	x					

Source: COACH 2013

x = available

* Vancouver Island Health Authority – Spirometer; Interior Health Authority – Digital Camera; Fraser Health Authority – Blood Pressure Cuffs, Oximeters; Provincial Health Services Authority – Microscope

** High end document camera (Pharmacy), Retinal Camera (Diabetic Retinal Exam)

*** Video-conferencing equipment at home for ventilated patient: Accelerometerm Spirometer, Personal health scale, Tensiometer, Oximeter, Oral Thermometer, Glucometer, Echography

Note: medical peripherals may not be available at all telemedicine sites throughout the province or territory

The availability of information pertaining to provincial telemedicine programs varies and, as a result, comparing provincial telemedicine programs is challenging. Some jurisdictions report the number of communities served whereas others report the number of telemedicine sites or stations, with some communities having multiple sites or stations. As a result, the majority of the evidence for this thesis is derived from four pan-Canadian reports by Ho and Jarvis-Selinger (2006), Praxia Gartner (2011), COACH (2011) and COACH (2013).

The introduction of telemedicine as a mode of health service delivery occurred during the mid to late 1990s. Nova Scotia was the first province to implement a province-wide telemedicine network in 1996 followed by British Columbia and New Brunswick in 1997. By the late 1990s, several other provinces and territories began telemedicine pilot projects (CIHI 2009). More recently, Health Canada's First Nations and Inuit Health Branch have worked with First Nations to increase access to community-level health care and services using telehealth technology. Appendix 2.2 documents the expansion of the services provided by provincial telemedicine programs. The number of telemedicine systems in Canada at the end of the 2009-10 fiscal year totaled 5710 and were located in over 1100 communities, including 284 First Nations communities and 46 Inuit communities (Praxia Gartner 2011).

The majority of telemedicine programs in Canada are coordinated by the RHAs within the province; however, Ontario, Manitoba and Newfoundland and Labrador have consolidated telemedicine into a centralized, provincially coordinated program (Picot and Cradduck 2000, Ho and Jarvis-Selinger 2006, Praxia Gartner 2011), while hospitals are responsible for telemedicine applications in Prince Edward Island (COACH 2013).

Sophisticated scheduling systems are used by many jurisdictions to ensure that patients' needs are matched with the appropriate resources (i.e. equipment, health provider), with some jurisdictions operating provider registries that identify physicians and other allied health professionals who provide telemedicine services (Praxia Gartner 2011, OTN 2012a).

Physician remuneration has long been identified as a barrier to the adoption of telemedicine. A number of provincial health ministries have made changes to their fee schedules to allow for remuneration and/or to incentivize telemedicine services. Since 2008 physicians providing telemedicine services have been able to bill the Ontario Health Insurance Plan (OHIP) directly. In an attempt to provide an incentive to offer telemedicine services physicians are paid $15 to $35 more than a face-to-face consultation (Edwards 2009), although the premium only applies to the first telemedicine patient seen daily and S&F consultations are exempt (OHIP 2011). Additionally, in order to bill OHIP for telemedicine services, physicians must be registered as telemedicine providers. Physician fees in Alberta increase by an additional 20% when care is provided via telemedicine (Alberta Health 2012), and providers in Saskatchewan are provided a daily supplement when telemedicine is utilized (Saskatchewan Ministry of Health 2012a). The Yukon does provide separate billing codes for telemedicine, but it is unclear whether this remuneration replaces regular office codes or is in addition to conventional billing codes (Yukon Health and Social Services n.d.). Those physicians providing telemedicine services in British Columbia do so with no financial incentive as remuneration for services provide by telemedicine are the same as those that are provided face-to-face (BC

Minstry of Health n.d.). Unfortunately, public documentation regarding remuneration practices for the remaining provinces and territories was unavailable.

Physicians are required to be licensed by their respective College of Physicians and Surgeons in the province in which they practice medicine. However, one of the benefits of telemedicine is that it allows practitioners to provide care across provincial boundaries. The licensure requirements for physicians providing telemedicine services across jurisdictional borders vary across Canada. Licensure requirements range from no additional registration beyond the provider's home province to full registration when telemedicine practice numbers exceed a certain threshold. In most cases there is no fee associated with telemedicine licensure, but all jurisdictions require providers to be licensed by their home jurisdiction and carry appropriate malpractice insurance. Table 2.3 provides the provincial and territorial licensure requirements for the provision of telemedicine.

Table 2.3 Provincial and territorial telemedicine licensure requirements

Jurisdiction	Licensure requirements
YU	- Does not require the practitioner to be licensure in the Yukon - Practitioner must hold a current full license from the jurisdiction in which they practice - Practitioner must practice in a province that has existing medical service agreements in place with the territory (Yukon Medical Council 2012)
NL	- Maintains special registration policy whereby providers from outside the province are provided a license to provide telemedicine consultations - No licensure fee - To be registered with the College of Physicians and Surgeons providers must complete an application form, provide certificate of good standing from the jurisdiction in which they are licensed, provide proof of malpractice insurance, and a letter of reference - Telemedicine licenses are renewed annually by submitting a current certificate of good standing from the licensing body in which the provider is licensed (The College of Physicians and Surgeons of Newfoundland and Labrador 2010)
NB	- When telemedicine services are provided on occasion or on a limited basis licensure from the College of Physicians and surgeons is not required - Frequency of provision is not explicitly stated and may depend on the number of providers available within the province - To be added to the Telemedicine Provider List, physicians must be fully licensed to practice medicine by a recognized regulatory body, carry malpractice insurance, agree to comply with statutes and regulations and policies of NB, and the licensing regulatory body must be willing to assume responsibility for complaints that may arise from the provision of care (College of Physician and Surgeons of New Brunswick n.d.)

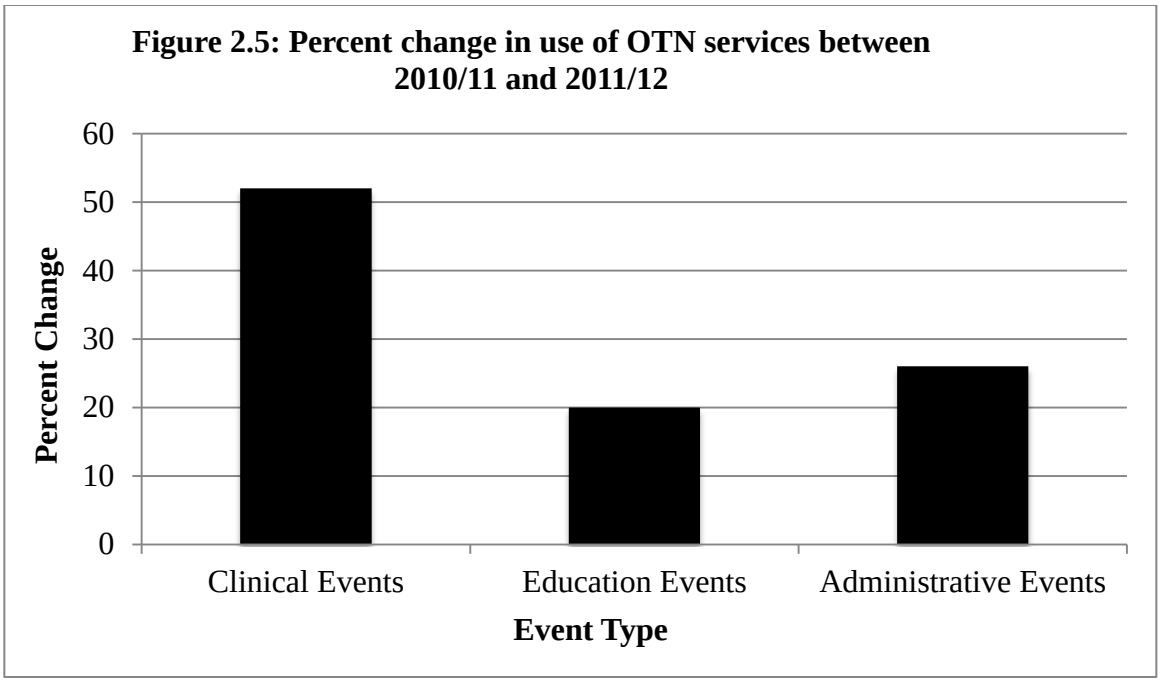
SK	- Special licensure is required to deliver medical services via telemedicine programming - Licenses are free for those who limit their telepractice to 12 patients per year, $250 per year with the restriction of 52 Saskatchewan patients per year, for those who see more than 52 patients are required to pay the full $1250 licensing fee - Additionally, providers must be fully qualified and eligible for full registration in Saskatchewan and are fully licensed (without restrictions) in the jurisdiction in which they practice and must carry malpractice insurance (The College of Physicians and Surgeons of Saskatchewan n.d.)
AB, NS, MB, and ON	- Regulatory bodies have telemedicine policies, but none address the issue of licensure of out-of-province physicians - Ontario's regulatory body is currently undertaking a review of its telemedicine policies and thus changes to its regulations may be forthcoming
BC, QC, PE, NT, and NU	- Information pertaining to the licensing regulations of telemedicine not available through publicly accessible sources

2.2 Experience and lessons learned from Canada's largest telemedicine program

The Ontario Telemedicine Network (OTN) is an incorporated, non-for-profit, and publicly funded organization that is responsible for providing telemedicine services to residents and providers of Ontario, and through contractual agreements provides selective services to other jurisdictions. The creation of the OTN allowed for central technology management and standardized training for clinicians and telemedicine coordinators ensuring that service delivery is uniform throughout the province (Edwards 2009). Currently, 170 full-time equivalents procure, provide and manage all equipment with 24 hour, 7 day a week support – an important feature because most rural sites lack the experience to manage the technology themselves. Telemedicine site coordinators are employees of the local care delivery organizations (CDO) as a way to ensure commitment of the CDOs (OTN 2012a).

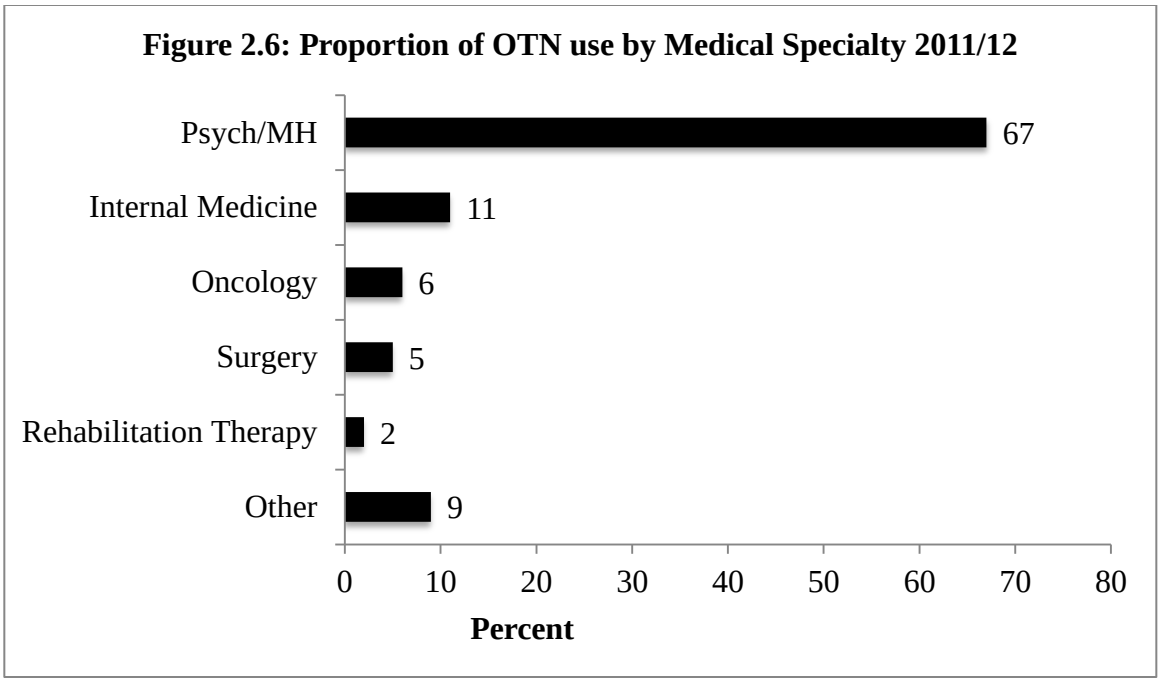
Currently, the OTN is the world's largest telemedicine program with 1147 sites, 2364 systems, and 826 members (OTN 2012a), and is responsible for almost 75% of Canada's telemedicine activity (Praxia Gartner 2011). The majority of sites are located within the community (54%), with an additional 27% located within hospitals, 14% in primary care settings, and 5% in other locations. The use of telemedicine services in Ontario continues to grow with over 3000 referring and consultant physicians using the OTN to treat patients in 2011/12, a growth of 15% in the consultant base, 11% in the physician base, and 24% in allied health consultants between the 2010/11 and 2011/12 fiscal years. Similar growth is seen in the number of events occurring in 2011/12. Over 200,000 patients received care using the OTN services, an increase of 52% from the previous year, and 13,965 educational and 16,523 administrative events occurred in

2011/12 (OTN 2012a). Figure 2.5 demonstrates the percent change in OTN use between the 2010/11 and 2011/12 fiscal years.



Source: OTN 2012a

Through partnerships with large academic centres the OTN is able to offer specialty services like trauma and burn services – care that is rarely available in rural and remote areas. Usage of telemedicine by specialty mirrors national trends, which is not surprising given the fact that Ontario leads the country in the adoption of telemedicine for health care delivery. Figure 2.6 illustrates the proportion of OTN use by medical specialties.



Source: OTN 2012a

Abbreviations: Psych: psychiatry; MH: mental health

The OTN has been successful in decreasing wait times, increasing access to services, decreasing health system costs, and improving the quality of care Ontario residents receive. Wait times for dermatology have been significantly improved using S&F technology. The teledermatology service decreased wait times simply by allowing physicians to make an electronic referral and sending a digital image for assessment. Over the 2011/12 fiscal year approximately, 1200 teledermatology consults were completed with an average response time of less than 5 days versus the 8 – 12 months wait to see a dermatologist face-to-face.

Individuals with diabetes are at risk for developing diabetic retinopathy, a condition that can lead to blindness. Currently, one-third of Ontarians with diabetes do not receive retinal screening as a result of ophthalmology services being unavailable in their communities. In response, the OTN has established an at-a-distance screening program for diabetic retinopathy encompassing six sites located throughout the province. Patients with diabetes can be referred to have digital images of their retinas taken and uploaded to a secure central server where ophthalmologists review the images and provide assessment, diagnosis, and treatment recommendations.

In addition to the direct costs of health care (e.g. fee-for-service payments and hospital payments), Ontario also incurs costs associated with travel subsidization for residents of rural and remote areas who are required to seek treatment at urban health facilities. Telemedicine consultations conducted during the 2011-12 fiscal year saved the Northern Health Travel Grant program more than $44 million, and over 208,000,000 km in patient travel was avoided (OTN 2012a). It is important to note as well the out-of-pocket expenses incurred by patients would have also been saved.

The OTN has also been instrumental in improving the quality of care stroke patients receive in their communities. Since 2002, 2433 patients have received care through the Ontario Telestroke Program and of those, 741 patients received the protein tissue plasminogen activator, or tPA. When administered to patients having a stroke within the first three hours, tPA can significantly decrease the severity of impairments experienced by many stroke patients. As a result, many stroke patients have improved quality of life and require less physiotherapy, homecare, and long-term care. The avoidance of more intensive rehabilitation also results in savings to the system and to patients and their families.

The recent implementation of telehomecare (THC) by the OTN has had a dramatic effect on health service utilization. Phase one of the OTN's Telehomecare Program saw a 70% reduction in ED visits and a 60% reduction in hospitalization rates. These reductions have significant cost savings to the system as well as the improved quality of life of those with chronic illnesses and as a result THC is currently being expanded.

The Ontario Ministry of Health and Long-Term Care (OMHLTC) considers chronic disease prevention and management to be a top health priority. Telehomecare is a strategy that employs remote monitoring and patient education to manage chronic disease in the hopes of reducing their impact on the health system and improving the quality of life of those using THC. The OMHLTC developed the Ontario Telehomecare Strategy in 2006 to support the deployment, sustainability and growth of THC services to residents of Ontario. Patients with CHF or COPD and associated comorbidities are eligible for THC. Telehomecare nurses in partnership with primary health teams and other health care professionals (i.e. specialists) develop a care plan for each individual patient.

Patients continue to be followed by their care teams but are monitored daily by THC nurses in between scheduled visits. THC nurses provide regular updates that allow care teams to intervene before the patient is in crisis and requires more intensive care. In addition to remote monitoring, THC nurses also provide health coaching to help patients increase their self-awareness, decision-making, and planning skills to support behavioural change so that patients are more aware of the signs and symptoms that they should seek care for in order to avoid hospitalization. Health coaching helps patients develop a customized self-management strategy that is in accordance with their attitudes, beliefs, cultures, and preferences, which increases the likelihood that patients will change their behavior (PWC 2009, OTN n.d.).

Telehomecare was implemented in phases in Ontario. Phase one consisted of 617 patients from eight different family health teams around the province who suffered from COPD or CHF who, when surveyed after using THC services, reported greater knowledge, confidence, willingness, and ability to self-manage their condition and saw an improvement in their quality of life (PWC 2009). By 2011-12, the THC pilot expanded province wide, supporting 2300 patients with COPD, CHF, and other associated comorbidities, and the program will eventually enroll up to 40,000 patients with complex chronic diseases by 2015 (OTN 2012b). Given the rates of chronic disease in rural and remote areas that was discussed in Chapter 1, the use of remote monitoring, similar to that which is being employed in Ontario, may result in better health outcomes for rural and remote residents across Canada.

The success of telemedicine in Ontario can be attributed to the willingness of providers and patients to use the OTN, a direct result of the efforts undertaken by the

OTN to change the way stakeholders view health care delivery. Satisfaction surveys of both referring and consulting clinicians showed clinicians are highly satisfied with OTN services and over 90% would recommend videoconferencing to their colleagues for patient consultation. Although provider satisfaction is high, referring clinicians often point to a lack of awareness among their colleagues as a major constraint on the use of telemedicine. Consulting clinicians, for example, find the process for scheduling appointments to be problematic. Patient satisfaction has also been shown to be very high with 94 percent of patients recommending telemedicine to their family and friends (Edwards 2009).

From their experience, the OTN has several recommendations that government agencies establishing telemedicine services should consider, including having both urban and rural providers involved in the development of telemedicine programs. Additionally, telemedicine facilities need to coordinate telemedicine services to ensure that provider workflow experiences minimal disruption and referral patterns are maintained. The OTN also suggests establishing membership fees or shared funding to ensure commitment from providers, and health facilities offering telemedicine services, and recommends that technology management and training is centrally administered for providers and support personnel to ensure telemedicine standards are uniform throughout the province. Lastly, the provision of a wide range of services and specialties is imperative to ensure continued usage and support of telemedicine applications (Edwards 2009).

