Telehealth Benefits and Adoption
Connecting People and Providers Across Canada

May 30th 2011
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# Table of Contents

1.0 Executive Summary ........................................................................................................... 1

2.0 Introduction To Pan-Canadian Telehealth Benefits Evaluation Report ........ 5

2.1 Evaluation Study Background ......................................................................................... 5

2.2 Evaluation Methodology ................................................................................................. 5

2.2.1 Evaluation Project Description .................................................................................. 6

2.2.2 Evaluation Project Stakeholders ................................................................................. 6

2.2.3 Why Evaluate? ........................................................................................................... 6

2.2.4 When to Evaluate? .................................................................................................... 6

2.2.5 What to Evaluate? ..................................................................................................... 7

2.2.6 How to Evaluate? ....................................................................................................... 7

2.2.7 Analysis and Reporting ............................................................................................. 8

2.2.8 Recommendations .................................................................................................... 9

3.0 Healthcare in Canada ...................................................................................................... 10

4.0 Telehealth In Canada ...................................................................................................... 12

4.1 Telehealth from a Clinical Perspective ........................................................................... 12

4.2 Telehealth from a Technology Perspective ................................................................... 14

4.3 Telehealth from a Program Perspective ......................................................................... 14

4.4 Telehealth Use in Canada ............................................................................................. 16

4.5 Telehealth Stakeholders ................................................................................................. 18

4.6 The Value of Telehealth ............................................................................................... 19

4.7 Canadian Experience in the Global Context ................................................................... 20

5.0 Current Benefits of Telehealth in Canada ................................................................. 21

5.1 Access .............................................................................................................................. 21

5.1.1 Telehealth improves equitable access to specialized clinical services for rural and Aboriginal Canadians ..................................................... 22

5.1.2 Telehealth enhances patient-centred care through the provision of convenient services closer to home ............................................... 23

5.1.3 Telehealth saves patients time and avoids personal travel costs ........................................... 24

5.1.4 Telehealth improves the timeliness of care .................................................................. 26

5.1.5 Telehealth enables provincial and territorial responses to emergency management situations ................................................................. 27

5.2 Quality ............................................................................................................................ 28

5.2.1 Telehealth supports better chronic disease management ............................................. 28

5.2.2 Telehealth supports the application of leading practices .............................................. 29
5.2.3 Telehealth improves knowledge and skill development in local care providers ......................................................... 30
5.2.4 Telehealth improves care coordination ......................................................... 32
5.3 Productivity ....................................................................................................... 32
5.3.1 Telehealth improves provider efficiency through reduced provider travel time ......................................................... 33
5.3.2 Telehealth avoids health system costs through avoided subsidized travel ......................................................... 33
5.3.3 Telehealth reduces avoidable health system utilization ......................................................... 33
5.3.4 Telehealth reduces unnecessary transfers ......................................................... 35
5.3.5 Telehealth increases productivity by allowing providers to perform a higher volume of consultations ......................................................... 35
5.4 Summary of Current Benefits ........................................................................... 36
6.0 Projected Future State of Telehealth in Canada ............................................ 41
6.1 Projected Future State of Telehealth in Canada .............................................. 42
7.0 Critical Success Factors for Telehealth ........................................................... 46
8.0 Recommendations ........................................................................................... 50
9.0 Appendix 1: Telehealth Service Descriptions ............................................ 53
  9.1 Telemental Health ............................................................................................ 53
  9.2 Teleoncology ................................................................................................. 54
  9.3 Teleprimary Care .......................................................................................... 54
  9.4 Telestroke ..................................................................................................... 54
  9.5 Tele-Urgent and Emergent Care .................................................................. 55
  9.6 Teledermatology ........................................................................................... 55
  9.7 Teleophthalmology ....................................................................................... 55
  9.8 Telehomecare ............................................................................................... 56
  9.9 Telehealth Support for Surgery ..................................................................... 57
  9.10 Telenephrology/Teledialysis ....................................................................... 57
  9.11 Industry Analysis of Telehealth ................................................................... 57
  9.12 Teledicine Hype Cycle ................................................................................ 58
10.0 Appendix 2: Evaluation Methodology Technical Notes ............................. 60
  10.1 Telehealth Events ........................................................................................ 60
  10.2 Robustness ................................................................................................. 60
  10.3 Causality vs. Correlation ............................................................................ 61
  10.4 Evaluation vs. Research ............................................................................. 61
  10.5 Pan-Canadian Telehealth Survey .................................................................. 1
11.0 Appendix 3: Details on Quantifying Benefits ............................................. 63
  11.1 Telehealth facilitates equitable access to specialized clinical services for rural and Aboriginal Canadians ......................................................... 72
11.2 Telehealth enhances patient-centred care through provision of services closer to home ................................................................. 81
11.3 Telehealth avoids patient costs through avoided travel costs ............................................................................................................................ 84
11.4 Telehealth improves timeliness of care ......................................................................................................................................................... 87
11.5 Telehealth enables provincial and territorial responses to emergency management situations ................................................................. 91
11.6 Telehealth improves provider efficiency by reducing provider travel time ........................................................................................................... 92
11.7 Telehealth avoids health system costs through avoided subsidized travel ........................................................................................................... 94
11.8 Telehealth reduces avoidable health system utilization .............................................................................................................................. 96
11.9 Telehealth reduces unnecessary transfers ......................................................................................................................................................... 104
11.10 Telehealth increases productivity by allowing a higher volume of consultations ........................................................................................ 106
11.11 Telehealth supports better chronic disease management ........................................................................................................................... 107
11.12 Telehealth supports application of leading practices ...................................................................................................................................... 111
11.13 Telehealth improves knowledge and skill development in local care providers ......................................................................................... 113
11.14 Telehealth improves care coordination ........................................................................................................................................................ 116

12.0 Appendix 4: Growth Model ................................................................................................................................. 118
12.1 Historical Data (where available) ......................................................................................................................................................... 118

13.0 Appendix 5: Study Contributors ........................................................................................................................................................ 119
13.1 Infoway Telehealth Study Working Group ......................................................................................................................................................... 119
13.2 Infoway Telehealth Study Advisory Panel ......................................................................................................................................................... 119
13.3 Infoway Telehealth Study Steering Committee ................................................................................................................................................ 119
13.4 Study Contributors ......................................................................................................................................................................................... 120

14.0 Appendix 6: List of Data Sets, Reports and Documents Reviewed ......................................................................................................................................... 121
14.1 Data Sources ........................................................................................................................................................................................................ 121
14.2 Document Review ......................................................................................................................................................................................... 121
List of Figures
Figure 1. Telehealth Benefits and Adoption Study Stakeholders ............................................6
Figure 2. Canada Health Infoway Benefits Evaluation Framework ........................................7
Figure 3. Total Number of Telehealth Sessions in 2010..........................................................16
Figure 4. Total Number of Telehealth Sessions in 2010 — by 10,000 Population ............17
Figure 5. Proportion of Telehealth Services — by Clinical Service ....................................18
Figure 6. Years to Reach Estimated Future Number of Telehealth Visits ..........................42
Figure 7. Years to Mainstream Adoption (Gartner)..............................................................45
Figure 8. Home Telehealth Solution Architecture .............................................................56
Figure 9. Telemedicine Hype Cycle (Gartner) ....................................................................59
Figure 10. Similarities and Differences in Evaluation Research (Levin-Rozalis) ..............61

List of Tables
Table 1. Availability of Clinical Telehealth Services by Jurisdiction.................................12
Table 2. CITL Taxonomy and Maturity Model for Telehealth ............................................14
Table 3. Summary of Current Benefits and Calculations...................................................37
Table 4. Gartner’s Applications of Telemedicine .................................................................58
Table 5. Summary of Current Telehealth Benefits and Calculations ...............................63
Table 6. Summary of Estimated Future Benefits and Calculations ...............................67
Table 7. Number of Telehealth Systems and Communities ...............................................72
Table 8. Telehealth Implementations in First Nations Communities .................................73
Table 9. Number of Inuit Communities Served by Telehealth ........................................73
Table 10. Percent Rurality in Canada by Province/Territory ............................................73
Table 11. Reported Number of Events by Jurisdiction .......................................................74
Table 12. Reported Number of Most Widely Used Clinical Telehealth Programs ..........74
Table 13. Examples of Pre- and Post-implementation Wait Times for TH Programs ..........89
Table 14. Selected Ambulatory Care-Sensitive Condition Admissions and Co-morbidities .................................................................98
1.0 Executive Summary

The objective of the Telehealth Adoption and Benefits Study was to inform Telehealth stakeholders, including funders of Telehealth programs, health system administrators, clinicians and patients, about the evidence of value of Telehealth activities in Canada. The study focused on the quality, access, and productivity benefits being achieved by these Telehealth activities. The benefits were assessed utilizing the Canada Health Infoway (Infoway) Benefits Evaluation Framework.

The benefits evaluation process employed a combination of quantitative and qualitative methods. Where it was possible, quantitative methods were used to calculate current benefits and to forecast/extrapolate potential future benefits. Qualitative methods of inquiry were used to gain an in-depth understanding of benefits experienced by users, and to give context and to help interpret the quantitative data.

Data sources for this study included:
- Utilization, benefits evaluation, satisfaction and other surveys, and case study data provided by Infoway and its jurisdictional partners (more than 20 reports and studies from nine jurisdictions — see Appendix 6 for a listing of data sets, reports and documents reviewed);
- The 2010 Pan-Canadian Telehealth Survey as well as historical data provided by the Canadian Telehealth Forum of COACH: Canada’s Health Informatics Association;
- A Pan Canadian Environmental Scan of Clinical Telehealth Applications submitted by Dr. Sandra Jarvis-Selinger, and Dr. Kendall Ho, University of British Columbia;
- Data from Health Canada’s First Nations and Inuit Health Branch (FNIHB) on Telehealth utilization and descriptions of services;
- Interviews with more than 20 key informants including Canadian Telehealth leaders, coordinators and researchers (see Appendix 5 for a listing of interviewees and study participants);
- Broad-based literature reviews of more than 200 documents on the effectiveness of Telehealth; and
- Prior eHealth and Telehealth benefits evaluations conducted by Praxia and Gartner.

The study found significant and growing utilization of Telehealth — the use of information and communication technologies to extend health care service delivery across distance — all over the country.

In 2010, 5,710 Telehealth endpoints were being used in at least 1,175 communities. There were nearly 260,000 Telehealth events held in 2010. This included 187,385 clinical, 44,600 educational, and 27,538 administrative events. In addition, nearly 2,500 patients were enrolled in Telehomecare.

The utilization of this Telehealth infrastructure has resulted in a number of access, quality and productivity benefits:

Access
- In 2010, Telehealth was used for Mental Health consults in 54% of the reported 187,385 clinical events; for Internal Medicine in 15% of the reported events; and for Oncology in 13% of the reported events.
- Almost 94,000 consults were performed for rural Canadians in 2010.
- Telehealth events saved elderly or ill Canadians living in remote communities an estimated 47 million kilometres of travel. This not only means travel distance saved, but also $70 million in
personal travel costs, 5.6 million litres of gasoline and almost 13 million kilograms of CO₂ emissions.

- Store-and-forward applications of Telehealth reduced wait times for some dermatology and ophthalmology programs. Other programs that experienced a decrease in wait times included Telecrisis, Telewoundcare and Tele-endocrinology.
- Real-time connectivity, utilizing Telehealth networks, during the SARS (2003) and H1N1 (2009) outbreaks, was essential to educate clinicians about the spread of the disease and its likely cause. Telehealth solutions were also effective in connecting patients with their families and their providers during these critical times.

**Quality**

- Telehealth demonstrated improvements in timeliness of care, leading to improved outcomes. Furthermore, there were numerous examples of Telehealth being the catalyst for leading practices, which led to better quality of care:
  - During Telestroke consultations, doctors at small hospitals consulted with stroke experts at tertiary hospitals and administered the generally accepted tPA treatment within a crucial three-hour window (tPA can cause dangerous bleeding in the brain if administered after three hours).
  - Real-time engagement between physicians provided opportunities for remote mentoring and skill development. Examples of this type of engagement were found in Telewoundcare and Teledermatology.
- Telehealth solutions oriented toward chronic disease management have taken many forms, ranging from telephone support to monitoring technologies in the home. Programs in these areas demonstrated improvements in patient quality of life and in achieving better outcomes. More than 80% of patients reported satisfaction with these remote services, better capability to manage their care, and measurable improvements in clinical outcomes and hospitalizations.

**Productivity**

Beyond personal costs saved for patients, Telehealth solutions across Canada resulted in cost avoidance for the health system of approximately $55 million per year. For instance:

- Improved quality of care also led to a more effective health system. Some providers used Telehealth instead of traveling to see their patients. In three reports of provider time saved, 25 clinicians saved 496 days of provider travel time that was then available to be reallocated to providing other health care services.
- By avoiding the need for individual patients to travel, Telehealth reduced utilization of medical travel subsidies or grants. Savings in provincial and federally subsidized travel through current Telehealth programs was estimated to be nearly $34 million in 2010.
- As a result of the Telehomecare programs in Ontario, Quebec, New Brunswick and British Columbia, hospitals or health regions avoided an estimated $915,000 in emergency department visit costs and about $20 million in inpatient costs over the study period.

In summary, current Telehealth activity across Canada has resulted in annual health system cost avoidance of approximately $55 million and personal travel cost savings of $70 million.

**Future State**

Using the current status of Telehealth networks and solutions as a base, a number of conservative assumptions were applied to develop potential future benefits. For example, to project future uptake, the study used calculations that elevate current Telehealth activity to the median rate of usage observed in leading jurisdictions.
Historical data has shown that Telehealth use has grown at a rate of over 35% annually over the past five years. If the future growth of Telehealth consults will continue to be between 20%–40% per year, the conservative projections outlined in the report could be achieved within a five to 10 year time frame.

Assuming that one-half of all Telehealth events are for rural consults, approximately 600,000 rural Telehealth events may occur in the future. This utilization would result every year in 300 million kilometres of travel avoided (336 person-years of travel), about 35 million litres of gasoline saved and 80 million kilograms of CO₂ emissions avoided, and could save more than $440 million in personal travel costs every year.

Telehealth will increasingly become an important part of the lives of patients living with chronic conditions — especially for rural patients, for whom Telehealth is not merely a supplement or replacement to current treatments, but a channel which facilitates access to health care services that were not previously available.

The future potential quality benefits of Telehealth-enabled leading practices are widespread, but difficult to quantify in aggregate. However, the evidence suggests that Telehealth is a catalyst for better care in many clinical areas or educational domains. The following are examples:

- Each year, an estimated 2,000 rural Canadian patients could have improved outcomes if Telestroke were to be adopted as a standard best practice across the country.
- Close to 300,000 face-to-face physician visits could be avoided per year, which could save Canadian jurisdictions approximately $92 million in travel subsidies.
- Telehomecare could yield an annual reduction in approximately $540 million in inpatient costs and $23 million in emergency department visit costs.
- Teleophthalmology screening for diabetes and other services for diseases that result in avoidable blindness could avoid $65 million per year in direct health care costs to Canadian governments.
- As Telehealth solutions mature, some clinicians who use asynchronous store-and-forward technologies could increase the volume of consultations they provide, leading to a potential savings of $10 million annually.

In summary, estimated future benefits of Telehealth could lead to annual savings of approximately $730 million for the health system, and an additional $440 million in cost avoidance for patients.

The benefits of Telehealth are very clear. However, based on lessons learned from current Telehealth programs, there are a number of issues that Telehealth programs and participants need to consider to continue this strong growth and transition into mainstream health care delivery. They include:

- Clinician Reimbursement — a transparent reimbursement model for institutions, physicians and for allied health care providers who provide Telehealth services.
- Professional Development — design and development of new roles, training, education and in-service support to develop new skills and insights.
- Technology Implementation — implementation of complex underlying infrastructure, but especially integration with hospital information systems, jurisdictional interoperable electronic health records, and physician electronic medical records.
- Licensing and Other Regulatory Issues — support for individuals to provide care within and across jurisdictional boundaries, and policies and processes for authorization, authentication, privacy, security and consent.
Governance and Policy — clear and transparent structures for deciding on investment priorities, determining service scheduling and service delivery protocols, and for facilitating the alignment of demand and supply.

Change Management and Adoption — carefully designed workflows and processes which are effectively and widely transitioned into mainstream practice.

Benefits Realization and Measurement — clear articulation of benefits and the value proposition to each stakeholder group, measurement against those benefits, and activities to optimize over time.

Support for Implementation and Transition to the Mainstream — operationalization of the many existing projects, extension of the existing technical and physical infrastructure, as well as change management to move Telehealth into the mainstream of care delivery.

With these critical success factors in mind, Tele-enabled care processes can become a mainstream way of delivering service to all patients and their families. It can be used not only for those who are at great distances from specialized health care facilities and care providers, but also to provide efficient care for people in more dense urban and suburban settings. As real-time, high-bandwidth videoconferencing becomes pervasive in consumer technology and becomes a pervasive part of consumer behaviour, Telehealth growth will accelerate and Telehealth will become just one more well-established channel for health service delivery and education.

The Telehealth Adoption and Benefits Study team makes the following three key recommendations to accelerate the realization of identified future benefits:

- Encourage adoption of Telehealth processes and technologies in mainstream health care delivery — all jurisdictions and organizations need to encourage the evolution of Telehealth from a technology solution to an integral component of the overall care delivery continuum.

- Measurement and reporting of benefits realization — Infoway and jurisdictional partners and stakeholders should continue to refine the benefits evaluation framework and hypotheses, and establish performance metrics, realistic targets and methods for establishing whether Telehealth programs are achieving the projected benefits. In doing so, stakeholders must be cognizant of the fact that measuring Telehealth activity may become even more difficult as it becomes more integrated into regular health care processes.

- Provide funding for implementation and increased utilization — investments in Telehealth should be directed toward sustainable technology infrastructure and, even more, at supporting jurisdictions to achieve the transition of Telehealth services into mainstream care delivery.
2.0 Introduction To Pan-Canadian Telehealth Benefits Evaluation Report

*Infoway’s* mandate is to accelerate the use of electronic health records (EHRs) across Canada. Funded by the federal government, *Infoway* works with all provinces and territories to fund the implementation of private and secure electronic health record systems. Once implemented, these systems provide health care professionals with quick access to accurate and complete patient information. In addition to enabling better decisions about diagnosis and treatment, electronic health record systems are essential to a modernized health care system that provides improved accessibility, quality and productivity.

*Infoway’s* investment in EHR programs is focused on the development of innovative technology to enable the delivery of more-efficient, more-effective health care for all Canadians — no matter where they live. At this time, *Infoway* has invested in 10 programs, including Telehealth. The goal of the Telehealth program is to implement solutions that facilitate the delivery of health information and services between patients and providers over distance, with a focus on Aboriginal, official language minority, northern and remote communities.

A key aspect of *Infoway’s* strategy is to promote solution adoption and benefits realization of investments in EHR solutions and programs. In keeping with this mandate, *Infoway* commissioned a “Telehealth Benefits and Adoption Study” to describe and quantify current and potential benefits achieved by both *Infoway*-funded and non-*Infoway*-funded Telehealth investments.

2.1 Evaluation Study Background

*Infoway* has conducted benefits aggregation studies of the Diagnostic Imaging Systems and Drug Information Systems programs. This benefits aggregation study of the Telehealth program is the next in this ongoing series of initiatives.

*Infoway* engaged Praxia Information Intelligence, one of Canada’s leading healthcare management professional services companies, and Gartner Consulting, one of the world’s leading information technology consultancy organizations, to assist in undertaking the Telehealth Benefits and Adoption Study.

2.2 Evaluation Methodology

The evaluation team used eight steps to conceptualize the study:\(^1\)

1. Evaluation of project description
2. Evaluation of project stakeholders
3. Why evaluate?
4. When to evaluate?
5. What to evaluate?
6. How to evaluate?

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\(^1\) Project Review and Objective Evaluation for Electronic Patient and Health Records Projects (PROBE). The PROBE report, prepared by the National Health Service (NHS) in the UK, describes a practical approach for the evaluation of Electronic Patient and Health Records. The Newfoundland and Labrador Centre for Health Information utilizes the PROBE approach.
7. Analysis and reporting
8. Recommendations and actions

2.2.1 Evaluation Project Description
The objective of the Telehealth Benefits and Adoption Study was to identify and measure benefits currently being experienced in Canada through the delivery of Telehealth services offered by different jurisdictions, and then to extrapolate those findings into potential benefits of a pan-Canadian deployment of such services. The scope included Infoway and non-Infoway Telehealth investments. The scope did not include Teleradiology or Teletriage services, which are widely deployed in Canada.

2.2.2 Evaluation Project Stakeholders
The stakeholders of the Telehealth Benefits and Adoption Study included funders of Telehealth programs/systems/services, health system administrators and others.

Figure 1. Telehealth Benefits and Adoption Study Stakeholders

2.2.3 Why Evaluate?
The Telehealth Benefits and Adoption Study was primarily intended to:

- Measure the benefits resulting from the Telehealth activities and services;
- Evaluate whether Telehealth programs and services have had an impact elsewhere in the system or the “ripple effect” of Telehealth on other parts of the health care system; and,
- Make the case for further Telehealth investment to support ongoing operations and expansion.

2.2.4 When to Evaluate?
The benefits aggregation study was conducted between September 2010 and February 2011, and was based on evaluations and reports completed by December 2010. Prior studies were primarily focused on the most recently completed fiscal year of Telehealth activity (2009–2010), but also included Telehealth examples and services completed prior to this time frame. Data on jurisdictional Telehealth program activity in the last 12 months collected by the Canadian Telehealth Forum (CTF) of COACH, Canada’s Health Informatics Association, were used to support the quantitative findings in this study.
2.2.5 What to Evaluate?

As a precursor to the development of the evaluation plan, the evaluation team, supported by an Advisory Panel¹, reviewed prior Infoway evaluations and the current Canada Health Infoway Benefits Evaluation Framework — a useful, validated and well-known method for evaluating Health Information Systems (HIS).

Figure 2. Canada Health Infoway Benefits Evaluation Framework

The evaluation focused primarily on the net current benefits of quality, access and productivity, and the potential evidence-based extrapolation of these benefits. The study did not focus on functionality, adoption and use elements of the Infoway framework, illustrated above.

- Quality benefits include patient safety, appropriateness and effectiveness of care, and health outcomes.
- Access benefits include the ability of patients and providers to access services, and the patient and caregiver participation in health care.
- Productivity benefits include efficiency, care coordination and costs associated with the health care services delivered.

2.2.6 How to Evaluate?

The evaluation employed a combination of quantitative and qualitative methods, and data triangulation. This mixed-method design was appropriate for the aggregation study because²:

- Benefits realization is a complex phenomenon;

¹ The Advisory Panel included recognized Telehealth experts from across Canada and was broadly representative of all Canadian Telehealth jurisdictions. Many panelists are senior members of the Canadian Telehealth Forum of COACH, Canada’s Health Informatics Association. See Appendix 5 for a list of Advisory Panel members.

The study comprised a set of hypotheses that investigate the same underlying complex phenomena; the study had multiple groups of stakeholders; the study contained several types of variables that do not fit together in a single analytic scheme; and, several concepts or variables were measured using different forms of measurement.

Where it was possible, quantitative methods were used to calculate current benefits and to estimate potential future benefits. Qualitative methods of inquiry were used to gain an in-depth understanding of benefits experienced by users, as well as to give context and to help interpret the quantitative data. See Appendix 2 for more information about methodologies.

The aggregation study described the benefits demonstrated by individual Telehealth services. To describe the benefits and to cross-reference utilization, the study looked at:

- Utilization, benefits evaluation, satisfaction and other surveys, and case study data provided by Canada Health Infoway and its jurisdictional partners (more than 20 reports and studies from nine jurisdictions — see Appendix 6 for a listing of data sets, reports and documents reviewed);
- The 2010 Pan-Canadian Telehealth Survey as well as historical data provided by the Canadian Telehealth Forum of COACH, Canada’s Health Informatics Association;
- Data from Health Canada’s First Nations and Inuit Health Branch (FNIIHB) on Telehealth utilization and descriptions of services.
- A Pan Canadian Environmental Scan of Clinical Telehealth Applications Submitted by Dr. Sandra Jarvis-Selinger, and Dr. Kendall Ho, University of British Columbia
- Interviews with more than 20 key informants including Canadian Telehealth leaders, coordinators and researchers (see Appendix 5 for a listing of interviewees and study participants);
- Broad-based literature reviews of more than 200 documents on the effectiveness of Telehealth; and
- Prior eHealth and Telehealth benefits evaluations conducted by Praxia and Gartner.

### 2.2.7 Analysis and Reporting

The benefits aggregation study was a form of systematic review, as it was based on prior, sometimes incompatible, studies and data sets. Analysis required triangulation with several measures to assess the credibility of the current and extrapolated data. As well, quantitative data were reviewed by Infoway and the Telehealth Advisory Panel to ensure credibility of the current and projected future benefits.

The analysis is organized in this document as follows: first, the report provides a description of the Canadian health system, especially with respect to the potential areas and scale of opportunities for remotely delivered health care. It then provides a high-level overview of Telehealth services across Canada and describes the impact that Telehealth has had on health systems across the country. Finally, the report extrapolates the potential future benefits of Telehealth.

The current and potential future extrapolated benefits are organized into the three categories described in the Infoway evaluation framework — access, productivity and quality. The report identifies a number of different benefits in each of these categories. The benefits were

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quantified to the extent possible and are highlighted and illustrated with a series of case studies and direct quotes.

2.2.8 Recommendations

Recommendations from the evaluation study are available at the end of this report. The recommendations are based on:

- Critical success factors for realizing potential benefits
- Future directions of Telehealth
- A description of how Telehealth will integrate into mainstream healthcare practices
3.0 Healthcare in Canada

Access, productivity and quality continue to be challenges facing Canadian health systems. It is becoming more difficult to deliver health care, in line with expectations of quality and cost, whilst achieving expectations for improvements in effectiveness and efficiency and equitable access to care.\(^1\)\(^2\)\(^3\) There are increasing efforts to improve the effectiveness of care, particularly in the care and monitoring of patients with chronic diseases.\(^4\) The quest for higher quality has driven more standardization of care and a concerted push for the adoption of best practices by all practitioners. It has reinforced the need for well-trained clinicians to continually improve their skills and knowledge, and has promoted new models of care. There are a number of ways in which the health care system can be made more efficient. These range from increasing provider efficiency and productivity to reducing avoidable health system utilization, either by providing care earlier in the disease cycle or by avoiding the need for patients to access expensive health system resources, where less-expensive alternatives would suffice.

While the challenges facing the Canadian health system as a whole are daunting, the issues facing Aboriginal, northern, rural and remote communities are even more longstanding, difficult and complex. For many patients living in the northern, rural and isolated regions in Canada, getting access to appropriate health care is hindered by long commutes, which get worse in inclement weather; high travel costs for gas, accommodations, food and the like; and by the stress of leaving home and going to an unfamiliar, larger city. Patients are often willing to travel to the larger centres for major one-time interventions such as an MRI or major surgery. However, making a series of trips for ongoing pre- and post-intervention care such as consultations and follow-ups can be very disruptive to a patient’s personal and professional life.

Providers and health care delivery organizations in rural areas and the north also face challenges. Health care facilities serve multiple roles relative to those in urban centres and are farther apart, with significant travel distances between locations. Health and human resources are more difficult to recruit and retain, and health providers are asked to carry out a wider range of medical and emergency services compared with their urban counterparts. In some cases, service volumes may not achieve critical mass to maintain clinical competency or justify cost-efficient practices, but need to be provided in order to ensure equitable access and universality of care. Policy and planning organizations continue to struggle with how to effectively provide services in remote locations to meet the needs of local populations.

\(^3\) Pong, RW; Pitblado, JR: Geographic Distribution of Physicians in Canada: Beyond How Many and Where. Ottawa: Canadian Institute for Health Information; 2005.
There is a range of responses to meet these challenges, including recruiting more staff, training already-employed staff, acquiring or improving facilities, and investing in process improvements and technology. Telehealth is one such technology which can have a truly transformational effect on cost structures, as well as on overall health outcomes and equitable access to care. Indeed, some of the most effective organizations are already seeing Telehealth as just another channel for delivering healthcare service, and have subsumed the technology and processes of everyday operations.
4.0 Telehealth In Canada

Telehealth transforms the way patients can receive needed health care by extending service delivery reach across distance. Beyond this general theme, there lies a whole range of clinical services, technologies and programs.