2.3 How telemedicine fits into the Triple Aim

2.3.1 Telemedicine's ability to improve population health

To date telemedicine has played a limited role in improving population health. Administrators' and educators' use of telemedicine is likely to have the largest impact on

population health in rural and remote communities as well as in urban settings. Telemedicine programs played an important role during the SARS outbreak in 2003 and then again during the threatened H1N1 pandemic in 2009. Administrators and clinicians used web-casting and mass videoconferencing to coordinate care and educate health professionals as well as connect separated family members during the health crisis (Praxia Gartner 2011). Unfortunately, no research has been conducted to assess the effect telemedicine has had on the health status of rural communities served by telemedicine.

2.3.2 Improving the rural and remote patient's experience through the use of telemedicine

Telemedicine has also been shown to improve efficiency in health service delivery. Patients that are provided health services through telemedicine are able to participate in clinical and educational programs in their communities, and in some cases in the comfort of their home, that would otherwise be unavailable in their community. New Brunswick's telemedicine program allowed satellite kidney dialysis clinics to be set up eliminating patient and physician travel – significant given the fact that dialysis has to be performed several times a week (Canadian Society of Telehealth 2007). For illnesses or conditions that can be assessed using S&F technology, like many dermatology and ophthalmology conditions, wait times can be significantly decreased, from 2 to10 days versus 7.1 weeks for the former and 2 days versus 25 days for the latter (Praxia Gartner 2011). Lastly, for many rural and remote patients, follow up visits to monitor chronic diseases can be difficult due to travel constraints and may often result in fewer follow up visits that result in poorer outcomes. Telemedicine programs, such as remote monitoring, allows clinical information to be collected and transmitted to care teams in urban centres, where an assessment is made as to whether a change in treatment plan is required.

Patients and their care teams can respond quickly to changes in symptoms because patients do not have to wait until the next scheduled appointment before taking action.

2.3.3 Cost savings associated with telemedicine programs

The use of telemedicine to provide medical services to rural and remote areas of Canada has resulted in considerable savings to the health care system in two ways. The first source of cost savings is through the reduction in the utilization of hospital care through telemedicine initiatives. The expansion of telemedicine in Nunavut reduced the transfer of patients to health facilities in neighboring provinces, resulting in a savings of over $1.6 million. Other jurisdictions have also incurred savings as a result of using telemedicine. Alberta saw a 38% reduction in transfers to tertiary centres as a result of telemedicine being used to treat stoke patients, resulting in a savings of approximately $390,000. Nova Scotia saw a decrease in ED visits and readmissions for CHF after the implementation of THC. In New Brunswick, the adoption of telemonitoring allowed patients to be discharged from hospital sooner, resulting in a decreased risk of hospital acquired infections and cost savings (Canadian Society of Telehealth 2007, Praxia Gartner 2011).

The second source of cost savings includes telemedicine's capacity to provide preventative care at a distance. The introduction of THC and telemonitoring programs has resulted in a decrease in complications as a result of delayed treatment of chronic conditions, resulting in fewer emergency visits and admissions to hospital. A study of patients suffering from chronic diseases and receiving care via THC programs in Ontario, Quebec, New Brunswick, and British Columbia showed a decreased use of EDs resulting in an estimated $915,000 in ED visit costs and $20 million in in-patient costs over the trial period (Praxia Gartner 2011). Telemedicine allows for the closer monitoring of

patients and earlier intervention before catastrophic events occurred, resulting in better care and cost savings.

2.4 Barriers to the adoption of telemedicine in Canada

Barriers to telemedicine identified in the literature tend to be based on preliminary results, pilot projects, opinions and speculation rather than definitive evidence obtained through more systematic and comprehensive analyses. Part of policy development includes the process of identifying what may inhibit the interventions decision makers implement to solve a particular problem. As such, it is important to re-evaluate what barriers may be encountered if telemedicine is to be expanded and ask whether the issues that were of concern in the early 2000s are still relevant today. Additionally, it is important to ask whether changes in technology and culture have raised new challenges for the adoption of telemedicine as a mainstream delivery model for health services.

Barriers to telemedicine like privacy, licensure and liability concerns are intertwined with legal requirements that create uncertainty for telemedicine providers, as legislation was written for the traditional care provision. Much is said about provider liability when delivering telemedicine services, but the perceived risk is disproportionate to the actual number of medical negligence cases brought forward for disciplinary action. The telemedicine service delivery model is mature and has faced very few medical legal challenges (Donahue 2005-06, Ceresia 2012). The Canadian Medical Protection Association has only had one complaint pertaining to telemedicine. In this case, the complainant was a non-telemedicine patient who felt that it was unfair that telemedicine patients had shorter waits to see a physician specialist than those who lived in the same community as the physician (Ceresia 2012). Although, risk of liability is low it is still an

issue, but one that can be managed through educating providers on how to practice telemedicine in a manner that protects them and the patients for whom they provide care.

Whether health services are provided face-to-face or through electronic means, providers are legally required to protect the privacy of their patients (Donahue 2005-06). Providers often cite privacy concerns as the reason for not using telemedicine to deliver care. However, telemedicine programs use encryption technology and secure networks to provide services. As a result the risk of improper disclosure of health information is no higher in a telemedicine setting than it is in a face-to-face setting. Privacy becomes an issue when providers and patients communicate using non-telemedicine provided modes such as email and online video chat programs (Ceresia 2012). Increasingly, managers of telemedicine programs find it challenging to persuade providers to use secure telemedicine networks, rather than services like Skype (Ashworth 2012). Providers use less secure modes of communication because they do not require the provider to leave their office to provide telemedicine services. Given the increasing capacity of personal computers, it is reasonable to assume that telemedicine in the future will allow providers to deliver telemedicine services using their office computers to connect telemedicine networks. As telemedicine continues to expand to include mobile technology there may be a greater concern over privacy as health information will be stored on devices like smart phones, which often do not operate on secure networks. Mobile health applications require disclaimers indicating that the mobile application is not secure and the protection of health information is not guaranteed. Policies related to privacy will require ongoing review to adapt to the ever-changing technology.

The issue of licensure is only an issue if consultations are to occur between jurisdictions, as provincial regulatory bodies license physicians. As noted earlier, some jurisdictions require physicians providing telemedicine services across provincial borders to be licensed in the province in which the patient is residing – sometimes at the full licensure rate. This requirement is prohibitive because most physicians will not incur the cost of dual licensure for the number of consultations they are likely to perform each year – it is simply not to their benefit. There have been several suggestions as to how to eliminate the licensure barrier. The first is to establish a national licensing system for telemedicine; the second is for provincial regulatory bodies to create a special license limiting the out-of-province providers' practice to telemedicine; and the third is reciprocity, whereby licenses from one province are valid in another when providing care via telemedicine (Donahue 2005-06). Given the overwhelming support of governments to the expansion of telemedicine services and the lack of movement on this issue from the regulatory bodies, in particular the provincial colleges of physicians and surgeons, government intervention may be required to accelerate the process of inter-jurisdictional licensure for telemedicine services.

2.5 Telemedicine's impact on the delivery of health care in rural and remote communities.

Telemedicine continues to be embraced by provincial and territorial governments as a tool to improve access to health services to residents in rural and remote areas of Canada. Although, telemedicine use has grown, its impact has been small as it has yet to become the standard of care in the provision of health services to rural and remote residents. Additionally, there is significant variation in telemedicine use across the country, with Ontario accounting for almost three-quarters of the number of clinical

events conducted in Canada in 2012 (COACH 2013). The variation in use among provinces may be in part a result of differing remuneration practices and provincial licensure requirements as well as the difference in governance structures of provincial telemedicine programs (provincial versus RHA-run programs). Because few systematic reviews of telemedicine programs have been completed, determining the cause of the variation in telemedicine use remains speculative. As mentioned, licensure and reimbursement policies have been identified as barriers to the adoption of telemedicine as have privacy and provider liability; had greater change management strategies on the part of governments at the time of telemedicine implementation occurred, many concerns of providers may have been alleviated. Despite the limited use of telemedicine, gains have been made in improving access to health services to rural and remote communities, and improvements in health outcomes and status have been demonstrated through programs for specific illnesses. Greater benefits are likely to be incurred as telemedicine is integrated into routine practice workflows.

Chapter 3: Health Help Lines

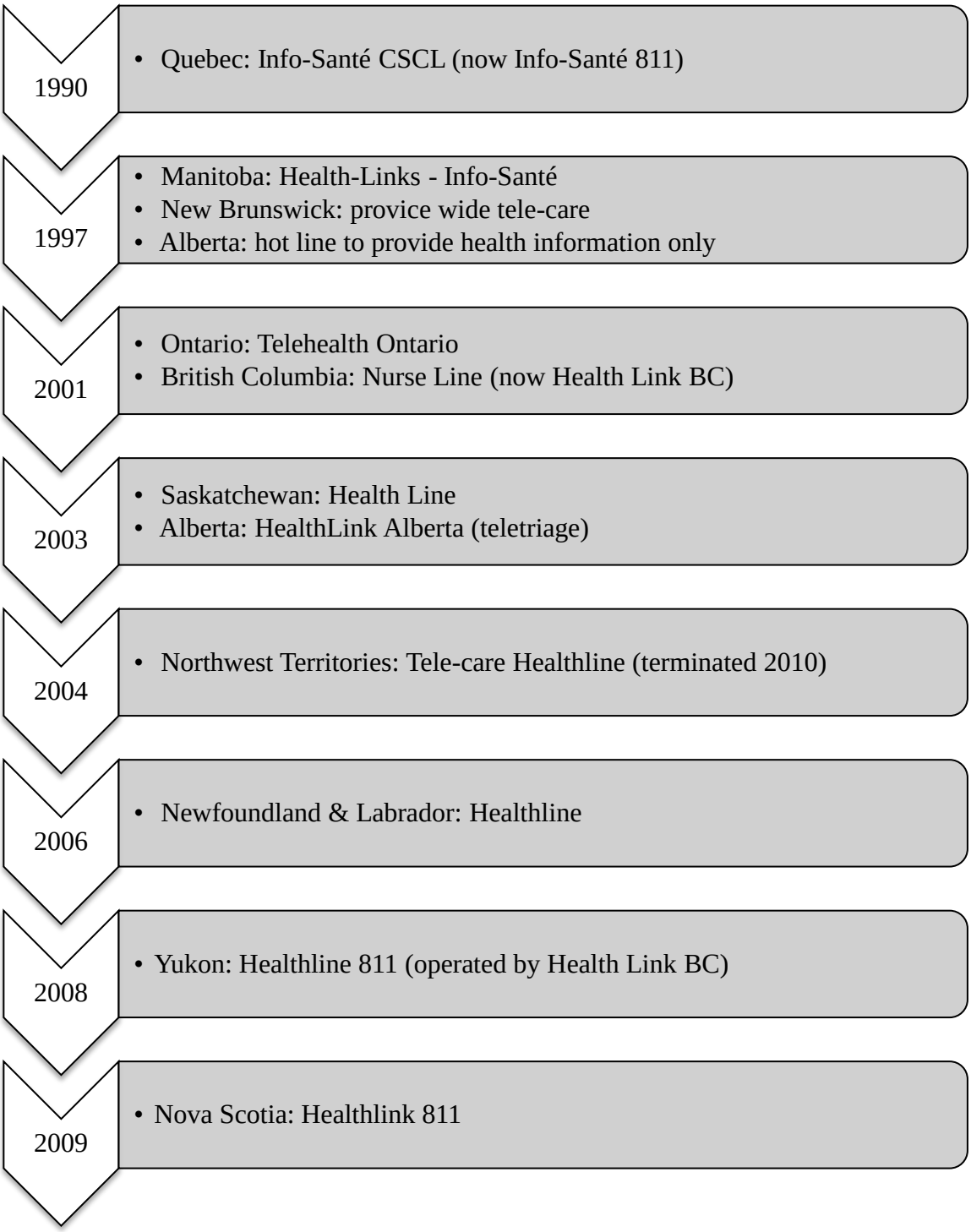
3.1 Background

Rural and remote areas of Canada continue to be underserved with regard to physician services, and thus individuals residing in these areas often have to travel significant distances to obtain medical advice or information tailored to their particular needs. As noted in chapter one, the time required and costs associated with travel often result in individuals not seeking medical help until such time as they are experiencing a major health crisis. At the other end of the spectrum, some rural and remote residents seek health advice in the EDs of smaller rural hospitals because their family physician is away from their offices, as rural physicians are often responsible for emergency services in addition to providing primary care. In response to the health human resources shortages, provincial health help lines (HHL), also known as teletriage, health lines, or telehealth, were first established in the 1990s in an attempt to meet the unmet need for health information and, when appropriate, provide self-care instruction, using nurses and other allied health professionals in place of physicians.

Health help lines serve two main purposes: teletriage and provision of health information, although some jurisdictions have expanded these mandates to include other services. Telephone triage was originally used by pediatricians in the United States to handle the high volume of after-hours calls (Poole et al. 1993), but over the last two decades this type of service has expanded beyond pediatric triage into primary health care delivery around the world, including Canada. Health help lines are seen as an important tool in the delivery of primary health care and health promotion and are used in the United States, Australia, New Zealand, the United Kingdom, South Africa, Scandinavia, France, Portugal, and Singapore (HRMC 2006).

All jurisdictions in Canada, with the exception of the Northwest Territories, Nunavut, and Prince Edward Island, have HHL programs. Figure 3.1 shows the time-line for implementation of HHL across Canada. Health help lines in Canada are most often staffed by RNs who provide telephone triage and health information using protocols from a computer decision support tool to callers 24 hours a day, seven days a week. The nurse answering the call at the HHL enters the information obtained from the caller into the decision support tool. The decision support tool is an algorithm used to determine the appropriate triage disposition or advice. The computer protocols are tailored to meet provincial clinical guidelines and standards of care, i.e. what symptoms must be present and for what period of time to warrant triage to the ED (Moore et al. 2005). The goal of these provincial/territorial programs is similar in that they aim to improve access to timely and accurate health information and advice (which includes helping callers navigate the health system and overcome barriers that exist within it), avoid inappropriate use of health services by directing callers to appropriate sources of care, reinforce self-care where appropriate, and decrease ED use for non-urgent care (Robinson 1998, Saskatchewan Health 2002, CCOHTA 2004, QUILTS 2006, Government of Newfoundland and Labrador 2006, HRMC 2006, Government of Ontario 2009, Alberta Health Services 2011, Gouverment du Québec 2011, Province of Nova Scotia 2009).

Figure 3.1: Time-line for implementation of health help lines in Canada



Source: CIHI 2009

3.1.1 Potential benefits of health help lines in rural and remote areas of Canada

Although data does not exist for HHL that explicitly pertains to residents of rural and remote areas of Canada, HHL show considerable promise in the delivery of care to rural and remote areas. Rural and remote residents gain access to after-hours medical advice, and are often able to avoid unnecessary trips to their family physician or ED by receiving advice that allows them to tend to their health concern at home. Although most research evaluates the teletriage component of HHL, information can be extrapolated and applied to the health information and advice provided to callers. HHL have high satisfaction rates among users and provide accurate and reliable health information that can be utilized by those individuals who merely have health related questions, such as, "I cannot remember when I'm supposed to use which inhaler?" Rural and remote residents can access HHL to receive information on how to better manage their health, obtain test results (in jurisdictions with established electronic health records), ask questions about medications they are taking, and determine whether they should be seen by their health care provider should unforeseen symptoms or complications arise.

3.1.2 Effects of HHL on utilization of health services in Canada

To date, decision makers in Canada have made the assumption that callers to HHL adhere to the professional advice they receive. Unfortunately, limited research is available on the effect HHL have on the utilization of health services in Canada, and no reviews have been conducted specifically addressing their impact in rural and remote communities. Although research pertaining to the effect HHL have on health services utilization is scarce, a small collection of analyses has been identified that show that HHL can potentially affect ED use. In a review of Quebec's Info-Santé, 69% of callers were given advice that downgraded the level of medical service they required. The assumption

was made that if callers adhered to the advice they were given 29 percent to 34 percent of callers would have been diverted from using the ED (Department of Health and Social Services 1999). Unfortunately, administrative data was not used to verify whether callers complied with the advice that was given, and as a result no conclusion can be drawn concerning compliance.

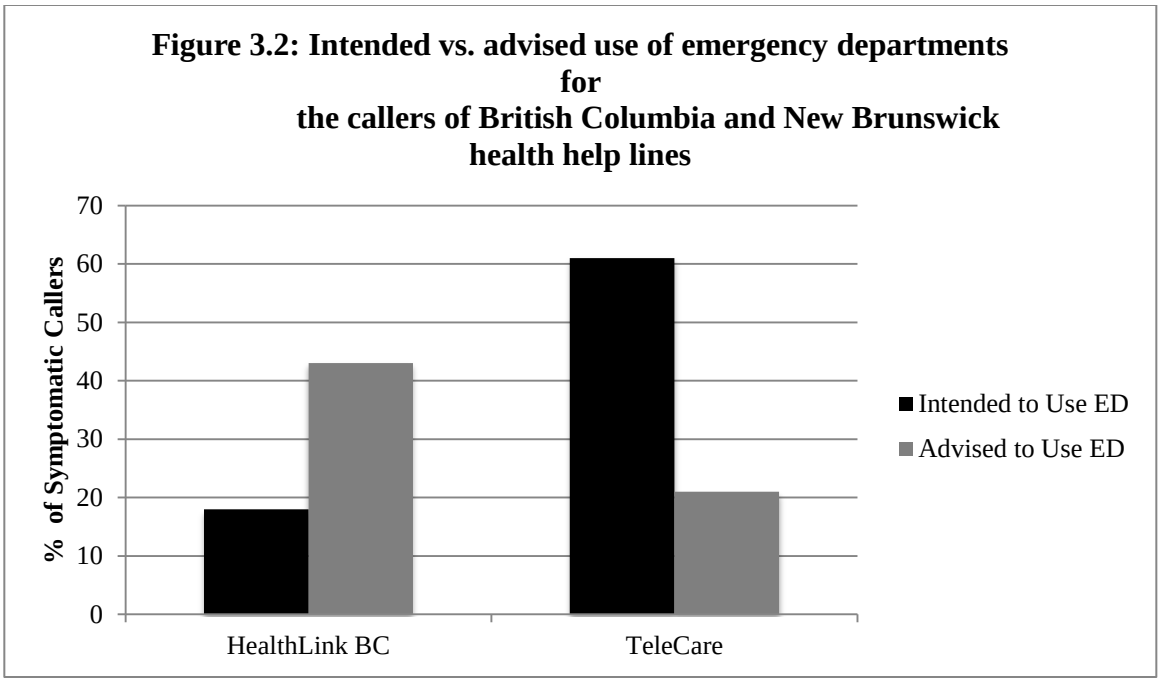
Several HHL pilot studies have assessed the potential of HHL to impact health service utilization with promising results. A review of New Brunswick's pilot Tele-care program demonstrated a decrease in ED use for non-urgent care following the implementation of its HHL, only the rate of change was lower than the forecasted decrease calculated prior to Tele-care. The fact was that ED use for non-urgent care in New Brunswick had been decreasing prior to the implementation of the HHL. Projections of ED use for non-urgent care, based on previous rates of change, estimated approximately 9000 more non-urgent ED visits occurred than would have been expected had the HHL not been put into operation (Robinson 1998). Table 3.1 provides the number of ED visits pre- and post-implementation of New Brunswick's HHL, as well as the expected use (based on projected forecasts) had the HHL not been implemented.