4.1 Telehealth from a Clinical Perspective

Behind the sophisticated technology, coordination and governing structures, the driving force for Telehealth is the opportunity to extend and enhance access to health care providers and services. Telehealth is transforming the way patients receive needed care, and is a way to eliminate or reduce barriers to care.

There is a startlingly diverse set of clinicians using Telehealth. The Canadian Telehealth Forum (CTF) survey, international scan, literature review and key informant interviews identified dozens of services in different Canadian jurisdictions. The table below presents a selection of reported services during the time of the benefits aggregation study.¹

Table 1. Availability of Clinical Telehealth Services by Jurisdiction

<table>
<thead>
<tr>
<th>CLINICAL SERVICE</th>
<th>BC</th>
<th>AB</th>
<th>SK</th>
<th>MB</th>
<th>ON</th>
<th>QC</th>
<th>NB</th>
<th>NS</th>
<th>NL</th>
<th>YK</th>
<th>NT</th>
<th>NU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood Disorders, Haemophilia</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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¹ Canadian Telehealth Forum, 2010 Pan-Canadian Telehealth Survey. Chart presents a selection of services that were reported across participating provinces/territories during the time of the survey.

² A province may have one or multiple clinical services.

³ Quebec services reported through key informant interviews and from Infoway documentation review.
### CLINICAL SERVICE

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A representative set of disciplines illustrates the innovative and eclectic ways that clinicians are using Telehealth in Canada.

- **Telepsychiatry** — allows a single psychiatrist to remotely provide patient assessments and a care plan that can be administered by a family physician in a shared care model.

- **Telecrisis** — connects mental health crisis specialists to emergency physicians who are treating patients experiencing a mental health crisis such as a schizophrenic episode or anxiety attack.

- **Telestroke** — an emergency service that immediately connects an on-call neurologist to an emergency physician who is treating a stroke patient (in a small community or a rural area). Video consultation allows the neurologist to guide and mentor the ER physician and clinical staff as they treat the patient. The neurologist can also talk to the patient and family members. Additionally, CT scan images are sent over to the neurologist, who can then review these images and determine whether the patient is experiencing an ischemic stroke and is a candidate for tPA, a blood thinning treatment.

- **Teleophthalmology** — allows for screening of diabetic retinopathy. Retinal images are captured by primary care providers and forwarded to retinal specialist or ophthalmologist for review and assessment.
Teledermatology — allows for review and assessment of a patient’s dermatological condition by a dermatologist.

Teleoncology — enables pre-treatment assessments of patients receiving chemotherapy, as well as for post-treatment follow-up.

Telehomecare — is most often used for patients who have chronic conditions such as congestive heart failure, chronic obstructive pulmonary disease or diabetes. It may also be used for patients with acute conditions and for patients who require post-operative care that can be managed at home. These Telemonitoring solutions provide remote monitoring and transmission of clinical data to a centralized facility for review and action by a care team.

Detailed descriptions of some of the most widely used Telehealth clinical services documented in this aggregation study are provided in Appendix 1.

4.2 Telehealth from a Technology Perspective

From a technology perspective, Telehealth refers to the delivery of services by health care organizations using information and communications technology (ICT) solutions when the clinician and patient are not in the same location. Practically, this has referred to:

- **Live Videoconferencing:** The backbone of most Telehealth services observed in the Canadian context is live videoconferencing between two or more sites. This is supplemented by the use of diagnostic peripherals such as digital stethoscopes, otoscopes and patient examination cameras that are wielded by a clinician local to the patient, to provide clinical information to a consulting specialist at a distance.

- **Store-and-Forward (S&F) Solutions:** These solutions permit asynchronous transmission of images or video to a specialist clinician for interpretation. Emerging S&F solutions in Canada include applications in radiology, pathology, wound care, ophthalmology and dermatology.

- **Telemonitoring Solutions:** These solutions offer patients remote monitoring and transmission of clinical data to a centralized facility for review and action by a care team. Telemonitoring is often used for the management of chronic diseases.

The Center for Information Technology Leadership (CITL)\(^1\) taxonomy and maturity model for Telehealth Technologies, described in the following table, indicates that the Canadian environment is at Level 2, with some pockets of Level 3 maturity.

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<thead>
<tr>
<th>Maturity Level</th>
<th>Store-and-Forward</th>
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<td>Convergence of Telehealth functionality, including integration with interoperable-EMR systems; no distinction between Telehealth and traditional medicine</td>
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<td></td>
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<td>Convergence of EHR, Images, Video</td>
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<td><strong>Modern Telehealth</strong></td>
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<td>Hybrid with High-Resolution Video and Image</td>
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<td>2</td>
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<td>Low-Resolution Video</td>
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<table>
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<th><strong>Type of Data Transmitted</strong></th>
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<td>Images, Video</td>
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<td>Images, Low-Resolution Video</td>
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<tr>
<td>Electronic Transmission of Text</td>
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<tr>
<td>Traditional Reports</td>
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4.3 Telehealth from a Program Perspective

Simply providing the technology for live videoconferencing or image transfer does not result in improved processes to ensure that the right providers are available at the right time to provide

\(^1\) Center for Information Technology Leadership, 2007.

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the correct services to the right patient. The capability to coordinate these kinds of health care processes is the ambition of the Telehealth program.

In the Canadian context, Telehealth programs support integrated care processes over distances, both between providers as they deliver patient care, and between providers and their patients.¹ There are ancillary technology, process and governance aspects to this:

- Many jurisdictional Telehealth programs have implemented sophisticated scheduling systems that allow Telehealth schedulers to do the three-way match among patients and their health care needs, space and equipment, and available health care providers.
- Most Telehealth programs also encompass technology for education, collaboration and professional development for physicians, allied health care providers and students. Webcasts may be broadcast live or may be pre-recorded, and may be broadcast to many users in multiple locations.
- Some Telehealth programs have implemented provider registries to identify physicians and other clinicians, some have implemented linkages with local patient identification systems and some have implemented basic referral services between requesting and consulting providers.
- Most programs have developed the care protocols that make Telehealth services function properly. These include care protocols, referral protocols, training tools, emergency on-call protocols and care processes that allow the care processes to function smoothly between different organizations.
- Most Telehealth programs have an advocacy function and attempt to deal with the legislative, governance and process challenges that hold back the widespread adoption of Telehealth, including:
  - Legal liability, licensing and accreditation, especially when Telehealth services are delivered across jurisdictional boundaries.
  - Clinician perceptions of inadequate private and public health care payment structures that reflect added time and overhead associated with delivery of Telehealth services.
  - The requirement for new models of staffing, scheduling and care coordination, especially for Telehealth services that involve remote monitoring which requires job roles, such as “care coordinator,” and new care processes.
  - Financial justification and incentives that do not reward wellness or preventive activities sufficiently.
  - Limited integration of Telehealth data into electronic health record systems, which in turn limits the ability to easily share diagnostic and clinical information over distance in real time.
  - Privacy, confidentiality and security concerns.
  - Lack of sufficient bandwidth or Internet connectivity.

There are a variety of Telehealth programs in Canada. Some provinces have consolidated Telehealth into a centralized provincial program — notably Ontario and Manitoba. Others leave Telehealth to regional discretion, with little centralized coordination. Some programs, such as the Ontario Telemedicine Network, Telehealth Services at Alberta Health Services, MBTelehealth and some of the Aboriginal Telehealth programs have focused on process infrastructures such as scheduling, governance, operating procedures and some clinical guidelines.

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On a national level, Health Canada’s First Nations and Inuit Health Branch (FNIHB), working with First Nations, has undertaken substantial efforts during the past five years to deploy Telehealth services to improve access to community-level healthcare and services in a fully integrated fashion, with provinces where possible. FNIHB works with First Nations and Inuit regionally to access key services within established provincial and territorial Telehealth networks, forming partnerships for joint and integrated service delivery and cost support.

Also, Infoway has a Telehealth funding program that is focused on Aboriginal, official language minority, northern and remote communities.

### 4.4 Telehealth Use in Canada

Most Telehealth programs in Canada have measured their success based on the deployment and utilization of the technologies by different clinical services. There is no standard definition for “tele”-enabled health care services or a standard taxonomy for categorizing services. Different jurisdictions count Telehealth events differently and several, particularly those without a scheduling system, do not count Telehealth events. There are also a couple of provinces that do not count specific Telehealth event volume data because the sessions are integrated into mainstream delivery of care.

This report obtained its data from multiple sources, including the self-reported CTF survey, review of Telehealth program data, and Praxia-Gartner research. It provides a high-level estimate of Telehealth penetration overall and by clinical service. The data also provide the basis for identifying current benefits and for estimating potential future benefits. See Appendix 2 for a detailed explanation of methodology and data limitations.

**Figure 3. Total Number of Telehealth Sessions in 2010**

Source(s): 2010 CTF Pan-Canadian Telehealth Survey. Quebec data and Alberta administrative numbers were collected from key informant interviews with the respective Ministries of Health. Data for Prince Edward Island were unavailable.

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1 See Appendix 3: Details on Quantifying Benefits

Telehealth facilitates equitable access to specialized clinical services for rural and Aboriginal Canadians.
Analysis of reported data shows there were nearly 260,000 Telehealth events in Canada in 2010.\(^1\) As shown in Figure 3, jurisdictions reported 187,385 clinical events\(^2\), 44,600 educational events and 27,538 administrative events. In addition, nearly 2,500 patients were enrolled in telehomecare. Ontario has the largest absolute Telehealth program, with more than one-half of the Telehealth events reported.

**Figure 4. Total Number of Telehealth Sessions in 2010 — by 10,000 Population\(^3\)**

![Bar chart showing the total number of Telehealth sessions in 2010 by 10,000 population for different provinces in Canada.](chart)

Source(s): 2010 CTF Pan-Canadian Telehealth Survey. Quebec data and Alberta administrative numbers were collected from key informant interviews with the respective Ministries of Health. Data for Prince Edward Island were unavailable.

When looking at the number of events per 10,000 population, the Territories demonstrate the highest per capita penetration, illustrating how important Telehealth is in these vast, predominantly rural and northern areas. The graph also suggests that there is great potential for future utilization in urban areas.

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\(^1\) Most data from the CTF 2010 Pan-Canadian Telehealth Survey. Quebec data were collected from key informant interviews. Alberta administrative numbers were provided from a key informant interview. The data do not include PEI.

\(^2\) Clinical utilization does not include Telehomecare.

\(^3\) Most data from the CTF 2010 Pan-Canadian Telehealth Survey. Quebec data were collected from key informant interviews. Alberta administrative numbers were provided from a key informant interview. The data do not include PEI.
Figure 5. Proportion of Telehealth Services — by Clinical Service

Source(s): 2010 CTF Pan-Canadian Telehealth Survey. Quebec data were collected from key informant interviews. Data for Prince Edward Island were unavailable.

About 73% of measured Telehealth clinical activity was generated by a few clinical service areas: Mental Health (which includes addictions, forensic mental health, general mental health services, psychiatry, psychology and psychometry) (54%), Internal Medicine (15%) and Oncology (13%).\(^1\) The extent of use varies from small pilot projects to well-established clinical services. The distribution of services also varies among provinces/territories.

Other clinical services that include multiple sub-services are:

- Surgery and anaesthesia, which includes anaesthesia, general surgery, cardiac surgery, plastic surgery and vascular surgery;
- Paediatrics, which includes general paediatrics, paediatric surgery and anaesthesia, paediatric oncology, medical paediatrics, child/adolescents, paediatric rehab and physical medicine;
- Chronic disease, which includes diabetes, pulmonary (chronic obstructive pulmonary disease – COPD) and cardiology (congestive heart failure);
- Rehabilitation, which includes general rehabilitation, physiotherapy, occupational therapy and physiatry.

### 4.5 Telehealth Stakeholders

Telehealth is being driven forward by the needs of four main stakeholders:

- **Patients** can get easier access to primary and specialist care. Chronically ill patients can remain at home and receive the care they need. Patients are increasingly expecting to interact with clinicians online.

- **Clinicians** can use Telehealth to work more effectively or to offer services over a wider geographic catchment area. By interacting with more-experienced peers, clinicians can improve their knowledge and can extend the range of services they can offer. As well, having access to

\(^1\) See Appendix 3: Details on Quantifying Benefits
expertise from a distance might also decrease the feeling of professional isolation which, in turn, might contribute to increased retention of health professionals in rural areas.

- **Health care delivery organizations** use Telehealth to reduce travel costs, improve care quality, reduce the disparities between urban and rural areas, and as a tool to improve cost efficiency.
- **Health care systems** view Telehealth as a vehicle to deliver uniform access to high-quality services, drive down the costs of care delivery and overall management, and improve the skills and knowledge of their provider pools.

### 4.6 The Value of Telehealth

Different stakeholders have adopted different Telehealth applications for a wide variety of reasons. Some of the potential benefits include, for example:

- Making specialist services more accessible to patients
- Enabling closer monitoring of patients’ health and enabling more-frequent or rapid intervention
- Avoiding or delaying hospital admissions, nursing home admissions and physician office visits
- Using clinicians’ time more efficiently
- Improving the working lives of clinicians, for example, by enabling them to work from home
- Reducing travel costs and time for patients and clinicians
- Involving patients more closely in taking care of themselves
- Helping clinicians to share skills and expertise and encouraging mentorship from one provider to another
- Reducing the social inequality caused by the suboptimal geographic distribution of health services, especially between urban and rural areas
- Enabling health care delivery organizations to improve efficiency by eliminating loss-making medical services and outsourcing them to vendors or to other health care delivery organizations
- Managing the workforce and addressing resource gaps
- Connecting patients with their families and friends as they receive treatment and care.

A large body of literature exists which discusses efficacy, outcomes and benefits. Findings range from highly specific quantitative benefits all the way through to conclusions that no quantitative benefits could be identified.

Just as there is no standard definition for “tele”-enabled health care services, there is no standard set of definitions for measurable benefits from these services. Similarly named programs deliver different types of benefits, and differently named services or programs can be found that deliver overlapping or corresponding benefits. Benefits are never attained solely due to the Telehealth intervention, but depend on a wide range of variables including the overall health system, communities (identified by geography, ethnicity and language), payers, providers, and patients and their families and caregivers.

It is clear that Telehealth programs are actively implementing technologies and services, and clinicians are adopting new ways of delivering care at a distance. Telehealth is being driven by patients, clinicians, health care delivery organization and health care systems, which all receive a variety of different kinds of value from their Telehealth investments.
4.7 Canadian Experience in the Global Context

Based on Gartner research and input from the literature review, it seems that Canada is at the forefront in the use of some Telehealth technologies and service programs, and is on par with most western countries in the use of others.

Canada is a leader in the use of video technology for Telehealth. Gartner research indicates that there does not seem to be any other country where it is as well-developed and well-used. Some of the Australian States are also recognized as leaders, but their programs are grant funded and not a self-sustaining part of the system.

Canada is on par with most of the world with regard to home health monitoring. There are a number of successful pilots but no self-sustaining initiative (other than one reported in New Brunswick). England, Germany, Spain, Italy and Israel do have sustainable initiatives, and the United States Department of Veteran Affairs has been using this technology broadly for a number of years. It is the exception in this area.

While Canada has Telestroke programs in a number of facilities in a number of jurisdictions, the transaction numbers seem comparatively low compared to other jurisdictions. There are fewer Telestroke networks in Canada than the US, and a comparable number to advanced jurisdictions in Europe. Telestroke seems to be more advanced in the US than in most other countries. They have deployed well developed networks and software for documentation of the remote Telestroke consultation.

Not surprisingly, given the reimbursement and licensing structures, Canada does not have a large penetration of e-visits. E-visits are non-real-time digital consultations enabled by application software that permit structured, secure messaging between a patient and a provider for nonemergency consultations. Because they are structured messages, e-visits are distinct from e-mail. Shortages of physicians, the difficulty of actually scheduling a visit, the growing acceptance of online services and the need to reduce costs have led to increased interest in e-visits by health care providers, payers and governments. This is further fueled by the desire of clinicians to grow their revenue, improve efficiencies and increase patient satisfaction. In the US, pilot programs have evolved into complete application rollouts, success has been connected to the existence of an interlinked EHR and patient portal. In Europe, the Danish national health portal has offered an e-visit service for the past few years, although it does not appear to be heavily used. There is minimal usage of e-visits in other countries.

While there are a number Teledermatology programs using store and forward technologies in Canada, the penetration is not very high. The main challenge seems to be the lack of integrated EHRs. In Netherlands, a country doing close to 30,000 Teledermatology encounters a year, the key success factor points to the tight integration between the store-and-forward (S&F) technologies and the EHRs.

Recent deployment of some kiosk-based solutions makes Canada a leader in the area of Telepharmacy.
5.0 Current Benefits of Telehealth in Canada

Significant benefits have been realized across Canada through the provision of health care using Telehealth infrastructure, applications and processes. Hundreds of organizations and thousands of patients and clinicians have chosen to use Telehealth technologies and services to receive and provide care.

The Telehealth Benefits and Adoption Study team and Advisory Panel assessed the experience across Canada, considered global experience, and applied the Infoway Benefits Evaluation Framework to arrive at the following benefits hypotheses:

| Access | 1. Improves equitable access to specialized clinical services for rural and Aboriginal Canadians |
| 2. Enhances patient-centred care through provision of convenient services closer to home |
| 3. Saves patients time and avoids personal travel costs |
| 4. Improves timeliness of care |
| 5. Enables provincial and territorial responses to emergency management situations |
| Quality | 1. Supports better chronic disease management |
| 2. Supports application of best practices |
| 3. Improves knowledge and skill development in local care providers |
| 4. Improves care coordination |
| Productivity | 1. Improves provider efficiency by reducing provider travel time |
| 2. Avoids health system costs through avoided subsidized travel |
| 3. Reduces avoidable health system utilization |
| 4. Reduces unnecessary transfers |
| 5. Increases productivity by allowing providers to perform a higher volume of consultations |

A description of each of the categories and an assessment of each of the hypotheses follows. Appendix 3 provides detailed calculations and explanations of current and potential extrapolated benefits.

5.1 Access

Telehealth provides an alternative and/or supplemental vehicle for traditional medical referrals and consultations by beginning to address some of the barriers that limit access for patients or restrict health care professionals from providing effective and efficient care. By employing

“We have a very considerable Mennonite population... Having the individual there with family or friends certainly maximizes our ability to assess someone who has a first language different from our own.”

— Telehealth Coordinator
Telehealth technology, people who would not otherwise have access to health care due either to distance or a shortage of specialists in their region can still receive comparable care to those who have in-person access. Enabling access to care is one of the primary benefits of Telehealth.

By enabling access to geographically distant specialized resources, Telehealth supports access by:

- Improving equitable access to specialized clinical services for rural and Aboriginal Canadians
- Enhancing patient-centred care through provision of convenient services closer to home
- Saving patients time and avoiding personal travel costs
- Improving the timeliness of care
- Enabling provincial and territorial responses to emergency management and pandemic situations

## 5.1.1 Telehealth improves equitable access to specialized clinical services for rural and Aboriginal Canadians

As of the end of the 2009–2010 fiscal year, Canada had in place more than 5,710 Telehealth systems in at least 1,175 communities. Many of these systems serviced the 21% of the Canadian population who live in rural or remote areas, one-third of whom identified themselves as being of Aboriginal heritage. This included 284 First Nations communities and 46 Inuit communities served by Telehealth.¹

Most Canadian Telehealth organizations reported that they focus on providing services to rural, remote and northern populations. In fact, most of these organizations felt that at least 50% of the clinical Telehealth consults were for these populations. With this assumption, then, an estimated 93,693 Telehealth consults were performed for rural and remote Canadians.²

Telehealth technologies assisted in extending both basic and specialist health services and health promotion and disease prevention to these underserviced areas, including First Nations and Inuit communities. Without Telehealth, the distance from a specialist and the difficulty and time to obtain a specialist consult would have prevented access to these services altogether.

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¹ See Appendix 3: Details on Quantifying Benefits

² ibid.
As well, Many Telehealth consults were for therapies that required ongoing access. While an occasional inconvenience to travel once or twice for specialist care may be tolerated, ongoing consultations that require multiple sessions may not be at all possible, with associated disruptions to life, work, time and money. In oncology, for example, Telehealth services are used to perform follow-up visits in the five years after patients have completed treatment. The inconvenience of making travel arrangements for these appointments may discourage some patients from complying with the need for these visits. Telehealth may therefore enable higher compliance rates with follow-up visits which, in turn, may reduce the concomitant risk of undetected relapse or secondary disease.

5.1.2 Telehealth enhances patient-centred care through the provision of convenient services closer to home

The Telethoracic surgery service is provided regularly from Kelowna General Hospital to patients in seven Interior Health sites, plus an additional three sites that provide services on an as-needed basis. The program also connects to up to nine northern health sites.

In 2009, an estimated 3.87 million kilometres of patient travel were saved for 5,433 patients, because a return trip was avoided.

For a cancer patient living in Masset, British Columbia, located on Queen Charlotte Island, travelling to the cancer centre in Vancouver could mean a six-hour ferry ride to Prince Rupert, followed by a 15-hour ferry ride to Port Hardy, or a $400 return flight to and from Vancouver, plus accommodations and incidental expenses. The prospect of making one such visit to a specialist is daunting, and in some cases impossible if 20 to 30 visits are required for follow-up care. There are countless stories of similar challenges for Canadians who need to travel to access care.

“The use of Telehealth at the regional cancer program has improved our ability to care for our regional patients across the vast geographical expanse of Northeastern Ontario.”

—Regional Hospital CEO
Margaret, 67, has Alzheimer’s disease. Her 70-year-old husband Frank is her primary caregiver. The couple lives in Red Lake, the most northwesterly municipality in Northern Ontario.

In the past year, Frank has required care himself. Through Telehealth, Frank was connected with three different specialists in three different communities without having to travel outside of Red Lake. As a result, respite or alternate arrangements for Margaret did not need to be made.

When Margaret was admitted to the hospital last spring, a family videoconference visit was arranged so that her daughter, a resident of Sudbury, could visit virtually. The family was able to share personal time together and discuss discharge plans.

By using Telehealth, patients can receive the care and services they need at a health care facility located closer to where they live. Surveys of Telehealth patients demonstrate that the majority of patients who were treated using Telehealth found it easier to see their provider with Telehealth than in person. Most patients also agreed that Telehealth allowed for more regular follow-ups with their providers.¹ It helps patients get care without having to make additional child care or elder care arrangements.

Telehealth also facilitates convenient, patient-centred access to care in less-obvious ways. It enables caregivers who are looking after sick, immobile relatives to obtain services without having to travel and find alternative care arrangements. Patients and their families can get easier access to educational and therapy events to help them self-manage. It provides better access to services for people with different cultures or languages.

5.1.3 Telehealth saves patients time and avoids personal travel costs

Providing access to needed care closer to home provides a range of patient-centred benefits, not the least of which is a reduction in time, costs and inconvenience due to travel. In some jurisdictional surveys, more than 85% of Telehealth coordinators agreed that Telehealth improved the convenience of care to their patients, citing less travel time and greater cost savings. This was particularly true for winter health care visits, for the elderly, for sick or immobile Canadians, and for Canadians in low-income brackets.

¹ See Appendix 3: Details on Quantifying Benefits, Section 11.2 Telehealth enhances patient-centred care through provision of services closer to home.
Telehealth patients reported avoiding return trips of between 200 and 712 kilometres for each Telehealth event. In one study alone, more than one-half of the respondents reported avoiding a return trip of more than 500 kilometres per Telehealth event.¹

By applying an assumption of 500 kilometres per trip to the estimated 93,693 rural/remote patient events, Canadians living in these areas avoided an estimated 47 million kilometres of personal travel. This is equivalent to approximately 470,000 hours of driving time and 54 person-years in a car. The use of Telehealth also has green benefits, as 47 million kilometres in a car equates to about 5.5 million litres of gas saved, and almost 13 million kilograms of reduced CO₂ emissions.

In addition to avoiding travel time and distance, patients avoid the costs associated with travel. Costs include expenses for gas, parking, flights, board and lodging, and travel and arrangements for caregivers or family members. In one jurisdictional Telehealth survey, 66% of respondents reported they had saved money by using Telehealth.² Travel costs may even be prohibitive in some cases; there are patients who may not receive the care they need simply because they cannot afford the time and cost of travel.

According to Telehealth surveys, patients reported avoiding between $400 and more than $1,000 per return trip.³ By using the assumption of $750 per trip (which is just over the halfway point between $400 and $1,000) and applying it to the 93,693 rural patient events last year, Canadians living in rural regions avoided an estimated $70 million of personal costs due to the availability of Telehealth. This is an underestimation because it does not include urban patients who may also save money, albeit less. As well, this estimate does not include the cost of time off work.

¹ See Appendix 3: Details on Quantifying Benefits, Section 11.2 Telehealth enhances patient-centred care through provision of services closer to home.
² See Appendix 3: Details on Quantifying Benefits, Section 11.3 Telehealth avoids patient costs through avoided travel costs.
³ See Appendix 3: Details on Quantifying Benefits, Section 11.3 Telehealth avoids patient costs through avoided travel costs.
5.1.4 Telehealth improves the timeliness of care

Receiving timely care not only lessens the burden of uncertainty on patients, but it may also influence the patient’s condition and outcome. Through its processes, referrals and relationships, the use of Telehealth in some jurisdictions has resulted in improvements to the delivery of more-timely care.

Improvements in timeliness of care are service-dependent. For some clinical services, Telehealth consultations are no different from face-to-face consultations. As a result, patients using the Telehealth services may not experience changes in the timeliness of care. For other Telehealth services, however, the use of centralized and improved scheduling processes could lead to dramatic improvements in the timeliness of care. Eighty percent of respondents to one Telehealth survey reported that Telehealth allowed them to see the health care provider much sooner than if they had waited to see the clinician in person.

More-timely care was most apparent in the cases of dermatology and ophthalmology. Patients requiring consultations from dermatologists and ophthalmologists must contend with a scarcity of resources and long wait times. In Canada, the average wait time to see a dermatologist is 7.1 weeks for the initial visit and 5.3 weeks for a follow-up visit.1 Challenges to see a dermatologist or retinal specialist are more pronounced for patients who live far away from an urban centre, where most specialists tend to be located.

Using store-and-forward (S&F) solutions, retina or skin images are captured and sent electronically to consulting specialists for their review and assessment. Not only do patients avoid waiting for a face-to-face visit, but ophthalmic specialists or dermatologists review images at their convenience.

Wait-time reductions were reported by some Teleophthalmology and Teledermatology programs. Wait times for Teledermatology were reported to be reduced to no more than 10 days, and frequently only two days; wait times for Teleophthalmology were observed to decrease from about 25 days to less than two days.2 Other international jurisdictions have reported similar findings.3

1 See Appendix 3: Details on Quantifying Benefits, Section 11.4 Telehealth improves timeliness of care.
2 Ibid.
3 A 2008 University of California–San Francisco study found that skin cancer Teledermatology patients completed their consults in four days, on average, vs. 48 days for conventionally referred patients. Journal of the American Academy of Dermatology, August 2008.
A number of other disciplines reported more-timely care in a variety of care settings.\(^1\) The use of Telestroke allowed for timely intervention for stroke patients. Mental health crisis teams reported that emergency mental health services were provided at the location where the patient presented, rather than transferring the patient to another emergency department. Wait times for crisis services were reported to be reduced from 48 hours to two hours. As well, wait times for home visiting nursing staff to access wound specialists went from three weeks to 48–72 hours.\(^2\)

5.1.5 Telehealth enables provincial and territorial responses to emergency management situations

The ability for Telehealth to connect multiple providers in different geographic locations is especially useful in cases of pandemic or outbreak. In these situations, the provision of accurate and timely information and knowledge is crucial. In this way, Telehealth serves as a vehicle for mobilizing a system-wide response to urgent public health situations.