Table 3.1: Non-urgent emergency department visits pre- and post-TeleCare in New Brunswick				
	1993	**1994**	**1995**	**1996**
Non-Urgent ED visits	126,967	113,618	109,505	106,451
Projected Non-Urgent visits without Telecare	n/a	n/a	106,701	100,202

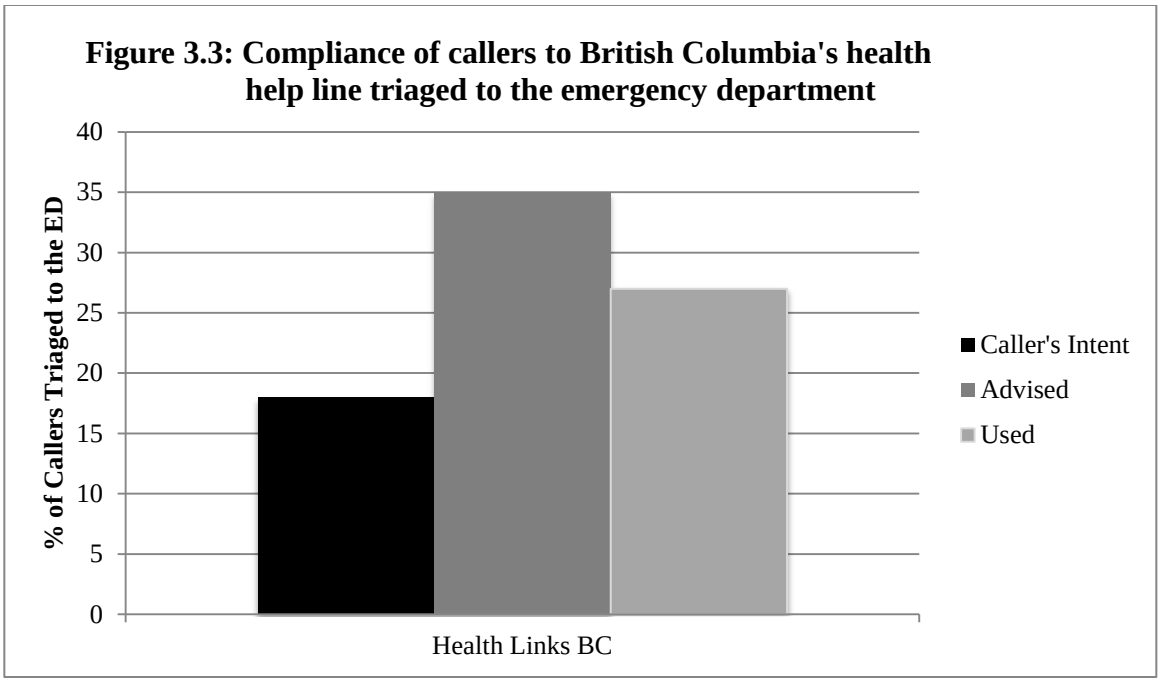
Source: Robinson 1998

Additionally, a self-report study of users in Northern Ontario of Ontario's HHL found that the HHL may have decreased the use of ED, increased self-care, and increased visits to family practitioners, relative to the caller's intent (Hodgenbirk, Pong and Lemieux 2005). Finally, the annual increase in ED use was lowered in the area that was chosen to pilot HealthLink Alberta (Weatherill, Paul and Stewart 2002/2003), but no formal studies have been conducted on the impact that HealthLink Alberta has had on ED use (De Coster et al. 2010).

Although pilot studies of HHL in Canada did show the promise of HHL, a study of British Columbia's HealthLinks BC suggests it may actually increase ED use based on the number of callers triaged to urgent care compared to the number of callers whose pre-call intent was to use the ED (QUILTS 2006). Figure 3.2 and 3.3 uses data from New Brunswick and British Columbia to illustrate the potential for HHL to both increase and decrease the use of ED.



Source: Robinson 1998, QUILTS 2006



Source: QUILTS 2006

3.2 Do health help lines meet the objectives of the triple aim?

3.2.1 Potential use for population health

Currently, HHLs have not been assessed with respect to their contribution to population health, but an argument could be made that HHLs have the potential to improve health outcomes and overall population health. Many population health initiatives have significant educational components, usually disseminated by health care professionals. HHLs allow rural and remote residents to access health information that can be used to improve their overall health, or improve outcomes of specific illnesses, such as diabetes. With the continued expansion of electronic health and medical records, HHLs have the potential to improve population health in rural and remote areas by improving access to and use of individualized health information. As electronic health and medical records diffuse throughout the health system and greater interconnectivity is established between them, HHL will be able to expand services to include patient counseling for illnesses such as diabetes and congested heart failure to rural and remote residents which could improve population health outcomes.

3.2.2 Improving the patient experience

Like telemedicine applications, HHLs have the potential to improve the patient experience. Rural and remote residents are able to access health information and health counseling that was previously only available by visiting a health practitioner. The savings in travel time and money has the ability to improve rural and remote patients' experience accessing the health system by avoiding unnecessary visits to their medical practitioner's office. Similar to how compliance impacts cost and cost-effectiveness, caller satisfaction will contribute to whether the patient experience is improved. Satisfied

callers will be more likely to be repeat users, and may be more likely to adhere to the advice they are given.

International studies have reported satisfaction levels between 54% and 100%, and have correlated satisfaction with compliance and health service utilization (Wahlberg and Wredling 2001, National Audit Office 2002, Wetta-Hall, Berg-Copas and Edwards Dismuke 2005, Valanis et al. 2007). A study of a large health maintenance organization (HMO) in the United States looked at whether callers' expectations had been met as a measure of satisfaction. Fifty-four percent of callers had all their expectations met while only 3 percent had none of their expectations met. The mean overall satisfaction rating was 5.16 on a scale of 0 to 6, and this high satisfaction rating had a positive correlation to the large number of callers who indicated having all or the majority of their expectations met by the HHL (Valanis et al. 2007). Swedish researchers reported similar findings in their study which found that there were lower levels of satisfaction among callers who received advice that was at a lower disposition (or triage level) than they had expected, and when they disagreed with the advice given. In this study dissatisfied callers were more likely to seek out higher-level care in ED than those with higher satisfaction ratings (Rahmqvist, Ernesater and Holmstrom 2011).

Rates of satisfaction are similar to those reported from international studies with users of Canadian HHL reporting satisfaction levels between 86 percent and 97 percent (Robinson 1998, Department of Health and Social Services 1999, Alberta Health and Wellness 2006, QUILTS 2006, HRMC 2006). Interestingly, users of HealthLink BC satisfaction increased as triage disposition decreased (QUILTS 2006) – which is similar

to results seen in a Swedish study where high satisfaction was a result of avoiding visits to the doctor or ED (Rahmqvist, Ernesater and Holmstrom 2011).

TeleCare New Brunswick's evaluation of satisfaction surveyed 600 users. Overall satisfaction was high with 86 percent of respondents very satisfied with the service. Expectations of callers were met or exceeded 48 percent and 46 percent of the time respectively. Callers were very satisfied with their interaction with nursing staff 91 percent of the time. HHL users were very satisfied with the instructions received from the nurse 87 percent of the time and were able to follow the instructions 99 percent of the time (Robinson 1998). Correlation between satisfaction and compliance for this study was not possible due to the fact that individuals in one evaluation were not necessary included in the other.

3.2.3 Cost containment

The adoption of HHL has the potential to reduce, perhaps significantly, health care costs (Barber et al. 2000) by: avoiding unnecessary visits to physicians or ED; facilitating access to health information; directing callers to appropriate sources of care; and providing direction for self-care when appropriate. In the absence of Canadian data on the cost-effectiveness of HHL, including reductions in ED use, a number of international studies are relied upon to explore this component. Although the results of these analyses are mixed when it comes to whether or not HHL are cost-effective, they nonetheless provide some useful results.

A randomized controlled trial conducted in the late 1990s in the United Kingdom of a general practice cooperative, comprised of 19 practices, showed there was potential for long-term savings associated with a reduction in ED use even if the immediate savings after subtracting the cost of the call centre were minimal (Lattimer et al. 1998).

However, it should be noted that this study was designed to evaluate the safety and effectiveness of nurse led HHL and did not include a rigorous evaluation of cost.

Cost reductions were seen in a study that assessed a HHL operating in 32 different states in the United States. When costs were calculated for services callers intended to use prior to their call and then compared to the costs actually incurred, the authors found a 38.6% reduction in costs associated with the use of the HHL. In this study based on self-reported responses, the total savings amounted to US$54.42 per call (Cariello 2003). However, this analysis did not take into account the administrative costs associated with running the HHL and thus like the British study the net savings were less.

A single pediatric institution in Denver, Colorado surveyed parents over a one-month period in 2004 asking what they would have done if they could not call the call centre. Of those who would have sought care from the ED only 13.5 percent were given advice to do so, and 15 percent of those who would have provided self-care were advised to seek care urgently. Unfortunately, compliance data were not collected. Using a net-cost analysis to evaluate the advice line, the authors determined that if all callers followed the recommendations, there would be a net savings per call of US$42.61 based on local costs and US$56.26 based on national payment data from the Medical Expenditure Panel Survey. It was also noted that if even one half of the callers were compliant there would be a cost savings to the health system just under or just over US$10.00 per call depending on whether local or national costs were used to determine net savings (Bunik et al. 2007). A limitation to this study is the fact that compliance information was not collected and thus the calculated cost savings must be viewed as potential, as opposed to realized, savings.

Swedish researchers also reported a cost saving associated with the redirection of callers to appropriate health services at one call centre. The authors calculated net cost savings per call for those callers who were redirected to self-care to be €70.3, those redirected to primary health clinics to be €24.3, and those redirected to ED to be €22.2. At this one site the approximate savings per year is €1 million per year (Marklund et al. 2007).

Formal evaluations of cost pertaining to Canadian HHL have yet to be conducted, but cost per HHL call is available for six jurisdictions in Canada. Cost per call for the 2008-09 fiscal year varied from $39 per call in Ontario to $20 in Quebec and the three other provinces using the same HHL service provider as Ontario. Alberta fell in the middle with costs estimated to be between $26 and $29 (Ontario 2009). The variation in cost per call appears to be dependent on the quantity of calls received – higher contractual costs require high call volumes to keep cost per call low. Additionally, variation may also be a function of HHL governance structure, in particular whether call centres are contracted out or operated directly by provincial ministries.

In the absence of direct studies evaluating cost-effectiveness of HHL in Canada, two proxies can be evaluated: appropriateness and compliance. Assessing the appropriateness of advice and caller compliance can provide insight as to whether HHL have the potential to decrease costs to the health care system. A change in health service utilization or health status or outcomes as a result of HHL use depends on the appropriateness of advice and referrals being given to callers and the willingness of callers to comply. In most evaluations appropriateness is determined by the treating physician in the ED, or in retrospect by physicians reviewing call transcriptions or logs,

occasionally using pre-established criteria to standardize the evaluation of disposition. Although the measurement of appropriateness varies in Canadian studies, the majority of referrals to ED or other health practitioners are appropriate. Since a physician does not assess those who are triaged to self-care, determination of appropriateness cannot be determined; however given that the under-referral and adverse event rates are low, we can assume that appropriate advice has been given (Lattimer et al. 1998, Munro et al. 2001, Kempe et al. 2006).

Three physician panelists assessed advice from Northern Ontario's pilot HHL study for appropriateness. All three of the panelists agreed that advice given was appropriate 53% of the time, two of the three panelists were in agreement of appropriateness 92% of the time, and all calls were deemed to provide appropriate advice by at least one panelist. When advice was deemed inappropriate reviewers "were three times as likely to rate the calls as 'overly cautious' rather than 'insufficient'" (Hogenbirk and Pong 2004, 59). Overly-cautious protocols may lead to more use of the ED, which was a concern in British Columbia when a review there found that 72 percent of callers with symptoms were advised to contact a doctor or go to the ED within 24 hours (QUILTS 2006).

New Brunswick's TeleCare pilot reviewed the appropriateness of calls that were referred on to medical services. Two physicians, one being the chief of emergency medicine, were asked to randomly select a sample of calls for review. The physicians were asked if they agreed or disagreed with the disposition assigned by the triage nurse. In the cases where callers were referred to the ED, both physicians were in agreement 79 percent of the time, with an additional 13% of ED referrals felt to be appropriate by at

least one of the physicians and the remaining 8% classified as over-triaged. The referrals to a general practitioner or a walk-in clinic within 24 hours were felt to be appropriate by both physicians 83% of the time, with another 3% deemed reasonable by one physician. Only 3% of calls should have been redirected to the ED, while 10% could have been offered self-care (Robinson 1998).

Researchers at the Children's Hospital of Eastern Ontario assessed the appropriateness of ED visits among three referral groups: those referred by the HHL (n = 129), those self or parent referred (n = 102), and those who were referred by another physician (n = 347). Appropriateness of referral was assessed in two ways: 1) attending ED physicians were asked to subjectively assess whether the patient needed to been in the ED that day; and 2) a pediatrician was asked to do a blind review of the patients' chart and complete an assessment of appropriateness using a standardized checklist. Using the checklist, 72% of ED visits were deemed appropriate with no statistical difference between modes of referral. Attending physicians deemed referrals from another physician significantly more appropriate than those from the HHL (80% versus 56%). Parents referred by the HHL were surveyed as to whether they would have visited the ED had they not been referred. Survey results indicated that 25 (35.2 percent) of the parents would not have attended; of these 14 (56 percent) were deemed appropriate. Of the 45 (63.4 percent) respondents that would have attended, 29 (64.4 percent) were deemed appropriate using the checklist approach (Al-Albdullah et al. 2009). Interestingly, the results of this study have a lower appropriateness rating compared to a US study of pediatric HHL (Kempe et al. 2000). A possible explanation for this is that HHL call

centres in the US study were all affiliated with pediatric hospitals and therefore staffed by specialized pediatric nurses.

While appropriateness of referral is certainly important, the willingness of callers to comply with the advice given will determine whether HHL are cost-effective. Studies evaluating compliance for Canadian HHL are almost nonexistent, and the literature that is available addressing caller compliance makes it difficult to determine the precise impact HHL has on the utilization of health services. Most studies do not report their findings for the compliance of each advised disposition (i.e. self-care, consult a physician within 24 hours if symptoms persist, or report to ED), and are often based on self-report questionnaires with potential response bias[5] rather than on administrative data.

Four studies evaluating compliance, two evaluating HealthLinks Alberta, one from British Columbia's Health BC, and one assessing the TeleCare New Brunswick pilot showed that callers complied with the advice they were given between 72 percent to 87 percent of the time. Unfortunately, as discussed below, all three evaluations are flawed and provide little insight to why callers fail to comply with the advice they receive from HHL nurses.

The first study assessing compliance of HealthLinks Alberta was limited to residents of Calgary and was conducted during the HHL's first full year of operation in Calgary. Compliance was highest for those who received self-care (83.7%), but was considerably lower for those who were triaged to the ED or to see their general practitioner within 24 hours, with only 52.3% of the former and 43.2% of the latter complying with nurse advice. A key limitation of this study is that it provides information

[5] Response bias occurs when respondents answer survey questions in the way they believe the surveyor would like them to answer rather than their true belief or action.

for only a single geographical location that may not represent the compliance rates for the entire population. Additionally, this study took place during HealthLink Alberta's first full year of operation in Calgary and thus compliance may have changed given that the number of calls per day more than doubled from 2002 to 2007 (De Coster et al. 2010). The second review was conducted three years after the implementation of HealthLinks Alberta, and reported that those who were provided with self-care advice or advised to go to the emergency department complied over 74 percent and 72 percent of the time respectively (Letourneau 2009), although it is unclear exactly how compliance was measured in this study.

An evaluation of British Columbia's HHL reported that the majority of users were compliant. However, compliance was based on self-report survey and was not matched to triage disposition (QUILTS 2006).

An evaluation of 111 calls from the TeleCare pilot HHL in New Brunswick used administrative data to determine whether callers to TeleCare accessed the ED or the services of general practitioners within 48 hours of their call to the HHL. Of those who were directed to the ED, 87 percent were seen within 48 hours in the ED or doctor's office, however it is unknown what percentage were actually seen in the ED. Callers who were directed to see a physician within 12 to 24 hours were compliant 50 percent of the time, with 10 percent utilizing ED and 40 percent failing to seek care. For those who were given self-care advice, 59 percent complied, but 15 percent utilized ED and another 26% percent contacted a physician or sought care from a physician in the ED (Robinson 1998). Due to the small sample size caution must be taken in interpreting these results.

As can be seen, provincial HHLs in Canada have yet to undergo rigorous evaluation, and until this is done only a few definite conclusions can be drawn about HHL compliance in Canada. However, as set out below, the results from American and British studies can help predict Canadian HHL caller compliance given the professional and medico-cultural similarities among the three countries.

A study of a large HMO in the United States found that callers adhered to all of the advice given 79.9 percent of the time, according to a self-report questionnaire (Valanis et al. 2007). The authors identified four predictors of patient follow-through that were statistically significant (at 5%):

1. Patient's overall health status was good;
2. Callers perceived the nurse as being helpful;
3. The advice being given was the advice that the caller expected; and
4. The caller understood the advice being provided.

Wetta-Hall, Berg-Copas and Edwards Dismuke (2005) found similar findings in their pilot study of HHL use and satisfaction within an uninsured population in the United States. Users reported adhering to the nurse's advice 90 percent of the time. Satisfaction rates for this study supported three of the four predictors for patient follow through identified by Valanis et al. (2007) with over half reporting their health status to be good, 97 percent of respondents believing the nurse to helpful or very helpful, and 98 percent agreeing with the advice they received. Comprehension of the advice was not assessed in this patient population.

A report commissioned by the British Department of Health in 2000 identified three categories of non-compliers: deliberate non-compliers, compliers who

misinterpreted advice, and those whose health status changed requiring different advice. Similar to the results from Valanis et al (2007), reasons for non-compliance in this study were that the advice given was deemed "inconvenient or impossible to follow because of existing social or domestic commitments or relationships" (Munro et al 2000, 25); callers' expectations of the service were not met; callers disagreed with the disposition or they believed that they had complied with the advice given when in fact they had not. Callers who were advised to contact their general practitioner were less likely to comply with all the advice given than those who were advised to seek care on an urgent basis. The authors also noted that the results might have overestimated compliance as the report was generated by a self-report survey and advice given was not compared to billing information to corroborate whether advice had in fact been followed (Munro et al 2001).

In summary, the research to date inadequately depicts the impact HHL have on health care utilization. Few studies capture data pertaining to a caller's intended health services usage prior to contact with the HHL. Additionally, most studies assessing compliance rely on self-report surveys, rather than linked administrative data, and fail to identify the action that was actually taken by non-compliant callers. Information about caller intent and service use of non-compliant callers is vital if researchers are to accurately assess whether HHL decrease inappropriate use of medical services that translate into cost savings.

3.3 Limitations of health help lines

Although awareness of the existence of HHL tends to be high among the provincial populations, less than 20% actually use HHL. Uptake of the HHL in the Northwest Territories was so dismal that officials discontinued the service citing that resources could be better used as the HHL only received 7000 calls a year, or about 20

calls per day with an estimated cost of $80 per call (CBC News 2010). Other provinces have seen similar declines in use. Table 3.2 demonstrates the decrease in use of HHL in Saskatchewan in recent years. The reason for the decrease in calls to HLL has yet to assessed, but may be linked to the perceived futility of the service as a result of the high percentage of callers triaged to ED. To achieve their objectives, HHL need to encourage greater usage by adults, especially males, as the majority of calls are currently made by women and are usually in respect to children (Robinson 1998, Government of Saskatchewan 2004, Moore et al. 2005, HRMC 2006, QUILTS 2006, De Coster et al. 2010).

Table 3.2: Number of calls to Saskatchewan's HealthLine from 2007/08 to 2011/12					
	2007-08	2008-09	2009-10	2010-11	2011-12
Number of Calls	100,708	103,271	134,296	87,024	89,841

Source: Saskatchewan Ministry of Health 2012b

Health help lines utilize a mix of health professionals to provide health services at a distance but RNs are the most common providers of HHL services. Although nurses are not able to diagnose callers with specific ailments or offer direct treatment, other than self-care when it is deemed appropriate, they are providing callers with health advice and information that previously was only available from physicians. Access to reliable, consistent, and evidence-based medical information and advice provided by HHL has the potential to improve the health and well-being of Canadians living in rural and remote areas, but only if HHLs see an increase in the number of individuals making use of the programs.

Chapter 4: Online Mental Health Therapy for Rural and Remote Areas of Canada

4.1 Mental health in Canada

The Centre for Addiction and Mental Health (2012) reports that one in five Canadians will suffer from mental illness in their lifetime, with major depressive disorders and anxiety disorders affecting 8 percent and 12 percent of the adult population respectively. However, only a third of those who are in need of mental health services in Canada actually receive such services (MHCC 2009). The under treatment of mental illness can be attributed to the social stigma associated with mental illness, the inability of many to pay for psychological services available outside the public system, time constraints, mobility, and the shortage and uneven geographic distribution of providers (Pong and Russell 2003, Pitblado and Pong 1999, Cohen 2009, Collins et al. 2004, Mulvale 2006).

The barriers to access to mental health are exacerbated in rural and remote areas (MHCC 2009). The Mental Health Commission of Canada's (2009) report set several goals pertaining to mental health services, which included the goal that "people have equitable and timely access to appropriate and effective programs, treatments, services, and supports that are seamlessly integrated around their needs" (67). The commission also recommended that efforts should be made to ensure that mental health services could be met in community settings close to home and be offered in the least intrusive and restrictive way.

Many jurisdictions in Canada have made a commitment to provide the right care at the right time by the right provider, but in many cases this does not occur in mental health care, especially in rural and remote areas. The majority of psychologists practice in the private sector where services are not publically funded and thus inaccessible to many

Canadians. Rural and remote areas of Canada are less likely to have private psychologists practicing in their communities. As a consequence, residents in these areas have poorer access to at least some types of mental health services (Cohen 2009). Mental health practitioners have embraced telehealth modalities as a means to provide mental health care to those in rural and remote areas of Canada, and are currently the highest users of telemedicine services. Although, telemedicine allows many individuals residing in rural and remote communities to access mental health professionals, it does not alleviate the long waitlists that currently exist or address treatment avoidance issues related to stigma.

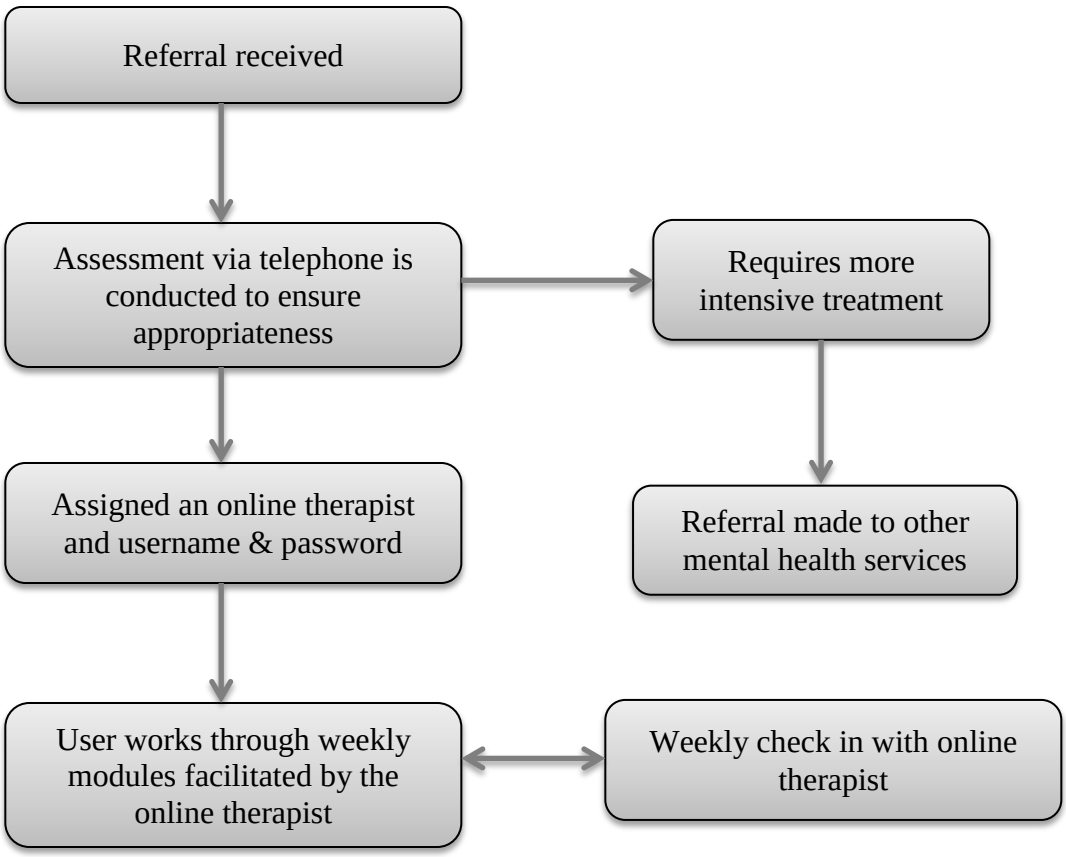
A new telehealth initiative using online cognitive behavioural therapy (OCBT) may improve access to mental health services for those individuals living in rural and remote areas by alleviating three significant barriers: distance to services, stigma, and wait times. OCBT allows patients to receive treatment in the privacy of their homes, eliminating the distance barrier and providing a safe environment to seek care. Online therapy is less labour intensive on the part of mental health practitioners and as such has the potential to shorten waitlists by potentially allowing practitioners to increase their patient loads.

4.2 Online Cognitive Behavioural Therapy

OCBT uses a modular approach to deliver cognitive behavioural therapy. Each module educates patients about their particular mental health issue, teaches them how to manage symptoms and triggers, and provides the opportunity to apply the knowledge they have ascertained through weekly homework exercises (Hollinghurst et al. 2010). Individuals interested in OCBT are screened prior to commencing treatment to ensure that OCBT is an appropriate treatment option. Patients selected to receive OCBT are then paired with a therapist specially trained to deliver online therapy. Most OCBT programs

are comprised of four to twelve modules that patients work through over a period of time. Once a module has been completed, the patient completes an off-line exercise to put what they have learned into practice. The therapist's role is to provide support, motivation, and direction from a distance, usually through confidential and secure weekly email correspondence (Hadjistavropoulos et al. 2011), but additional communication via phone may also occur. Figure 4.1 illustrates the online therapy process.

Figure 4.1: Online therapy process



Practitioners who offer OCBT are providing care in a dramatically different way. To address this change in practice regulatory bodies need to develop professional practice guidelines to address the unique issues related to the provision of OCBT, specifically practitioner competency and patient selection. Therapists who provide OCBT are reliant on text to evaluate a patient's progress – a skill not routinely attainable through current training programs. As such, additional training is required to obtain the necessary skills to provide text-based care. Guidelines should address the necessary training, skills, and minimum proficiency level to provide OCBT.

The success of OCBT is dependent on patient selection. Practice guidelines need to identify patient groups for whom OCBT is appropriate. Researchers have generally agreed that OCBT is not an appropriate treatment option for those suffering from severe mental illness; however, Australian researchers are currently using OCBT in this patient population with positive outcomes (Dear 2013). Although it is possible to treat patients who suffer from severe mental illness with OCBT the practice outside of a research setting has yet to be adopted. Aside from individuals who require more intensive care due to more severe mental illness, users of OCBT must be motivated and be able to work on their own with a structural and practical approach. Those who choose online therapy must be able to apply principles and must be comfortable with testing and applying treatment strategies (Hollinghurst et al. 2010). Additionally, the limited interaction with the therapist also requires that users are comfortable with the level of autonomy required with this type of intervention.

4.3 How does online cognitive behavioural therapy adhere to the objectives of the Triple Aim

4.3.1 Online cognitive behavioural therapy improves population mental health

Early use of OCBT was a bridge to face-to-face treatment, but randomized control trials have shown OCBT to be superior to (Klein, Richards and Austin 2006, Perini, Titov and Andrews 2009, Carlbring et al. 2011), or comparable (Carlbring et al. 2005, Kiropoulos et al. 2008) to other standard treatment practices. A meta-analysis concluded that OCBT holds promise as a treatment for depression (Andersson and Cuijpers 2009), and a review by the Institute of Health Economics showed positive clinical outcomes with the use of OCBT for both depression and panic disorders (Hailey, Roine and Ohinmaa 2007). A reduction in the number of visits to general practitioners and improved physical health status was seen in one study assessing the use of OCBT for panic disorders (Klein, Richards and Austin 2006). Additionally, the use of OCBT has been shown to reduce the risk of relapse, and has similar dropout and satisfaction rates to traditional face-to-face cognitive behavioural therapy (Proudfoot 2004, Dear 2013).

4.3.2 Online cognitive behavioural therapy improves the patient experience

Given that OCBT takes only a quarter of the time that traditional face-to-face therapy takes, freeing up the time of mental health professionals (Klein et al. 2009), it is not surprising to find that access to mental health services are improved when OCBT is used (Andersson 2010). Access is also improved because users of OCBT are able to receive treatment in their homes without the need to travel to a therapist's office as is required by face-to-face therapy sessions. OCBT empowers patients to manage their own treatment in that they are able to work through the modules at a pace that suits their needs. In addition, the greater convenience may result in improved compliance and higher program completion. Lastly, OCBT may result in attracting individuals who

previously avoided seeking care, because of the stigma associated with mental illness, seeking care as they can receive treatment in a private setting (Andersson 2010).

4.3.3 Cost effectiveness of online cognitive behavioural therapy

The use of online therapy has the potential to improve access to mental health services and the evidence of OCBT's cost-effectiveness is promising. Randomized control trials have shown that OCBT for the treatment of anxiety (Proudfoot 2004) and depression are cost-effective (Proudfoot 2004, Warmerdam et al. 2010), but may be dependent on the ability to select suitable candidates for OCBT (Hollinghurst et al 2010). Improved access may result in fewer individuals presenting at a point when more intensive and acute treatment is required, resulting in lower treatment costs. Additionally, rural and remote residents and provincial travel grant programs are able to reduce travel costs associated with weekly treatment visits, which may deter many from seeking treatment. Based on the available evidence, OCBT has the ability to decrease the cost, or at a minimum contain costs, associated with the treatment of mental illness in rural and remote areas.

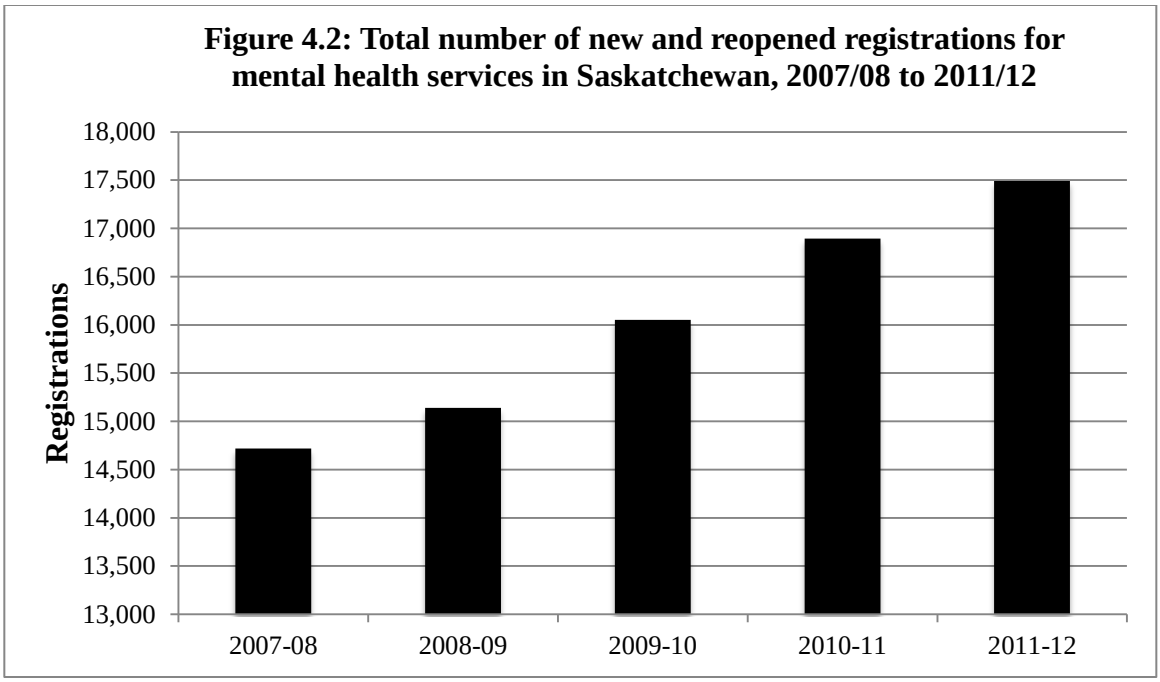
4.4 The need for online cognitive behavioural therapy in rural and remote areas

Provinces with a high percentage of their population living in rural and remote communities, like Saskatchewan, face several challenges to providing mental health services. Using Saskatchewan as an example, the remainder of this section illustrates the need for OCBT in the delivery of mental health services to rural and remote communities. The province of Saskatchewan has the fewest number of psychiatrists per 100,000 population than any of its provincial counterparts (CIHI 2011). Table 4.1 provides the total population and number of budgeted positions for mental health outpatient units for 2011-12, and illustrates the shortage of mental health providers in the province. Demand

for mental health services in the province has increased 19% from 2007-08 to 2011-12. Figure 4.2 shows the steady increase for mental health services from 2007-08 to 2011-12 for Saskatchewan. According to the Saskatchewan Ministry of Health's Community Care Branch, wait-times for mental health services in 2012 were as high as twelve weeks in rural areas (Saskatchewan Ministry of Health 2012b). The lengthy wait times for mental health services in rural and remote communities are due in part to an increase in demand for services and a shortage of mental health professionals in these areas.

Table 4.1: Number of persons holding Saskatchewan health coverage, number of budgeted mental health professionals by region, 2011/12				
Regional Health Authority	**Total Population**	**# of Psychologists**	**# of Psychiatrists**	**# of Other**
Athabasca	2,743	0	0	1.75
Cypress	44,526	3	3	18.25
Five Hills	55,288	5	2.5	18.26
Heartland	44,051	0	0	18.13
Keewatin Yatthé	12,032	0	0	6.5
Kelsey Trail	42,348	2	0	11.5
Mamawetan Churchill River	24,226	0	0	10.5
Prairie North	78,237	8	4	36.68
Prince Albert Parkland	80,000	6	6	31.7
Regina Qu'Appelle	267,931	25	11.6	61.5
Saskatoon	318,102	22.97	3.5	102.26
Sun Country	56,529	4	3	26
Sunrise	58,113	4	4	26.2

Source: Adapted from Saskatchewan Ministry of Health 2012



Source: Saskatchewan Ministry of Health 2012b

The majority of mental health services are provided in the Regina Qu'Appelle and Saskatoon RHAs, which serve the two largest urban centres in Saskatchewan. With the significant centralization of mental health services to urban centres in the province, many rural and remote residents have limited access to mental health services and incur significant treatment barriers. Treatment for mental illness, unlike other types of illnesses, often requires weekly treatment. For many, travel to and from urban centres for weekly psychotherapy may not be possible due to time constraints and associated travel costs. Although, telemedicine may be an option for many living in rural and remote communities in Saskatchewan, the time required to conduct face-to-face therapy sessions impedes access to mental health services. The implementation of OCBT in Saskatchewan may improve access to rural and remote areas by addressing the uneven geographic distribution of providers, as well as decrease the wait time to receive mental health services since OCBT takes a fraction of the time to provide.

4.5 Case study: Saskatchewan's online cognitive behavioural therapy unit

OCBT shows great promise in increasing access to mental health services – something that is in great need in rural and remote areas of Canada. Researchers at the University of Regina recognized this potential and in 2010 established an OCBT research unit. The purpose of the unit is to generate new OCBT programing and provide OCBT services on a pilot project basis in Saskatchewan. Currently OCBT is not the standard of care in Canada and is only available through participation in the research study under the direction of Dr. Heather Hadjistavropoulos, a clinical psychologist and professor at the University of Regina. The Online Therapy Unit trains and supervises graduate students in psychology, social work, medical students, psychiatry residents, as well as mental health professionals in four southern regional health authorities in the provision of OCBT.

Table 4.2 provides a breakdown of the number of student and regional health authority professionals recruited and providing OCBT. Therapists interested in providing OCBT through the Online Therapy Unit are required to attend a one-day training workshop, and must have previous training or experience in treating depression, anxiety, or panic disorders with cognitive behavioural therapy. Individuals interested in receiving OCBT can either self-refer or be referred by a mental health professional from one of the participating regional health authorities.

Table 4.2: Number of therapists who have participated in the Online Therapy Unit as of July 30, 2013		
Provider Location	**Received Training**	**Have Provided Therapy**
Online Therapy User Staff	5	5
Psychology Students	27	26
Social Work Students	7	2
Medical Students	8	0
Psychiatry Students	2	0
RQHR Rural	5	3
RQHR Urban	13	5
Sun Country	13	4
Cypress	5	4
Five Hills	6	4
HealthLine	**2**	**2**
Total	**93**	**55**

Source: Unpublished data received from Dr. Heather Hadjistavropoulos 2013

The Online Therapy Unit licenses an already existing OCBT program for the treatment of generalized anxiety disorder, panic disorder, and depression. Each program is made up of twelve modules. As noted previously, the modules provide educational material on the specific mental health disorder as well as cognitive and behavioural strategies that users can use to manage their disorder. The research team modified the program to require users to check in with their therapist at the beginning of each module regarding the weekly exercises. To ensure that users of the OCBT program receive the appropriate level of care, all prospective OCBT users are screened by phone using a standardized screening interview. Those individuals who are deemed appropriate are assigned a therapist to assist them through the treatment process and are provided a username and password to the Online Therapy Unit's website (www.onlinetherapyuser.ca). Users can then log on and work through the modules of their program and check in with their therapist using an integrated confidential messaging system. Therapists are able to log on to the site and monitor their client's progress, review the weekly check in, and respond to any messages. To ensure privacy the Online Therapy Unit uses "a dedicated virtual server that the university maintains locally in a secure environment" (Hadjistavropoulos et al 2011, 465), and only stores identifiable information that is pertinent on the university's server. All information that is stored electronically is encrypted to industry standards for added protection.