Several Telehealth programs were used quite extensively during the SARS outbreak (2003) and then during the H1N1 influenza outbreak (2009).\(^3\) Most programs reported using webcasting and mass videoconferencing facilities to educate clinicians about the influenza and its likely course. In Manitoba, it was reported that the rebroadcasting of World Health Organization broadcasts in real-time to remote providers help them to feel as connected and educated as their urban counterparts. First Nations Chiefs from Northern Ontario and Manitoba used Telehealth to engage and plan for H1N1 in their communities.

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\(^1\) Ibid.

\(^2\) See Appendix 3: Details on Quantifying Benefits, Section 11.4: Telehealth improves timeliness of care.

\(^3\) See Appendix 3: Details on Quantifying Benefits, Section 11.5 Telehealth enables provincial and territorial responses to emergency management situations.
Beyond providing educational support for clinicians, Telehealth also demonstrated its effectiveness to connect patients with their families during emergency situations. For example, during the H1N1 influenza outbreak, Thunder Bay Regional Health Sciences Centre (TBRHSC) and Keewaytinook Okimakanak Telemedicine (KOTM) used Telehealth to provide Televisits for First Nation families in Northwestern Ontario who were unable to be at their loved ones' bedside.

5.2 Quality

The improvements in timeliness of care for stroke or mental health patients are not only access improvements, but also an improvement in the quality of care. Telehealth can be shown to enhance quality of care in the following ways:

- Supports better chronic disease management
- Supports application of best practices
- Improves knowledge and skill development in local care providers
- Improves care coordination

5.2.1 Telehealth supports better chronic disease management

Telehealth oriented toward chronic disease management has taken many forms, ranging from telephone support to monitoring technologies in the home. Typical disease focus areas include cardiac disease, diabetes, oncology, mental health and nephrology.

Telehealth services used to support chronic diseases have demonstrated success, both in improving the patient quality of life and in achieving better outcomes. In each of five different studies of Telehealth for managing chronic disease across the country, more than 70% of providers strongly agreed that quality of patient care was better. As well, in most patient studies, the vast majority of patients (typically more than 80%) reported being very satisfied. They felt that care was better, and that their quality of life was improved. Many patients reported that Telehealth improved their knowledge of their condition, their confidence in managing their condition and their ability

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“The value of extended family being a part of the bedside virtually means that they can come to terms with the reality faced by the immediate family and are better able to offer support and be a catalyst for healing.”

— Chief Joe Meekis of Keewaywin, speaking of the use of Telehealth during H1N1

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In New Brunswick, the implementation of the Telediabetes project in Zone 3 encouraged better self-management of diabetes and improved health outcomes. Reported benefits included:

- Increased frequency of testing / more-thorough monitoring for patients, resulting in better information and more immediate reinforcement
- Increased patient confidence in ability to self-adjust insulin levels based on increased feedback
- Testing occurring at different times of day
- Patients seeing the impacts of eating habits and exercising
- Patients feeling accountability to the observing health professional and/or a comfort level that someone is monitoring their results
- Better feedback on patterns of blood glucose levels with more frequent testing
- Health professionals having more confidence in accuracy of readings (compared to self-report logs)
to self-manage.

Evidence from a New Brunswick study demonstrated that education and monitoring led to patients spending less time visiting health care professionals and in hospitals, as well as demonstrated improvements in measurable clinical outcomes (e.g., 1% drop in mean A1C levels in the case of diabetes patients and a 63% drop in all causes of hospitalization).  

5.2.2 Telehealth supports the application of leading practices

Leading practices are tested, evidence-based and standardized practices that have proven to result in better outcomes. Measuring leading practices in care can be done using process measures (i.e., whether we provided the right care) or outcome measures (i.e., whether we achieved the result that the best care should produce). For example: a leading practice for retinal screening for diabetics is that diabetics should be screened every year for diabetic retinopathy; leading practices for wound care require regular monitoring and the type of dressing to use; leading practices in stroke care state that blood thinners (tPA) should be administered within three hours after an ischemic stroke.

There are multiple examples of leading practices being enabled through the use of Telehealth. Telestroke is perhaps the most compelling demonstration of the use of Telehealth services to achieve better patient outcomes through the application of evidence-based practices. The sooner the treatment is started, the less brain damage occurs. Due to the risk of secondary intracerebral haemorrhage, tPA administration must be preceded by rapid brain imaging and review by stroke experts to ensure that the stroke can be treated safely. Without Telestroke, the combination of imaging and neurologist review limits the effectiveness of this treatment to patients who are within 100 kilometres of a major hospital. Through teleconsultations, doctors at local hospitals can interface with stroke experts at tertiary hospitals and administer the tPA treatment within the crucial three-hour time frame. Various Telestroke programs in Canada have been able to treat about 20% of consultations with tPA, with outcomes comparable to patients treated at major hospitals.

In another example, Telehealth was used to demonstrate how to manage a surgical drain for a patient who returned home after surgery. Using videoconferencing, a nurse demonstrated how to open, close and replace the drain. Similarly, in a Quebec study, homecare nurses reported greater confidence in treating serious wounds when they could obtain assistance from a specialized physician via Telehealth.

Telehealth has also been demonstrated to improve patient outcomes both through improved diagnosis and through better treatment and follow-up care. Having access to highly specialized expertise allows for conditions to be diagnosed accurately, treatment to be delivered in a timely

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1 See Appendix 3: Details on Quantifying Benefits, Section 11.11 Telehealth supports better chronic disease management.

2 See Appendix 3: Details on Quantifying Benefits, Section 11.12.12 Telehealth supports application of leading practices.

3 See Appendix 3: Details on Quantifying Benefits, Section 11.12 Telehealth supports application of leading practices.

4 A 2008 study at University of California–San Diego found that more than 98% of patients in the Telehealth program who needed thrombolytics received them, compared to 82% in a telephone-only assessment.

5 Ibid.
way, and appropriate follow-up to be made to ensure successful recovery and rehabilitation. A University of California study found that a Telehealth consultation resulted in a change of diagnosis in 55.9% of dermatology cases studied and 36.9% of psychiatry cases. Changes to treatment occurred in 93.8% of psychiatry cases and 78.7% of dermatology cases. Clinical improvement occurred in 72.3% of psychiatric cases and 58.3% of dermatology patients.\(^1\) Similar experiences were reported by Canadian informants.

By providing the myriad of administrative and clinical services to health care providers and patients, Telehealth serves as a catalyst to the provision of standardized care and care based on best practices. It brings health care professionals together in a way they traditionally would not. This ongoing interaction between members of the care team leads to refined and consistent care practices, which also facilitate better health outcomes.

In addition to clinical best practices, several studies have demonstrated the diagnostic performance of Telehealth applications. For instance, Nielsen et al. evaluated the validity and diagnostic performance of virtual microscopy in routine histologic diagnosis of skin tumours.\(^2\) Similar studies have been published in Teleradiology. Further, Paré et al. indicated that a good level of accuracy and reliability of transmitted data was consistently reported in home Telemonitoring studies, and the process of data transfer was usually performed successfully in most cases with minimal technical problems and errors.\(^3\)

### 5.2.3 Telehealth improves knowledge and skill development in local care providers

> “I sent the referral to a consulting dermatologist [and] I got the response back much quicker. I was able to see what really works. It really opens the communication line between the family physician and the dermatologist.”

— Referring Family Physician

A corollary to the leading practices for patients brought about through health professional interaction is the increased opportunities for mentoring and skill development.

With Telehealth, physicians and allied health practitioners can consult with specialists more readily. The more these consultations happen, the more opportunities occur for knowledge and skill transfer. Increasing providers’ knowledge on specialty areas and treatments can lead to better utilization of local resources, better treatment, improved patient health outcomes and greater levels of provider satisfaction and retention of resources. These unstructured communications between the providers transfer expertise and encourage best practice. In one notable example, a Telestroke site, as result of the consultation and local skill development, developed its stroke treatment expertise to the point that videoconferencing with a consulting neurologist was no longer necessary.

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\(^1\) Changes in Diagnosis, Treatment and Clinical Improvement Among Patients Receiving Telehealth Consultations. [Source?]


In another example, Teledermatology has changed the way family physicians provide dermatology care. Improved access has meant that family physicians are more inclined to get a dermatology consult and less inclined to experiment with different, sometimes ineffective treatment. Consulting with dermatologists through Telehealth has allowed family physicians to continually build a repertoire of knowledge on effective treatments.¹

Similarly, Virtual Intensive Care Unit (VICU) participants felt that using Telehealth to consult with intensivists led to better knowledge transfer and feelings of increased confidence. For each case managed through Telehealth, the VICU participants felt that they gained experience and knowledge in managing patients locally.²

In addition to the natural knowledge transfer that occurs when clinicians with different expertise confer, Telehealth also contributes to education, training and mentorship of future, new and existing health care providers in other ways. In Canada, in the time period under study, there were 44,600 tracked educational Telehealth sessions:

- Videoconferencing capability allowed remotely located medical students and residents to participate in grand rounds, symposia and lectures in real time. They could also review previous sessions.

- The ability to engage with professors and peers when far away from campus allowed medical students and residents to develop social networks in their placement communities. This is a proven recruitment and retention strategy, which results in the willingness of new physicians to stay in the communities where they trained.

- Through the use of Telehealth, physicians connected to education events and avoided the need to travel and leave their communities and patients in their care. This has a positive impact on the retention and recruitment of health professionals in rural and remote areas, as well as First Nations and Inuit communities.

Grand rounds are a large and important part of continuing education for both physicians who are engaging in ongoing professional education and for medical students, residents and other care providers. Via webcasting, remotely located providers can participate in education events in real time.³ The ability to engage with professors and peers while located in rural communities helps medical students and residents develop social networks in rural communities, and encourage new physicians to stay in these communities as they begin their own practice. By supporting educational events for students and physicians, webcasting supports the placement of providers in rural communities, enables life-long learning by medical residents and physicians, and is a conduit for mentorship and skill development. Providing professional support and continuing education opportunities especially has positive impacts on the

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¹ See Appendix 3: Details on Quantifying Benefits, Section 11.13 Telehealth improves knowledge and skill development in local care providers.

² Ibid.

³ Ibid. One program reported a 73% increase in the use of webcasting for education during the last year.
recruitment and retention of health professionals in remote and isolated First Nations and Inuit communities.

5.2.4 Telehealth improves care coordination

Many clinical Telehealth events involve at least two clinician parties collaborating in the care of a patient. In these cases, Telehealth fosters multidisciplinary, team-based care and better integration and coordination of health system resources. In a number of jurisdictions, a Telehealth scheduling service is available, which promotes referral and resource matching. The service promotes traditional relationships and fosters new referral relationships by allowing clinicians to coordinate and connect with any participating clinician — not just their local referral physicians. Primary care teams reported that centralized Telehealth coordinators providing scheduling services cut down on administrative effort of their staff.

Through the development of referral networks, Telehealth programs have also been able to further develop standards of care related to referrals. Each new referral partnership includes a referral protocol that identifies the appropriate patient population and conditions, and information that is required by the consulting clinician. This greatly improves the timeliness and completeness of the referral, and the consultant has all the required information available at the time of the consultation.

Previously, Wallaceburg Police would transport patients requiring mental health assessments to the Chatham Hospital Emergency Department, where they would wait sometimes for hours until the patient had been treated and discharged, because they were responsible for then charging the person or transporting them back to Sydenham. With only four officers on duty, that places a huge demand on resources. The HELP team trained police officers to make use of the OTN videoconferencing facilities at Sydenham Hospital and to obtain the mental health services they need.

In addition, Telehealth solutions are also catalysts for non-traditional relationships. For example, mental health workers are collaborating with police officers using videoconferencing facilities either at the time of arrest or during bail hearings. This has reduced the need for transporting people in custody to hospitals for clinical assessments.

5.3 Productivity

Telehealth can also be viewed through the lens of productivity for organizations and for the health system. There are efficiencies that can be gained from Telehealth which, in turn, may be turned into direct savings for cost avoidance in the jurisdiction or the care delivery organization in question.

The evaluation team and Advisory Panel investigated five hypotheses about the benefits of Telehealth in the productivity category:

- Improves provider efficiency by reducing provider travel time
- Avoids health system costs through avoided subsidized travel
- Reduces avoidable health system utilization
- Reduces unnecessary transfers
Increases productivity by allowing providers to perform a higher volume of consultations

5.3.1 Telehealth improves provider efficiency through reduced provider travel time

The corollary of Telehealth enables patients not to travel to clinicians, allowing clinicians to practice at a distance. In some cases, providers travel to visit patients and, at times, to cover for the lack of specialists in rural and remote areas. Instances include providers who visit immobile patients or homecare or community-based patients in remote areas who generally would not be able to travel themselves.

Provider travel time affects the number of patients the provider can see and so has a direct impact on the overall utilization of the health care system. Time not spent travelling to patients or travelling to meet fellow providers for case conferences can be reallocated to patient visits.

Some key informants reported that participants prefer to use Telehealth rather than travel for meetings, especially during winter. There are also reported experiences of providers getting stuck in remote communities in bad weather and using Telehealth to link back to their urban practices. Telehealth services have also resulted in efficiencies for organizations who report using videoconferencing for staff meetings, executive director meetings and case management conferences. Telehealth has allowed more people to participate in events which would not have been possible, had they been required to attend in person.

While there were numerous anecdotal reports of providers saving travel time, the available measurable quantitative evidence of provider travel time saved is sparse and covers only a very small percentage of Telehealth providers. In the three reports of provider time saved, 25 clinicians saved 496 days of provider travel time that could be reallocated to more-productive activities.¹ Conservatively, this would mean that a provider can save 20 days annually from travel and could see approximately an additional 400 patients per year.

5.3.2 Telehealth avoids health system costs through avoided subsidized travel

Many Canadian jurisdictions have programs that pay for medically necessary travel. For example, Manitoba has the Northern Patient Transportation Program, Ontario has the Northern Health Travel Grant Program and Health Canada provides extensive medical travel grant funds as part of the Territorial Health System Sustainability Initiative.

By avoiding the need for individual patients to travel, Telehealth reduces medical travel subsidies or grants.

Travel grant programs differ widely in their eligibility criteria and payment terms. Using the Ontario formula and extrapolating to all rural physician visits, the savings in provincial and federally subsidized travel through current Telehealth programs was estimated to be $34 million.²

5.3.3 Telehealth reduces avoidable health system utilization

There is evidence to suggest that the use of Telehealth services results in a reduction in avoidable inpatient admissions, as well as reductions in ER visits. In this study, Telehealth

¹ See Appendix 3: Details on Quantifying Benefits, Section 11.6 Telehealth improves provider efficiency by reducing provider travel time.

² See Appendix 3: Details on Quantifying Benefits, Section 11.7 Telehealth avoids health system costs through avoided subsidized travel.
services that demonstrated such efficiencies were Telecrisis, Telestroke, VICU, Telehomecare and Teleophthalmology.

With Telecrisis services, local emergency departments can connect directly with crisis workers via videoconferencing. Based on the crisis worker’s immediate assessment, a decision is made on whether the patient can be safely sent home or whether the patient needs acute care services. If a crisis worker is not readily available, the patient would likely be kept in the local ER for extended periods or even be admitted so that they can be seen by a visiting psychiatrist the next day, or when available. Alternatively, the patient would be transferred to the nearest centre with a mental health crisis team.

With Telestroke, the initial care of a stroke patient is given in their local hospital, as opposed to being transferred to a regional stroke centre, facilitating the delivery of healthcare services in lower-cost-per-unit settings by delivering care in local community hospitals whenever possible. This type of analysis has been extended to the Canadian context. Estimated savings with appropriate administration of tPA have ranged from $600 per patient in the first year to a lifetime total of $3,800. The modelling study by Sinclair et al. estimated that, in addition to the economic savings, patients treated with tPA experienced an average net gain of 3.46 quality adjusted life years compared with a non-treated group. This type of care also has the added benefit to the health system of reducing the pressure on regional referral hospitals. Similarly, VICU, which connects local ICUs with larger ICUs, allows the local hospital to provide the required care to ICU cases that they would have normally transferred.

As well, Telehomecare has shown the greatest potential for improving health system utilization. The use of Telehomecare in the monitoring of patients with congestive heart failure (CHF) and chronic obstructive pulmonary disease (COPD) demonstrated reduced admissions and emergency department visits. This evaluation study found there were approximately 2,500 Telehomecare patients in Canada in the reported period, located primarily in Ontario, British Columbia, Quebec and New Brunswick. Through the patient education and the monitoring and reporting offered by Telehomecare systems, hospitals avoided an estimated $915,000 in unnecessary emergency department visit costs and about $20 million in inpatient costs due to unplanned visits and avoided admissions.  

“Telecrisis affects who cares for patients in the ER and how long they stay there. Without it, it would be non-mental health clinicians deciding how to manage these patients, potentially opting to transfer high-risk patients inappropriately, extending the length of their ER visit and causing two ER visits to happen. With Telehealth, the crisis worker can assess the patient directly, give good disposition, and eliminate the whole transportation or admission the patient is faced with.” — Telecrisis Nurse (crisis worker)

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2 See Appendix 3: Details on Quantifying Benefits, Section 11.8 Telehealth reduces avoidable health system utilization.
3 Cost efficiencies through Telehomecare are well-documented internationally. See, for example, Agency for Healthcare Research and Quality Healthcare Innovation Exchange, December 2010.
5.3.4 **Telehealth reduces unnecessary transfers**

Patients are transferred from one care setting to another in order to get access to scarce skills (e.g., specialists) or scarce equipment (e.g., diagnostic or treatment devices and services). Telehealth was hypothesized to reduce the number of transfers required by making the skills, knowledge and physical assets available at the patient location, rather than having to move the patient.

In Alberta, it was reported that stroke acute care by Telehealth resulted in a 38% decrease in transfers to tertiary sites, which led to net savings of approximately $390,000.\(^1\) Other available evidence is mainly anecdotal. In the case of paediatric visits, Telehealth programs in Alberta and Manitoba reported that transfer from remote neonatal ICUs are sometimes avoided if expert advice is available from a tertiary or quaternary centre. In the case of Telecrisis, some Telehealth programs reported the avoidance or reduction of duplicated efforts. That is, the assessment in the local emergency room location avoided a transfer and a second emergency room visit.

There is insufficient evidence to estimate current or future health system cost avoidance as a result of avoided transfers.

5.3.5 **Telehealth increases productivity by allowing providers to perform a higher volume of consultations**

There is some evidence to support the hypothesis that Telehealth can improve provider efficiency through shorter, more-efficient encounters and tighter scheduling. As well, some Telehealth programs reported cases where surgeons performed pre-operative consults and post-operative follow-ups by Telehealth to maximize operating room time at the remote site.

However, other studies showed that Telehealth consultations took longer than face-to-face consultations. Results from a study in the U.K. suggested that the average consultation times for both rural and urban patients increased by 30% (22 minutes instead of 16.8 minutes).\(^2\) This may be a more pervasive effect than reported, since, in most studies, setup and logistical times have not been considered in time calculations. These would adversely affect the overall encounter time, especially in the early stages of programs, as both providers and patients become comfortable with the new technologies.

Services using store-and-forward (S&F) applications such as Teleophthalmology and Teledermatology rely on asynchronous consultation, which does not require simultaneous scheduling of both the patient and providers. Key informants reported that this is greatly more efficient for them. Data from S&F Telepsychiatry implementations by the University of California suggested that such programs enable the consulting specialist to give an opinion on a patient in one-half the time that would be required in a face-to-face visit. With these implementations, consultations between family physicians and patients were captured on video and forwarded to psychiatrists for diagnosis.\(^3\)

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\(^1\) See Appendix 3: Details on Quantifying Benefits, Section 11.9 Telehealth reduces unnecessary transfers.

\(^2\) Loane, MA; Bloomer, SE; Corbett, R; Eedy, DJ; Gore, HE; Hicks, N; Mathews, C; Paisley, J; Steele, K and Wootton, R., Patient cost-benefit analysis of Teledermatology measured in a randomized control trial, *Journal Telemed Telecare* 1999; 5:1-3 doi:10.1258/1357639991932414.

\(^3\) Peter Yellowlees, MD; Don Hilty, MD; Alberto Odor, MD, Store-and-Forward Telepsychiatry, University of California–Davis, Sacramento, CA.
It has also been reported that Telehealth systems enable clinical staff to be in regular contact with larger member caseloads compared to standard telephonic models for individuals with complex, chronic conditions. On the patient side, each member is connected to the Telehealth system, is assessed, given feedback and positive reinforcement when needed — a model that is not feasible by traditional models of telephonic clinical management (because of personnel capacities necessary and related costs), even for individuals at high acuity levels.

5.4 Summary of Current Benefits

Results of this aggregation found significant utilization of Telehealth all over the country. Currently, there are 5,710 Telehealth systems deployed in at least 1,175 communities. In 2010, close to 190,000 clinical sessions were held. The result of this utilization has been demonstrated by a series of benefits in the access, productivity and quality categories.

More specifically, Section 5 of this report demonstrates the following Telehealth benefits:

Access

- Telehealth was used for mental health consults in 54% of the reported events, by internal medicine and cardiology in 15% of the events reported, and 13% for oncology.
- Almost 94,000 consults were done for rural Canadians in 2010.
- These Telehealth events saved Canadians living in remote places approximately 46,846,500 kilometres of travel, representing 54 person-years of travel, 5.6 million litres of gasoline and almost 13 million kilograms of CO2 emissions.
- With an assumption of $750 per trip for rural patients, Telehealth helped patients save approximately $70 million in personal travel costs.
- Some Telehealth programs demonstrated significant improvements to the timeliness of care received. S&F applications of Telehealth, in particular, reduced wait times for some dermatology programs from 7.1 weeks to 10 days, and frequently only two days; wait times for some Teleophthalmology programs were observed to decrease from about 25 days to less than two days. Other programs that experienced a decrease in wait times included Telecrisis, Telewoundcare and Tele-endocrinology.
- Anecdotal evidence suggested that real-time videoconferencing during the SARS and H1N1 outbreaks were essential to mitigate risks and deliver quality care. Telehealth solutions were also effective in connecting patients with their families and their providers during these times.

Quality

- Telehealth oriented toward chronic disease management has taken many forms, ranging from telephone support to monitoring technologies in the home. Programs in these areas demonstrated improvements in patient quality of life and in achieving better outcomes. More than 80% of patients reported satisfaction with these remote services, better capability to manage their care, and measurable improvements in clinical outcomes.
- There were numerous examples of how Telehealth also applied the use of leading practices. Examples of where Telehealth catalyzed the dissemination of leading practices include programs such as Telewoundcare to Telestroke to Teleoncology.
- An additional contribution of Telehealth was demonstrated through the engagement between physicians, thereby providing more opportunities for mentoring and skill development. This, in turn, contributes to increased provider satisfaction, and a positive impact on retention and recruitment of professionals, especially in northern, rural and remote areas, including First Nations and Inuit communities.
Productivity

- Some providers used Telehealth instead of traveling to see their patients. In the three reports of provider time saved, 25 clinicians saved 496 days of provider travel time that could be reallocated to more-productive activities. It was estimated that 20 days could be saved by clinicians annually.

- By avoiding the need for individual patients to travel, Telehealth reduced utilization of medical travel subsidies or grants. Savings in provincial and federally subsidized travel through current Telehealth programs was estimated to be nearly $34 million.

- As a result of the Telehomecare programs in Ontario, British Columbia, Quebec and New Brunswick, hospitals or health regions saved an estimated $915,000 in avoided emergency department visit costs and about $20 million in avoided inpatient costs.

In summary, actual Telehealth solutions across Canada resulted in cost avoidance of approximately $55 million over the course of one year.

The following table provides an overview of the hypotheses, findings and calculations used for the current benefits of Telehealth.

**Table 3. Summary of Current Benefits and Calculations**

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Current Benefits</th>
<th>Calculations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improves equitable access to specialized clinical services for rural and Aboriginal Canadians</td>
<td>5,710 Telehealth endpoints providing services to at least 1,175 communities</td>
<td># of clinical events:</td>
</tr>
<tr>
<td></td>
<td>284 First Nations communities served by Telehealth</td>
<td>= data collected from CTF survey</td>
</tr>
<tr>
<td></td>
<td>46 Inuit communities served by Telehealth</td>
<td>= 187,385</td>
</tr>
<tr>
<td></td>
<td>187,385 clinical events</td>
<td># of rural events:</td>
</tr>
<tr>
<td></td>
<td>93,393 rural clinical events (assumption of 50% of total)</td>
<td>Assume rural visits are 50% of the current visits</td>
</tr>
<tr>
<td></td>
<td>Approximately 109,625 physician Telehealth consults</td>
<td>= # of current Telehealth visits × 50%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= 187,385 × 50%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= 93,693</td>
</tr>
</tbody>
</table>

Physician Telehealth consults:
Data from Ontario were used in a benchmarking method for these calculations.

= # of ON physician consults ÷ ON % of population
= 42,425 ÷ 38.5%
= 109,625

Enhances patient-centred care through provision of convenient services closer to home

- Based on the 93,693 rural Telehealth consults:

  - 46,846,500 kilometres (km) saved
  - 5,551,353 litres of gasoline saved
  - 12,813,896 kilograms (kg) of reduced CO₂ emissions

  Travel distance:
  = # of rural consults × 500 km
  = 93,693 × 500 km
  = 46,846,500 km

  Gas:
  1 litre of gas = 8.5 km
<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Current Benefits</th>
<th>Calculations</th>
</tr>
</thead>
</table>
| Saves patients time and avoids personal travel costs | ▪ 468,465 hours in a car, which equals 54 person-years  
▪ $70,269,375 personal costs saved for travel | Travel time:  
Assume driving speed of 100 km/h  
= travel distance ÷ 100 km  
= 46,846,500 ÷ 100  
= 468,475 hours  
Person-years:  
= hours of travel ÷ (24 × 365)  
= 468,475 ÷ 8,760  
= 54  
Personal costs:  
Assume $750 per trip for rural patients  
= # of rural TH consults × $750  
= 93,693 × $750  
= $70,269,750 |
| Improves timeliness of care                      | ▪ Wait times for specialist consultations have decreased anywhere from 20–90% through the use of Telehealth  
▪ Some S&F applications for dermatology reduced wait times from 7.1 weeks to 10 days, and frequently only two days  
▪ Wait times for Teleophthalmology were observed to decrease from about 25 days to less than two days  
▪ Telecrisis, Telewoundcare and Tele-endocrinology also saw some reductions in wait times |                                                                              |
| Enables provincial and territorial responses to emergency management situations | ▪ Real-time connectivity between emergency coordinators was essential to mitigate risk and deliver quality care in time-sensitive and widespread situations such as SARS and H1N1  
▪ Telehealth solutions were effective in connecting patients with their families and their providers |                                                                              |

1 litre of gas = 2.325 kg CO₂  
CO₂ emissions:  
= gas saved × 2.325 kg CO₂  
= 5,511,353 litres × 2.325  
= 12,813,896 kg of CO₂ emissions
### Hypothesis

<table>
<thead>
<tr>
<th>Current Benefits</th>
<th>Calculations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quality Benefits</strong></td>
<td></td>
</tr>
<tr>
<td>Supports better chronic disease management</td>
<td>Telehealth program centred on chronic disease management demonstrated improvements in patient quality of life and in achieving better outcomes</td>
</tr>
<tr>
<td></td>
<td>More than 80% of patients reported satisfaction with these remote services, better capability to manage their care, and measurable improvements in clinical outcomes</td>
</tr>
<tr>
<td>Supports application of leading practices</td>
<td>Examples of where Telehealth catalyzed the dissemination of leading practices include programs such as Telewoundcare, Telestroke and Teleoncology</td>
</tr>
<tr>
<td>Improves knowledge and skill development in local care providers</td>
<td>Some Telehealth programs facilitated engagement between physicians, thereby providing more opportunities for mentoring and skill development</td>
</tr>
<tr>
<td>Improves care coordination</td>
<td>Telehealth fosters multi-disciplinary, team-based care, and better integration and coordination of health system resources</td>
</tr>
<tr>
<td></td>
<td>Telehealth solutions are also catalysts for non-traditional relationships</td>
</tr>
<tr>
<td><strong>Productivity Benefits</strong></td>
<td></td>
</tr>
<tr>
<td>Improves provider efficiency by reducing provider travel time</td>
<td>In the three reports of provider time saved, 25 clinicians saved 496 days of provider travel time that could be reallocated to more-productive activities</td>
</tr>
<tr>
<td></td>
<td>An estimated savings of 20 days of travel time through the use of Telehealth; this time could be used to see an additional 400 patients each year per physician</td>
</tr>
<tr>
<td>Avoids health system costs through avoided subsidized travel</td>
<td>Savings in provincial and federally subsidized travel through current Telehealth programs was estimated to be nearly $34 million</td>
</tr>
<tr>
<td></td>
<td>Days of travel saved:</td>
</tr>
<tr>
<td></td>
<td>Days saved per provider per year ÷ # of clinicians</td>
</tr>
<tr>
<td></td>
<td>= 496 ÷ 25</td>
</tr>
<tr>
<td></td>
<td>= 20 days</td>
</tr>
<tr>
<td></td>
<td>Additional patients seen:</td>
</tr>
<tr>
<td></td>
<td>Assume 20 patients per day</td>
</tr>
<tr>
<td></td>
<td># of days saved × 20 patients</td>
</tr>
<tr>
<td></td>
<td>= 20 × 20</td>
</tr>
<tr>
<td></td>
<td>= 400 patients</td>
</tr>
<tr>
<td></td>
<td>Subsidized travel savings:</td>
</tr>
<tr>
<td></td>
<td>= travel grant for distance + travel grant for accommodation</td>
</tr>
<tr>
<td></td>
<td>Travel grant for distance:</td>
</tr>
<tr>
<td></td>
<td>= distance for rural physician Telehealth consult × $0.41</td>
</tr>
<tr>
<td></td>
<td>= (number of physician events × 500 km) × $0.41</td>
</tr>
<tr>
<td>Hypothesis</td>
<td>Current Benefits</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Reduces avoidable health system utilization | As a result of Telehomecare programs in Ontario, British Columbia, Quebec and New Brunswick, an estimated $915,000 of avoided emergency department (ED) visit costs and $20 million of avoided inpatient costs were saved. | = (109,626 × 500) × $0.41  
= 54,813,000 × $0.41  
= $22,473,330  
Travel grant for accommodation:  
= # of physician rural Telehealth events × $100 (assumed)  
= 109,626 × $100  
= $10,962,600  
= $22,473,330 + $10,962,600  
= $33,435,930  
Data from Telehomecare Business Case  
Avoided ED costs:  
= # of patients × ED visits/year × ED visit avoidance × ED visit cost  
= 2,500 × 3.96 × 67% × $138  
= $915,354  
Avoided inpatient stays:  
= # of patients × average inpatient stays/patient × cost per inpatient stay  
= 2,500 × 1 × $8,000  
= $20,000,000 |
| Reduces unnecessary transfers           | While there is significant anecdotal discussion of the reduction in transfers, there is insufficient evidence to project future savings and benefits for the reduction of transfers.                           |                                                                                                                                                                                                         |
| Increases productivity by allowing providers to perform a higher volume of consultations | There is some evidence to support the hypothesis that Telehealth can improve provider efficiency.  
Examples of Telehealth disciplines that significantly benefit from S&F techniques include Teleophthalmology and Teledermatology.  
There are also reported cases in which specialist surgeons performed pre-operative consults and post-operative follow-ups by Telehealth in order to maximize their operating room time at the remote site — another example of improved efficiency. |                                                                                                                                                                                                         |
6.0 Projected Future State of Telehealth in Canada

The current use of Telehealth has already shown significant impact on the lives of Canadians, on the health system, and for providers. However, it is the future value of Telehealth that is most compelling.