Although Dr. Hadjistavropoulos and colleagues have yet to publish their research findings, data pertaining to recruitment, as well as findings from a preliminary analysis of the data, have been provided to aid in this thesis's assessment of OCBT in a Canadian setting. At the time of writing, 55 therapists, just under half of which were graduate

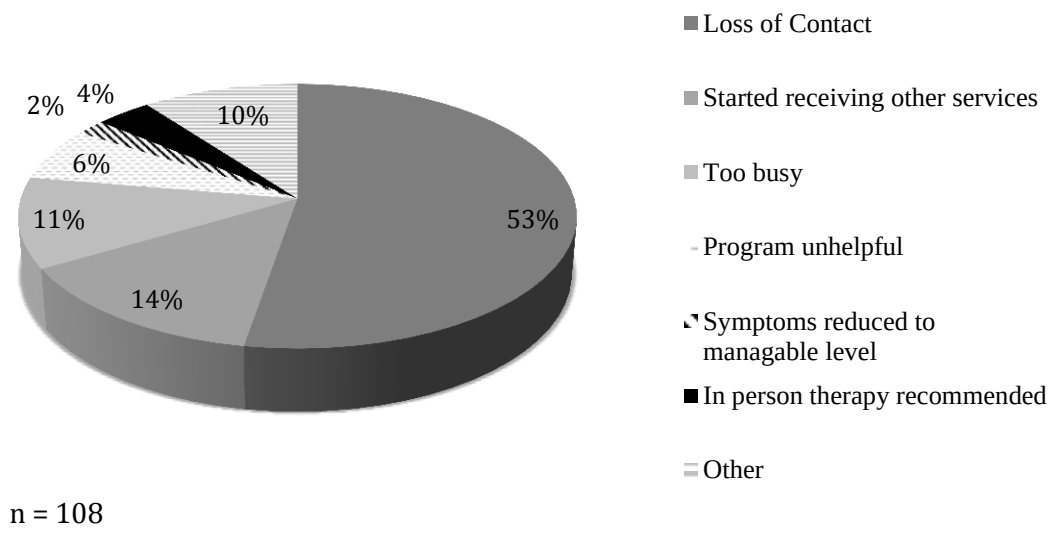
students in psychology, have provided OCBT. Of those in clinical practice, only three have discontinued service provision, and in all three cases discontinuation was due to a role or job change within their organization. Of the 211 users of the OCBT program, 102 (48 percent) completed all twelve-therapy modules. Table 4.3 provides the number of users who have completed each module. Reasons for not completing treatment included: loss of contact, receiving other services, too busy, did not find program helpful, symptoms reduced to a manageable level, in person therapy recommended and other. Figure 4.3 provides the percentage of users in each incompletion category. Dr. Hadjistavropoulos and her team have also shown that there is no statistical difference between therapy offered by a student therapist and that, which is provided by therapists practicing in a RHA. Additionally, positive outcomes have been seen for all three mental health disorders. Although these results are promising, they are preliminary and should be interpreted with caution. A survey of providers found that OCBT was seen as a valuable tool for delivering mental health services, specifically to those living in rural communities; but seemed to be more difficult to incorporate into current workloads in the more urban RHA (Regina Qu'Appelle Health Region) as it serves a greater population. Mental health professionals also found that the online content was consistent with best practice, but felt that the usability of the site was a challenge (although this seems to have been rectified). The exchange of emails between therapist and user seems to provide an adequate base for developing a therapeutic relationship, but some therapists did feel that providing therapy in this manner could be difficult if the user is less responsive and provides little information at the check ins. Overall, the preliminary results from

Saskatchewan's OCBT program appear to show that the intervention is effective and well received, replicating similar findings in the international literature.

Table 4.3: Number of OCBT users who have completed each module	
Module Completed	# of users
0	13
1	198
2	194
3	180
4	168
5	159
6	148
7	134
8	127
9	120
10	114
11	108
12	102

Source: Unpublished data received from Dr. Heather Hadjistavropoulos

Figure 4.3: Reason for discontinuation of online cognitive therapy



Source: Unpublished data received from Dr. Heather Hadjistavropoulos

The next phase of research (July 2013 – June 2016) will see the unit expand to include three additional RHAs, the Saskatchewan HealthLine and the University of Regina and University of Saskatchewan Counselling Services. Currently, the Online Therapy Unit is developing OCBT programs to treat post-partum depression, depression in cancer patients, individuals with chronic disease and comorbid mental illness (specifically, concurrent treatment of anxiety and depression). In an attempt to alleviate the pressures on providers to incorporate OCBT into their caseloads, the Online Therapy Unit has opted to license an OCBT program that allows treatment to be delivered through a five-module program with optional supplemental resources versus the twelve-module program previously used. The change in the number of modules may also see improved completion rates as the five modules are completed over a shorter eight-week period.

Online cognitive behavioural therapy is an intervention that could improve the delivery of mental health services to rural and remote areas of Canada. Although not complete, the pilot project shows the potential for OCBT to support two Canadian health policy goals: the first is to improve access to services in rural and remote care, and the second is to develop and provide health care in a patient-centric manner. Because mental health disorders often require frequent visits to care providers, those living in rural and remote areas are often unable to seek treatment due to economic and familial obligations. OCBT can be delivered anywhere at any time removing the distance barrier that often impedes access to mental health services. Additionally, OCBT may allow mental health providers to increase the number of patients seen within the public system. As noted above, OCBT takes a fraction of the time to deliver, and thus allows providers to accommodate a greater number of patients.

The second policy aim that OCBT serves is the concept of patient-centred care; which requires decision makers and providers to deliver care in a manner that treats the whole patient, including their emotional, psychological, and social needs as well as their physical needs. Traditionally, mental health service provision has been provider centred, with treatment and models of care designed to meet the needs of the provider. OCBT is centred around the needs of the patient by allowing treatment to come to them in a safe and private location. Expanding telehealth to include OCBT removes the distance barrier, reduces stigmatizing feels associated with seeking treatment, and may assist in alleviating wait times.

Strategies are being developed across Canada to improve mental health service delivery. The Mental Health Commission of Canada has identified the need to strengthen mental health human resources, and "increase access to psychotherapies and clinical counselling," as priorities for the mental health system (MHCC 2012, 63). Additionally, the commission also cited the need to increase the use of technology to increase access to mental health services. The introduction of OCBT offers a safe and cost-effective method to alleviate mental health human resource pressures, while improving access to care and maintaining patient satisfaction.

Chapter 5: Policy and Research Implications

Chapter one of this thesis identified the inverse care law that exists in rural and remote communities in Canada, and the subsequent chapters demonstrated how the use of information and communications technology aids in the diagnosis, treatment and follow up of illnesses in individuals living in underserviced regions across Canada. The increase in access to care that telehealth provides may translate into improved health status and outcomes for rural and remote residents. Millar and Wood (2011) articulate the importance of telehealth in the health care system, recognizing its ability to raise awareness of health risks, both physical and psychological, and provide the solutions to prevent or mitigate against those risks; while at the same time providing motivation and the necessary skills to reduce risk. Patients who are able to access information via telehealth are better educated regarding their health needs and thus decrease the demand for inappropriate services while increasing the demand for appropriate services. Health providers are able to use telehealth to educate themselves on evolving practice methods and technological advances, and as a result are able to provide better care and improve service delivery (Miller and Wood 2011, de Fatima dos Santos et al. 2011).

Unlike countries such as Australia and Sweden, which have national telehealth strategies aimed at rural and remote citizens (Victorian Department of Human Services 2008, Government of Sweden 2010), Canada does not have a national telehealth strategy despite the vastness of its rural and remote areas. Consequently, provincial and territorial jurisdictions need to take steps to ensure telehealth is working to its full potential. Policy issues related to telehealth are inter-related involving multiple policy actors and are complicated by jurisdictional issues. The literature identifies several factors that are

required for telehealth to be successful. Telehealth programs need clear policies and laws and regulations governing their operations. Fragmented and uncoordinated policies and programs result in accessibility issues, scalability, duplication and lack of integration with existing systems (Liaw and Humphreys 2006). Individuals developing telehealth programing must include users in every step of the policy and program design process. Support and willingness to adopt ICT into the delivery of health services will increase as a result of this inclusion. Users will view the technology as a tool to improve the provision of care, rather than an imposed or coerced mode of practice (Jones et al. 2012). Canada's telehealth use continues to grow; however, additional work in the areas of policy development, implementation, and evaluation is needed to ensure the success of telehealth programming. The remainder of this chapter is dedicated to identifying the policies and research gaps that have implications for telehealth in Canada.

5.1 Technology considerations for the widespread adoption of telehealth

Widespread adoption of telehealth is dependent on the availability of technology regardless of location. Physical infrastructure, such as fiber optic cabling, that provides the ability to utilize ICT is a key determinant in the ability to provide telehealth services. Initial ICT infrastructure is costly and return on investment analyses conducted by large telecommunication companies rarely recommend making the investment. As a result, many rural and remote communities have minimal or no Internet access due to this market failure. In 2010, 22 percent of rural residents were without broadband connectivity (Industry Canada 2010) making home-based telehealth initiatives, like education and remote monitoring, problematic. The availability to connect to the Internet at home is an indicator of the inequitable access to health information of rural and remote residents (Miller and Wood 2011) that may contribute to the disparity of health status.

Similar access issues have been identified in the United States and are cited as a significant barrier to the adoption of telehealth by providers in that country (Hein 2009).

In response to the market failure in the communications sector the Canadian federal government's Economic Action Plan allocated $225 million to Industry Canada to provide broadband service to rural and remote residents of Canada, with the hope that service would be available to the majority of rural and remote residents by the end of 2013 (Industry Canada 2010). The infrastructure investment made by the federal government will allow the expansion of telehealth activities into communities that previously could not support such initiatives. On-going investment for maintenance of the new infrastructure is required, and consideration as to who (federal government or private sector) will assume responsibility for maintenance costs is unclear. Access to telehealth may continue to be impeded despite the investment in ICT infrastructure. Socio-economic factors, such as affordability of computers and Internet services, may limit the expansion of telehealth.

The lack of interoperability (or the ability for modes of technology to interact with one another) has been a major deterrent to the implementation of ICT in health care in the United States (Miller 2007, Hein 2009). By the year 2000, 300 private-sector companies were active in the telehealth sector in Canada – limiting interoperability and hindering the use of telehealth (Office of Health and the Information Highway 2000). To ensure telehealth's widespread use, interoperability among telehealth applications and networks is imperative (Matusitz and Breen 2007). Several jurisdictions have contractual agreements to provide some telehealth services to other provinces (Ho and Jarvis-Selinger 2006), and the ability for the technology to cross-talk is imperative if these

partnerships are to be successful. Interoperability is mitigated when jurisdictions adopt a centralized governance structure, like Ontario's OTN, which procures the ICT for network members. This arrangement guarantees that all users are working with compatible technology. At a minimum, provinces and territories need to regulate which ICT can be used to provide telehealth services.

The use of online technologies, like OCBT, holds significant potential in the delivery of health services to rural and remote areas. However, it is important to remember that online interventions will only be available to those who have regular access to a computer and internet access, which may limit access to those of lower socio-economic status (Carlbring and Andersson 2006). Before implementing online programing, decision makers and health service administrators need to ensure that the populations they are targeting with an intervention have adequate resources to access such services. Policy makers also need to be cognizant that online interventions, like OCBT, are timely and costly to develop (Hadjistavropoulos et al. 2011). Thus jurisdictions that pursue online interventions are advised to consider licensing currently available programs that can be adapted to meet the needs of their patients and providers.

5.2 Protection of privacy through appropriate telehealth technology

Privacy has long been identified as a concern with regard to the adoption of ICT in the health care setting (Miller 2007). When telehealth is used appropriately, privacy is a non-issue as it is protected through the use of secure networks and encryption techniques similar to those used by the banking industry (Miller and Wood 2011). Privacy becomes an issue when providers use non-approved technology (for example, Skype) to deliver telehealth services. Many practitioners are unaware that the use of these technologies can put patients' privacy at risk. Jurisdictions need to ensure that providers

practicing within their borders are aware of the necessity to use technology that meets telehealth standards and practice to telehealth guidelines (National Initiative for Telehealth Framework of Guidelines 2003).

5.3 Is funding a barrier to the adoption of telehealth?

The lack of long-term funding and the cost of equipment can be significant barriers to the adoption of telehealth (Miller 2007). In the United States clinicians often pay the costs while other stakeholders, such as insurance companies, receive the gains. Infrastructure costs are less of an issue in Canada because, outside of primary care, the majority of the consulting sites are located in hospital or academic settings, where infrastructure is not the responsibility of the consulting physician (Ho and Jarvis-Selinger 2006). However, as ICT expands into community and primary care settings the costs associated with infrastructure will need to be considered. Telehealth initiatives implemented for educational purposes tend to use the Internet, email, list serves and chat rooms, for example, and can be implemented with minimal start up and maintenance expenses. Telemedicine involving video consulting or the relaying of diagnostic images (Magnetic Resonance Imaging and Computer Tomography scans) with large file size require more sophisticated infrastructure and is more expensive. Providers in the future will employ the use of videophones or PC-based desktop video software, when the use of peripheral devices are not required, in order to provide health services in a more economical manner (Miller and Wood 2011).

While the costs of such programs appear to be reasonable, and there seem to be economies of scale associated with telehealth programs (Jennett et al. 2003), there is a need for additional research evaluating the cost-effectiveness of telehealth. The literature to date is based on small pilot projects rather than province-wide programs and may not

adequately address the funding need of regional or provincial programming. Cost-effectiveness studies, should they result in positive findings, would provide the evidence for more strategic investment and policy interventions by government.

5.4 Professional practice considerations

Telehealth programs have been shown to improve the continuity of care and efficiency of the health care system by supporting rural-based GPs as they handle services that their urban counterparts often refer on for specialist care (Watanabe, Jennett and Watson 1999). Telehealth also provides rural-based health care professionals with greater ability to connect with their peers, which may improve morale and decrease isolation. There is however, the need to be aware that providers' perceptions of the need for telehealth will be different depending on their location – rural providers receive direct benefit from telehealth and thus perceive telehealth as a need whereas urban providers may perceive the new care delivery model as an inconvenience. As such, rural practitioners are more likely to adopt telehealth into their practices. It has been suggested that personal incentives (financial and professional) are required for the widespread adoption of e-Health practices (Zanaboni and Wootton 2012). Additionally, change management strategies need to be developed to facilitate adoption of ICT by provider groups because the introduction of ICT into clinical practice challenges traditional clinical care models (Liaw and Humphreys 2006). Sections 5.5 and 5.6 pay specific attention to understanding how technology is adopted and what change management strategies are required.

The delivery of care via the Internet requires providers to make significant changes to the way they practice. Since the primary mode of communication for OCBT is text, and social cues and tones are difficult to decipher through this mode of

communication, care must be taken to avoid miscommunication and ensure crisis situations are managed sensitively (Carlbring and Andersson 2006). Implementation of online interventions, like other telehealth initiatives, goes beyond the provision of the technology and requires governing bodies to also invest in training and support of patients and providers to use the technology. Given the heavy case loads of mental health professionals in the public system it may be difficult to incorporate OCBT in the public system. As a consequence, decision makers may find it necessary to partner with and provide funding to academic training and research programs, similar to the Online Therapy Unit reviewed in Chapter 4, to ensure that the needs of low-intensity or low-risk clients are met. Alternatively, Canada could adopt the Australian model of a national online therapy program, whereby mental health professionals are employed by the program to provide care solely through online interventions (Dear 2013). The Australian model presents a number of challenges since provincial governments, as opposed to the federal government, are constitutionally responsible for the provision of most health care services in Canada. There are two options Canadian jurisdictions can choose from if a centralized OCBT program is desirable. Individual provinces can establish provincial OCBT programs or the provinces and territories can contribute resources, or solicit funds from the federal government, to establish a national program. The latter option is more complicated and unlikely to be selected as obtaining consensus from all the province and territories as well as meeting individual provincial legislative requirements is difficult.

5.5 Understanding the willingness to adopt new technologies to increase telehealth usage

Early adopters of ICT in the health care sector report positive results and experiences, but there are many providers who continue to avoid using telehealth in their

day-to-day practice. Some practitioners are concerned that telehealth may hinder their ability practice effectively and interfere with the doctor-patient relationship (Watanabe, Jennett and Watson 1999, Crisostomo-Acevedo and Medina-Garrido 2010). The resistance to change demonstrated by some professionals can often be traced back to the development and implementation of telehealth initiatives. In many cases providers were not included in the project, had their interests and needs ignored, were improperly trained, or were not educated on the need for and benefits of adopting telehealth in their practice (Crisostomo-Acevedo and Medina-Garrido 2010). Additionally, providers are concerned that the more intensive use of telehealth may translate into fewer jobs and extra work with no additional remuneration (Watanabe, Jennett and Watson 1999).

Understanding and planning for change management is required in order for telehealth to expand in Canada. The implementation of ICT into the health care sector has been met with ambivalence by patients, providers, and administrators who may be reluctant to accept new modalities of health services delivery. Users of ICT make a choice to adopt technology and understanding how those choices are made is an important first step in developing policies and programs related to the adoption of ICT in the health care sector.

There are several change management theories that address the implementation and adoption of technology, the most prevalent of which is Rogers' (1995) diffusion of innovation theory (DIT). DIT postulates that an individual's decision to adopt new technology occurs as a sequence of steps: a perception of the new technology is formed; an attitude or opinion is formed about the technology – favourable or unfavourable based on the advantages/disadvantages of the innovation; a decision is made to adopt or reject

the technology; the technology is initially adopted; diffusion – completed adoption of the technology, or use is terminated due to dissatisfaction or adoption of new and improved technology.

Rogers (1995) also suggests that the decision to adopt technology is influenced by five factors: value (are there benefits to the patient and or provider); compatibility (can it be assimilated into practice smoothly), complexity or ease of use and learnability; the trialability (the ability of the provider to experiment with the technology before adopting it); and the observability of the technology (the outcomes from adoption are demonstrable). Research by Moore and Benbasat (1991), identified two additional factors – image and voluntariness - that affect technology adoption. Image relates to an individual's perceived status as a result of using the new technology, while voluntariness refers to the perception of whether the use of technology is mandatory or an individual choice.

The rate of adoption, or how quickly, the technology becomes mainstream is measured by the cumulative percentage of adopters and usually forms an S-shaped logistic growth curve with different types of users entering at different points in time (Zanaboni and Wootton 2012). There are five kinds of users: 1.) innovators, 2.) early adopters, 3.) early majority, 4.) late majority, and 5.) laggards (Rogers 1995). The rate of adoption depends on the number in each category and the ability of innovators and early adopters to demonstrate the advantages (most important), compatibility, and complexity of the new ICT so that the remaining users will want to or need to make a decision about adopting the technology (Zanaboni and Wootton 2012). It is for this reason that policy

makers and managers need to ensure that a clinician champion of health ICT is a part of the implementation team.