The potential estimated activity and benefits of Telehealth were based on elevating current Telehealth activity to the median rate of usage in observed leaders. The median was calculated with reported volumes and benefits currently being achieved.

Through this method, it was estimated that Telehealth activity could reach 1.2 million consults and could yield significant quantitative and qualitative benefits.

More specifically, if all activity below the median were brought up to the median, the potential for Telehealth could include the following:

Access

- With an assumption that one-half of all potential Telehealth events are for rural consults, approximately 600,000 rural Telehealth events may occur in the future.
- These 600,000 events could avoid close to 300 million kilometres of travel, representing 336 person-years of travel every year, about 35 million litres of gasoline and 80 million kilograms of CO₂ emissions.
- Based on the estimated 600,000 events, rural patients could save more than $440 million in personal travel costs every year.

Quality

- Telehealth will continue to become an important part of the lives of patients living with chronic conditions. This will be true for all beneficiaries of Telehealth, though it will be especially true for rural patients, for many of whom Telehealth is not merely a supplement or replacement to current treatments, but instead represents access to health care that was not previously realistically available.
- The future potential quality benefits of Telehealth-enabled leading practices are widespread, but difficult to quantify in aggregate. To take one example only, 2,000 rural Canadian patients could have improved outcomes if Telestroke were adopted as a standard best practice across the country.
- Telehealth will continue to enhance the capability and capacity for education, training and mentorship of new and existing health care providers.

Productivity

- An estimated 300,000 face-to-face physician visits could be replaced with a Telehealth encounter, saving both providers and patients time and money.
- Avoiding the estimated 300,000 visits could save could save Canadian jurisdictions approximately $92 million in travel subsidies.
- The Canadian healthcare system could avoid $540 million in inpatient costs and $23 million in emergency department visit costs.
- Telehealth services that are focused on reducing vision loss (Teleophthalmology screening for diabetes and other services for diseases that result in avoidable blindness) could avoid $65 million in direct healthcare costs to Canadian governments.
As Telehealth solutions mature, this could lead to an increase in productivity of approximately 7% for clinicians who are able to provide care that way, leading to a potential savings of $10 million.

Increasing productivity through asynchronous technologies might save about $10 million in physician-equivalent costs.

Further detail about the estimated future activity and benefits of Telehealth, as well as calculations, are located in Appendix 3.

Historical data has shown that Telehealth has grown over the past five years at a rate of over 35% annually (see Appendix 4). If the future growth of Telehealth consults will continue to be between 20%–40% per year, the conservative projections outlined in the report could be achieved within a five- to 10-year time frame, as follows:

Figure 6. Years to Reach Estimated Future Number of Telehealth Visits

**Note: Timeframe needed to achieve projected patient enrollment in telehomecare is likely longer.

6.1 Projected Future State of Telehealth in Canada

The projections in this analysis are based on evidence of current programs and experience in Canada. The potential future benefits (both quantitative and qualitative) are likely to be much more extensive, based on structural changes to the way that Telehealth is deployed and the populations and health care conditions to which it is applied.

Over time, Telehealth will become another channel for health service delivery and education. Conducting encounters or consultations via Telehealth technologies will become as normal and everyday as current face-to-face office visits or in-person professional education sessions. Telehealth programs as they are currently constituted (providers of technology and facilitators of encounters) will develop into everyday processes for providing care. The technologies and processes will thus become more pervasive, since they will be more widely accepted and easier to conduct. They will also be applied to broader parts of the system, including urban patients and caregivers who will, with their care provider, choose to receive care in the home, or to conduct technology-mediated consultations rather than face-to-face consultations.
The wider penetration and broader acceptance of these transformational technologies, disciplines and processes will deliver significant benefits to the broad range of stakeholders, including jurisdictional healthcare systems, care delivery organizations, clinicians and other care providers, private and public payers, and patients and their families and caregivers.

As real-time connectivity becomes even more highly adopted by providers and coordinators, the benefit of using these systems will continue to grow, and additional groups will start to use them. Practice in the use of the systems will generate additional benefits, as standardized approaches will provide faster and more structured responses.

**Growth will be accelerated due to existing widespread global activity**

This projection of acceleration in adoption and penetration is based on technology trends and on the level of investment in process and technology, structural issues such as funding, and policies such as privacy and licensing. Governments around the world are investing in the acceleration of Telehealth programs. For example, the government of Australia recently announced an investment of AUS$400 million in Telehealth, comprising $352.2 million for Medicare rebates for online consultations, incentives for general practitioners/specialists and online training, and $50 million for a general practitioner after-hours helpline to include videoconferencing.¹

European governments are embarking on programs of radical cost-cutting in order to address their debt and deficit crises. As governments look to radical solutions, they are increasingly paying attention to Telehealth. There are a number of initiatives to develop standard practices and policy to enable reporting and measurement of outcomes and benefits.²

A November 2008 publication by the European Commission proposed a series of 10 actions grouped into the following three categories:

- Increasing the confidence and acceptance of Telemedicine services by users, in particular by encouraging provision and dissemination of Telemedicine’s effectiveness and cost-effectiveness
- Clarifying existing European Union (EU) legislation regarding Telemedicine services and encouraging member states to improve provision of Telemedicine services
- Solving technical problems such as the lack of adequate broadband infrastructure and interoperability of Telemedicine devices

The EU countries continue to make progress on these goals and are reporting and sharing experiences through such forums as the Med-e-Tel conference, and such organizations such as the International Society for Telemedicine & eHealth (ISfTeH).

In mid-2010 the European Coordination Committee of the Radiological, Electromedical and Healthcare IT Industry released a Telemedicine Toolkit and, in it, remarked that “it is clear that hundreds of pilot projects now exist in all member states — and that Telemedicine is not yet entitled to be cited at the national level in any one of them. The situation is evolving fast: the


² One such example is the TeleSCoPE Project conducted by the Health Design and Technology Institute Coventry University–United Kingdom to develop a Telehealth Services Code of Practice for Europe, under the EU Health Programme. It will address Telehealth (embracing Telecare) in relation to response and event recognition, medication compliance, disease management, care management, and health and fitness/lifestyle issues.
number of legal barriers is falling and professionals are increasingly interested — occasionally even becoming promoters.”

The American Telemedicine Association has established a Training Program Accreditation process. In doing so, ATA seeks to “accredit telemedicine/telehealth/e-health training programs to improve the practice of telemedicine in various clinical applications and programs.”

Canada also has an accreditation program that includes telehealth standards of practice. In 2006, Accreditation Canada, along with the support of Canada Health Infoway, enhanced its accreditation program to include specific telehealth criteria in the standards to support excellence in the delivery of services using telehealth. The criteria were guided by the National Advisory Committee of Telehealth experts and were developed based upon the National Initiative for Telehealth Framework of Guidelines (NIFTE) standards published in 2003.

In addition, several of the US government’s health care reform initiatives include incentives for using Telehealth, including:

- Encouraging health care providers to manage care across multiple settings
- Introducing payment for value rather than activity through Accountable Care Organizations
- Mandating “meaningful use” of IT for chronic disease management

These effects will help to drive momentum around the world due to broader availability of success stories. They will help to facilitate the maturity of policy and practice, and to mature Telehealth infrastructures and applications.

**Growth will be accelerated due to technology advances**

Recent Gartner research into Telemedicine shows that advances in technology such as digital imaging, mobile communications and sensors are enabling accelerated development of Telemedicine applications. Although a couple of Telemedicine applications have reached maturity, most are in the difficult process of “crossing the chasm” between pioneer sites and widespread adoption.

Appendix 1 provides the Gartner Telemedicine Hype Cycle, which describes and depicts the progression of Telemedicine applications toward maturity. Based on the projections of the Gartner Hype Cycle Analysis, the following Telehealth applications are, or are close to, consistently delivering recognized benefits — Teleradiology, e-visits, remote ECG monitoring, remote ICU and Teledermatology.

In addition, Gartner research across the globe projects the following projections regarding years to mainstream adoption of specific technologies:

---

While this is a projection of mainstream adoption across the globe, based on the evidence presented by jurisdictions, it seems that the Canada can demonstrate a more rapid advancement toward broad adoption of many of these technologies and, thus, likely earlier mainstream adoption.

**Growth will be accelerated due to advances in consumer technology and consumer behaviour**

Consumer technologies such as mobile devices, collaboration and communication, and social networking platforms are becoming more and more pervasive and are providing tools and technologies to conduct a wide range of activities previously constrained by large capital outlay and the need to be present at a point of service.

Much has been written about how this has changed consumer behaviour and consumer expectations in many different domains. Health care will be no exception. The evaluation team expects that there will be increasing demand for the ability to choose a technology-mediated encounter rather than a face-to-face encounter. Once barriers such as funding, privacy and licensing are overcome, this will make Telehealth encounters more pervasive across a much broader geography and population. Telehealth encounters will increase both in rural and in urban settings, and will cover a broader spectrum of health care encounters.
7.0 Critical Success Factors for Telehealth

The benefits of Telehealth are very clear. The qualitative benefits have been shown to include the delivery of higher access, better quality of care, and better quality of life for providers and patients and their families. The quantitative benefits include delivery of lower costs for the health care system, efficiencies and lower costs for practitioners, lower costs for patients and their families, and reduced negative societal impacts (such as the cost of absenteeism, and greenhouse gas emissions).

However, the evidence shows that there are a number of challenges that Telehealth programs and participants need to overcome before Telehealth can grow exponentially and become mainstream. These challenges, which can be thought of as key success factors for Telehealth to achieve mainstream penetration and benefits realization, are:

- Clinician reimbursement
- Professional development
- Technology implementation
- Licensing and other regulatory issues
- Governance and policy
- Change management and adoption
- Benefits realization and measurement
- Funding for implementation and transition to the mainstream

Clinician reimbursement

Telehealth use and uptake by providers has been higher where relevant incentives are in place. Encouraging adoption requires the addition of financial and practice incentives. In many environments, this will require a restructuring of the reimbursement regime to recognize and reward behaviours which avoid face-to-face in-person encounters while still maximizing prevention, care management and direct care provision.

A critical success factor for increasing adoption and deployment of Telehealth is a transparent reimbursement model for institutions, physicians and allied health care providers.

Professional development

Telehealth requires new job roles and new care processes. Successful programs have introduced new administrative roles and skills in areas such as care co-ordination and scheduling. In addition, they have supported practitioners to develop skills in facilitation of care-from-a-distance for on-site care providers, and also skills in interaction at a distance for those who are remote.

These skills and processes are required to enhance the interaction among providers who are jointly engaged in a Telehealth encounter, among providers who complete sequential consultations for the same patient, and among providers who are communicating and collaborating around a store-and-forward (S&F) diagnostic result.

A critical success factor for increasing adoption and deployment of Telehealth is the recognition that new roles and skills are needed and that training, education and in-service support be provided to develop these new skills and insights.
Technology implementation

In order to be successful, current programs have developed strong capabilities for implementing and operationalizing very complex technologies. Successful implementations currently provide high availability, and reliable and consistent network quality of service.

Implementation of these underlying technologies is non-trivial, and continues to require careful attention. There is a large body of experience and knowledge that new Telehealth initiatives can draw upon across Canada, to deploy underlying technologies such as networks, teleconference and videoconference equipment, tele-enabled diagnostic devices, scheduling solutions and even home-monitoring solutions.

There is less evidence in Canada, but more evidence in other jurisdictions, that adoption is enhanced through integration of Telehealth devices, Telehealth solutions and Telehealth data into an interoperable electronic health record (iEHR). Addressing this most important remaining technical challenge, will allow providers and patients to make decisions and develop and manage care plans prior to, during and after a Telehealth encounter. It will make the results of the Telehealth encounter available in a computable and actionable format to all other relevant care providers. This level of integration facilitates the move of Telehealth into the mainstream of care provision.

Integration with hospital EHRs, a jurisdictional iEHR and physician electronic medical records (EMRs), to provide comprehensive information and full-featured clinical decision support, is a critical success factor to Telehealth adoption and benefits realization.

Licensing and other regulatory issues

The ability for individuals to provide care across jurisdictional boundaries has been shown to enhance adoption and deployment of Telehealth. Lessons can be learned from such provinces as New Brunswick, which has developed streamlined processes for physicians from other provinces to provide services in the province.

In particular, physician licensing for services provided across jurisdictional borders allows broader reach for physicians and greater access for patients. Without addressing this issue, the Telehealth solution will never be able to achieve its full potential to enhance access.

In addition, Canadian jurisdictions have developed policies and processes for authorization, authentication, privacy, security and consent for their jurisdictional EHR strategies. These need to be revised and deployed to address the special requirements of distributed Telehealth solutions and resulting broader dissemination of protected health information.

Governance

Some jurisdictions have developed a central organization (e.g., Ontario, Manitoba); other jurisdictions have developed decentralized organizations focused on a region or on a disease class (e.g., Vancouver Island Health Authority or New Brunswick Empcare).

It is not clear that there is one right solution; however, there is evidence that a centralized organization generates greater critical mass and can be more efficient. It seems that the centralized model allows jurisdictions to more effectively leverage capital investment and human resources, and to achieve higher reuse of processes, sharing of knowledge and experience.

In the long term, governance structures for Telehealth need to be effectively integrated with governance structures built around other technologies, such as electronic health records. In these cases, continuing efforts to align with broader health system initiatives must be a central aim of the governing body.
Clear and transparent structures are necessary for deciding on investment priorities, determining service scheduling and service delivery protocols, and for facilitating the alignment of demand and supply. It is important that the governance structure be well-thought-out and address key operating principles, that it supports the jurisdictional model of care, and is aligned to the overall operating and governance model of the jurisdiction.

**Change management and adoption**

Successful Telehealth implementations have effected changes in the workflow of individual providers and of health care organizations. Processes for planning for an encounter, the encounter itself, and encounter follow-up often require more patient engagement and require more discipline and structure on the part of providers.

Adoption is enhanced if these new workflows and processes are carefully designed with all stakeholders in mind (including not only the providers but also the administrative staff, patients and their families). In addition, adoption is enhanced through effective communication, education and training of all of these stakeholders. Training and communication are required on the direct benefits that are to be achieved by each stakeholder, on the new workflows and processes, on how best to share knowledge, and on how to reduce or cease older, less-efficient behaviours.

A critical success factor for adoption and deployment of Telehealth is the ability to integrate Telehealth seamlessly into the care process. Like all applications of technology in healthcare, the focus should be on designing an effective intervention and applying a select technology in support of those care processes and interventions.

**Benefits realization and measurement**

Benefits realization is the process of organizing and managing change so that the potential benefits arising from an investment are actually achieved and acknowledged. Implementing a benefits realization program is a critical success factor for mainstream Telehealth adoption and use in all jurisdictions.

The capabilities required for an effective benefits realization program are:

- To identify and quantify projected benefits of a Telehealth-enabled process
- To implement the Telehealth-enabled process so that the benefits are achieved, and ensure processes are established to optimize benefits over time
- To measure and demonstrate the benefit
- To evaluate and report on the intended benefits and unintended consequences of the Telehealth-enabled processes, for the purpose of communication and of optimizing adoption and benefits over time

Articulation of benefits and the value proposition to each stakeholder group (including funders, clinicians, administrators, researchers, and patients and their families) needs to be explicit and resonate with those users to encourage long-term buy-in and support.

**Funding for implementation and transition to the mainstream**

All Telehealth programs studied were funded largely on a time limited project basis and many had challenges with sustaining operations after the end of project, with evergreening their technology assets, and with funding the change management activities necessary to effect the necessary systemic changes. Those that did achieve the uptake of the technologies and the new ways of delivering care had sufficient financial and human resources to:
- Fund projects in early stages of production to obtain critical mass
- Conduct organizational support and change management to move Telehealth services into ongoing operations
- Evergreen technology assets

Financial and human resources are required to both do initial implementation and also design and achieve systemic change. These resources are required to assist both projects starting and other projects which are effectively in production to obtain the critical mass and ongoing organizational support to move them into ongoing operations.
8.0 Recommendations

The Telehealth Benefits Aggregation Study has demonstrated that Telehealth is being implemented by all jurisdictions across Canada and is being used by a wide variety of clinicians to deliver care to Canadians every day. Currently, Telehealth-enabled clinical services produce access, quality and productivity benefits for many Canadians, especially those who live in rural or northern areas, who are of Aboriginal descent, who are part of minority language populations, and whose health or circumstances prevent them from travelling for care. The study shows that the current benefits could increase significantly through greater penetration and adoption of currently available technologies and services.

In the future, these benefits could expand exponentially. Consumer and mobile technologies will make care at a distance more feasible and expected. Tele-enabled care processes can become the mainstream way of delivering service to all patients and their families, not only to those who are at great distances from health care facilities and care providers.

The benefits aggregation study team makes the following three key recommendations to facilitate the realization of these significant benefits:

- Encourage adoption of Telehealth processes and technologies in mainstream care delivery
- Measure and report on benefits realized
- Provide funding for implementation and transition to the mainstream

**Encourage adoption of Telehealth processes and technologies in mainstream care delivery**

Canadian jurisdictions have proved themselves to be successful at encouraging grassroots Telehealth adoption. With the possible exception of cancer care, there are, however, very few Telehealth-enabled clinical services that have been adopted into mainstream use. Some jurisdictions have started to develop sustainability plans; however, they are still in their infancy. Federal and jurisdictional partners should work together to encourage migration of Telehealth from a technology solution to an integrated part of the overall care delivery continuum. This could include such activities as:

- Developing and sharing stakeholder value propositions to encourage adoption and utilization by care providers, patients and administrators
- Identifying clinical populations and disease classes that could take best advantage of mainstream Telehealth delivery, including:
  - Determining the business and technology drivers for those services
  - Defining patient populations and provider populations that will benefit from the service
  - Providing generic clinical and administrative process templates related to the services which could be tailored to fit specific jurisdictions, services and care delivery environments
- Developing guidelines and tools to determine and resolve clinical governance issues
- Developing guidelines, tools and case studies which can be used by jurisdictions to assess and develop their own transparent reimbursement model to encourage and compensate the provision of tele-enabled care
- Developing guidelines and tools for the definition and development of necessary new roles and skills
- Developing guidelines and tools to address intra and inter-jurisdictional regulatory issues associated with providing the Telehealth-enabled services
Maintaining and updating existing toolkits for creating tele-enabled care processes such as process design, education and training materials, communication materials, data sharing agreements, privacy and consent tools, documents and processes

Defining governance models for prioritizing investment, setting direction, developing policy, and designing operating and management models for Telehealth

- This evaluation has demonstrated that jurisdictions with centralized Telehealth governance have developed greater critical mass than those jurisdictions without centralized governance

**Measurement and reporting of benefits realization**

This study has demonstrated the variety of benefits that accrue to different Telehealth stakeholders. Federal and jurisdictional partners should continue to refine Infoway’s Benefits Evaluation framework and hypotheses, and establish performance metrics, realistic targets and methods for establishing whether Telehealth programs are achieving success.

In addition, Infoway, together with its jurisdictional stakeholders, may wish to conduct jurisdictional Telehealth evaluation activities including:

- Evaluations of clinical adoption and its relationship to funding and regulatory barriers
- Formative evaluations that continuously improve Telehealth implementations
- Summative evaluations that describe both the intended impacts of telemedicine-enabled clinical services at the end of an adoption period and unintended benefits or consequences once the clinical service has been adopted
- Further evaluation of the quality impact of Telehealth services is required

**Provide funding for implementation and transition to the mainstream**

The current aim of Infoway’s Telehealth program is to increase access to health care for all Canadians, including Aboriginal, northern, rural, remote and official language minority communities to result in access to timely health care and reduced wait times. Infoway has invested almost $100 million in solutions that improve the coordination of health services, and reduce patient and provider travel time and costs to access and deliver services. Infoway has largely invested in the deployment of technology projects and some development of organizational structures.

Infoway has recently considered the following items for its ongoing Telehealth Strategy: extend Aboriginal videoconferencing, Telepathology services, Teletriage-EHR integration and provider-led remote monitoring. Each of these is an extension of deployment of underlying technology.

While there is a need for additional infrastructure across the country to achieve the projected benefits, there is a greater need for existing programs to transition from independent programs or projects into the mainstream of care delivery. There is also a need to develop new programs and services. These new services will deliver value by utilizing the existing infrastructure and processes to those currently receiving Telehealth services and to other population groups and communities who are currently not considered candidates for Telehealth services.

Given the success achieved by current projects and the widely available benefits, investments in Telehealth should be directed toward sustainable technology infrastructure and, even more, at supporting jurisdictions to achieve transition of Telehealth services to mainstream care delivery. This could include investments in supporting jurisdictions to achieve changes to their reimbursement and licensing policies and practices, development and implementation of...
necessary privacy and security processes and policies, and development and deployment of new skills and standards of clinical and operating processes.
9.0 Appendix 1: Telehealth Service Descriptions

Telehealth uses a myriad of technologies and supports communication among and between providers and their patients through two delivery methods: synchronous and asynchronous delivery.

“Real-time Telehealth involves the use of information and communication technologies (e.g., a minimum set of video cameras, computer displays and a secure high-speed Internet connection) to enable individuals to communicate live (or synchronously) over long and short distances.”

“Asynchronous Telehealth refers to the storage of clinically important digital samples and relevant data (e.g., pictures of moles or surgical wounds and radiological images) from any location and forwarding them to a health care professional at a distant site for assessment at a convenient time.” This is called store-and-forward (S&F) technology.

The following section describes the Telehealth services that have been included as part of the Canada Health Infoway Pan-Canadian Telehealth Benefits Evaluation Study.

9.1 Telemental Health

“Telemental Health may be defined as the use of electronic communications technology to eliminate or reduce geographic barriers to receiving psychiatric and other mental health services provided by many mental health providers.”

Services are provided by organizations and individual physicians in such therapeutic areas as:

1. General psychiatric and case management services (Telepsychiatry)
2. Crisis management (Telecrisis)
3. Chronic pain management
4. Forensic psychiatry
5. Addictions

Telepsychiatry services allow a single psychiatrist to assess a number of patients and provide an assessment and care plan which can be managed and administered by the patient’s family physician in a shared care model. Telepsychiatry has been shown to provide valuable services to patients in remote communities and affords the opportunity to resolve inequities in access to services.

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4 Kathleen M. Myers, MD, MPH University of Washington School of Medicine, Child Study and Treatment Center, Seattle, WA et al. Child and adolescent telepsychiatry in telepsychiatric consultation to and collaboration with primary care.
Telecrisis services are provided between hospitals and are quite established. Telecrisis supports adults and adolescents who are experiencing crises by connecting them to crisis services that are not provided in their local hospitals. Using Telehealth systems and services, a Telecrisis videoconference can be arranged at the time a patient presents at an emergency department, or it can be facilitated when the patient presents at their local hospital.

Supporting patients with pain management techniques forms the basis of Telepain clinic events. In these clinics, a specialist leads a self-management program with patients who may be in rural, northern or isolated communities.

Through the use of Telehealth, forensic psychiatrists can work with courts to evaluate an individual’s competency to stand trial and assist with sentencing recommendations. By using videoconferencing technology, the need to transport the offender to the psychiatrist’s office is reduced or eliminated.

Addictions and Treatment Centres use videoconferencing services to assist clients in drug and addiction therapy.

9.2 Teleoncology

Oncologists are large-scale users of Telehealth. The majority of the Teleoncology events enable pre-treatment assessments of patients receiving chemotherapy by a medical oncologist before each chemotherapy session and post-treatment patient follow-up. Patients are able to access these consultations from sites close to home instead of having to travel from their local communities into regional cancer centres for these routine appointments.

Some regional cancer centres integrate Telemedical appointments between the satellite chemotherapy units in outlying communities with regular face-to-face consultations, providing seamless and equitable oncology services for cancer patients across the north.

9.3 Teleprimary Care

In the primary care setting, the goal is to create local and regional “webs of care,” connecting healthcare professionals, patients and families via Telehealth for more-timely and accessible care. As these “webs of care” evolve into communities of practice, they are intended to forge the links and networks that will provide opportunities for sharing of best practices and scarce health human resources, as well as ongoing professional and continuing education.2

9.4 Telestroke

Telestroke is a hyper-acute emergency service that immediately connects patients in a small community or rural area who have suffered a stroke to neurologists at a regional stroke centre (usually in an urban area). The goal of the service is to enable diagnosis and direction for treatment as soon as possible after the stroke event. Using Telehealth integrated with an on-call service, neurologists review CT scan images and participate in real-time videoconference conversations involving the patients, their families (if available), the emergency room physician in the referring rural hospital, and the consulting neurologist located elsewhere. Within minutes of CT scan image capture, decisions can be made on the diagnosis of ischemic stroke and

1 LeBlanc, MB, Meeting the needs of an underserviced community — Telepsychiatry, District TeleHealth Coordinator — 7&8, Nova Scotia TeleHealth Network, Halifax, NS.
2 Primary Care/Family Health Team Telehealth Service Delivery Engagement and Adoption Strategy and Plan Date: December 31, 2007.
eligibility to receive tPA, a highly effective stroke treatment that, if used within the first three to four hours of the onset of a stroke, may dramatically reduce its debilitating effects.1 Patients who may have otherwise faced a long travel time to a regional stroke centre are able to receive treatment at their local hospital.

9.5 Tele-Urgent and Emergent Care

The success of Telestroke demonstrated that Telehealth can play a role in emergent care. Over the past several years, clinicians in other areas have explored providing using Telehealth to support urgent and emergent care, including mental health, paediatrics, geriatrics, critical care and burns.

9.6 Teledermatology

Teledermatology is a commonly used and effective service in achieving dermatological assessment in an efficient and cost-effective manner.2,3,4 Using asynchronous store-and-forward (S&F) technology, dermatological digital images and information are sent to a consulting dermatologist, who reviews the images and makes a diagnosis and treatment plan, which are sent back to the referring physician.

Teledermatology can improve access and efficiency to quality dermatological care for patients in under-serviced areas. This is beneficial, as demand for dermatology services is increasing and the availability of dermatologists is limited. In Canada, only 19% of dermatologists practice in a rural setting and less than 0.5% practice in a remote setting.5 In the primary care setting, dermatologic problems represent about 15%–20% of visits to family physicians and are ranked in the top 20 most common reasons for visiting physicians.6,7

9.7 Teleophthalmology

Teleophthalmology is used for screening of diabetic retinopathy, a microvascular complication of both insulin-dependent (Type 1) and non-insulin-dependent (Type 2) diabetes that can lead to blindness. Teleophthalmology programs have been initiated in response to the growing numbers of diabetics in Canada. Teleophthalmology operates in a similar manner to Teledermatology. Using S&F technology, retinal images are captured by primary care providers and forwarded to an ophthalmologist/retinal specialist for review and assessment. The specialist review and assessment are then documented and attached to the patient’s file within the

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6 Dermatologic Emergencies CMAJ (Canadian Medical Association Journal) 2005; 173 (11)
Teleophthalmology application, and a notification is sent to the referring physician. As with dermatology, the referring physician manages patient follow-up care.

9.8 Telehomecare

Home Telehealth, or Telehomecare, uses information and communications technology to bring healthcare into a patient’s home. Telehomecare is most often used for patients who have chronic conditions such as congestive heart failure (CHF) or chronic obstructive pulmonary disease (COPD), who had a hospital admission within the past 12 months and live in a residential setting. Telehomecare provides for remote monitoring of the patient’s condition, targeted and rapid response from the care team to an emerging health crisis, and coordination of care amongst multiple care providers.

Home Telehealth applications vary considerably, but use the general home Telehealth solution architecture illustrated in the following figure.

Figure 8. Home Telehealth Solution Architecture

As the diagram illustrates, patients or clients utilize condition-specific client devices to monitor their conditions. These devices transmit information via a communications network to the central Client Home Telehealth Management System, which collects and displays vital-sign data and

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stores clinical and assessment documentation. Clinicians then utilize provider devices to capture and access the data in central systems to monitor multiple clients and share information with clients and other providers on the care team.

9.9 Telehealth Support for Surgery
Telehealth is often used by surgeons to offer pre-operative consultations and for follow-up after surgery. Other clinicians may also use Telehealth before and after surgery: for example, anaesthesia, nursing and patient education.

9.10 Telenephrology/Teledialysis
Telenephrology services allow for monitoring of patients with advanced kidney disease and who receive frequent renal dialysis in a dialysis unit at a remote site. Through the use of videoconferencing, patients can return home and have follow-up sessions with the nephrologists during their dialysis procedure. Telenephrology follow-up sessions are generally quite short, lasting only three to six minutes, provided there are no outstanding issues. Several patients in the dialysis unit can be seen by nephrologists via videoconference.

9.11 Industry Analysis of Telehealth
Gartner defines Telemedicine as the delivery of health care services to patients by using IT in situations where the clinician and patient are not in the same location. Telemedicine includes the real-time asynchronous transmission of medical images, audio, video or other data to support the diagnosis, monitoring and treatment of patients.

While the terms “Telehealth” and “Telemedicine” are often used interchangeably, the Gartner definition for Telemedicine excludes several areas that are part of Telehealth, such as Tele-education (the use of telecommunications designed specifically for education) and the use of computer-based patient record systems and health information exchange tools, because they do not involve direct patient care. These systems and tools are included in the wider definition of Telehealth, however, as they may lead to the provision of improved care overall.

Gartner has identified applications of Telemedicine which fit within five health care processes: monitoring, diagnosis, triage, consultation and procedure.

- **Remote monitoring** includes home and mobile health monitoring, and inpatient monitoring. The primary example of inpatient monitoring is a remote intensive care unit (ICU), in which ICU patients are monitored by intensive care physicians located elsewhere.

- **Remote diagnosis** occurs when a clinician gives an opinion using information sent from a remote location. Teleradiology has become a mainstream application due to the wide use of picture, archiving and communication systems (PACS). Other specialties for which remote diagnosis is used include cardiology, dermatology, retinal imaging, stroke and pathology.

- **Remote triage** is the use of telecommunications to give an immediate opinion on the urgency of a patient’s case and to direct the patient to the appropriate care venue. Eleven out of 13 provinces and territories in Canada have implemented the 24/7 call lines.

- **Remote consultations** between clinicians and patients using video or e-visits. Telepharmacy is the remote delivery of pharmacy services, using a pharmacy technician or a vending machine, and includes a videoconference between the patient and the pharmacist. Clinical kiosks are completely self-contained devices that allow patients to have an interaction with a physician without the need for on-site personnel.

- **Remote procedures** are clinical procedures performed on patients by remotely located clinicians. This is in its infancy; the main application is Telesurgery.
### Table 4. Gartner’s Applications of Telemedicine

<table>
<thead>
<tr>
<th>Monitoring</th>
<th>Diagnosis</th>
<th>Triage</th>
<th>Consultation</th>
<th>Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periodic or continual monitoring of vital signs or medication compliance</td>
<td>Using remote clinicians to give medical opinions</td>
<td>Sorting patients according to urgency</td>
<td>Substituting in-person visits with virtual visits</td>
<td>Using remote clinicians to perform procedures</td>
</tr>
<tr>
<td>• Home Health Monitoring</td>
<td>• Teleradiology</td>
<td>• Medical Call Centers</td>
<td>• E-Visits</td>
<td>• Teleradiology</td>
</tr>
<tr>
<td>• Mobile Health Monitoring</td>
<td>• Teledermatology</td>
<td>• Teltrauma</td>
<td>• Video Visits</td>
<td>• Healthcare-Assistive Robots</td>
</tr>
<tr>
<td>• M-Health</td>
<td>• Tulustroke</td>
<td></td>
<td>• Telepharmacy</td>
<td></td>
</tr>
<tr>
<td>• Remote ICU</td>
<td>• Teleral Imaging</td>
<td></td>
<td>• Real-Time Virtual Visits</td>
<td></td>
</tr>
<tr>
<td>• Remote ECG Monitoring</td>
<td>• Telepathology</td>
<td></td>
<td>• Virtual Medical Assistants</td>
<td></td>
</tr>
<tr>
<td>• Digital Plasters</td>
<td>• Tele-audiology</td>
<td></td>
<td>• Clinical Kiosks</td>
<td></td>
</tr>
<tr>
<td>• Medication Compliance Management</td>
<td></td>
<td></td>
<td>• Rounding Robots</td>
<td></td>
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<tr>
<td>• Smart Pills</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Much potential, much hype | Adoption is quietly progressing | In use, being enhanced | Much potential, some usage | In its infancy |

### 9.12 Telemedicine Hype Cycle

Recent Gartner research into Telemedicine shows that advances in technology such as digital imaging, mobile communications and sensors are enabling accelerated development of Telemedicine applications. Although a couple of Telemedicine applications have reached maturity, most are in the difficult process of “crossing the chasm” between pioneer sites and widespread adoption.

The Telemedicine Hype Cycle depicts a linear progression of Telemedicine applications toward maturity. Because of the wide variations among countries in terms of adoption rates, it is not possible to define a single worldwide position for each dot. Therefore, we’ve chosen to position the dot to reflect the status of the most advanced country or region.

Based on the projections of the Gartner Hype Cycle Analysis, the following Telehealth applications are, or are close to, consistently delivering recognized benefits:

- Teleradiology outsourcing is the use of third-party-licensed and certified radiologists to remotely complete primary and non-primary diagnostic studies of digital radiology images.

- E-visits are non-real-time digital consultations enabled by application software that permit structured, secure messaging between a patient and a provider for non-emergency consultations. In Europe, the Danish national health portal has offered an e-visit service for the past few years, although it does not appear to be heavily used.
Remote ECG monitoring is the transmission of ECG readings from wearable devices to a service centre typically operated by a third-party company. In tax-funded health systems, governments are increasingly willing to fund remote ECG monitoring services.

The remote ICU is an application that enables remote critical care specialists to sit in a central command centre, from where they can monitor and direct the care of patients in multiple ICUs.

Teledermatology is the remote diagnosis of skin conditions. There are two primary models: store-and-forward (S&F) and video.

Other applications will deliver value in the longer term after some likely negative press and disillusionment.

Home health monitoring is the use of IT and telecommunications to monitor the health of patients in their homes and to help ensure that appropriate action is taken.

Teleretinal imaging is the use of S&F imaging to remotely diagnose diseases of the retina, especially diabetic retinopathy.

Telestroke is the use of video assessments to verify whether the patient has had an ischemic stroke and is therefore eligible for clot-busting drugs that can reduce the disability caused by strokes.

Video visits involve the use of video for remote consultations between clinicians and patients.

Telemedicine is now in use in many countries and in a variety of forms. Although a couple of Telemedicine applications have reached mainstream adoption, most are clustered in the early and middle sections of the Hype Cycle. They are in a difficult transition from a phase characterized by pilot projects or highly customized implementations for early-adopter organizations, to a phase characterized by repeatable implementations and sustainable services.
10.0 Appendix 2: Evaluation Methodology Technical Notes

10.1 Telehealth Events

For every Telehealth event, one or more sites may participate in the call. Telehealth services count a single event from the perspective of the participant site that initiated, or “hosted,” the event. Thus the patient site, where the referral to a remote specialist is initiated, is usually known as the host site. Conversely, the consulting health provider is typically located at a participating site.

Other ways of describing the participants in a Telehealth event is as a “referring” or “consulting” site. The referring site, where the patient is, typically refers to the host site, and the consulting site, where the doctor is, typically refers to a participating site.

The lack of standardization in medical terms, metrics and Telehealth event definitions present challenges in making comparative use of metrics collected from various organizations and jurisdictions.

10.2 Robustness

Substantial effort went into making robust estimates. Evidence of quantified benefits was gathered through a comprehensive literature review of available research and other essential literature including medical publications, health care informatics publications, reports from departments and Ministries of Health throughout Canada, and case studies on the outcomes of Telehealth initiatives in different health care organizations. More than 200 source documents were reviewed, including Infoway Telehealth background documents, Infoway Telehealth adoption reports, documents profiling evaluation results of Telehealth projects across the country, Telehealth Forum presentations, Gartner research, relevant prior Praxia and Gartner engagement deliverables, and general literature searches conducted by Infoway, jurisdictions and the Praxia/Gartner project team.

These data were complemented by interviews held with Telehealth researchers, leaders in the design and deployment of Telehealth solutions, and field managers and operations staff. Input was provided by Gartner health care research analysts and consultants, and Praxia consultants who have conducted previous Telehealth benefits evaluations in Canada. Gathered data were verified with health care representatives of each province.

The report examines what could be achieved through continued investment in Telehealth technologies. While it focuses on quantitative benefits, qualitative outcomes have been identified and modeled to the degree possible.

It is essential to recognize that the quantitative data presented should not be taken as absolute values or representing harvestable cost savings from the health system, given the uncertainty of the assumptions behind them; however, the estimates generated from the methodology illustrate the order of magnitude of the outcomes that can be expected from Telehealth, based on the best information currently available. The levels of technology adoption used to estimate benefits are high-level self-assessments, provided by subject matter experts at central health agencies within each jurisdiction.

This study focuses on the potential unmet need, it assumes conservative adoption levels of this unmet need, and thus is conservative in its estimates. However, achieving the potentials estimated typically requires changes in culture, processes and procedures. Costs to achieve these potentials are not calculated. The values do not represent the net value saved; they represent the gross potential.
10.3 Causality vs. Correlation

The health outcomes presented are based on self-reported health utilization, health status, quality-of-life and other health indicator measures collected. The data are collected at various points in time. There is no direct causal link between the trends in such health indicators during the period in which data are collected and the Telehealth intervention in question.

One can postulate, based on the size and direction of each health indicator, reductions as to the degree to which changes in the health outcomes discussed are associated with Telehealth. However, it is important to note that, due to the absence of a control group, these findings do not prove a casual relationship between the use of Telehealth and the outcomes presented, but rather they are good indications of the perceived or hypothesized benefit that Telehealth is having from the best available current data.

10.4 Evaluation vs. Research

There are critical distinctions between evaluation and research which influence the approaches used for each. Without a clear understanding of the distinct benefits that evaluation and research have to offer, stakeholders may have inappropriate expectations of how the initiative should be conducted and the results it should produce. The figure below summarizes the differences/similarities between evaluation and research (Canadian Journal of Program Evaluation):

Figure 10. Similarities and Differences in Evaluation Research (Levin-Rozalis)

<table>
<thead>
<tr>
<th>Evaluation</th>
<th>Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area of application</td>
<td>Application of the examination as wide as possible</td>
</tr>
<tr>
<td>Narrow application of findings focused in the project</td>
<td>Application of findings as wide as possible</td>
</tr>
<tr>
<td>Aim of providing concrete feedback</td>
<td>Aim of increasing the body of scientific knowledge</td>
</tr>
<tr>
<td>Theory</td>
<td>Field-dependent: theory used to enlarge the understanding of findings</td>
</tr>
<tr>
<td>Methodology</td>
<td>Evaluation setting and data collection methods derived from the field</td>
</tr>
<tr>
<td>The evaluator is reactive</td>
<td>The researcher is active</td>
</tr>
<tr>
<td>Generalization</td>
<td>Attempt to understand what is happening in a specific project</td>
</tr>
<tr>
<td>Relevance</td>
<td>Useful for the project</td>
</tr>
<tr>
<td>Causality</td>
<td>Stresses internal validity; that which is an artefact in research is seen as an internal variable in order to reach causality</td>
</tr>
</tbody>
</table>

10.5 Pan-Canadian Telehealth Survey

Data from the 2010 Pan-Canadian Telehealth Survey, conducted by the Canadian Telehealth Forum of COACH, Canada’s Health Informatics Association, were used to provide utilization data on Telehealth programs across Canada.

The survey was intended to capture general information about the nature and scope of Telehealth Services being provided in Canada. The survey was sent to all jurisdictional Telehealth programs and networks; data were provided by all jurisdictions with the exception of Quebec and Prince Edward Island.
11.0 Appendix 3: Details on Quantifying Benefits

The Pan-Canadian Telehealth Benefits Evaluation involved quantitative analysis for the purpose of identifying and describing benefits currently being experienced in Canada through the delivery of Telehealth services offered by different jurisdictions and then extrapolating those findings into potential benefits of a pan-Canadian deployment of such services. The analysis is not intended to constitute a comprehensive return on investment (ROI) analysis of Telehealth programs as a whole.

The analysis is impacted by the fact that most Telehealth pilots and operating programs and services were not established with the intent of a positive return on investment but rather as a means to enable and facilitate equitable access to essential health care services to communities that would otherwise be under served.

However, the study found that, notwithstanding the primary mandate of enabling access to patient-centred care, many Telehealth programs and services contribute directly to a reduction in avoidable system utilization, increase in system capacity, and reduction of costs to a wide range of stakeholders including jurisdictional health systems, care delivery organizations, care providers, payers, and patients and their families and care givers.

The report provides a quantification of the magnitude of this reduction and associated actual and potential system-wide cost savings. It is essential to recognize that the values presented should not be taken as absolute values, given the uncertainty of the assumptions behind them; however, the estimates generated from the methodology illustrate the order of magnitude of the outcomes that can be expected from Telehealth, based on the best information currently available.

This Appendix provides detailed information on the following current benefits of Telehealth:

Table 5. Summary of Current Telehealth Benefits and Calculations

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Current Benefits</th>
<th>Calculations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improves equitable access to specialized clinical services for rural and Aboriginal Canadians</td>
<td>5,710 Telehealth endpoints providing services to at least 1,175 communities</td>
<td># of clinical events:</td>
</tr>
<tr>
<td></td>
<td>284 First Nations communities served by Telehealth</td>
<td>= data collected from CTF survey</td>
</tr>
<tr>
<td></td>
<td>46 Inuit communities served by Telehealth</td>
<td>= 187,385</td>
</tr>
<tr>
<td></td>
<td>187,385 clinical events</td>
<td># of rural events:</td>
</tr>
<tr>
<td></td>
<td>93,393 rural clinical events (assumption of 50% of total)</td>
<td>Assume rural visits are 50% of the current visits</td>
</tr>
<tr>
<td></td>
<td>Approximately 109,625 physician Telehealth consults</td>
<td>= # of current Telehealth visits × 50%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= 187,385 × 50%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= 93,693</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Physician Telehealth consults:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data from Ontario were used in a benchmarking method for these calculations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= # of ON physician consults ÷ ON % of population</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= 42,425 ÷ 38.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= 109,625</td>
</tr>
<tr>
<td>Hypothesis</td>
<td>Current Benefits</td>
<td>Calculations</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Enhances patient-centred care through provision of convenient services</td>
<td>Based on the 93,693 rural Telehealth consults:</td>
<td>Travel distance:</td>
</tr>
<tr>
<td>closer to home</td>
<td>■ 46,846,500 kilometres (km) saved</td>
<td>= # of rural consults × 500 km</td>
</tr>
<tr>
<td></td>
<td>■ 5,551,353 litres of gasoline saved</td>
<td>= 93,693 × 500 km</td>
</tr>
<tr>
<td></td>
<td>■ 12,813,896 kilograms (kg) of reduced CO₂ emissions</td>
<td>= 46,846,500 km</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gas:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 litre of gas = 8.5 km</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= km avoided for rural consults ÷ 8.5 km</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= 46,846,500 ÷ 8.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= 5,511,353 litres</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 litre of gas = 2.325 kg CO₂</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CO₂ emissions:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= gas saved × 2.325 kg CO₂</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= 5,511,353 litres × 2.325</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= 12,813,896 kg of CO₂ emissions</td>
</tr>
<tr>
<td>Saves patients time and avoids personal travel costs</td>
<td>■ 468,465 hours in a car, which equals 54 person-years</td>
<td>Travel time:</td>
</tr>
<tr>
<td></td>
<td>■ $70,269,375 personal costs saved for travel</td>
<td>Assume driving speed of 100 km/h</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= travel distance ÷ 100 km</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= 46,846,500 ÷ 100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= 468,475 hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Person-years:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= hours of travel ÷ (24 × 365)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= 468,475 ÷ 8,760</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= 54</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Personal costs:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assume $750 per trip for rural patients</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= # of rural Telehealth consults × $750</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= 93,693 × $750</td>
</tr>
<tr>
<td></td>
<td></td>
<td>= $70,269,750</td>
</tr>
<tr>
<td>Improves timeliness of care</td>
<td>■ Wait times for specialist consultations have decreased anywhere from 20–90% through the use of Telehealth</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Some S&amp;F applications for dermatology reduced wait times from 7.1 weeks to 10 days, and frequently only two days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Wait times for Teleophthalmology were observed to decrease from about 25 days to less than two days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Telecrisis, Telewoundcare and Tele-endocrinology also saw some reductions in wait times</td>
<td></td>
</tr>
<tr>
<td>Hypothesis</td>
<td>Current Benefits</td>
<td>Calculations</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Enables provincial and territorial responses to emergency management situations | - Real-time connectivity between emergency coordinators was essential to mitigate risk and deliver quality care in time-sensitive and widespread situations such as SARS and H1N1  
- Telehealth solutions were effective in connecting patients with their families and their providers |                                                                                                                                                                                                                                                                                                                                                                                          |
| Quality Benefits                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Supports better chronic disease management                                | - Telehealth program centred on chronic disease management demonstrated improvements in patient quality of life and in achieving better outcomes  
- More than 80% of patients reported satisfaction with these remote services, better capability to manage their care, and measurable improvements in clinical outcomes |                                                                                                                                                                                                                                                                                                                                                                                          |
| Supports application of leading practices                                  | - Examples of where Telehealth catalyzed the dissemination of leading practices include programs such as Telewoundcare, Telestroke and Teleoncology |                                                                                                                                                                                                                                                                                                                                                                                          |
| Improves knowledge and skill development in local care providers           | - Some Telehealth programs facilitated engagement between physicians, thereby providing more opportunities for mentoring and skill development |                                                                                                                                                                                                                                                                                                                                                                                          |
| Improves care coordination                                                 | - Telehealth fosters multi-disciplinary, team-based care, and better integration and coordination of health system resources  
- Telehealth solutions are also catalysts for non-traditional relationships |                                                                                                                                                                                                                                                                                                                                                                                          |
| Productivity Benefits                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Improves provider efficiency by reducing provider travel time             | - In the three reports of provider time saved, 25 clinicians saved 496 days of provider travel time that could be reallocated to more-productive activities  
- An estimated savings of 20 days of travel time through the use of Telehealth; this time could be used to see an additional 400 patients each year per physician | Days of travel saved:  
Days saved per provider per year ÷ # of clinicians  
= 496 ÷ 25  
= 20 days  
Additional patients seen:  
Assume 20 patients per day  
= # of days saved × 20 patients  
= 20 × 20  
= 400 patients |
<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Current Benefits</th>
<th>Calculations</th>
</tr>
</thead>
</table>
| Avoids health system costs through avoided subsidized travel | ■ Savings in provincial and federally subsidized travel through current Telehealth programs was estimated to be nearly $34 million | Subsidized travel savings:  
= travel grant for distance + travel grant for accommodation  
Travel grant for distance:  
= distance for rural physician Telehealth consult × $0.41  
= (number of physician events × 500 km) × $0.41  
= (109,626 × 500) × $0.41  
= 54,813,000 × $0.41  
= $22,473,330  
Travel grant for accommodation:  
= # of physician rural Telehealth events × $100 (assumed)  
= 109,626 × $100  
= $10,962,600  
= $22,473,330 + $10,962,600  
= $33,435,930 |
| Reduces avoidable health system utilization | ■ As a result of Telehomecare programs in Ontario, British Columbia, Quebec and New Brunswick, an estimated $915,000 of avoided emergency department (ED)visit costs and $20 million of avoided inpatient costs were saved | Data from Telehomecare Business Case  
Avoided ED costs:  
= # of patients × ED visits/year × ED visit avoidance × ED visit cost  
= 2,500 × 3.96 × 67% × $138  
= $915,354  
Avoided inpatient stays:  
= # of patients × average inpatient stays/patient × cost per inpatient stay  
= 2,500 × 1 × $8,000  
= $20,000,000 |
| Reduces unnecessary transfers                  | ■ While there is significant anecdotal discussion of the reduction in transfers, there is insufficient evidence to project future savings and benefits for the reduction of transfers |  |
| Increases productivity by allowing providers to perform a higher                    | ■ There is some evidence to support the hypothesis that Telehealth can improve provider efficiency  
■ Examples of Telehealth disciplines |  |

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Telehealth Benefits and Adoption Connecting People and Providers across Canada

May 30th, 2011 —Page 67

Hypothesis Current Benefits Calculations

volume of consultations that significantly benefit from S&F techniques include Teleophthalmology and Teledermatology

- There are also reported cases in which specialist surgeons performed pre-operative consults and post-operative follow-ups by Telehealth in order to maximize their operating room time at the remote site — another example of improved efficiency

It also includes detailed descriptions of the following estimated future benefits:

Table 6. Summary of Estimated Future Benefits and Calculations

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Estimated Future Benefits</th>
<th>Calculations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improves equitable access to specialized clinical services for rural and Aboriginal Canadians</td>
<td>1,175,711 projected physician and non-physician Telehealth consults Close to 600,000 (587,856) Telehealth consultations to rural patients Close to 300,000 potential physician Telehealth consults</td>
<td>Data from Ontario were used for these calculations. Projected # of all Telehealth consults: = ON projected physician and non-physician consults ÷ ON % of population = 455,000 ÷ 38.7% = 1,175,711 Projected # of rural Telehealth consults: Assume rural visits are 50% of the current visits = # of potential rural consults × 50% = 1,175,711 × 50% = 587,856 Projected # of physician consults: # of possible consults × physician to non-physician Telehealth consult rate = 587,856 × 47% = 274,064 = round to 300,000</td>
</tr>
</tbody>
</table>

Enhances patient-centred care through provision of convenient services closer to home Based on the projected 600,000 future Telehealth visits by rural patients, there could be: Almost 300 million kilometres (km) of saved travel | Travel distance: Assume 500 km per trip = # of potential rural consults = 587,855 × 500 km |

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### Hypothesis
- A reduction of nearly 35 million litres of gas consumed during this travel
- A reduction of 80 million kilograms (kg) of CO₂ emissions
- Two fatalities avoided per year from automobile accidents in transit

### Estimated Future Benefits

<table>
<thead>
<tr>
<th>Calculations</th>
</tr>
</thead>
<tbody>
<tr>
<td>= 293,927,500 km</td>
</tr>
</tbody>
</table>

#### Gas:
- 1 litre of gas = 8.5 km
- km avoided for potential rural consults ÷ 8.5 km
- 293,927,500 km ÷ 8.5
- 34,579,706 litres

#### CO₂ emissions:
- 1 litre of gas = 2.325 kg CO₂
- potential gas saved × 2.325 kg CO₂
- 34,579,706 litres × 2.325 kg CO₂
- 80,397,816 kg of CO₂ emissions

### Saves patients time and avoids personal travel costs
- Almost three million hours of patient time in a car, which is equivalent to 336 person-years
- Avoided patient travel costs could amount to almost $500 million

#### Travel time:
- projected travel distance ÷ 100 km
- 293,927,500 ÷ 100
- 2,939,275 hours

#### Person-years:
- hours of travel ÷ (24 × 365)
- 2,939,275 ÷ (24 × 365)
- 336

#### Personal costs:
- Assume $750 per trip for rural patients
- # of projected rural Telehealth consults × $750
- 587,855 × $750
- $440,891,250

### Improves timeliness of care
- As other specialists begin to adopt this method, the total number of S&F consultations will increase significantly across Canada, increasing capacity and reducing overall wait times

### Quality Benefits
- Supports better chronic disease management
- There is strong evidence that, through education and monitoring, patients spend less time visiting healthcare professionals and in hospitals

### Enables provincial and territorial responses to emergency management situations
- Families affected by the emergency are able to be together to provide comfort and support when not able to be present, leading to better health outcomes
<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Estimated Future Benefits</th>
<th>Calculations</th>
</tr>
</thead>
</table>
| Supports application of leading practices      | ■ Best practices have been clearly identified and operationalized for many of the services in which Telehealth has shown significant progress — practice for retinal screening for diabetics, regular monitoring of wound care, and tPA administration for stroke care  
  ■ In addition, more-structured, centralized scheduling encourages regular appointments when needed, offers greater assurance of collaboration among providers, and enhances the likelihood of best-practice processes being conducted  
  ■ Training promotes structured communications between providers, which has its own benefits — studies have shown reductions of complications and deaths of 40%  
  ■ Expansion of Telehealth to support Canada-wide tPA administration for stroke would lead to additional treatment for 4,000 stroke victims  
  ■ If one-half of the 4,000 patients were positively affected by the drug, Canada could see 2,000 stroke victims treated                                                                                                                                                  | Stroke:  
  # of strokes per year: assume 50,000  
  # of ischemic strokes: assume 40,000  
  Percent rurality of Canadian population = 20%  
  