When implementing new ICT into the health care sector decision makers need to be mindful of how providers come to adopt telehealth into their practice, identify innovators and early adopters who can champion telehealth, and those who require incentives to adopt ICT into their practice. The next section identifies change management strategies that may increase the possibility of successful implementation of telehealth initiatives.

5.6 Implementing change management strategies

The issue of change management may be the most critical success factor for advancement of telehealth in health care in Canada. The adoption of telehealth requires both practitioners and patients to change the way they think about and deliver health care. Local leadership is required to promote and communicate with the pubic and providers about the benefits of telehealth (Health Canada 2004, Praxia Gartner 2011). Successful adoption of telehealth is tied to individuals or organizations that have taken it upon themselves to promote the use of telehealth in their communities (Health Canada 2004).

Workflows of providers and organizations are different when providing health services using telehealth, and these new workflows must be designed with all stakeholders in mind. Effective communication, education, and training will facilitate the necessary changes in health care delivery (Health Canada 2004, Praxia Gartner 2011). In order for the use of ICT in health care delivery to become the norm, governments will need to work with medical educators and provide funding to integrate telehealth into medical education and residency programs (Health Canada 2004). Early exposure to the practice of telehealth during medical training may result in an increase in the number of physicians willing to integrate telehealth into their practices. Additionally, to be eligible

for government funding all new initiatives should include a plan for remote delivery when feasible.

5.7 Sustaining telehealth

Although, telehealth has been in existence for decades in Canada and hundreds of millions of dollars have been invested, the maturity of telehealth in Canada is considered only to be at a moderate level[6]. Long-term financial and political investment and commitment to telehealth technology, training of health professionals and organizations, as well as the evaluation of telehealth programs will be required if telehealth is to fully mature and integrate into the health care system in Canada.

A study commissioned for Health Canada's Office of Health and the Information Highway in 2002 identified the keys to sustaining telehealth initiatives. First, technical support and training is imperative to ensure ease of use, which has been linked to the long-term adoption of ICT. Second, a communication strategy to promote, encourage, and educate the providers of the merits of telehealth is required. Ideally the person promoting services would be a clinical user – someone to champion the alternative delivery model. Third, decision makers need to incorporate telehealth into the workflow of providers with minimal disruptions. This means that workflows may have to be redesigned to accommodate the assimilation of telehealth as well as designing technology with providers needs in mind (TecKnowledge 2002). The Ontario Telemedicine Network (OTN) embraces Health Canada's recommendations and is Canada's largest user of telemedicine for health care delivery. Slow or stagnant growth in other jurisdictions in Canada can be attributed to the fact that the key sustaining factors have not been acted

[6] Moderate maturity level represents telehealth programs where S&F data is available in high-resolution, real-time technologies are primarily low-resolution video, and telehealth has not been completely integrated into standard of care with the support of electronic health records.

upon. Based on the success that OTN has experienced, another key to sustainability is the central organization of telemedicine services. A single organization is better equipped to organize and coordinate services, as well as offer consistent support and training.

As OCBT develops the keys to sustainability will be relevant to its long-term adoption. Mental health professionals participating in the research pilot in Saskatchewan noted the difficulty of incorporating the use of the technology into their workflow (Hadjistavropoulos et al. 2011). For OCBT to become the standard of care a change in caseload management will be necessary. The provision of training and support was also imperative to the willingness of therapists to adopt OCBT. While providers and patients were satisfied with OCBT, its growth will require communication strategies to encourage new providers to adopt the practice and educate patients about available treatment options.

The keys to sustainability are difficult to apply to HHL in that they are directed at the provider rather than those seeking health services. Technical training and support and workflow are not applicable as call centre personnel are not required to adapt the technology into an existing practice or work with complicated technology. However, promotion of the service is and will remain a key to sustaining HHLs. The keys to sustainability of telehealth in Canada will vary depending on the mode and complexity of ICT, and whether ICT is being introduced into a new or existing practice environment.

5.8 Further research of telehealth programs in Canada

Although telehealth use continues to increase gradually over time, the current usage among many Canadian provinces with sizeable rural and remote populations is low. The expansion and adoption of telehealth is impeded, in part, by the lack of knowledge of what works and what does not (Miller 2007). To date program evaluation has not been

built into the development of telehealth programs as resources are limited and the focus has been on getting clinical services mobilized (Ashworth 2012). Policy makers need to allocate funding in telehealth programming budgets for program evaluations that assess the implementation, quality and accountability, and clinical utilization to determine how to optimize telehealth services (Liaw and Humphreys 2006, Miller 2007). Going forward programs would benefit from defining what telehealth is operationally for their jurisdiction – identifying what it is and is not. Jurisdictions will need to clearly articulate what objective telehealth is to achieve, what modes of ICT are included in telehealth programming, and what metrics should be collected for program evaluation.

Evidence-based decision-making is the norm for today's decision makers, but little evaluation of provincial telehealth programs has occurred outside the academic setting (Scott et al. 2004). External evaluators and scholars do not have access to pertinent information and thus most evaluations are based on estimates and assumptions. Health Canada's Office of Health and the Information Highway's 2000 report identified the lack of program evaluation data, which likely stems from the lack of a systematic framework for evaluating the effects of clinical telehealth programs on the quality of care, accessibility, cost or acceptability. The research that is available has several notable limitations. Most studies pertain to pilot projects or are limited to a defined geographical location, making generalizability difficult. Additionally, the evaluations completed to date focus on the feasibility of telehealth, rather than measures that evaluate increased access and improved health status and outcomes. A further limitation of current reviews is that they do not target or perform subset analysis to assess the impact telehealth has on rural and remote users. Continued expansion of telehealth programs without

comprehensive evaluation, may result in needs being missed, the over or under provision of services, and or the inappropriate or ineffective use of telehealth. Additionally, future telehealth research would benefit from the incorporation of a comparison arm to the study design. In doing so, the scientific rigor of telehealth research is strengthened and better decisions can be made. As the use of ICT in health care delivery continues to grow, greater emphasis on evaluation should be an integral part of program design, implementation, and redesign.

The evaluation of telehealth programs and initiatives should be done using the framework developed by the Institute of Medicine in 2000, which centred around the quality of care, accessibility of health services, cost, and acceptability (Office of Health and the Information Highway 2000) – a framework similar to the Triple Aim. Quality of care is assessed by whether improved health outcomes for individuals and populations who are accessing telehealth services are achieved. Immediate, intermediate and long-term health outcomes need to be measured. An increase in the quality of care may be seen through a decrease in emergency room visits and hospitalization rates, which are higher is rural and remote areas in Canada, and an increase in the uptake of preventative health promotion services. Quality in telehealth encompasses continuity and coordination of care, timeliness, improved access to specialist care, as well as personal treatment and satisfaction of patients and providers and need to be measured accordingly (Office of Health and the Information Highway 2000).

Although the CHA defines access to health care according to the ability to seek physician or hospital services based on need and not ability to pay, the public perception of access can be very different. The definition of access to health services should also

include the availability of timely and appropriate care in rural and remote communities. The expanded definition forces governments and health system managers to address service gaps aimed ultimately at reducing the disparity between urban and rural health status and outcomes. Improved access to health care services in rural and remote communities can be assessed through a variety of measures. An increase in the uptake of specific health services delivered via telehealth in a rural and remote area may signify that care can now be delivered in a timely way with less burden to the patient (relieving the barrier to care). Retention and recruitment of providers would be expected to improve in underserviced locations as a result of reduced social isolation and increased education opportunities. Lastly, access to care can be evaluated by measuring the use of telehealth services over time – changes in the types of consultations, frequency of use over time, and specialist wait times.

Costs are often evaluated simply by looking at what the program costs a particular government versus the savings to the health system for which that government is accountable. However, the evaluation must go beyond just direct costs (Office of Health and the Information Highway 2000). The costs associated with telehealth programs need to be evaluated in the context of the goal of the initiative. If the goal is to allow patients living in rural and remote communities the opportunity to receive care in their communities so that familial and community support can be offered, then the savings to the system will be of lesser concern. Improving patient outcomes is another example where an increase in treatment costs may be offset by outcomes that may not be quantifiable in dollar values. Alternatively, if the goal of the program is to decrease travel costs for treatment then the cost of the program services should be lower than the travel

costs. Economic evaluation is difficult because there are often competing goals and assigning costs can vary, and may include capital and variable costs but may also need to consider savings from patient and staff travel, savings in time, better use of specialists, and more effective treatment (Office of Health and the Information Highway 2000). Additionally, it is important to consider the possible benefits that can be gained from economies of scale should telehealth be more widely utilized (Taylor 2005).

The willingness of patients and providers to use telehealth is a measure of the acceptability of telehealth services. Evaluating acceptability through the use of qualitative research methods, such as questionnaires and structured and semi-structured interviews, can provide insight into: the physical and psychological comfort with the use ICT in the delivery of health care, convenience of the delivery model, impact on the doctor-patient communication/relationship, privacy and security issues, technical quality, and most importantly the quality of the consultation – was the at-a-distance consultation of equal quality to one conducted face-to-face.

The evaluation of existing provincial telehealth systems should be conducted in three stages. As defined in the evaluation literature, an evaluability assessment that identifies the problem(s) that telehealth is to rectify, i.e. access to health services within one's community, as well as the objectives of the major stakeholders (benefits and costs to patients, providers etc.). Next, a formative evaluation takes place and looks at the type of services, the process of care, and the effect telehealth has on health care utilization and patient and provider satisfaction. Finally, a summative evaluation is done to examine the effect telehealth has on health outcomes (Office of Health and the Information Highway 2000). Provincial jurisdictions have the opportunity to learn from the evaluations of their

counterparts, but will only do so if a standardized method of recording telehealth statistics is developed using consistent terminology and measures.

5.9 Conclusion

The preceding chapters have demonstrated the alignment telehealth has with the Triple Aim and highlight the numerous benefits telehealth has to offer to rural and remote patients. Based on the limited evidence available, telehealth does have the ability to improve access to health services in rural and remote communities, but is currently underutilized. Studies to date provide no baseline information and thus no determination can be made as to whether rural and remote residents are receiving care they otherwise would not have access to. Telehealth's impact on the health status and outcomes of rural and remote patients remains unknown, as studies to date focus on the feasibility and acceptability of the use of ICT in health care delivery. Data from pilot studies and projects (like those being performed through Ontario's OTN) are showing the potential for telehealth to impact the health status of rural and remote populations. Telehealth empowers patients and caregivers and provides them with the opportunity to play a greater role in their care (Hein 2009), which can lead to improved adherence to treatment protocols resulting in better health outcomes.

There are many benefits in the use of telehealth, including: improving access to specialty physicians; providing health education to patients and practitioners (Matusitz and Breen 2007); and aiding in health service administration and management through care pathways, and coordination and monitoring of health services (Liaw and Humphreys 2006). Despite the benefits, telehealth continues to be underutilized in Canada. For telehealth to become the standard of care in health care delivery in rural and remote communities four specific actions must be taken: the establishment of clear national

terminology, definitions and standards; the reevaluation and modification of current policies to reflect the needs of today's health practitioners; investment in program evaluation and research to ensure program goals are met and maintained; and the creation of centralized governing bodies to increase efficiency and ensure consistency in telehealth programing.

In chapter one telehealth was defined as the use of ICT to diagnosis, treat and prevent illness at a distance; however each province and territory defines telehealth differently and bundles products and services differently. Provincial and territorial counterparts need to collectively define telehealth, and determine the goals and objectives of telehealth programing. Once these questions are answered the appropriate modes of technology can be identified and health practitioners can be recruited to provide care. Establishing national terminology and definitions allows data to be collected and reported in a consistent manner. Data can then be synthesized and disseminated to decision makers and researchers to inform telehealth programing and direct future research.

An investment in program evaluation and research is required for telehealth to reach its full potential. Future growth is dependent on identifying and understanding both the successes and failures of telehealth across Canada. Researchers have the knowledge and expertise to conduct rigorous program evaluations – identifying key metrics to be measured to determine whether the goals and objectives of the program are being met. The ability of jurisdictions to demonstrate the advantages and positive outcomes of telehealth empirically will influence providers' decisions to utilize telehealth. Additionally, robust telehealth research using administrative data, either through data sharing agreements or collaborations with academics, will inform decision makers as to

whether specific modes of ICT are effective service delivery models. Collaborations or partnerships with academic researchers, like that of the Online Therapy Unit and several RHAs in Saskatchewan, allow jurisdictions to assess and fine tune new ICT in clinical settings prior to committing financial and human resources.

Many of the policy barriers to the use of telehealth in the provision of health care have already been overcome. However, jurisdictions would benefit from reevaluating the policies and incentives currently in place. Although licensure within physicians' home jurisdictions is no longer a barrier, the issue of inter-jurisdictional consultation is still impeded by licensure requirements. It is believed that if the use of telehealth is to reach its full potential, providers will need to be able to consult with patients and other providers across jurisdictional boundaries (Praxia Gartner 2011). A standardized and simplified process for telehealth licensure across Canada is required to ensure residents have access to highly specialized practitioners who may only practice in large metropolitan centres such as Toronto or Vancouver. As long as jurisdictions limit the number of patients a physician can consult on, or require providers to be fully licensed in multiple provinces to offer telehealth services, the less likely providers will be to offer services remotely. In addition to licensure requirements, policy makers should reassess the fee schedules for telehealth activities. Current incentives for physicians to offer care via telehealth programming are likely insufficient for providers to invest in the necessary technology. Similar incentives may also need to be considered for non-physician providers, such as physiotherapists and speech therapists, to provide services via telemedicine. Although progress has been made in developing policies that encourage the

use of telehealth, jurisdictions are advised to examine their existing policies and ensure that they align with the goals and objectives of telehealth programing.

The final recommended action, the creation of centralized governance and accountability structures, will facilitate the preceding actions while improving strategic planning, provincial coordination, and ICT support. For telehealth in Canada to become the standard of care for rural and remote patients greater, strategic planning and implementation is necessary. Policy makers need to assess the needs of the community as well as their readiness and willingness to embrace a new way of delivering health care. Equally important is understanding the culture of the community and ensuring commitment of providers by involving them in the planning of policies, procedures, protocols, and guidelines (Health Canada 2004). A centralized body is able to conduct these assessments on a provincial basis and assist in the procurement of technology and the ongoing training and support. Centralized organization results in greater efficiency, allows jurisdictions to leverage capital investment and human resources, and results in greater continuity of care because similar processes, knowledge and experience are used between sites (Praxia Gartner 2011). Since the provision of care is primarily the responsibility of the provinces and territories, a structure similar to that of the OTN is recommended for every province and territory. Although, provinces and territories would lead telehealth initiatives, a partnership with Health Canada to address the health needs of First Nations and Inuit communities, military personnel and other groups whereby the federal government has jurisdiction should be developed.

Disparities in health status and outcomes between rural and remote residents and their urban counterparts continue to exist more than two decades after the implementation

of telehealth programming. Chapter one identified several contributing factors to rural health disparities, such as shortages of health professionals in rural and remote areas, distance to care, and costs associated with travel to receive care. Telehealth was identified by ministries of health across Canada as a method to overcome many of the barriers to care rural and remote residents experience, but has failed to make a significant impact on rural and remote health care delivery. Until utilization of telehealth increases, rural and remote residents will continue to find accessing health care services problematic, and will continue to live with poorer health and inferior health outcomes compared to urban populations.

Access to health care is considered by most Canadians to be a right, despite how law makers and policy makers choose to define access under the CHA. Telehealth programming is a mechanism by which provinces and territories can improve access and remove barriers to care for residents in rural and remote communities. As telehealth expands into more communities, and the number of physician specialists and medical disciplines offering services increases, the greater likelihood the differences in health status and outcomes will decrease between rural and remote residents and their urban counterparts. Improved health status and outcomes can translate into decreased health expenditures. Governments who pursue the four previously noted actions empower telehealth programs to provide better quality care, obtain better value for money, while ensuring that Canadians living in rural and remote communities are receiving the care they need.

Bibliography

Al-Albdullah, Tawfik. Amy C. Plint, Alyson Shaw, Rhonda Correll, Carol Pitters, Anna Bottaglia, and Tammy Clifford. 2009. "The appropriateness of referrals to a pediatric emergency department via a telephone health line." *Canadian Journal of Emergency Medicine* 11 (2): 139-148.

Alberta Health. 2012. *SOMB - Health professional fees.* Accessed January 4, 2013. http: www.health.alberta.ca/documents/SOMB-Medical-Prices-2012-04.pdf.

Alberta Health and Wellness. 2006. *Evaluation of Health Link Alberta.* Edmonton: Alberta Health and Wellness.

Alberta Health Services. 2011. *HealthLink Alberta Health Inforamtion Alberta Health Services.* Accessed November 17, 2011. http://www.albertahealthservices.ca/223.asp.

Andersson, Gerhard. 2010. "The promise and pitfalls of the internet for cognitive behavioral therapy." *BMC Medicine* 8: 82.

Andersson, Gerhard, and Pim Cuijpers. 2009. "Internet-Based and Other Computerized Psychological Treatments for Adult Depression: A Meta-Analysis." *Cognitive Behaviour Therapy* 38 (4): 196-205.

Barber, Judson W., William King, Kathy W. Monre, Michele H. Nichols. 2000. "Evaluation of emergency department referrals by telephone triage." *Pediatrics* 105 (4): 819-821.

Barer, Morris L, and Greg L Stoddart. 1999. *Improving Access to Needed Medical Services in Rural and Remote Canadian Communities: Recruitment and Retention Revisited.* Vancouver, BC: The University of British Columbia Centre for Health Services and Policy Research. Accessed January 4, 2012. http://www.chspr.ubc.ca/files/publications/1999/hhru99-05.pdf

Berwick, Donald W, Thomas W Nolan, and John Whittington. 2008. "The Triple Aim: Care, Health, and Cost." *Health Affairs* 27 (3): 759-769.

Bilbey, Nicolas, and Shifana Lalanie. 2011. "Canadian Health Care: A Focus on Rural Medicine." *University of British Columbia Medical Journal* 2 (2): 7-8.

Brannen, Cyndi, Karen Dyck, Cindy Hardy, and Christopher Mushquash. 2012. "Rural Mental Health Services in Canada: A model for Research and Practice." In *Health in Rural Canada*, edited by Judith C Kulig and Allison M Williams, 239-257. Vacouver: UBC Press.

Bunik, Maya, Judith E Glazner, Vijayalaxmi Chandramouli, Caroline Bubliz Emsermann, Teresa Hegarty, and Allison Kempe. 2007. "Pediatric telephone call centers: how do they affect health care use and costs?" *Pediatrics* 119 (2): e305-313. doi: 10.1542/peds.2006-1511.

Canadian Society of Telehealth. 2007. *Telehealth - What the Future Holds. A White Paper produced by the Canadian Society of Telehealth.* Toronto: Canadian Society of Telehealth.

Cariello, Francesca P. 2003. "Computerized Telephone Nurse Triage: An Evaluation of Service Quality and Cost." *Journal of Ambulatory Care Management* 26 (2): 124-137.