  # of strokes that could be treated with T (assume one-half could):  
  = # of ischemic strokes × % rurality × 50%  
  = 40,000 × 20% × 50%  
  = 4,000 additional stroke victims could be treated  
  If one-half of the 4,000 were rural patients, then 2,000 stroke victims could be treated in rural areas.                                                                                                                                                                                                                       |
| Improves knowledge and skill development in local care providers | ■ Video conferencing shows distinct and significant benefits for provider education  
  ■ Anecdotal evidence also provides some support for the assertion that local care providers will be able to provide higher levels of care through extending their knowledge in close Telehealth-based interaction and consultation with a range of care providers with whom they would have normally had no access |                                                                                                                                                                                                                                                                                                                                    |
| Improves care                                   | ■ No evidence was found which |                                                                                                                                                                                                                                                                                                                                    |
### Hypothesis

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Estimated Future Benefits</th>
<th>Calculations</th>
</tr>
</thead>
</table>
| coordination                        | quantified this benefit in terms of quality of care, access or efficiencies; however, a number of surveys provide strong evidence that providers believe that Telehealth does indeed support enhanced collaboration, communication and co-ordination of care | For 10,000 additional visits per year:  
\[
\frac{10,000}{\text{# of current additional patients seen}} = \frac{10,000}{400} = 25 \text{ providers}
\]  
For 100,000 additional visits per year:  
\[
\frac{100,000}{400} = 250 \text{ providers}
\]  
If it is estimated that 20 days of travel could be saved for each provider using Telehealth, resulting in approximately 400 more patients being seen, then only 25 providers need to experience this benefit for Canada to realize 10,000 additional visits annually; for Canada to realize 100,000 additional visits annually, only 250 providers need realize this benefit.  
With the projection of 300,000 potential rural physician consults via Telehealth, there is also the potential to save approximately $91.5 million in travel subsidies.  
Avoided health system costs through avoided subsidized travel  
Reduces avoidable health system utilization  
Avoided inpatient stays and emergency room (ER) visits could deliver more than $1 billion in inpatient costs and more than $46 million in emergency department costs.  
Data from Telehomecare business case\(^7\)  
Avoided ED costs:  
\[
\text{Avoided ED costs} = \text{# of patients} \times \text{ED visits/year} \times \text{ED visit avoidance} \times \text{ED visit cost}
\]  
\[\text{Subsidized travel savings:}
\begin{align*}
\text{Travel grant for distance:} & = \text{future distance for rural physician Telehealth consult} \times 0.41 \\
& = (\text{number of future events} \times 500) \times 0.41 \\
& = 150,000,000 \times 0.41 \\
& = 61,500,000
\end{align*}
\begin{align*}
\text{Travel grant for accommodation} & = \text{# of future physician rural Telehealth events} \times 100 \text{ (assumed)} \\
& = 300,000 \times 100 \\
& = 30,000,000
\end{align*}
\begin{align*}
& = 61,500,000 + 30,000,000 \\
& = 91,500,000
\end{align*}
\]  

---

\(^7\) Pan-Canadian Home Telehealth Business Case, Canada Health Infoway, 2007.
### Hypothesis

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Estimated Future Benefits</th>
<th>Calculations</th>
</tr>
</thead>
</table>
| (ED) costs (Note: the timeframes necessary to reach this estimate are longer than the 5-10 year projections assumed in the rest of this study) | There are potential savings of $65 million to governments in Canada through better detection of vision loss and vision complications | = 129,000 × 3.96 × 67% × $138  
= $46,997,280 |
| Avoided inpatient stays: | = # of patients × average inpatient stays/patient × cost per inpatient stay  
= 129,000 × 1 × $8,000  
= $1,032,000,000 |
| Vision: | CNIB estimated that the burden of disease costs the federal government $2.4 billion, and provincial/territorial governments $6.3 billion  
Estimated that 75% are avoidable through early detection and treatment |
| Even if 1% of cases were supported by Telehealth: | = government spending × 75% × 1%  
= 8.7 million × 75% × 1%  
= $65 million |
| Reduces unnecessary transfers | This benefit should be monitored and measured as it is further concretized |
| Increases productivity by allowing providers to perform a higher volume of consultations | With an assumption that this results in an additional 400,000 consultations, an additional 80 physician equivalents would be required for this work, valuing it at $10 million |
| Baseline of 20 patients per day | Additional patients per year:  
= # of patients per day × # work days × work weeks  
= 20 × 5 days a week × 50 work weeks  
= 5,000 |
| Physician equivalents: | Assume 400,000 consultations per year  
= # of consultations per year ÷ # of additional patients  
= 400,000 ÷ 5,000  
= 80 |
| Estimated annual salary for physician = $125,000/year  
= # of physician equivalents × salary  
= 80 × 125,000  
= $10,000,000 |
11.1 Telehealth facilitates equitable access to specialized clinical services for rural and Aboriginal Canadians

Indicators

- Proportion of patients who are part of the rural or Aboriginal population who have access to Telehealth services

Rationale

By providing care at a distance, Telehealth improves access for Canadians who live in geographically remote areas, far from urban centres where specialists and specialty health services are readily available.

Indicator Setting and Populations

- Telehealth sites or systems in rural or Aboriginal communities
- Patients who are part of the rural or Aboriginal populations, who have access to Telehealth services
- Telehealth events in rural or Aboriginal communities

Known Evidence

The following table shows an excerpt of the number of Telehealth systems and communities served, reported by province/territory. Across Canada, there were 5,710 Telehealth endpoints serving at least 1,175 communities.

Table 7. Number of Telehealth Systems and Communities

<table>
<thead>
<tr>
<th>PROVINCE/CATEGORY</th>
<th>BC</th>
<th>AB</th>
<th>SK</th>
<th>MB</th>
<th>ON</th>
<th>QC</th>
<th>NB</th>
<th>NS</th>
<th>PE</th>
<th>NL</th>
<th>YK</th>
<th>NT</th>
<th>NU</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total endpoints (systems)</td>
<td>919</td>
<td>1100</td>
<td>140</td>
<td>377</td>
<td>2,113</td>
<td>350</td>
<td>296</td>
<td>150</td>
<td>-</td>
<td>93</td>
<td>44</td>
<td>80</td>
<td>48</td>
<td>5,710</td>
</tr>
<tr>
<td>Total communities</td>
<td>218</td>
<td>125</td>
<td>62</td>
<td>67</td>
<td>305</td>
<td>268</td>
<td>46</td>
<td>18</td>
<td>-</td>
<td>N/A</td>
<td>13</td>
<td>28</td>
<td>25</td>
<td>1,175</td>
</tr>
</tbody>
</table>
The following table shows statistics regarding Telehealth implementation in First Nations communities by region.¹

**Table 8. Telehealth Implementations in First Nations Communities**

<table>
<thead>
<tr>
<th>Region</th>
<th># of FN Communities</th>
<th># of Health Facilities</th>
<th>Total # of TH Sites</th>
<th>Clinical</th>
<th>Videoconference (Ed. and Admin.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pacific</td>
<td>203</td>
<td>203</td>
<td>79</td>
<td>9</td>
<td>74</td>
</tr>
<tr>
<td>Alberta</td>
<td>46</td>
<td>67</td>
<td>48</td>
<td>48</td>
<td>44</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>79</td>
<td>88</td>
<td>33</td>
<td>0</td>
<td>33</td>
</tr>
<tr>
<td>Manitoba</td>
<td>63</td>
<td>64</td>
<td>19</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>Ontario</td>
<td>134</td>
<td>134</td>
<td>77</td>
<td>31</td>
<td>73</td>
</tr>
<tr>
<td>Quebec</td>
<td>30</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atlantic</td>
<td>33</td>
<td>40</td>
<td>28</td>
<td>16</td>
<td>19</td>
</tr>
<tr>
<td>TOTAL</td>
<td>588</td>
<td>626</td>
<td>284</td>
<td>122</td>
<td>262</td>
</tr>
</tbody>
</table>

The following table presents the number of Inuit communities served by Telehealth:

**Table 9. Number of Inuit Communities Served by Telehealth²**

<table>
<thead>
<tr>
<th>PROVINCE</th>
<th>BC</th>
<th>AB</th>
<th>SK</th>
<th>MB</th>
<th>ON</th>
<th>QC</th>
<th>NB</th>
<th>NS</th>
<th>PE</th>
<th>NL</th>
<th>YK</th>
<th>NT</th>
<th>NU</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td># of Inuit communities served by Telehealth</td>
<td>11</td>
<td>5</td>
<td>6</td>
<td>24</td>
<td>46</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Demand for Telehealth services by Aboriginal community health services is increasing. The utilization for the fiscal year ending March 31, 2010 has realized an increase of 15.6% over the previous fiscal year.³

Rurality in Canada varies across provinces. The following table details the rurality in each province and the compound rurality of Canada.

**Table 10. Percent Rurality in Canada by Province/Territory**

<table>
<thead>
<tr>
<th>PROVINCE</th>
<th>BC</th>
<th>AB</th>
<th>SK</th>
<th>MB</th>
<th>ON</th>
<th>QC</th>
<th>NS</th>
<th>NB</th>
<th>PE</th>
<th>NL</th>
<th>YT</th>
<th>NT</th>
<th>NU</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent Rurality</td>
<td>14</td>
<td>24</td>
<td>30</td>
<td>30</td>
<td>13</td>
<td>21</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>55</td>
<td>55</td>
<td>100</td>
<td>20.6</td>
</tr>
</tbody>
</table>

Rurality across Canada varies by province and territory.

- In all 13 provinces/territories, the proportional senior population is larger in rural than in urban zones

² Canada Health Infoway, Telehealth Communities Coverage data, 2011.
³ Manitoba eHSU Year-End Review 2009–10 v20101006, pg 10, Telehealth.
36.6% of the total population of Canada’s rural areas self-identified as being of Aboriginal descent (compared to the total of 7.9%)\(^1\)

The following table shows recent Telehealth data on the number of clinical, educational and administrative events by jurisdiction.\(^2\)

**Table 11. Reported Number of Events by Jurisdiction**

<table>
<thead>
<tr>
<th>PROVINCE</th>
<th>BC</th>
<th>AB</th>
<th>SK</th>
<th>MB</th>
<th>ON</th>
<th>QC</th>
<th>NS</th>
<th>NB</th>
<th>NL</th>
<th>YK</th>
<th>NT</th>
<th>NU</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical events</td>
<td>21,747</td>
<td>9,129</td>
<td>2,584</td>
<td>6,959</td>
<td>122,029</td>
<td>5,060</td>
<td>1,694</td>
<td>7,128</td>
<td>8,528</td>
<td>472</td>
<td>771</td>
<td>1,284</td>
<td>187,385</td>
</tr>
<tr>
<td>Educational</td>
<td>19,335</td>
<td>3,786</td>
<td>1,815</td>
<td>1,653</td>
<td>10,492</td>
<td>241</td>
<td>1,693</td>
<td>2,451</td>
<td>1,117</td>
<td>419</td>
<td>715</td>
<td>883</td>
<td>44,600</td>
</tr>
<tr>
<td>Admin</td>
<td>5,105</td>
<td>4,500</td>
<td>956</td>
<td>1,113</td>
<td>12,518</td>
<td>Data not available</td>
<td>803</td>
<td>1,861</td>
<td>Data not available</td>
<td>227</td>
<td>245</td>
<td>210</td>
<td>27,538</td>
</tr>
<tr>
<td>Total</td>
<td>46,187</td>
<td>17,415</td>
<td>5,355</td>
<td>9,725</td>
<td>145,039</td>
<td>Data not available</td>
<td>4,190</td>
<td>11,440</td>
<td>9,645</td>
<td>1,118</td>
<td>1,731</td>
<td>2,377</td>
<td>259,523</td>
</tr>
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</table>

The following table shows recent Telehealth data for the “top” clinical programs reported by the jurisdictions in the CTF survey. These programs represent approximately 73% of total Telehealth clinical activity.\(^3\)

**Table 12. Reported Number of Most Widely Used Clinical Telehealth Programs**

<table>
<thead>
<tr>
<th>PROVINCE</th>
<th>BC</th>
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<th>SK</th>
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<th>ON</th>
<th>QC</th>
<th>NS</th>
<th>NB</th>
<th>PE</th>
<th>NL</th>
<th>YK</th>
<th>NT</th>
<th>NU</th>
<th>Total</th>
<th>Total as % of Top Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oncology</td>
<td>1,035</td>
<td>279</td>
<td>11</td>
<td>2,090</td>
<td>10,241</td>
<td>101</td>
<td>4,620</td>
<td>19</td>
<td>12</td>
<td>18,408</td>
<td>13.4%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic Disease</td>
<td>-</td>
<td>742</td>
<td>5</td>
<td>35</td>
<td>-</td>
<td>-</td>
<td>759</td>
<td>-</td>
<td>107</td>
<td>21</td>
<td>-</td>
<td>1,669</td>
<td>1.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>32</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>759</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>32</td>
<td>137</td>
<td></td>
</tr>
<tr>
<td>Pulmonary (COPD)</td>
<td>185</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>186</td>
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<td></td>
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</tr>
<tr>
<td>Cardiology</td>
<td>525</td>
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<td>35</td>
<td>759</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>13</td>
<td>11</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1,346</td>
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</tr>
<tr>
<td>Renal/ Nephrology</td>
<td>703</td>
<td>405</td>
<td>83</td>
<td>4,490</td>
<td>1,146</td>
<td>3</td>
<td>15</td>
<td>6,845</td>
<td>5.0%</td>
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<td></td>
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<tr>
<td>Chronic Pain</td>
<td>201</td>
<td>31</td>
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<td>-</td>
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<td>-</td>
<td>-</td>
<td>233</td>
<td>0.2%</td>
<td></td>
</tr>
<tr>
<td>Mental Health and Addictions</td>
<td>-</td>
<td>3,218</td>
<td>1,239</td>
<td>796</td>
<td>67,531</td>
<td>-</td>
<td>583</td>
<td>-</td>
<td>240</td>
<td>82</td>
<td>-</td>
<td>-</td>
<td>73,689</td>
<td>53.8%</td>
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<tr>
<td>Addictions</td>
<td>-</td>
<td>8</td>
<td>43</td>
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<tr>
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<td>186</td>
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<td>186</td>
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</tr>
</tbody>
</table>

---


\(^2\) Data from CTF 2010 Pan-Canadian Telehealth Survey results. Alberta administrative data gathered from key informant interview. Quebec clinical data gathered from key informant interview. No data available for PEI.

\(^3\) Most of the data are from the CTF 2010 Pan-Canadian Telehealth Survey. Where necessary, data from Praxia data analysis and document review are also included. PEI did not participate in the CTF survey.
## Telehealth Benefits and Adoption Connecting People and Providers across Canada

### PROVINCE

<table>
<thead>
<tr>
<th>PROVINCE</th>
<th>BC</th>
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<th>SK</th>
<th>MB</th>
<th>ON</th>
<th>QC</th>
<th>NS</th>
<th>NB</th>
<th>PE</th>
<th>NL</th>
<th>YK</th>
<th>NT</th>
<th>NU</th>
<th>Total</th>
<th>Total as % of Top Services</th>
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<tr>
<td>Health</td>
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<td></td>
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<td>58</td>
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<td>-</td>
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<td></td>
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<td></td>
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<td>658</td>
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<td>175</td>
<td>5,808</td>
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<td>2</td>
<td>8</td>
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<td></td>
<td>6,024</td>
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<tr>
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<td></td>
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<tr>
<td>Surgery — Plastic</td>
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<td></td>
<td></td>
<td></td>
<td>57</td>
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<td>10</td>
<td>60</td>
<td>9</td>
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<td>62</td>
<td>2,515</td>
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<td>11</td>
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<td>62</td>
<td>77</td>
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<td>863</td>
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<td></td>
<td></td>
<td>149</td>
<td>149</td>
</tr>
<tr>
<td>Paediatrics (Child/ Adolescent)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>935</td>
<td>935</td>
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</tr>
<tr>
<td>Paediatrics (Medical)</td>
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</tr>
<tr>
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<tr>
<td>Paediatrics (Physical medicine/Rehab )</td>
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<td>Paediatrics (Surgery)</td>
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<td></td>
<td></td>
<td>400</td>
<td></td>
<td>407</td>
</tr>
<tr>
<td>Obstetrics/ Gynaecology/ Women’s Health</td>
<td>-</td>
<td>760</td>
<td>-</td>
<td>12</td>
<td>788</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
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<td>-</td>
<td>1,569</td>
<td>1.1%</td>
</tr>
<tr>
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<td>760</td>
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<td></td>
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<td></td>
<td></td>
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<td></td>
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<td>769</td>
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<tr>
<td>Obstetrics</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td>-</td>
<td>496</td>
<td>-</td>
<td>-</td>
<td>1,385</td>
<td>-</td>
<td>-</td>
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<td>-</td>
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<td>3</td>
<td>13</td>
<td>-</td>
<td>1,897</td>
<td>1.4%</td>
</tr>
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<td>Stroke</td>
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<td>1</td>
<td>306</td>
</tr>
<tr>
<td>Internal Medicine — Neurology</td>
<td>496</td>
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<td></td>
<td></td>
<td>2</td>
<td>1,591</td>
</tr>
</tbody>
</table>
Ontario

75% of events were hosted by sites in the three Local Health Integration Networks (LHINs) with the greatest number of remote or rural inhabitants, as might be expected: southwest, northwest and northeast.

The second-largest relationships are events occurring within the northeast (11.5%).

The third-largest relationships are events occurring within the Northwest (9.1%).

Almost 65% of events occur between sites within the same LHIN.

66% of all hosted events are services referred or requested by small or community hospitals.

Another 19% of events are hosted by mental health and addictions facilities.

It is not surprising to see that academic/teaching hospitals are responsible for more than 35% of participant events.

Of note, small hospitals are participants in 23% of Ontario Telemedicine Network (OTN) events, and mental health and addictions organizations in 22% of OTN events.

Saskatchewan

In 2006, the Saskatchewan Telehealth Network had 26 sites across the province, and served about 5,500 Saskatchewan residents and health care providers every year.

British Columbia

Telehealth services are currently available in approximately 20 clinical program areas, including oncology, mental health/psychiatry, thoracic surgery, homecare, renal, rheumatology and wound care, as well as special services for children.

The capacity for two-way, live videoconferencing, clinical, administrative and health-related educational encounters exist in more than 100 communities throughout the province. There are approximately 200 Telehealth facilities providing access to approximately 470
videoconferencing end points. Two Aboriginal Telehealth networks are providing health education and training to approximately 30 sites in British Columbia.

Telehealth facilities supported approximately 18,000 Telehealth consults through videoconferencing, for Fiscal Year 2007–2008, with anticipated annual growth of 25% per annum (estimated at $125\% \times 125\% \times 18,000 = 28,125$ events).

**Current Value**

As of the end of Fiscal Year 2009–2010, in Canada there were 5,710 Telehealth endpoints deployed in at least 1,175 communities. Many of these communities service the 21% of the Canadian population who live in rural areas, one-third of whom identify as being of Aboriginal heritage. This includes 284 First Nations communities and 46 Inuit communities served by Telehealth.

In that same year, Canadian clinicians performed more than 187,385 health services via Telehealth in more than 150 different specialty areas. The “top” services in Telehealth represented almost 80% of all Telehealth activity. Of the major services, about 54% was represented by mental health and addiction consults, 15% was for internal medicine and 13% was for oncology consults. As well, across Canada, almost 2,500 patients were treated using Telehomecare systems.

Estimating quite conservatively that 50% of the Telehealth consults were for the rural population, 93,693 Telehealth consults were performed for rural Canadians.¹ Many of these were for services that would not have been received due to distance from a specialist and the difficulty and time to obtain a specialist consult in a rural area. These Telehealth consults represent a true increase in access to healthcare for rural Canadians.

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>FINDINGS</th>
<th>CALCULATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td># of endpoints</td>
<td>5,710</td>
<td></td>
</tr>
<tr>
<td># of communities</td>
<td>1,175</td>
<td></td>
</tr>
<tr>
<td># of systems for FN communities</td>
<td>284</td>
<td></td>
</tr>
<tr>
<td># of FN communities</td>
<td>588</td>
<td></td>
</tr>
<tr>
<td># of Inuit communities served by</td>
<td>46</td>
<td></td>
</tr>
<tr>
<td>Telehealth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total # of events</td>
<td>187,385</td>
<td></td>
</tr>
<tr>
<td>Top events</td>
<td>142,662</td>
<td>$= \frac{\text{# of top Telehealth events}}{\text{Total # of Telehealth events}}$</td>
</tr>
<tr>
<td></td>
<td>76.1%</td>
<td>$= \frac{142,662}{187,385}$</td>
</tr>
<tr>
<td># of Telehomecare patients</td>
<td>2,500</td>
<td></td>
</tr>
<tr>
<td>Average % of rurality in Canada</td>
<td>Ranges from 14% to 100%; average is 21%</td>
<td>Estimate = 50%</td>
</tr>
</tbody>
</table>

¹ Rural events can be estimated from the total of 180,000 events: estimates range from 20% (using the percentage of Canadian rural population as a proxy) to 75% of events treated in Ontario in rural LHINs. All key informants report that rural and Northern use is more predominant than urban use. A reasonably conservative estimate is that 50% of Telehealth events are rural.
Estimated Telehealth events for the rural population 93,693
\[
\text{Total # of Telehealth events } \times \% \text{ of rural}
\]
\[
= 187,385 \times 50\% = 93,693
\]

Future Value

Projections on future value were made based on a complete set of Ontario Telehealth and health system data gathered from 2009. Based on these data, it is estimated that pan-Canadian Telehealth programs could increase from the current 187,385 consults to close to 1.2 million Telehealth consults if Telehealth sites reach the current median usage.

About one-half (587,855) of these Telehealth events are projected to be rural consults. Many of these would likely be for services that would not have been received due to distance from a specialist and the difficulty and time to obtain a specialist consult in a rural area. These Telehealth consults would represent a true increase in access to health care for rural Canadians.

Approximately 6.7 million people in Canada are considered to live in rural areas. The use of 587,855 Telehealth visits for this population equates to one Telehealth visit per 11.4 people annually (6.7 million ÷ 587,855). The proportion of those for which a consultation would not have been performed if not for Telehealth will continue through the expansion of the program, if not grow. This population will also likely be able to have a full complement of medical care, including ophthalmology, dermatology and mental health, as well as chronic disease management and other health care that previously was not available to them.

The estimates above were developed using the following detailed calculations:

- Of all the jurisdictions interviewed, Ontario was able to provide the most detailed measurements of the volume and type of Telehealth consultations, and the analysis is largely based on these numbers. The estimates assume that Canadian median Telemedicine adoption rates and per-capita Canadian physician consultations will be similar to those of Ontario — a reasonable assumption, based on the reported current rates and penetration.

- In Ontario,\(^1\) 0.024% (42,425) of physician consults was billed as Telemedicine consults out of 176 million physician consults billed in 2008–2009. A total 91,000 Telehealth events were recorded in the same year.

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>ONTARIO</th>
<th>CANADA</th>
<th>CALCULATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>13,064,900</td>
<td>33,720,200</td>
<td></td>
</tr>
<tr>
<td>% population</td>
<td>38.7%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>All physician consults</td>
<td>176,771,297</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(input and output from OHIP)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current physician</td>
<td>0.024%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telehealth consult rate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current physician</td>
<td>42,425</td>
<td>109,625.61</td>
<td>= ON current physician Telehealth consults + % of population = 42,425 ÷ 38.7%</td>
</tr>
<tr>
<td>Telehealth consults</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) Ontario Telemedicine Network Final Evaluation report, November 2010.
## Telehealth Benefits and Adoption Connecting People and Providers across Canada

### PARAMETER ONTARIO CANADA CALCULATIONS

<table>
<thead>
<tr>
<th></th>
<th>ONTARIO</th>
<th>CANADA</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Possible physician Telehealth consult rate if all achieve median use</td>
<td>0.12%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possible physician Telehealth consults if all achieve median use</td>
<td>212,126</td>
<td>548,128</td>
<td></td>
</tr>
<tr>
<td>Total physician and non-physician Telehealth consults</td>
<td>91,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physician to non-physician Telehealth consult rate</td>
<td>47%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possible projected physician and non-physician Telehealth consults</td>
<td>455,000</td>
<td>1,175,711</td>
<td></td>
</tr>
<tr>
<td>Current Telehealth services</td>
<td>91,000</td>
<td>187,385</td>
<td></td>
</tr>
<tr>
<td>% of total Telehealth consults</td>
<td>49%</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

ON: All physician consults × median Telehealth rate
= 176,771,297 × 0.12%
= 212,126

Canada = ON possible physician consults ÷ % of population
= 212,126 ÷ 38.7%
= 548,128

ON: # current physician Telehealth consults ÷ total physician and non-physician Telehealth consults
= 42,425 ÷ 91,000
= 47%

ON = possible physician Telehealth consults if all achieve median use ÷ physician to non-physician consult rate
= 212,126 + 47%
= 455,000

Canada = ON possible projected physician and non-physician Telehealth consults ÷ ON % of population
= 455,000 ÷ 38.7%
= 1,175,711

ON = Ontario Telehealth consults ÷ Canada Telehealth Consults
= 91,000 ÷ 180,270
### PARAMETER | ONTARIO | CANADA | CALCULATIONS
---|---|---|---
% rural consults (estimated) | 50% | 50% | = 50%
Rural consults | 45,500 | 93,693 |  
Possible rural consults if all achieve the median rate | 227,500 | 587,855 | ON = possible projected physician and non-physician Telehealth consults × % of rural consults
= 455,000 × 50%
= 224,500
Canada = Possible projected physician and non-physician Telehealth consults × % of rural
= 1,175,711 × 50%
= 587,855
Possible rural physician Telehealth consults if all achieve median use | 274,064 |  
= physician to non-physician consult rate × possible rural consults achieve median rate
= 587,855 × 47%
= 274,064
= round up to 300,000

- Rural consults were identified as occurring in municipalities with fewer than 10,000 residents based on the 2006 census.
- The percentage of total fractioned consultations that were done by Telemedicine by specialty was calculated for each rural municipality of patient residence.
- The median Telemedicine rate was then calculated by specialty and was assigned as the benchmark or reasonable rate that all rural municipalities could attain for each specialty.
- The median Telemedicine rate (0.12% benchmark) was then applied to all rural municipalities that were below the median by specialty.
- Urban municipality rates were kept as is (as a conservative assumption based on the premise that the potential for Telemedicine growth is mainly in the rural communities).
- The same analysis was done by main diagnosis (instead of by fractioned specialty) to identify the cancer, chronic kidney disease (nephrology) and diabetes Telemedicine billing rates, since those types of patients could not be easily mapped to specialty.
- Based on achieving the median rural Telemedicine rate, 212,126 consults in Ontario could be physician Telemedicine consults; a five-fold increase from the present 42,425.
- The following table estimates the number of future Canadian Telemedicine physician consults, assuming that Canadian median Telemedicine adoption rates and per-capita Canadian physician consultations are similar to those of Ontario (0.12% × 176 million).
These estimates are conservative, given that:

- The Canadian current physician Telehealth consults are higher than the 187,385 known consults
- The future Telehealth consults are based on growth in rural consults only, and so are understated. The underestimate will be balanced by the current value potential overestimate.

### 11.2 Telehealth enhances patient-centred care through provision of services closer to home

#### Indicators

- Satisfaction with Telehealth
- Total number of kilometres travelled for Telehealth consult vs. in-person consult

#### Rationale

Patient-centred care involves the consideration of how particular patient traits, backgrounds or situations can affect care. Patients living in rural or northern areas away from a major urban centre, for example, may have more challenges in accessing specialized health care services. These patients are potentially faced with hours of travel time to see a health care provider.

Through the use of Telehealth, patient-centred care may be enhanced as Telehealth removes the barriers of distance and time. Patients may be connected to their provider through the myriad of Telehealth solutions provided, without having to travel out of their community, or by travelling to a closer centre where Telehealth is available. These indicators measure the extent to which patients feel satisfied with care closer to home, and the amount of travel (in kilometres) which they projected that they saved by travelling to a Telehealth site versus to an in-person visit.