Carlbring, Per, and Gerhard Andersson. 2006. "Internet and psycholgoical treatment. How well can they be combined?" *Computers in Human Behaviour* 22 (3): 545-553.

Carlbring, Per, Elizabeth Nilsson-Ihrfelt, Johan Waara, Cecilia Kollenstam, Monica Buhrman, Viktor Kaldo, Marie Soderberg, Lisa Ekselius, Gerhard Andersson. 2005. "Treatment of panic disorder: Live therapy vs. self-help via Internet." *Behaviour Research and Therapy* 43(10): 1321-1333.

Carlbring, Per, Linda Maurin, Charlotta Torngren, Emma Linne, Erikson Thomas, Elizabeth Sparthae, Markus Staat, Christian Marquez von Hage, Lise Bergman-Nordgren, Gerhard Andersson. 2011. "Indvidually-tailored, Internet-based treatment for anxiety disorders: A randomized controlled trial." *Behaviour Research and Therapy* 49: 18-24.

CBC News. 2010. *N.W.T. hangs up health-care hotine.* Accessed January 4, 2013. http:www.cbc.ca/news/health/story/2010/10/01/nwt-health-line-discontinued.html.

CCOHTA (Canadian Coordinating Office for Health Technology Assessment). 2004. *Telephone triage services:systematic review and a survey of Canadian call centre programs*. Ottawa: Canadian Agency for Drugs and Technolgies in Health. Accessed November 16, 2011. http://cadth.ca/media/pdf/327_triage_ov_e.pdf.

Centre for Addiction and Mental Health. 2012. *CAMH: Mental Health and Addiction Statistics.* Accessed January 2, 2013. http:/www.camh.ca/en/hospital/about_camh/newsroom/for_reporters/Pages/addictionmentalhealthstatistics.aspx.

Ceresia, Patrick. 2012. (Canadian Medical Protection Association). Personal Communication. December 10, 2012.

CIA (Central Intelligece Agency). 2013. *CIA - The Fact Book.* Accessed April 25, 2013. www.cia.gov/library/publications/the-world-factbook/rankorder/2147rank.html.

CIHI (Canadian Institute for Health Information). 2002. *Supply and Distribution of Registered Nurses in Rural and Small Town Canada, 2000.* Ottawa: CIHI.

———. 2005. *The Regulation and Supply of Nurse Practitioners in Canada.* Ottawa: CIHI.

———. 2006. *How Healthy are Rural Canadians? An Assessment of Their Health Status and Healt Determinants.* Ottawa: CIHI.

———. 2009. *Healthcare in Canada.* Ottawa: CIHI.

———. 2011. *Supply, Distribution and Migration of Canadian Physicians 2011.* Ottawa: CIHI.

———. 2012a. *Disparities in Primary Health Care Experiences Among Canadians with Ambulatory Care Sensitve Conditions.* Analysis in Brief, Ottawa: CIHI.

———. 2012b. *Physiotherapists in Canada, 2011 - National and jurisdictional highlights*. Ottawa: CIHI.

COACH (COACH: Canada's Health Informatics Association). 2011. *2010 Canadian Telehealth Report.* Toronto: COACH: Canada's Health Informatics Association.

———. 2013. *2012 Canadian Telehealth Report.* Toronto: COACH: Canada's Health Informatics Association.

Cohen, Karen. 2009. *Canadian Psychological Association Summary Position of Health Human Resources and Access to Health Services.* Ottawa: Canadian Psychological Association.

College of Physician and Surgeons of New Brunswick. n.d. *Telemedicine Regulation.* Accessed August 8, 2012. http://www.cpsnb.org/english/Regulations/TelemedicineRegulation.htm

College of Physicians and Surgeons of Newfoundland and Labrador. 2010. *College of Physicians and Surgeons of Newfoundland & Labrador - Telemedicine.* Accessed January 4, 2013. http://www.cpsnl.ca/default.asp?com=Pages&id=136&m=364.

College of Physicians and Surgeons of Saskatchewan. n.d. *CPSS Bylaws Related to the Practice of Telemedicine.* Accessed August 8, 2012. http://www.quadrant.net/cpss/resouce/telemedicinebylaws.html.

Collins, Kerry A., Henry A. Westra, David J. Dozois, and David D. Burns. 2004 "Gaps in accessing treatment for anxiety and depression: Challenges for the delivery of care." *Clinical Psychology Review* 24 (5): 583-616.

Crisostomo-Acevedo, Maria Jose, and Jose Aurelio Medina-Garrido. 2010. "Telemedicine Barriers." In *Health Information Systems: Concepts, Methodologies, Tools and Applications*, edited by Joel JPC Rodrigues, 315-322.

Dear, Blake F. 2013 "eCentreClinic: Treating anxiety, depression and chronic health conditions via the internet." Paper presented at the ICBT Community Partnership Meeting, Regina, Saskatchewan, October 4.

De Coster, Carolyn, Hude Quan, Rod Elford, Bing Li, Laura Mazzei, and Scott Zimmer. 2010. "Follow-through after calling a nurse telephone advice line: a population-based study." *Family Practice* 27: 271-278.

de Fatima dos Santos, Alaneir, Salime Cristina Haddad, Humberto Jose Alves, Rosalia Moraes Torres, Claudio de Souza, and Maria do Carmo Barros de Melo. 2011. "Evaluating the Experience of Training Through Videoconferences in Primary Care." *Telemedicine and e-Health* 17 (9): 722-726.

du Plessis, Valerie, Roland Beshiri, Ray D. Bollam, and Heather Clemenson. 2002. *Definitions of Rural*. (21-601-MIE) Ottawa, Ontario: Statistics Canada, Agriculture and Rural Working Paper.

Department of Health and Social Services. 1999. *Provincial Evaluation of Info-Sante CLSC Final recommendations of the Monitoring Committee for the improvement and further development of services.* Quebec: Government of Quebec.

DesMeules, M, R. W. Pong, J. Read Guernsey, F. Wang, W. Luo, and M. P. Dressler. 2012. "Rural Health Status and Determinants in Canada." In *Health in Rural Canada*, edited by Judith C Kulig and Allison M Williams, 23-43. Vancouver: UBC Press.

Donahue, Madeleine. 2005-06. "Regulating Telehealth in Ontario - Next Steps in the Transformation Agenda." *Telehealth Law* 6 (2): 17-44.

Edwards, Jonathan. 2009. *Key Lessons from a Video Visit Deployment in Ontario.* Industry Research, Gartner Inc.

Fierlbeck, Katherine. 2011. *Health Care in Canada: A Citizen's Guide to Policy and Politics.* Toronto: University of Toronto Press.

Fooks, Cathy, and Lisa Maslove. 2004. *Health Human Resources Policy Initiatives for Physicians, Nurses and Pharmacists.* Ottawa: Canadian Policy Research Networks Inc.

Gouverment du Quebec. 2011. *MSSS - Topics - Service organization - Info-Sante 8-1-1*. Accessed November 17, 2011). http://www.msss.gouv.qc.ca/en/sujets/organisation/info-sante-811.php.

Government of Newfoundland and Labrador. 2006. *HealthLine.* Accessed November 27, 2011. http://www.yourhealthline.ca/en/index.html.

Government of Ontario. 2009. "Ontario Ministry of Health and Long-term Care - Public Information - Publications - Ministry Report - Recommendations for Telephone Health Education and Triage/Advisory Service." *Ontario Ministry of Health and Long-term Care.* Accessed November 17, 2011. http://www.health.gov.on.va/english/public/pub/ministry_reports/telehealth/telehealth.html.

Government of Saskatchewan. 2004. *First Anniversary for Healthline - Government of Saskatchewan.* Accessed November 18, 2011. http://www.gov.sk.ca/news?ID=8cb9c3c2-e420-47cd-b0e8-dd59238753c2.

Government of Sweden. 2010. *National eHealth - the strategy for accessible and secure information in health and social care*. Ministry of Health and Social Affairs. Accessed July 25, 2012. http://www.sweden.gov.se/content/1/c6/16/79/85/8d4e616.pdf.

Hadjistavropoulos, Heather D, Maureen Thompson, Max Ivanov, Christina Drost, Cory Butz, Britt Klein, David W. Austin. 2011. "Considerations in the Development of a Therapist-Assisted Internet Cognitive Behaviour Therapy Service." *Professional Psychology: Research and Practice* 42 (6): 463-471.

Hadjistavropoulos, Heather D. Unpublished Data.

Hailey, David, Risto Roine, and Arto Ohinmaa. 2007. *Evidence of Benefit from Telemental Health: A Systematic Review.* Edmonton: Institute of Health Ecomics.

Hay, David, Judi Varga-Toth, and Emily Hines. 2006. *Frontline Health Care in Canada: Innovations in Delivering Services to Vulnerable Populations.* Research Report F|63, Ottawa: Canadian Policy Research Networks Inc.

Health Canada. 2000. *Canada health act annual report 1999-2000.* Ottawa, Ontario: Minister of Public Works and Government Services Canada.

———. 2004. *Telemental health in Canada: A status report.* Ottawa: Health and the Information Highway Division. Infomation, Analysis and Connectivity Branch of Health Canada.

———. 2011. "Canada Health Act Annual Report 2009-2010 [Health Canada, 2010]." *Health Canada.* Accessed January 12, 2012. http://www.hc-sc-gc-ca/hcssss/pubs/cha-lcs/2010-cha-lcs-ar-ra/index-eng.php.

Hein, Matthew A. 2009. "Telemedicine: An Important Force in the Transformation of Healthcare." International Trade Adminstration, U.S. Department of Commerce.

Ho, Kendall, and Sandra Jarvis-Selinger. 2006 *A Pan Canadian environmental scan of clinical telehealth activity.* Vancouver: University of British Columbia Division of Continuing Professional Development and Knowledge Transfer.

Hogenbirk, John C., and Raymond W. Pong. 2004. "An audit of appropriateness of teletriage nursing advice." *Telemedicine Journal and e-Health* 10 (1): 53-60.

Hollinghurst, Sandra, Tim J. Peters, Surinder Kaur, Nicola Wiles, Glyn Lewis, and David Kessler. 2010. "Cost-effectiveness of therapist-delivered online cognitive-behavioural therapy for depression: radomized control trial." *The British Journal of Psychiatry* 197 (4): 297-304.

HRMC (Howard Research and Management Consulting Inc). 2006. "Evaluation and 811 Feasibility Study for Tele-Care NWT." *Artic Institute of North America (AINA) publication server.* Accessed December 6, 2011. http://pubs.aina.ucalgary.ca/health/62208.pdf.

Industry Canada. 2010. *ARCHIVED - Broadband Canada: Connecting Rural Canadians.* Accessed November 15, 2012. http://www.ic.gc.ca/eic/site/719.nsf/eng/00016.html.

James, A.M. 1999. "Closing rural hospitals in Saskatchewan: on the road to wellness?" *Social Science and Medicine* 49: 1021-1034.

Jennett, Penny, Richard Scott, David Hailey, Arto Ohinmaa, Roger Thomas, Carol Anderson, Barbara Young, Diane Lorenzetti, Louise Affleck Hall, Lorna Milkovich, Tara Perverseff, and Caroline Clauseen. 2003. *Socio-Economic Impact of Telehalth: Evidence now for health care in the future, Volume 1.* Calgary: University of Calgary.

Jones, Spencer S., Paul S. Heaton, Robert S. Rudin, and Eric C. Schneider. 2012. "Unraveling the IT Productivity Paradox - Lessons for Health Care." *The New England Journal of Medicine* 366 (24): 2243-2245.

Kempe, Allison, Catherine Dempsey, Julie Whitefield, Joan Bothner, Todd Mackenzie, and Steven Poole. 2000. "Appropriateness of urgent referrals by nurses at a hospital-based pediatric call centre." *Archives of Pediatric and Adolescent Medicine* 154: 355-360.

Kempe, Allison, Maya Bunik, Jennifer Ellis, David Magid, Teresa Hegarty, L. Miriam Dickinson, John F. Steiner. 2006. "How safe is triage by an afer-hours telephone call centre?" *Pediatrics* 118 (2): 457-463.

Kiropoulos, Litza A, Britt Klein, David W. Austin, Kathryn Gilson, Ciaran Pier, Joanna Mitchell, and Lisa Ciechomski. 2008. "Is internet-based CBT for panic disorder and agoraphobia as effective as face-to-face CBT?" *Journal of Anxiety Disorders* 22 (8): 1273-1284.

Klein, Britt, David Austin, Ciaran Pier, Litza Kiropoulos, Kerrie Shandley, Joanna Mitchell, Kathryn Gilson, and Lisa Ciechomski. 2009. "Internet-Based Treatment for Panic Disorder: Does Frequency of Therapist Contact Make a Difference?" *Cognitive Behaviour Therapy* 38 (2): 100-113.

Klein, Britt, Jeffrey C. Richards, and David W. Austin. 2006. "Efficacy of internet therapy for panic disorder." *Journal of Behavior and Experimental Psychiatry* 37: 213-238.

Lattimer, Val, Steve George, Felicity Thompson, Eileen Thomas, Mark Mullee, Joanne Turnbull, Helen Smith, Michael Moore, High Bond, and Alan Glaster. 1998. "Safety and effectiveness of nurse telephone consutation in out of hours primary care: randomised controlled trial." *British Medical Journal* 317 (1765): 1054-1059.

Letourneau, Shaunne. 2009. "Health Link Alberta: a model for successful health service integration." *Health Quarterly* 13: 56-60.

Liaw, S.T., and J.S. Humphreys. 2006. "Editorial: Rural eHealth paradox: It's not just geography." *Australian Journal of Rural Health* 14: 95-98.

Marchildon, Gregory P. 2013. "Canada: Health system review." *Health Systems in Transition*. 15(1): 20.

Marklund, B., M. Strom, J. Mansson, L. Borgquist, A. Baigi, and B. Fridlund. 2007. "Computer Supported telephone nurse triage: an evaluation of medical quality and costs." *Journal of Nursing Management* 15: 180-187.

Matusitz, Jonathan, and Gerald-Mark Breen. 2007. "E-Health: A New Kind of Telemedicine." *Social Work in Public Health* 23 (1): 95-113.

MHCC (Mental Health Commission of Canada). 2009. *Toward Recovery and Well-being, A Framework for a Mental Health Strategy for Canada.* Calgary, AB: Mental Health Commission of Canada.

———. 2012. Changing directions, changing lives, The Mental Health Strategy for Canada. Calgary, AB: Mental HEalth Commission of Canada.

Miller, Edward Alan. 2007. "Solving the disjuncture between research and practice: Telehealth trends in the 21st century." *Health Policy* 82 (2): 133-141.

Miller, Thomas W., and Jennifer A. Wood. 2011. "Telepractice: A 21st Century Model of Health Care Delivery." In *Healthcare Delivery Reform and New Technologies: Organizational Initiatives*, edited by Matthew Guah, 226-240.

Moore, Gary C., Izak Benbasat. 1991. "Development of an instrument to measure the perceptions of adopting an information technology innovation." *Information Systems Research* 2: 192-222.

Moore, K., A. van Dijk W. Rolland, J. Aramini, E. Morre, J. Caudle, T. Donovan, and D. Fernando. 2005. *Integrating Ontario's Telehealth program into a province-wide public health surveillance system: Evaluation and Recommendations.* Accessed November 2, 2011. http://quesst.ca/compendium/compendium_final.pdf#page=29.

Mulvale, Gillian. 2006. "Mental Health Policy and Service Delivery in Canada: Issues in Policy Reform, Access to Care, and Use of Mental Health Providers." PhD diss., McMaster University.

Munro, James, Jon Nicholl, Alicia O'Cathain, Emma Knowles, and Anne Morgan. 2001. *Evaluation of NHS DIrect first wave site. Final Report of phase 1 research.* Sheffield: Medical Care Research Unit, University of Sheffield.

National Audit Office. 2002. *NHS Direct in England. Report by the Controller and Auditor General. HC 505 Session 2001-2002:January 25.* London: National Audit Office.

National Initiative for Telehealth Framework of Guidelines. 2003. "National Initiative for Telehealth Guidelines." Ottawa.

Neudorf, C., J. Marko, J. Wright, C. Ugolini, T. Kershaw, S. Whitehead, J. Opondo, and R. Findlater. 2009. *Health Status Report 2008: A Report of the Chief Medical Health Officer.* Saskatoon: Saskatoon Health Region.

Noorani, H, and J Picot. 2001. *Assessment of videoconferencing in telehealth in Canada.* Ottawa: Canadian Coordinating Office for Health Technology Assessment.

Office of Health and the Information Highway. 2000. *Evaluating Telehealth 'Solutions.' A Review and Synthesis of Telehealth Evaluation Literature.* Ottawa: Health Canada.

OHIP (Ontario Health Insurance Plan). 2011. "OHIP Billing Information for Telemedicine Services." *Ontario Telemedicine Network.* Accessed December 11, 2012. http://www.otn.ca/sites/default/files/ohip_telemedicine_billing_information_manual_september_2011_1.pdf.

Ontario. Legislative Assembly of Ontario. 2009. Standing Committee on Accounts. Teletriage Health Services (section 3.13, 2009 Annual report of the Auditor General of Ontario). 39th Parliament, 2nd Session. Toronto: Auditor General of Ontario.

OTN (Ontario Telemedicine Network). 2012a. "Ontario Telemedicine Network 2011/12 Annual Report." Toronto: OTN.

———. 2012b. *Telehomecare Centre.* Accessed December 10, 2012. http://telehomecare/otn.ca/health-care-provider

Pappas, Yannis, and Josip Car. 2011. "Chapter 18 Emerging technologies for health communication." In *The Knowledgeable Patient: Communication and Participation in Health - A Cochrane Hanbook. First Edition*, edited by Sophie Hill, 208-217. Blackwell Publishing Ltd.

Perini, Sarah, Nickolai Titov, and Gavin Andrews. 2009. "Clinician-assisted Internet-based treatment is effective for depression: Radomized control trial." *Australian and New Zealand Journal of Psychiatry* 43 (6): 571-578.

Picot, Jocelyne, and Trevor Cradduck. 2000. *The Telehealth Industry in Canada: Industry Profile and Capability Analysis.* Keston Group and InfoTelmed Communications Inc.

Pitblado, J. Roger. 2012 "Geographical Distribution of Rural Health Human Resources." In *Health in Rural Canada*, edited by Judith C Kulig and Allison M Williams, 83-100. Vancouver: UBC Press.

Pitblado, J. Roger, and Raymond W. Pong. 1999. *Geographic distribution of physicians in Canada - A Report Prepared for Health Canada.* Centre for Rural and Northern Health Research, Sudbury: Laurentian University.

Pong, Raymond W. 2008. "Stategies to overcome physician shortages in northern Ontario: A study of policy implementation over 35 years." *Human Resources for Health* 6 (24). Accessed May 8, 2013. doi: 10.1186/1478-4491-6-24.

Pong , Raymond W., Marie DesMeules, and Claudia Legace. 2009. "Rural-urban disparities in health: How does Canada fare and how does Canada compare with Australia." *Australian. Journal of Rural Health* 17: 58-64.