#### Indicator Setting and Populations

- Patients who received consults via a Telehealth program when they would have otherwise travelled to receive an in-person consult with a health care provider

#### Known Evidence

**Ontario**

Patient Satisfaction Survey — patients treated using Telehealth report that they experience improved convenience and access:

- 80% said it was easier to see the health care provider by Telehealth than in person
- 85% agreed that Telehealth allows them to have more regular follow-up for their health care problem

More than 85% of Telehealth coordinators agree that OTN improves the convenience of care to their patients.¹

---

**Newfoundland and Labrador**

- In a patient survey,\(^1\) 77.5% agreed that, “My travel time to Telehealth site was acceptable.” (62 out of 81)
- In a study conducted by the Newfoundland and Labrador Centre for Health Information,\(^2\) it was found that out of 100% of patients interviewed:
  - 47% estimated that they would have to travel more than 500 kilometres to see a specialist if Telehealth were not available
  - Another 32% estimated that they would have to travel more than 200 kilometres to see a specialist if Telehealth were not available
  - A weighted average of 299 kilometres was avoided in travel for all respondents

**Quebec\(^3\)**

- Teleconsultation for the First Nations community of Manawan for ENT and obstetrics in use since November 2008:
  - More than 150 consultations have taken place
  - 54,000 kilometres of reported patient travel avoided to date
  - 54,000 kilometres ÷ 150 consultations = 360 kilometres per Telehealth event

**British Columbia**

In British Columbia, the flagship Telethoracic program at Interior Health showed the following:\(^4\)

- As of December 30, 2009, 5,433 patients in 953 clinics saved 3.87 million kilometres in round-trip patient travel to see providers. This equates to an average of 712 kilometres per patient, per trip.

**Alberta**

When compared to conventional consultation methods, Teleophthalmology reduced average travel distance and time by 219.1 kilometres and 2.7 hours, respectively. Teleophthalmology reduced office visits to the retina specialist by 48% while improving the efficiency of clinical examination, testing and treatment. Patients benefited through reduced travel time and distance.\(^5\)

**Current Value**

Telehealth patients reported avoiding a round trip of between 200 and 712 kilometres per Telehealth event. In one study, more than one-half report avoiding more than 500 kilometres of round-trip travel per Telehealth event. Assuming that this value applies to the 93,693 rural

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\(^1\) Newfoundland and Labrador Centre for Health Information, “Evaluating the Benefits — Newfoundland and Labrador Provincial Telehealth Program: Chronic Disease Management,” January 2010, 49.


\(^3\) Quebec Telehealth Success Stories to Date, July 2010, 2–3.


patient events, Canadians living in rural regions avoided almost 45 million kilometres of personal travel. This is equivalent to 54 person-years and more than 460,000 hours of driving time, producing close to 13 million kilograms of CO₂.

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>FINDINGS</th>
<th>CALCULATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Telehealth events</td>
<td>187,385</td>
<td></td>
</tr>
<tr>
<td>Percentage of rural events</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>Rural Telehealth events</td>
<td>93,693</td>
<td></td>
</tr>
<tr>
<td>Kilometres driven per consult</td>
<td>500 km</td>
<td></td>
</tr>
<tr>
<td>(estimated)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total kilometres driven</td>
<td>46,846,500 km</td>
<td>93,693 × 500 km</td>
</tr>
<tr>
<td></td>
<td></td>
<td>46,846,500</td>
</tr>
<tr>
<td>Driving speed (km/hr) (estimated)</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Hours of driving time</td>
<td>468,465</td>
<td>46,846,500 ÷ 100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>463,325</td>
</tr>
<tr>
<td>Person-years of travel</td>
<td>54</td>
<td>468,465 ÷ (24 × 365)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>54</td>
</tr>
<tr>
<td>Gas saved</td>
<td>5,551,353 litres</td>
<td>46,846,500 km ÷ 8.5 km</td>
</tr>
<tr>
<td>1 litres of gas = 8.5 km</td>
<td></td>
<td>5,551,353 litres</td>
</tr>
<tr>
<td>Avoided CO₂ emissions</td>
<td>12,813,896 kg CO₂</td>
<td>5,551,353 litres × 2.325 kg CO₂</td>
</tr>
<tr>
<td>1 litres of gas = 2.325 kg CO₂</td>
<td></td>
<td>12,813,896 CO₂</td>
</tr>
</tbody>
</table>

It is not surprising that more than 85% of Telehealth coordinators agree that Telehealth improves the convenience of care to their patients. This is particularly true for elderly Canadians, winter health care visits, sick or immobile Canadians and low-income Canadians.

**Future Value**

As Telehealth programs become more developed, these benefits will become even more widespread and can be extrapolated to additional populations. Travel benefits will be further expanded in both avoiding travel that would have been taken, but was inconvenient to patients, and travel that precluded a patient from seeing a provider. Avoided inconvenient travel will be the most easily addressed and will see the most dramatic growth in the near future. Travel that would not have been taken will be harder to realize, as it will require acceptance by patients and changes to their health care habits.
Rural populations will see the largest growth in these benefits, and extrapolations of current benefits are likely conservative due to this disproportionate potential growth. At a forecasted 587,855 annual visits for rural patients at an average of 500 kilometres of travel per round-trip to a specialist, this can be categorized as:

- Almost 300 million kilometres of saved travel
- A reduction of 80 million kilograms of CO₂ emissions¹ and nearly 35 million litres of gas²
- 336 person-years of patient time in a car³

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>FINDINGS</th>
<th>CALCULATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Possible rural consults</td>
<td>587,855</td>
<td></td>
</tr>
<tr>
<td>Kilometres driven per consult</td>
<td>500 km</td>
<td></td>
</tr>
<tr>
<td>(estimated)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total kilometres driven</td>
<td>293,927,500 km</td>
<td>587,855 × 500 km = 293,927,500 km</td>
</tr>
<tr>
<td>Driving speed (km/hr) (estimated)</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Hours of driving time</td>
<td>2,939,275</td>
<td>293,927,500 ÷ 100 = 2,939,275</td>
</tr>
<tr>
<td>Person-years of travel</td>
<td>336</td>
<td>2,939,275 ÷ (24 × 365) = 336</td>
</tr>
<tr>
<td>Gas saved</td>
<td>34,579,706 litres</td>
<td>293,927,500 km ÷ 8.5 km = 34,579,706 litres</td>
</tr>
<tr>
<td>1 litres of gas = 8.5 km</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoided CO₂ emissions</td>
<td>80,397,816 kg CO₂</td>
<td>34,579,706 litres × 2.325 kg CO₂ = 80,397,816 kg CO₂</td>
</tr>
<tr>
<td>1 litres of gas = 2.325 kg CO₂</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11.3 Telehealth avoids patient costs through avoided travel costs

**Indicators**

- Avoided patient travel costs

**Rationale**

By avoiding travel required to see a provider in person, patients also avoid the costs associated with travel. For many patients in rural areas, this cost may be significant, as a single mode of transportation may not be available. Costs for travel may include gas, parking, flights, and similar expenses for partners/parents/caretakers who are not covered under provincial programs, lodging and board, and others.

¹ One litre of gasoline produces about 2.325 kg of CO₂ emissions (US EPA 2005; http://www.epa.gov/oms/climate/420f05001.htm).
² At 8.5 kilometers per litre — an approximate efficiency for a medium-size car.
³ Assuming 100 km per hour of driving.
Indicator Setting and Populations

- Current populations: rural patients in all regions who had Telehealth service
- Future state populations: outpatient health care events in the disciplines where there is Telehealth for rural residents

Known Evidence

Newfoundland and Labrador

In the Newfoundland and Labrador study, out of 100% of patients:¹

- 33% of Telehealth patients estimate savings of between $100 and $500
- 20% of Telehealth patients estimate savings of between $500 and $1,000
- 23% of Telehealth patients estimate savings greater than $1,000
- Average savings across all patients can be estimated to be about $949

In addition, a report of the Newfoundland and Labrador Conne River (Miawpukek First Nations) Telehealth Implementation Project included feedback that patients traveling to St. John’s often pay more than $400 per trip, and if they need to be accompanied there is additional cost to the health care system of $90.²

British Columbia

The Telethoracic program allows patients greater access to specialist doctors. The average cost saving is estimated at $750 for each patient, with savings for the Interior Health Authority as Telehealth maximizes the resources of the local communities.³

Manitoba

Manitoba estimated that the 538 clinical Telehealth sessions in 15 Aboriginal communities resulted in an added health service access worth $737,974, based on an overall estimated average cost of travel to Winnipeg of $1,372 per session equivalency, based on the following assumptions:⁴

- All clinical appointments are included, as they are almost always with specialists, and would have been eligible for client travel if necessary.
- Patient education sessions not normally funded by NIHB are excluded from the calculations. If included, the health access benefit would be even higher.
- Staff education costs are not included, as these would not fall within the “health care access” rationale used for this estimation. However, if included, the overall cost benefit of Telehealth use increases beyond the figure given below.

¹ Newfoundland and Labrador Centre for Health Information, “Evaluating the Benefits — Newfoundland and Labrador Provincial Telehealth Program: Chronic Disease Management,” January 2010, 55.
⁴ Manitoba eHSU Year-End Review 2009–10 v20101006, Telehealth, pg, 15.
The actual travel cost (inclusive of transportation, accommodation and meals) is assumed to be a reasonable proxy for the equivalent Telehealth session, as long as any outlier “high-cost” trips are reduced to the community average.

- Upstream benefits (e.g., future travel costs averted due to more-timely access to specialist care) are not included in the analysis.
- Personal costs included by clients are not included in this analysis (e.g., lost wages due to time off from work).

**Current Value**

By avoiding travel kilometres, patients avoid the costs associated with travel. Costs may be incurred for gas, parking, flights, flights for partners who are not covered under provincial programs, board and lodging. These costs can be prohibitive, especially for low-income or fixed-income Canadians, resulting in decreased access to care for these individuals.

Telehealth patients have reported avoiding between $400 and $1,000 per return trip. Taking a conservative estimate of $750 savings and applying it to the estimated 92,665 rural patient events, Canadians living in rural regions avoided approximately $70 million of personal costs due to the availability of Telehealth. This number underestimates the total costs to Canadians, since urban and suburban patients also saved on travel costs, though these savings are understandably less than for rural equivalents.

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>FINDINGS</th>
<th>CALCULATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Telehealth events</td>
<td>93,693</td>
<td>Patients reported saving between $400 and $1,000. $750 is an assumption, as it is a little more than the halfway point.</td>
</tr>
<tr>
<td>Estimated cost per trip</td>
<td>$750</td>
<td></td>
</tr>
<tr>
<td>Cost savings for patients in rural settings</td>
<td>$70,269,750</td>
<td>$70,269,750 = 92,665 × 750</td>
</tr>
</tbody>
</table>

**Future Value**

As detailed in Hypothesis 2 — provision of services closer to home, both types of travel benefits for patients will be realized, although during different time frames. Reducing avoidable travel that is currently being taken will be highly addressable in the near term. This benefit is also quantifiable, as patients are already able to calculate the travel they are avoiding by using Telehealth.

At an extrapolated 600,000 rural Telehealth visits annually and an average of $750 of patient costs saved per trip, avoided patient travel costs could amount to almost $500 million.

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>FINDINGS</th>
<th>CALCULATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Possible rural consults</td>
<td>587,855</td>
<td></td>
</tr>
<tr>
<td>Estimated cost per trip</td>
<td>$750</td>
<td></td>
</tr>
<tr>
<td>Possible cost savings</td>
<td>$440,891,250</td>
<td>$440,891,250 = 587,855 × 750</td>
</tr>
</tbody>
</table>
This amount is conservative; as the program expands, it will become more available to those with even higher travel costs, thereby raising the average avoided travel costs per person. This estimation also does not calculate those patients in urban settings who also save travel costs.

The benefit of being seen by a provider who normally would not have been seen is less quantifiable, but realizable nonetheless. This benefit will take longer to achieve at a high level, due to the patient life changes that need to occur to realize this benefit.

11.4 Telehealth improves timeliness of care

Indicators

- Wait times for specialist consultation, from referral to specialist assessment
- Other provider wait times

Rationale

Due to health care human resource shortages, there are often wait times for community specialist assessments. Telehealth-enabled clinical services tend to create new processes that reduce these wait times. This is especially the case for store-and-forward (S&F) applications, for example:

- Through the use of Telehealth, diabetic patients who require a visit with an ophthalmologist to screen for diabetic retinopathy can have their scans sent electronically to an ophthalmologist, who then performs the assessments. Because of the expediency of sending electronic scans, Teleophthalmology has the potential to improve wait times for ophthalmologist screening and assessment.

- Patients who are awaiting an assessment from a dermatologist generally have to wait several months for an appointment. Through the use of Telehealth, dermatologists may have access to dermatologic images more quickly than seeing a patient. Reducing the wait times for these patients will mean that the dermatological treatment may be delivered more quickly.

This question investigates the aggregate impact that Telehealth has on wait times for consultations by specialists such as ophthalmologists and dermatologists, and other specialist consultation wait times.

Indicator Setting and Populations

Patients who had a specialist consult (with particular emphasis on Teledermatology or Teleophthalmology consults). The population also includes other patients in Telehealth services who have a demonstrated reduction in wait times.

Known Evidence

In Canada, the average wait time to see a dermatologist is 7.1 weeks for the initial visit and 5.3 weeks for follow-up visits.¹

¹ Maguiness, Sheilagh; Searles, Gordon E.; From, Lynn; and Swiggum, Susan, The Canadian Dermatology Workforce Survey: Implications for the Future of Canadian Dermatology — Who will be your skin expert?, Journal of Cutaneous Medicine and Surgery: Incorporating Medical and Surgical Dermatology, 8(3): 141–147.
Ontario
With the Ontario Teledermatology service, wait times are no more than 10 days, and frequently only two days.¹

80% of Ontario Telemedicine Network (OTN) Telehealth survey respondents said that Telehealth allowed them to see the health care provider sooner than if they had waited to see the clinician in person.

Diabetic patients have to wait, on average, six months for a screening appointment for diabetic retinopathy. With Teleophthalmology, patients can be seen and provided a report within a maximum of four weeks.²

Wait times to see an endocrinologist are four to six weeks in a face-to-face visit, compared to a maximum of four weeks, as the clinic is held every four weeks and generally much less in a Telehealth encounter.³

Alberta
Average wait time between Telehealth referral and Teleophthalmology review of images by the retina specialist was 1.9 days (maximum 20 days). For those patients requiring office evaluation, the average wait time between Teleophthalmology referral and in-person evaluation was 25.1 days. Twenty-one of the 25 patients (84.0%) requiring treatment underwent examination, testing and treatment in a single day.⁴

Manitoba⁵
In Manitoba, the review of the store-and-forward demonstration project for dermatological care showed that 83 referrals were sent between April and September 2010. The average number of days to wait for a response from a specialist was 2.83 days. (Findings revealed a range of one hour to 15 days, when a specialist was on vacation.)

British Columbia⁶
For Interior Health’s Telenephrology service, the average wait time prior to implementing the TeleRenal System was 212 days, while after implementation the wait time was reduced to 156 days (a reduction of 56 days and 26%).

Similarly, Telewoundcare wait times went from three weeks to 48–72 hours for access to nursing staff.

² Ontario Telehealth Network, Telehealth Benefits Evaluation, Addendum: OTN Contributions to Ontario Health System Strategic Themes, August 2010, 16.
³ Ontario Telehealth Network, Telehealth Benefits Evaluation, Addendum: OTN Contributions to Ontario Health System Strategic Themes, August 2010, 16.
New Brunswick

In New Brunswick, the study of the C-Triage program showed that the average wait times for a transfer to a health centre (days on the hospital-to-hospital transfer list) decreased marginally from 2.94 to 2.84 days. In some health regions, the wait times were reduced by up to 33% and in other regions not at all, reflecting a more equitable and objective means of assessment of severity of illness for these patients achieved through C-Triage.

Two factors described in anecdotal statements from clinicians suggest the quantified improvement is probably conservative. First is the time taken for the extended “telephone tag” that took place pre-C-Triage. Often, several attempts were required before the referring physician could contact the New Brunswick Health Council (NBHC) physician and obtain agreement that the patient should be placed on the transfer list. Second, many times clinicians would make notes concerning the desired referral on “slips of paper,” which would then reside in their pockets for some time before they remembered to make a referral or place the patient on the wait list.

Current Value

Through its processes, referrals and relationships, Telehealth is able to improve the timeliness of care. This is most apparent in the case of Teledermatology and Teleophthalmology. Obtaining timely and efficient access to dermatological or ophthalmic consultations is very challenging for urban and rural physicians. In Canada, the average wait time to see a dermatologist without the use of Telehealth is 7.1 weeks for the initial visit and 5.3 weeks for follow-up visits.

With a Teledermatology service using S&F technology allowing specialists to review images at their convenience rather than in face-to-face visits, the wait times have been reduced to no more than 10 days, and frequently only two days. Similarly, wait times for Teleophthalmology were observed to decrease from about 25 days to less than two days. The following table shows some examples of pre and post-implementation wait times for Telehealth programs across Canada.

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Program</th>
<th>Pre-implementation</th>
<th>Post-implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>Teleophthalmology</td>
<td>6 months</td>
<td>4 weeks</td>
</tr>
<tr>
<td>ON</td>
<td>Teledermatology</td>
<td>7.1 weeks (national)</td>
<td>10 days</td>
</tr>
<tr>
<td>ON</td>
<td>Tele-endocrinology</td>
<td>4–6 weeks</td>
<td>4 weeks</td>
</tr>
<tr>
<td>MB</td>
<td>Teledermatology</td>
<td>NA</td>
<td>2.83 days</td>
</tr>
<tr>
<td>AB</td>
<td>Teleophthalmology</td>
<td>25.1 days</td>
<td>1.9 days</td>
</tr>
<tr>
<td>BC</td>
<td>Telenephrology</td>
<td>212 days</td>
<td>156 days</td>
</tr>
<tr>
<td>NB</td>
<td>C-Triage</td>
<td>2.94 days</td>
<td>2.84 days</td>
</tr>
</tbody>
</table>

Many other disciplines reported more-timely care in a variety of care settings:

- Telecrisis teams reported that care was provided in the location the patient presents, rather than requiring transfer to another emergency department and experiencing further wait times.
- It is reported that ER wait times for crisis services reduced from 48 hours to two hours.

1 Atlantic Health Sciences Corporation, VITAL — C-Triage Final Research Report, June 2001, 32.
Wait times for nursing staff to access wound specialists went from a pre-implementation wait time of three weeks to wait times of 48–72 hours.

Wait times to see an endocrinologist were four to six weeks for a face-to-face visit, compared to a maximum of four weeks (and generally much less) in a Telehealth encounter.

80% of respondents in a Telehealth survey said that Telehealth allowed them to see a healthcare provider sooner than if they had waited to see the clinician in person.

A study in Alaska through the Alaska Federal Health Care Access Network (AFHCAN)\(^1\) showed a marked improvement in access to care, especially to areas that do not have specialists on staff, which include nearly the entire State, besides the cities of Juneau and Anchorage. A Teleaudiology program that was introduced to supplement the normal three-month scheduled visits from an audiologist to the Norton Sound Regional Hospital reduced the number of face-to-face visits required from 2,080 to 255, and reduced average wait times for those visits from 4.2 months to 2.2 months. In addition, the percentage of patients who required a wait of more than five months was reduced from 47% to 3%.

The AFHCAN study also showed the benefit of timeliness for specialist consults. In a two-year period, the Alaska Native Medical Centre (ANMC) in Anchorage provided teleconsults for about 20 different specialty areas. 65% of consults were performed the same workday, 84% within one workday and 91% in two workdays. The average and median turnaround times for cases completed in the same workday were 2.5 hours and one hour, respectively. Although it is difficult to ascertain the time saved in this process, we can assume that the specialist consults would likely be measured in days or weeks rather than hours for these same patients.

**Future Value**

Reduction of wait times will be realized across the country to other populations that have not yet seen these benefits. Many specialties are seeing 20%–90% reductions in wait times through a variety of modalities.

Real-time video conferencing solutions have been effective in reducing visitation times by screening patients before requiring travel and face-to-face visits. Dermatology, ophthalmology and other specialties have proven this to be an effective method of care. Telehealth will be expanded within these specialties to include more physicians in Canada, and other specialties will begin to leverage the successes in these specialties, thereby reducing wait times for consultations.

S&F solutions have the potential to increase clinician productivity. As specialists refine their processes and skills with these technologies, the number of additional consultations will increase. Similarly, as other specialists begin to adopt this method, the total number of S&F consultations will increase significantly across Canada, increasing capacity and reducing overall wait times.

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\(^1\) Ferguson, A. Stewart et al., Impact of Store-and-Forward Telehealth in Alaska: A Seven-Year Retrospective, AFHCAN/Alaska Native Tribal Health Consortium, 2008–09.
11.5 Telehealth enables provincial and territorial responses to emergency management situations

Indicators
- Number of provincial and territorial emergency/emergent situations that are managed via Telehealth
- Number of families affected by emergency situations that are assisted via Telehealth solutions

Rationale
Telehealth is used as a medium to coordinate emergency response action by many different specialists and to catalyze collaboration.

Indicator Setting and Populations
- Emergency/emergent or outbreak situations in provinces and territories that have been managed through the use of Telehealth

Known Evidence

Ontario

During the H1N1 influenza outbreak, Thunder Bay Regional Health Sciences Centre (TBRHSC) and Keewaytinook Okimakanak Telemedicine (KOTM) utilized OTN services to provide televisits for Aboriginal families in Northwestern Ontario who were unable to be at their loved ones’ bedside.

In 2009, The Ottawa Hospital and the Winnipeg Regional Health Sciences Centre were two of the hardest-hit hospitals battling the H1N1 virus. In this early stage, health care professionals across the country had little firsthand information of what to expect — from the number of respirators required to the profiles of those most vulnerable.

OTN coordinated just-in-time education sessions from these hospitals, sharing front-line ICU experiences with viewers from across Canada. Participants were able to learn detailed information not yet available in the medical literature and to ask real-time questions via videoconference to front-line physicians. These events broke OTN records for participation and now other health care providers from around the world can access the presentations via OTN’s webcasting centre.

Alberta

In the fall of 2009, Telehealth was used to connect tertiary intensive care units (ICUs) to regional ICUs in the province of Alberta in preparation for H1N1. This served two purposes: first, to support the intensivists who were looking after the patients at the regional sites and, second, to assist tertiary and regional ICUs in making a decision on whether a patient should be transferred in light of H1N1.2

2 Stakeholder interview, December 2010.
Current Value

Although the benefits of Telehealth connectivity for emergency situations are difficult to quantify, the anecdotal evidence shows that real-time connectivity between emergency coordinators is essential to mitigate risk and deliver quality care in time-sensitive and widespread situations. Telehealth solutions have also been shown to be effective at allowing patients affected by the emergency to communicate with their family, which promotes patient well-being and healing.

Future Value

As real-time video connectivity becomes even more highly adopted by providers and emergency coordinators, the benefit of using these systems will continue to grow, and additional groups will start to use them. Practice in the use of the systems will generate additional benefits, as standardized approaches to emergency management will provide faster and more-structured responses.

11.6 Telehealth improves provider efficiency by reducing provider travel time

Indicators

- Avoided provider travel time

Rationale

Telehealth allows providers to practice at a distance and not spend time travelling to remote patient locations to provide in-person services.

Indicator Setting and Populations

All providers who provided a known Telehealth service that would otherwise have required them to travel to the patient. This may include a portion of:

- Telemental Health
- Teleophthalmology
- Telesurgery
- Televisitation

Known Evidence

Newfoundland and Labrador¹

A study evaluating the benefits of Telehealth found the following:

- An estimated two hours per week in travel savings through the program
- Twelve providers out of 61, evenly split between physicians and nurses, provided estimates of travel distance saved:
  - Five respondents reported a travel savings of 1,500–2,000 kilometres during one month

Three reported savings of more than 5,000 kilometres
Three reported savings of less than 1,000 kilometres
One respondent reported “thousands of kilometres”

This can be estimated to 216 days saved (a total of 18 days × 12 clinicians).

Ontario

As reported in a benefits evaluation study of the OTN, ACTT Telecrisis teams reported 80 minutes per day saved for four to seven clinicians.¹

- If it is assumed that this saving occurs every other day, then 10 days per month are saved
- 10 days × 80 minutes per day × 12 months ÷ 60 min/hour ÷ 8 hours per day = 20 days saved per clinician, per year
- Total of 80–140 days saved per year for the affected clinicians

Quebec²

Since implementation of the Televisitation service in October 2009:

- More than 152 days of travel time for staff have been saved
- More than 60 Televisits completed at McGill University Health Centre

Manitoba³

There are also reported experiences of physicians getting stuck in a remote community in bad weather and using Telehealth to link back to their urban practices.

New Brunswick⁴

Seventy-four per cent (39 out of 53 respondents) saved at least two hours, and 68% reported that they saved travel costs.

Current Value

The corollary of Telehealth enabling patients not to travel to clinicians is that it allows clinicians to practice at a distance. In most health care settings today, patients travel to see providers and therefore the entire travel burden rests on the patient seeking treatment. In some cases, however, providers travel to visit patients. Instances include providers who visit immobile patients or patients in remote areas who generally would not able to be travel themselves. Provider travel time affects the number of patients the provider can see and so has a direct impact on the overall utilization of the health care system. Time not spent travelling can be reallocated to patient visits.

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² Quebec Telehealth Success Stories to Date, July 2010, 5.
³ Manitoba Key Informant Interviews, December 2010.
⁴ New Brunswick Horizon Teleconferencing service assessment of staff satisfaction with videoconferencing, Zone 3.
In the three reports of provider time saved, 25 clinicians saved 496 days of provider travel time that could be reallocated to more productive activities. This is an average of nearly 20 days per provider per year saved through Telehealth. This amounts to approximately one extra month of patient visits.

**Future Value**

Using the calculations above, a provider who saves 20 days annually from travel can see an additional 400 patients per year. This benefit becomes very significant when this benefit is realized by only a small number of providers. For Canada to realize 10,000 additional visits annually, only 25 providers need to realize this benefit. For Canada to realize 100,000 additional visits annually, only 250 providers need to realize this benefit.

### 11.7 Telehealth avoids health system costs through avoided subsidized travel

#### Indicators

- Avoided subsidized travel

#### Rationale

Many provinces and the federal government offer subsidies for medical travel. For example:

- Manitoba — Northern Patient Transportation Program
- Ontario — Northern Health Travel Grant
- Health Canada — Health Travel Grant

Telehealth avoids the need for travel and thus saves jurisdictions from having to fund travel.
Indicator Setting and Populations

- All patients who received a Telehealth service who were eligible for subsidized travel

Known Evidence

**Ontario**

Ontario Northern Health Travel Grants (NHTG) are funded by the Ministry of Health and Long-Term Care. The grants help pay some of the travel-related costs for Northern Ontario residents who must travel at least 100 kilometres one-way for medical specialist or designated health care facility services that are not locally available. The NHTG Program provides an allowance of 41 cents per kilometre plus an accommodation allowance of $100 per eligible trip to patients whose one-way road distance to the closest specialist or designated health care facility (e.g., hospital for MRI) able to provide the required services is at least 200 kilometres. According to OTN, $14 million was saved in Northern Health Travel Grant.

**Health Canada**

The travel budget is $280 million for all forms of travel. There is also federal funding for travel by members of Aboriginal communities.

**Manitoba**

Three northern regions in Manitoba are subsidized for clinical travel — not education or staff education.

Current Value

Many Canadian jurisdictions have programs that pay for medically necessary travel. Telehealth services were estimated to have avoided $36 million of travel that would have been funded by provincial health ministries or by Health Canada.