Pong, R. W., M. DesMeules, D. Heng, C. Legace, J. R. Guernsey, A. Kazanjian, D. Manuel, J. R. Pitblado, R. Bollman, I. Koren, M. P. Dressler, F. Wang, and W. Luo. 2011. "Patterns of health service utilization in rural Canada." *Chronic Diseases and Injuries in Canada* 31 (Suppl 1): 1-36.

Pong, Raymond W., and Noreen Russell. 2003. *A review and synthesis of strategies and policy recommendations on the rural health workforce (A Component of the Ontario Rural Council Project, "Toward a Comprehensive Rural Health Human Resource Strategy for Ontario").* Sudbury: Centre for Rural and Northern Health Research, Laurentian University.

Poole, Steven R., Barton D. Schmidt, Thea Carruth, Ann Peterson-Smith, and Minnie Slusarsk. 1993. "After hours telephone coverage: the application of an area wide

telephone triage and advice system for pediatric practices." *Pediatrics* 92 (5): 670-679.

Praxia Gartner. 2011. *Telehealth - Canada Health Infoway.* Accessed February 20, 2012. https://www2.infoway-inforoute.ca/Documents/telehealth_report_2010_en.pdf.

Proudfoot, Judith G. 2004. "Computer-based treatment for anxiety and depression: Is it feasible? Is it effective?" *Neuroscience and Biobehavioral Reviews* 28 (3): 353-363.

Province of Nova Scotia. 2009. *HealthLink 811.* Accessed November 17, 2011. http://www.nshealthlink811.ca/.

PWC (Price Waterhouse Coopers). 2009. *Telehomecare Phase Once Program Evaluation Final Report Summary.* Ontario: Ontario Telemedicine Network.

QUILTS (Quality Improvement of Literacy, TeleCare and Self Help Collaborative). 2006. *BC HealthGuide Program Evaluation.* Victoria: BC Minstry of Health.

Rahmqvist, Mikael, Annica Ernesater, and Inger Holmstrom. 2011. "Triage and patient satisfaction among callers in Swedith computer-supported telephone advice nursing." *Journal of Telemedicine and Telecare* 17: 397-402.

Razibul Islam, A. H. M., Rashida Begum, and A. B. M. Shawkat Ali. 2009. "Trends and Prospects of Telemedicine." In *Handbook of Research on Modern Systems Analysis and Design Technologies and Applications*, edited by Mahbubur Rahman Syed and Sharifun Nessa Syed, 584-608.

Robinson, Chris. 1998. *TeleCare/Telelsoins: Evaluation of New Brunswick's 1-800 Dial-a-nurse Service (region 1 Pilot).* Fredrickton: New Brunswick Department of Health and Community Services.

Rogers, Everett M. 1995. *Diffusion of Innovations.* 4th Edition. New York: The Free Press.

Romanow, Roy J. 2002. "Building on Values: The Furture of Health Care in Canada - Final Report." Commission, Ottawa, 159-196.

Saskatchewan Health. 2002. "Primary Health Care Action Plan." Acccessed November 11, 2011. http://www.health.gov.sk.ca/primary-health-care-action-plan.

Saskatchewan Ministry of Health. 2012a. *Ministry of Health.* Accessed January 4, 2013. http://www.health.gov.sk.ca/adx/aspx/adxGetMedia.aspx?DocID=b1a061b0-12a-4-ac23-aea9-c0fe620aad3c&MediaID=5891&Filename=physician-payment-schedule-apr-2012.pdf&l=English.

———. 2012b. *Community Program Profile*. Regina: Community Care Branch.

Scott, R. E., P. A. Jennett, M. A. Hebert, and B. Rush. 2004. *Telehealth and e-Health Policy Considerations for Alberta.* Calgary: Albeta Health and Wellness.

Shan, Baiju R., Nadia Gunraj, and Janet E. Hux. 2003. "Markers of Access to and Quality of Primary Care for Aboriginal People in Ontario, Canada." *American Journal of Public Health* 93 (5): 798-802.

Society of Rural Physicians of Canada. 2012. *Our Resources | Society of Rural Physicians of Canada.* Accessed October 12, 2012. http://www.srpc.ca/resources_regional_stats.html.

Statistics Canada. 2009. *Definition of census metropolitan area and non-census metropolitan areas.* Accessed January 30, 2013. http://www.statcan.gc.ca/pub/81-004-x/2009004/def/cma-rmr-eng.htm.

———. 2012. *Population and dwelling counts, for Canada, provinces and territories, 2011 and 2006.* Accessed October 3, 2012. http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/hit-fst/pd-pl/TableTableau.cfm?Lang=Eng&TABID=1&T=101&SR=1&RPP=25&s=50&0=A&CMA=0&PR=0#C2.

Taylor, Paul. 2005. "Evaluating telemedicine systems and services." *Journal of Telemedicine and Telecare*. 11: 167-177.

TecKnowledge. 2002. *Telehealth and Electronic Health Record: A Guide to Sustainablility.* Ottawa: Office of Health and the Information Highway, Health Canada.

Valanis, Barbara G., Christina M. Guillion, Susan Randles Moscato, Christine Tanner, Shigeko Izumi, and Susan E. Shapiro. 2007. "Predicting patient follow-through on telephone nursing advice." *Clinical Nursing Research* 16 (3): 251-269.

Victorian Department of Human Services. 2008. *National E-Health Strategy Summary*. Australian Health Ministers' Conference. Accessed October 12, 2013. http://www/health.gov.au/internet/main/publishing/nsf/Content/69B9E01747B836DCCA257BF0001DC5CC/$File/Summary%20National%20EHealth%20Strategy%20final.pdf.

Wahlberg, Anna Carin, and Regina Wredling. 2001. "Telephone advice nursing - callers' experiences." *Journal of Telemedicine and Telecare* 7 (5): 272-276.

Warmerdam, Lisanne, Filip Smit, Annemieke van Straten, Heleen Riper, and Pim Cuijpers. 2010. "Cost-Utility and Cost-Effectiveness of Internet-Based Treatment for Adults with Depressive Symptoms: Randomized Trial." *Journal of Medical Internet Research* 12 (5): e53. Accessed March 5, 2012. doi: 10.2196/jmir.1436

Watanabe, Mamoru, Penny Jennett, and Margaret Watson. 1999. "The effect of information technology on the physician workforce and health care in isolated communities: the Canadian picture." *Journal of Telemedicine and Telecare* 5 (S2): 11-19.

Weatherill, Sheila, Susan Paul, and Marianne Stewart. 2002/2003. "Telephone contact centre links to primary healthcare reform." *Hospital Quarterly* 6 (2): 74-77.

Wetta-Hall, Ruth, Gina M. Berg-Copas, and S. Edwards Dismuke. 2005. "Help on the line: telephone-triage use, outcomes, and satisfaction within an uninsured population." *Evaluations & The Health Professions* 28 (4): 414-427.

Wilson, Kathi, and Mark W. Rosenberg. 2004. "Accessibility and the Canadian health care system: squaring perceptions and realities." *Health Policy* 67: 137-148.

Wong, S., and S. Regan. 2009. "Patient perspectives on primary health care in rural communities: effects of geography on access, continuity and efficiency." *Rural Remote Health* 9 (1): 1142-1153.

Yukon Health and Social Services. n.d. Accessed Janaury 4, 2013. http://www.hss.gov.yk.ca/pdf/physicianfeeguide.pdf.

Yukon Medical Council. 2012. *Yukon Medical Council.* Accessed January 4, 2013. http://www.yukonmedicalcouncil.ca/physician_licensing.html.

Zanaboni, Paolo, and Richard Wootton. 2012. "Adoption of telemedicine: from pilot state to routine delivery." *BMC Medical Informatics and Decision Making* 12 (1). Accessed August 1, 2012. doi: 10.1186/1472-6947-12-1.

Appendices

Appendix 2.1: Clinical Services Offered by Provincial Telemedicine Programs in 2006, 2010, and 2012

Clinical Services	BC			AB			SK			MB			ON			QC		NB			NS			NL			YK			NT			NU			PE
	2006	2010	2012	2006	2010	2012	2006	2010	2012	2006	2010	2012	2006	2010	2012	2010	2012	2006	2010	2012	2006	2010	2012	2006	2010	2012	2006	2010	2012	2006	2010	2012	2006	2010	2012	2012
Addictions		X	X			X					X	X		X	X	X	X		X	X					X		X	X	X	X					X	X
Amputee/ prosthetic consult				X				X	X		X					X	X		X	X											X					
Anesthesia			X			X			X	X		X		X	X								X												X	
Arthritis		X	X	X		X			X		X			X	X																					
Audiology		X	X			X											X			X									X		X		X		X	
Autism					X					X																										
Blood Disorders (general)					X											X																				
Cardiology	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X			X			X	X		X	X	X
Cardiac Surgery		X	X			X		X	X		X	X		X	X		X		X	X								X								
CDR		X	X			X		X	X		X	X		X	X		X		X	X		X	X		X	X		X	X						X	
Chronic Pain		X	X		X	X					X	X		X	X	X						X			X						X					
COPD/ Asthma		X	X	X		X					X			X	X	X	X			X								X						X		
DBS		X	X																																	
Derm.		X	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							X	X	X	X	X	X	
Diabetes		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X		X	X			X			X	X	X	X	X	X	X		X	X	
Dialysis			X			X		X	X		X		X	X	X		X		X	X		X						X								X
Discharge Planning		X	X	X	X	X		X	X		X	X	X	X	X	X	X		X	X		X			X	X		X	X	X	X		X	X	X	
Down Syndrome			X											X	X																					
Eating Disorders/ Dietary/ Nutrition		X	X	X		X	X			X				X	X	X		X	X		X								X	X						
ECG		X	X		X			X								X			X	X																

Emergency Medicine														X		X			X									X								
Endocrin.					X	X		X	X	X	X	X		X	X	X	X								X	X		X				X			X	
Ostomy Care		X						X		X	X			X																						
Epilepsy				X				X						X														X								
Family Medicine			X	X				X				X	X	X		X			X										X	X						
Family Planning														X	X	X																		X		
Family Visitation		X		X				X			X			X		X			X		X	X			X		X	X		X	X			X		
Forensic Psychiatry	X	X	X		X	X					X			X	X	X						X							X						X	
Gastroenterology		X	X		X	X		X			X	X		X	X	X					X										X	X				
General Surgery		X			X	X	X	X		X	X	X		X	X				X	X					X	X		X	X			X		X	X	
Genetics		X	X	X	X	X		X		X	X	X		X	X	X		X	X	X	X	X	X		X	X		X	X		X	X		X	X	X
Geriatrics			X	X	X	X		X	X		X		X	X	X	X			X	X		X	X		X			X	X		X	X				
Gyn		X			X	X	X	X						X	X	X	X		X		X					X			X		X				X	
Health Education	X	X						X			X			X		X	X		X			X						X			X			X		
Hemophilia		X	X					X			X			X	X	X				X											X					
Homecare (of any kind)		X	X	X										X	X	X	X	X	X	X								X								
ICU/ Emergency	X	X	X		X	X					X	X		X	X	X									X			X							X	
Infectious diseases			X		X	X		X	X	X	X	X		X	X		X		X	X					X						X				X	
Internal Medicine		X	X		X		X	X		X	X	X		X	X	X			X	X										X	X				X	
Lung Transplant			X			X					X			X	X				X	X	X	X	X		X											X
Mental Health/ Psychiatry		X	X	X	X	X		X	X		X	X	X	X	X	X		X		X	X	X	X		X	X	X		X	X	X	X	X	X	X	X
Nephrology (General)		X		X	X	X		X	X		X	X		X	X	X		X	X	X	X	X	X								X			X		X

Nephrology (Renal)			X			X			X		X	X		X	X	X	X								X	X		X	X		X	X		X	X	
Neurology (General)	X	X	X	X	X	X	X	X	X	X	X	X		X	X					X	X			X	X	X		X	X	X	X	X		X	X	
Neurology (Stroke Emergent)		X	X			X					X		X	X	X		X									X		X			X	X				
Obstetrics	X	X			X		X							X	X	X	X		X	X	X								X	X	X		X			
Oncology	X		X		X	X		X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X			X
Optho	X	X	X	X		X					X		X	X	X	X	X									X				X	X					
Orthopedic	X			X	X	X				X	X	X		X	X	X					X				X			X		X	X				X	
Palliative Care	X	X	X	X	X	X		X			X		X	X	X	X	X		X	X		X	X			X									X	X
Pathology		X	X					X						X	X	X	X																			
Pediatrics		X	X	X	X	X		X		X	X		X	X	X	X	X	X	X		X	X	X		X	X			X		X	X	X	X	X	
Pharmacy	X	X	X		X	X						X		X	X		X								X	X									X	
Plastic Surgery							X	X		X	X	X		X	X		X		X	X		X													X	X
Psychiatry	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X			X	X		X	X	X	X		X		X	X
POA		X	X					X	X		X	X		X	X	X	X		X	X	X	X	X		X			X	X						X	X
Public Health														X																						
Pulmonary/ Respir.				X	X					X				X																						
Radiology	X	X	X			X						X	X				X		X	X					X	X										
Rehab (PT)			X		X		X	X		X		X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	
Rehab (OT)			X	X	X	X		X		X	X	X		X	X	X	X		X	X	X	X			X	X			X	X	X	X	X	X	X	
Renal		X	X			X	X	X	X		X			X	X	X				X							X				X					
Rheum		X	X	X	X		X	X	X	X	X			X	X					X		X	X													
Rounds	X	X	X					X	X		X			X	X	X			X	X					X	X								X		X

Sexual Medicine		X	X						X					X	X				X																	
Sleep Disorders		X	X	X		X		X	X		X	X		X	X				X			X												X		
Speech Language		X			X			X		X	X			X		X	X		X	X					X		X			X	X		X			
Stroke Emergent		X	X	X		X		X	X		X		X	X	X		X			X						X		X	X							
Thoracics	X	X	X			X		X	X	X	X	X		X	X						X								X							
Trauma Assessment		X											X	X	X		X			X																
Ultrasound		X	X				X							X		X	X			X										X	X	X		X	X	
Urology		X	X		X	X		X	X	X	X	X		X	X					X	X				X						X			X		
Wound Care	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X		X	X		X			X	X								X	X	
Other		X	X		X	X		X											X									X			X	X				

Source: Praxia Gartner 2011, COACH 2011, COACH 2013

Abbreviations: CDR: Child Development and Rehab, COPD: Chronic Obstructive Pulmonary Disease, DBS: Deep Brain Stimulators, Derm: Dermatology, ECG: Electrocardiogram, Endcrin: Endocrinology, Gyn: Gynecology, POA: Pre-operative Assessment, PT: Physiotherapy, OT: Occupational Therapy, Respir: Respirology, Rheum: Rheumatology.

NOTE: The table above provides a list of commonly provided telehealth services that are available in each provincial jurisdiction. Services may be provided cross-jurisdictions but are only counted for the province in which the patient resides. Data has been aggregated for those provinces with multiple telehealth networks/programs, and thus not all services may be available province wide. Because each jurisdiction may use different program terminology it is possible that services may not be reported. The data is intended to provide an overview of telehealth services across Canada and to demonstrate the growth of telehealth programs. Data for Quebec is unavailable for the year 2006 and is incomplete for 2010 and thus may underrepresent services provided in the province. Data for Prince Edward Island is available for 2012 only.

Appendix 2.2: Significant provincial telemedicine information

BC	- Access points: hospitals, health centres, mental health centres, and several child development centres - Allowed for the UBC medical school to be expanded to Prince George and Victoria through technology-enabled learning - Provides THC
AB	- 1990s: few small telehealth projects in existence - 1998: $14 million was anonymously donated for the development of telehealth; the province provided additional funds and encouraged the RHAs to install telehealth facilities - Services provided by the health authorities with guidance and some evaluation and supplementary funding from the province
SK	- 1999: telehealth pilot project established to connect 8 northern communities to a hospital in Saskatoon - CHIPP provided funding to upgrade infrastructure to allow video-conferencing - 2007: additional support from the province, regions, and CHI allowed for the expansion of the program to 26 official sites – a site in every RHA and every provincial, regional, district, and northern hospital
MB	- 2001: Telehealth services commence as a result of CHIPP funding - 2006: provincial eHealth program established; administered by the WRHA - Lags other jurisdictions
ON	- 1995: ONIP investment allows several telehealth projects to get started - 1998: NORTH network linked to a large academic hospital in Toronto goes live - 2002: CHIPP program allowed for earlier projects to be expanded into 3 major networks - 2006: the three networks merge to form the OTN as a result of OMHLTC and CHI funding

	- 2010 funding from OMHLTC and CHI to support provincial THC
QC	- Telehealth evolved out of a pediatric cardiology initiative in the 1990s - Réseau Québécois de Télésanté de l'enfant was created in 1998 providing a side variety of clinical and educational services - 2003: province assumed leadership of telehealth and mandated the UIHN to include the development and sustainability of telehealth into their strategic plan - 350 telehealth endpoints throughout the province - Includes primary health and THC
NL	- One of the first jurisdictions to demonstrate benefits of telehealth - 2005: Teleoncology program implemented, was considered the model to emulate when implementing and integrating telehealth services into mainstream health service delivery at the RHA level - 2006: NLCHI mandated to oversee telehealth services in partnership with RHA; building on the success of the Teleocology program, a chronic disease management program was implemented
NS	- First jurisdiction in Canada to have a province-wide telehealth network (NSTHN) - 2004: THC initiated for patients suffering from CHF – led to a reduction in ER visits and readmissions of those suffering with the illness - 2007: 80 video-conferencing systems at 58 health facilities; offering clinical and educational events
PE	- Tele-hospice - Majority of telehealth services are provided by other Atlantic provinces and are operated by hospitals in Summerside and Charlottetown
NB	- Province wide system with 88 video-conferencing endpoints - Initiatives primarily led by the RHAs, but the provincial e-Health office provides guidance

YT	- Originally funded by CHIPP in 6 communities - 14 communities served
NT	- 1998: 3 telehealth sites implemented - Clinical services provided by AB
NU	- Requires satellite links thus communication among sites is limited (satellite delay) - Costly due to the use of satellite technology - CHIPP & PHCTF allowed telehealth to expand from the 5 original sites to reach all 25 communities in Nunavut - Relies on AB, MB, ON for specialist clinical services
FED	- 2007: FNIHB provides funding and support for 158 community telehealth and video-conferencing sites nationally - Successful First Nations Telehealth Project: MB Region Telehomecare Project, AB First Nations Telehalth Program, & KO Telehealth*

Abbreviations: NLCHI: Newfoundland and Labrador Centre for Health Information, RHA: Regional Health Authority, NSTHN: Nova Scotia Teleheath Network, CHF: congestive heart failure, UIHN: University Integrated Healthcare Network, ONIP: Ontario Network Infrastructure Program, CHIPP: Canada Health Infrastructure Partnership Program, OMHLTC: Ontario Ministry of Health and Long-term Care, CHI: Canada Health Infoway, OTN: Ontario Telemedicine Network, KO: Keewatinook Okimakanak, WRHA: Winnipeg Regional Health Authority, THC: telehomecare, NORTH: Northern Ontario Remote Telecommunications Health
Note: * in partnership with OTN
Source: Adapted from Canadian Society of Telehealth 2007, COACH and the Assembly of First Nations 2012, OTN 2012a, Edwards 2009.