<table>
<thead>
<tr>
<th>ONTARIO</th>
<th>FINDING</th>
<th>DETAIL AND CALCULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel grant</td>
<td>$0.41</td>
<td>$ per km, applies to rural events</td>
</tr>
<tr>
<td>Travel accommodation</td>
<td>$100 per event</td>
<td></td>
</tr>
<tr>
<td>Distance travelled per event for rural physician events</td>
<td>500 km</td>
<td></td>
</tr>
<tr>
<td>Number of events</td>
<td>42,425</td>
<td></td>
</tr>
<tr>
<td>Distance travelled for rural physician events</td>
<td>21,212,500 km</td>
<td></td>
</tr>
<tr>
<td>Travel grant for distance</td>
<td>$8,697,125 = 21,212,500 × $0.41</td>
<td></td>
</tr>
<tr>
<td>Travel grant for accommodation</td>
<td>$4,242,500 = 42,425 × $100</td>
<td></td>
</tr>
</tbody>
</table>

3 Key Informant interview, November 2010.
4 Key Informant interview, December 2010.
Telehealth Benefits and Adoption Connecting People and Providers across Canada

ONTOARIO FINDING DETAIL AND CALCULATION

TOTAL $12,939,625

Extrapolate for Canada

<table>
<thead>
<tr>
<th></th>
<th>FINDING</th>
<th>DETAIL AND CALCULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel grant</td>
<td>$0.41</td>
<td></td>
</tr>
<tr>
<td>Travel accommodation</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Distance travelled per event for rural physician events</td>
<td>500</td>
<td>$0.41 \times 500</td>
</tr>
<tr>
<td>Number of events</td>
<td>109,626</td>
<td></td>
</tr>
<tr>
<td>Distance travelled for rural physician events</td>
<td>54,813,000 km</td>
<td>109,626 \times 500</td>
</tr>
<tr>
<td>Travel grant for distance</td>
<td>$22,473,330</td>
<td>54,813,000 \times 0.41</td>
</tr>
<tr>
<td>Travel grant for accommodation</td>
<td>$10,962,600</td>
<td>109,626 \times 100</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$33,435,930</td>
<td></td>
</tr>
</tbody>
</table>

Future Value

The subsidized travel budget is intended for the populations for which Telehealth is most relevant — rural and northern. The application of Telehealth will limit the travel required for these residents and therefore reduce the travel to be subsidized. In some cases it will produce travel that would have otherwise not have been taken, especially in cases where medical issues are diagnosed earlier by a Telehealth professional than they would have without them.

EXTRAPOLATION FOR CANADA IN THE FUTURE

<table>
<thead>
<tr>
<th></th>
<th>DETAIL AND CALCULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel grant</td>
<td>0.41</td>
</tr>
<tr>
<td>Travel accommodation</td>
<td>100</td>
</tr>
<tr>
<td>Distance travelled per event for rural physician events</td>
<td>500</td>
</tr>
<tr>
<td>Potential number of events</td>
<td>300,000</td>
</tr>
<tr>
<td>Distance travelled for rural physician events</td>
<td>150,000,000 km</td>
</tr>
<tr>
<td>Travel grant for distance</td>
<td>$61,500,000.00</td>
</tr>
<tr>
<td>Travel grant for accommodation</td>
<td>$30,000,000.00</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$91,500,000.00</td>
</tr>
</tbody>
</table>

Telehealth will not be a substitute for all face-to-face visits with health professionals; however, given the evidence presented in Canada and elsewhere, it can reduce travel and therefore the subsidized travel budget by a significant portion. Extrapolating the success of Pan-Canadian Telehealth to include a projected 300,000 physician visits that could be avoided, the program could save more than $91 million in travel subsidies.

11.8 Telehealth reduces avoidable health system utilization

Indicators

- Avoided unplanned hospitalizations
Avoided unplanned ER visits
Reduced health system usage due to improved early detection or treatment

Rationale

As Canada’s population ages, chronic illnesses such as cardiovascular disease, diabetes, cancer, osteoporosis, Chronic Obstructive Pulmonary Disease (COPD), asthma, Alzheimer’s, dementia and arthritis are becoming more prevalent among Canadians. The challenges presented by such conditions are precipitating changes in health care delivery from a variety of provider, stakeholder and clinical perspectives.

Health care professionals generally believe that managing these conditions before a patient requires hospitalization improves the patient’s health, contributes to better overall community health status and often saves money, as more services are transitioned to community settings and as greater focus on primary care services provides greater continuity of health, health services and, ultimately, more-efficient health care systems. There is therefore a great emphasis on chronic disease prevention and management, and assisting individuals to maintain independence and keep as healthy as possible through prevention, early detection and management of their chronic conditions.

New delivery mechanisms, such as home Telehealth, are also emphasizing care in the home as an alternative to acute care and a complement to primary care. Programs such as home Telehealth provide health services to individuals in their place of residence to restore health, often following an acute episode, and are also intended to maintain health status by enhancing self-management to increase independence and avoid crisis emergency visits, hospital admissions and re-admissions.

In addition, Telehealth consultations allow these populations to have regular follow-up consultations with greater ease and lower cost, so the prevalence of these consultations is likely to be higher and the health quality and outcomes also higher, thus reducing high-cost acute encounters.

Indicator Setting and Populations

- Patients enrolled in Telehomecare programs in British Columbia, Ontario, Quebec, Nova Scotia and New Brunswick.
- An estimated 350,000 Canadians were affected by Congestive Heart Failure (CHF) in 2002, with one-year mortality after diagnosis reported to be between 25%–40%.
- Chronic Obstructive Pulmonary Disease (COPD) is considered to be a major public health problem, with a worldwide prevalence estimated to be 9.34 per 1,000 in men and 7.33 per 1,000 in women. In Canada it has been estimated that there are approximately 714,000 diagnosed patients, but studies have estimated that more than 50% of patients remain undiagnosed.
- The diabetes prevalence rate is 4.6%.

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1 Change Foundation, 2002.
3 Canadian Lung Association, 2006.
4 Statistics Canada.
Known Evidence

An analysis\(^1\) of the 2004–2005 Ontario Hospitalization Data identified hospitalizations associated with Most Responsible Diagnosis ASCS of diabetes, CHF and COPD, as well as the co-morbid diagnoses for these conditions. The analysis recognized that prevalence and admission thresholds were different across jurisdictions, but in the absence of national data by jurisdiction, it assumed that the Ontario proportions would apply to all Canadian admissions and it calculated the number of admissions and co-morbidities at a pan-Canadian level.

The following table lists selected ambulatory care-sensitive condition admissions and co-morbidities:

### Table 14. Selected Ambulatory Care-Sensitive Condition Admissions and Co-morbidities

<table>
<thead>
<tr>
<th>Ambulatory Care Sensitive Conditions Most Responsible Diagnosis</th>
<th>Admissions with no Co-morbidities</th>
<th>Diabetes Co-morbidities</th>
<th>CHF Co-morbidities</th>
<th>COPD Co-morbidities</th>
<th>Diabetes and CHF and COPD Co-morbidities</th>
<th>Total Number of Patients with Most Responsible Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>19,946</td>
<td>0</td>
<td>362</td>
<td>266</td>
<td>21</td>
<td>20,595</td>
</tr>
<tr>
<td>CHF</td>
<td>42,779</td>
<td>4,572</td>
<td>0</td>
<td>4,378</td>
<td>581</td>
<td>52,309</td>
</tr>
<tr>
<td>COPD</td>
<td>50,103</td>
<td>3,240</td>
<td>6,083</td>
<td>0</td>
<td>679</td>
<td>60,104</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td><strong>112,828</strong></td>
<td><strong>7,811</strong></td>
<td><strong>6,445</strong></td>
<td><strong>4,644</strong></td>
<td><strong>1,280</strong></td>
<td><strong>133,008</strong></td>
</tr>
</tbody>
</table>

Based on these data, in 2004–2005, there were 133,000 pan-Canadian admissions that could have potentially been avoided through the use of Telehomecare. Hospitalizations have declined during the past 15 years by 14\(^2\), mostly due to less-serious cases not being hospitalized (home Telehealth being an example of this). We can assume that in 2008–2009, there were 3\% fewer cases than in 2004–2005, or 129,000.

**Ontario**

The Ontario Telemedicine Network Telehomecare Phase One Evaluation\(^3\) showed that:

- Telehomecare resulted in 64\%–66\% reduction in hospital admissions (varies by disease)
- Telehomecare resulted in 61\%–72\% reduction in ER visits (varies by disease)
- ER visits per month: 0.32–0.34 \(\times\) 12 = 3.86 ER visits per year
- Admissions per month: 0.17–0.22 \(\times\) 12 = 2.28 admissions per year

\(^1\) Pan-Canadian Home Telehealth business case, Canada Health Infoway, 2007.


Cost per admission: $4,919 (COPD); $12,020 (CHF)
Cost of emergency department visit = $138\(^1\)
Number of patients = 800

**Quebec**

A study at Maisonneuve Rosemont Hospital in Montréal involved a six-month pilot comparing the effects and costs of care between 19 COPD patients under a Telehomecare program to a comparable group of 10 patients receiving regular home care without Telemonitoring. The results of the pilot clearly demonstrate fewer hospitalizations for patients in the experimental group.\(^2\)

Document review revealed an approximate number of 1,000 Telehomecare patients.

**Canada**

Vision care has a variety of successful, evidence-based and cost-effective interventions. In Canada, an intervention is considered cost-effective if it costs less than $40,000 per quality-of-life year (QALY). Screening and treatment of diabetic retinopathy costs $3,190 per QALY. Screening in remote Aboriginal communities costs $11,000 per QALY.\(^3\)

The direct costs associated with vision health were $8.6 billion in 2007:

- The largest health cost (40% of the total) fell under vision care, which covers optometrists, ophthalmologists, opticians and corrective lenses. The majority of this cost is publicly funded, usually by provincial and territorial governments.
- Other major costs include hospital care for people with vision loss (20%) and other expenditures (17%), which refer to public health, administration, capital costs and expenditures not classified elsewhere.
- Physicians’ services (10%) cover fee-for-service payments by provincial and territorial medical insurance plans for procedures such as eye exams, treatments and surgeries.
- Other institutions (5%) refer to expenditures for people living in facilities such as nursing homes as a result of vision loss.
- In the last few decades, expenditure on health care in Canada has been growing rapidly — considerably faster than GDP. However, expenditure on vision care has risen even faster, growing from 1.8% of total health expenditure in 1975 to 2.2% in 2007.

**British Columbia**

Evaluation of the Interior Health Telenephrology program showed that emergency department and acute care visits decreased from 384 to 254 for the 12 months prior and post to the TeleRenal implementation — a 34% decrease.\(^4\)

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\(^{1}\) Dawson, H; and Zinck, ED, Spending in Canada. A focus on cost of patients waiting for access to an inpatient bed in Ontario.

\(^{2}\) Pare et al., 2006.


\(^{4}\) Interior Health, “IH Clinical Telehealth Overview.” Presentation for Canada Health Infoway, September 2010, 8.
In 2009, Interior Health’s Telehomecare monitoring service had 175 patients enrolled. A report from September 2010, indicated that the program yielded the following:¹

- 64% reduction in emergency department visits
- 72% reduction in hospitalization days admissions 155 days pre- and post-44 days
- 15% reduction in ALOS
- 47% reduction in hospital admissions
- Reduction in homecare nurses in field and a decrease of 47% in home visits
- An increase of 116% in phoning based upon seeing data or patient-need phone calls
- Annual average savings of $2,600 per patient by keeping clients out of hospital²

For wound care, pilot home Telehealth interventions in British Columbia have anecdotally reported decreased admissions and cancelled surgical procedures as a result of improved healing, but have not measured these impacts.³

**New Brunswick**

It was found that, for the Extra-Mural Program (EMP) in New Brunswick, there was:

- A 12% decrease in emergency visits for Telehomecare (CHF and COPD) patients compared to standard EMP services.
- A 39% reduction in the annualized emergency room visit rate for Telehomecare patients in the first three months of the intervention.
- Reduction for standard EMP services was shown to be between 25% and 35%.
- Observed changes were maintained for the first three months following the interventions, and actually improved further to a 34%–47% reduction in emergency visit rates (Seymour et al., 2006).⁴

- New Brunswick’s C-Triage program showed the following:⁵
  - Total staffing costs per patient were $158.67 pre-C-Triage and $65.55 post-C-Triage
  - As a result, C-Triage resulted in a savings of $93.12 to be accrued per patient. Assuming ~1,200 referrals per year, this would result in a total cost savings of $111,744 per annum.

Data from 2010 Pan-Canadian Telehealth survey suggested a total of 497 homecare patients.

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² Interior Health, Telehomecare Benefits Slide — summary, No date.
Canada Health Infoway Telehomecare Business Case

The Infoway Telehealth business case projects a net annual savings of $911 million from home Telehealth for Cardiac, COPD, diabetes, post-surgical care and wound management patients.

- The largest benefit of the home Telehealth investment is the reduced need for hospitalizations for the populations impacted by the interventions — a benefit worth a potential $540 million per year.
- In 2007, approximately 750,000 Canadians utilized government-subsidized homecare, or approximately 2,610 homecare patients per 100,000 individuals in Canada. Spending on homecare was $3.4 billion in 2003–2004.
- Each home Telehealth case for the chronic or post-acute patient under consideration was calculated to avoid an inpatient admission costing $6,100 per case.
- A study of home Telehealth for wound patients in the United States reported that a 30% admission rate is expected among typical wound care patients receiving home care. Improved access to wound specialists through home Telehealth and the resulting decrease in time required for healing were noted as important contributors to reducing admission rates; no hospitalizations were reported in the initial pilot that included 18 patients chosen for their long length of stay in home care, little progression in healing, and multiple daily or twice-daily home care nursing visits (Moore et al., 2005).
- In their study of CHF, COPD and chronic wound patients receiving homecare, Finkelstein et al. reported that discharge to a higher level of care (hospital or nursing home) within six months of study participation was 42% for traditional homecare, 21% for homecare plus video and 15% for homecare plus video and monitoring, although these differences were not statistically significant (Finkelstein et al., 2006). This translates into a reduction in admission rates of 50% for home Telehealth compared to traditional homecare.

International

Nearly 40 million yearly hospital admissions are reported collectively in all six Scandinavian member states. It is generally estimated that between 75% and 85% of hospital admissions are for chronically ill patients. Assuming that an average of 80% of hospital admissions could be for chronic conditions in all member states, the yearly number of admissions for chronically ill patients could be as high as 30 million collectively in all six countries.

National self-assessments provided by subject matter experts at central health agencies within each member state estimate levels of adoption for Telehealth and Home Health Monitoring ranging from 0% to 10%, which indicates that a major proportion of realizable benefits could still be achieved through continued investment in this technology. Considering the remaining adoption of technology, the number of hospital admissions for chronically ill patients in all six member states could be reduced by more than 5.6 million every year. Reducing the number of admissions would improve quality of care by enhancing the patient experience, while at the same time easing resource utilization in hospitals, contributing to increased availability.

The previous calculations of benefits are based on the following assumptions:
- The benefit reported in the case study can be replicated in the above example
- A majority of chronically ill patients and their clinicians would want to use a home health monitoring system

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1 Pan-Canadian Home Telehealth Business Case, Canada Health Infoway, 2007.
2 Gartner report: E-Health Scandinavia.
The average rate of hospital admissions for chronically ill patients of 80% is representative of all six member states.

Best practice will be followed in the process of implementation to enact the cultural, operational and organizational changes necessary to embrace the appropriate use of the system in a way that can yield the expected level of benefits.

In a case study, the United States Department of Veterans Affairs in the reports a reduction of hospital admissions of 19.74% for chronically ill patients monitored from home through a home health monitoring system.¹

**Current Value**

Telehomecare is still in its early stages of adoption in Canada. There are approximately 2,500 patients with a variety of chronic diseases such as CHF, COPD and diabetes treated in Canada each year through Telehomecare. By recent estimates, Telehomecare was responsible for the reduction of one inpatient admission per patient — a 50% reduction. At a cost of $8,000 per stay, this reduced health care costs by $20 million across Canada.

Emergency department visits were similarly reduced. Two-thirds of the average 3.96 visits were eliminated through the use of Telehomecare. Emergency department visits average $138, saving an estimated $915,000.

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<th>CATEGORY</th>
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<tr>
<td>Inpatient stays avoided per patient</td>
<td>1</td>
<td>$20,000,000 = 2,500 × 1 × 8,000</td>
</tr>
<tr>
<td>Cost per inpatient stay</td>
<td>$8,000</td>
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</table>

**Future Value**

**Telehomecare**

Extrapolating current benefits to 129,000 patients each year, and based only on COPD, CHF and diabetes admissions and emergency department visits, health care entities in Canada could avoid significant costs and utilization. A single avoided inpatient stay (a 50% reduction) and two emergency department visits (a 67% reduction) for this population would save more than 900,000 inpatient bed-days² and 6,600 emergency department visits, which would carry a

¹ Care Coordination/Home Telehealth: The Systematic Implementation of Health Informatics, Home Telehealth, and Disease Management to Support the Care of Veteran Patients with Chronic Conditions, Veterans Affairs.

significant cost savings: more than $1 billion in inpatient costs and $46 million in emergency department costs.

In addition to this, studies have shown that use of Telehomecare can reduce the length of hospital stays if admitted by 24%–48%.\(^1,2\) At an average reduction in length of stay of 36%, this can reduce the cost of each admission by $2,880 and reduce the number of bed-days by at least two per stay. If each of the 129,000 patients had a reduction of two bed-days in one hospital stay per year, health care costs could decrease by more than $371 million. These savings, however, likely overlap the avoided stays mentioned above to some extent.

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<tr>
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<td>Inpatient stays avoided per patient</td>
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<td>Cost per inpatient stay</td>
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<td>$1,032,000,000 = 129,000 × 1 × 8,000</td>
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<td>Number of Telehomecare patients</td>
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<tr>
<td>Emergency department visits</td>
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</tr>
<tr>
<td>Emergency visit avoidance</td>
<td>67%</td>
</tr>
<tr>
<td>Emergency visit cost</td>
<td>$138</td>
</tr>
<tr>
<td></td>
<td>$47,232,266 = 129,000 × 3.96 × 67% × 138</td>
</tr>
</tbody>
</table>

**Vision Loss**

The CNIB report\(^3\) details the financial costs of vision loss of $15.8 billion annually, $8.6 billion of which is borne by the federal and provincial/territorial governments. The $15.8 billion price tag is also 1.19% of Canada’s GDP, or $500 per Canadian annually. The direct cost of the burden of disease for vision loss is the largest in Canada, followed closely by cardiovascular disease.

The financial costs break down as follows:

- Individuals with vision loss ($3.5 billion)
- Family/friends ($474 million)
- Federal government ($2.4 billion)
- Provincial/territorial governments ($6.3 billion)
- Employers ($141 million)
- Society/other ($3.0 billion)


The loss of vision affects a new resident every 12 minutes, or more than 40,000 people per year, one-half of whom have gross annual incomes of $20,000 or less, or for whom the loss will have significant consequences. CNIB estimates that 75% of these cases, however, are avoidable through early detection and treatment.

If 75% of the $8.7 billion borne by the governments of Canada could be avoided through appropriate detection and treatment, the aggregate savings could exceed $6.5 billion annually.

It is hard to project what proportion of these 75% of cases could be supported through Telehealth, but even if it was less than 1% that would be a potential savings of $65 million to governments in Canada, and $30 million to patients and their friends and families.

11.9 Telehealth reduces unnecessary transfers

Indicators

- Reduction of transfers

Indicator Rationale

Patients are transferred from one care setting to another in order to get access to scarce skills (e.g., specialists) or scarce equipment (diagnostic or treatment devices and services). Telehealth could reduce the number of transfers required by making the skills, knowledge and physical assets available at the patient location rather than having to move the patient.

Indicator Setting and Populations

- Current populations: Patients who did not need to be transferred to another health care organization because Telehealth was available to treat them at their local health care organization
- Future populations: Patients of the Telehealth programs who do not need to be transferred to another health care organization for consultation or treatment

Known Evidence

Ontario

In Ontario, Telecrisis program directors estimated that 75% of patients who would have normally been transferred or admitted were stabilized and sent home following a crisis consultation.¹

As well, it was reported that out of eight VICU consultations, just one transfer to another hospital occurred. Seven cases were resolved using the VICU system.²

British Columbia

A 2005 study found that using videoconferencing for the transmission of echocardiograms is useful in the assessment of children with suspected disease. A retrospective review of patient and management outcomes on cardiac teleconsultations performed at two regional hospitals showed that 72 out of a total of 106 echo studies found that 16% had been urgent and

conducted on the same day as referral. Following the videoconference, 90% of patients were able to be managed locally. Eight percent had significant cardiac lesions that were handled by elective transfer at the appropriate time. Only one child required urgent transfer for treatment.¹

**Alberta**

A key informant from Alberta reported that stroke acute care by Telehealth resulted in a 38% decrease in transfers to tertiary sites, which translated to a net savings of approximately $390,000 in cost avoidance, as patients were able to receive tPA in their local communities.

The University of Alberta Hospital acts as a Telestroke hub to seven remote spoke hospitals.² It has shown significant successes in this program, one of which is a decrease in acute stroke transfers of 92.5% between one of the spoke hospitals to the University hospital during the two-year study. This is likely due in part to better initial treatment of stroke patients through tPA and more-accurate diagnoses of all potential stroke cases presented at the hospital.

**Quebec**

In a study of a Telemedicine network for the Magdalene Islands, located in the middle of the Gulf of St. Lawrence in Quebec during a 13 month study period, 118 transmissions were made across 14 applications, the most being store-and-forward (S&F) for orthopaedic and radiology consults. The program was used by most for initial consults, 19 patients used it for follow-up, eight emergency transfers were avoided and 15 elective transfers were managed locally via videoconference.³

**Current Value**

There is significant anecdotal discussion of the reduction in transfers from community acute care institutions for emergency, urgent and stroke services. There is also some anecdotal support for reduction of transfers from long-term care facilities to acute care facilities.

**Future Value**

There is insufficient evidence to project future savings and benefits for the reduction of transfers; however, the evidence that has surfaced suggests that this benefit does exist and that it will continue to grow as the penetration of Telehealth technologies and processes becomes more pervasive. This benefit should be monitored and measured.

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² Khan, Khurshid; Shuaib, Ashfaq; Whittaker, Tammy; Saqour, Maher; Jeerakathil, Thomas; Butcher, Ken; and Crumley; Patrick, Telestroke in northern Alberta: a two-year experience with remote hospitals, The Canadian Journal of Neurological Sciences, Le journal canadien des sciences neurologiques, 2010; 37(6):808-13.

11.10 Telehealth increases productivity by allowing a higher volume of consultations

Indicators

- Increased number of consultations

Rationale

Due to asynchronous (S&F) methods of working, more efficient processes and improved patient scheduling, some providers are able to schedule and conduct an increased volume of consultations due to the use of Telehealth.

Indicator Settings and Populations

- Current populations: providers who have experienced an increased volume of consultations due to the use of Telehealth. This may include a portion of clinicians delivering services in: Teledermatology, Teleophthalmology, Telemental Health, Televisitation and Telewoundcare
- Future populations: all providers of the Telehealth programs, which has led to an increased number of consultations.

Known Evidence

Ontario

Ophthalmologists estimate a savings of 15 minutes per screened patient, compared with a 30-minute in-person consult — a 50% increase in capacity.\(^1\)

Manitoba\(^2\)

A gastroenterologist reported doing pre-ops and follow-ups by Telehealth, so his on-site time was spent in the operating room. In this case, provider time and local support staff time were more effectively utilized.

Current Value

There is some evidence to support the hypothesis that Telehealth can improve provider efficiency. This is particularly apparent with S&F technologies in which the provider can provide asynchronous services that do not interfere with established workflows and can be fit “in between” other responsibilities. Examples of Telehealth disciplines that significantly benefit from S&F techniques include Teleophthalmology for screening diabetic retinopathy patients and Teledermatology. There are also reported cases in which specialist surgeons performed pre-operative consults and post-operative follow-ups by Telehealth in order to maximize their operating room time at the remote site — another example of improved efficiency.

The AFHCAN study\(^1\) in Alaska has shown that specialists have been able to perform up to 350 S&F-based consultations per year in addition to their normal workload without a detriment to their performance. This is approximately 1.4 additional consults per provider, per work day.

\(^1\) OTN Teleophthalmology evaluation, 2010.
\(^2\) Manitoba Key Informant interviews, December 2010.
However, other studies have shown that Telehealth consultations have taken longer than face-to-face consultations. A study in the U.K. showed that average consultation time for both rural and urban patients showed an increase of consultation times with the physician of 30% (22 minutes instead of 16.8 minutes).²

This may be a more pervasive effect than reported since, in most studies, setup and logistical times have not been considered in time calculations. These would adversely affect the overall encounter time, especially in the early stages of programs as both providers and patients become comfortable with the new technologies.

**Future Value**

As Telehealth solutions mature and providers are able to select the most advantageous method for their particular needs, inefficient Telehealth solutions will likely be minimized and more-advantageous ones will be used instead.

Asynchronous methods such as S&F will create increases such as those described above and could lead to an increase in productivity of approximately 7%.³ With an assumption that this results in an additional 400,000 consultations, an additional 80 physician equivalents would be required for this work, valuing it at $10 million.

<table>
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<td># of patients each year</td>
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<td># of additional consultations per year</td>
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<td># of physician equivalents required</td>
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<tr>
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<tr>
<td>Value</td>
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<td>= 80 × $125,000</td>
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</table>

**11.11 Telehealth supports better chronic disease management**

**Indicators**

- Patient perceptions on whether their chronic diseases are better managed
- Provider perceptions on whether patients’ chronic diseases are better managed

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² Loane, MA; Bloomer, SE; Corbett, R; Eedy, DJ; Gore, HE; Hicks, N; Mathews, C; Paisley, J; Steele, K; and Wootton, R, Patient cost-benefit analysis of teledermatology measured in a randomized control trial, *Journal Telemed Telecare*, 1999; 5:1–3 doi:10.1258/1357633991932414.

³ Based on an additional 350 visits + 250 working days = 1.4 additional visits daily; and a baseline average of 20 patient visits per day.

Rationale

Chronic conditions affect at least one-third of Canadians. In 2005, 33% of youth and adults reported having at least one select chronic condition. Management of chronic diseases requires frequent and regular monitoring. Sometimes, patients need to visit their care provider regularly. As well, chronic disease management approaches centre on the education of the patient so that they have the knowledge and are empowered to self-care.

The use of Telehealth is one mode to facilitate improved chronic disease management. Through the use of innovative technologies, patients can be both reminded of regular monitoring and be monitored directly without significant interruption of their lives. As well, Telehealth can support patient education by connecting patients at home with their care providers and health educators.

Indicator Settings and Populations

- Current populations: patients living with chronic conditions who received care/consultations through the use of Telehealth. This could include programs such as Telehomecare and Telediabetes.
- Eligible home Telehealth patient populations considered for these groups are quite small as compared to the total number of Canadians who have these conditions; they are reasonable sizes for the ill patient populations that account for the benefits to the health system.

Known Evidence

**British Columbia**

Within the Interior Health Authority, findings from the Telehomecare monitoring service found that there was a high degree of patient satisfaction. There was strong agreement among patients that Telehomecare supported their knowledge of the condition (90%), confidence in managing their condition (84%) and their ability to self-manage (90%).

Telehomecare was also reported to improve health outcomes and encourage proactive treatment. For example:

- In a review of 27 charts, all 27 clients (100%) lost weight due to CHF intervention to decrease pulmonary and peripheral oedema for an average of 12.5 lbs. per person.
- Twenty-three congestive heart failure clients (85%) with co-morbid chronic conditions were appropriately referred to programs such as Diabetes Program and the Renal Team, resulting in providing more-integrated care and less likelihood of complications.

**Newfoundland and Labrador**

The Newfoundland and Labrador Telehealth Expansion Project deployed clinical videoconferencing platforms and services in 47 locations across four regions to help patients

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manage their chronic disease with provider support. The care areas of focus included: diabetes, oncology, mental health, nephrology and neurology, enabling a provincial Telehealth program focusing on chronic disease management. It also explored whether Telehealth supports equitable access to services and whether it increases patient empowerment.1

- 71% of patients noticed a cost savings of up to $1,000 related to travel expenses
- 71.6% of patients said: “Telehealth makes it more likely to see the same specialist than if Telehealth was not available”
- Approximately 75% of physicians felt that the Telehealth facilities were appropriate, while approximately 73% felt that Telehealth enhanced the quality of care patients received
- 71% of patients noted an increased likelihood of patient-specialist/other health care provider interactions, with a 77% comfort level in this type of approach to care delivery
- 80% of patients were “satisfied with the overall quality of their Telehealth session” and 78% “would recommend the use of the Telehealth service to others”

Quebec

The Constellation project in Quebec reported that the use of SyMO, a mobile computing application, enabled nurses to monitor the patients’ status over time (77%) and improved the quality of patient care (74%).

A study at Maisonneuve Rosemount Hospital in Montreal involved a six-month pilot comparing the effects and costs of care between 19 COPD patients under a Telehomecare program to a comparable group of 10 patients receiving regular home care without telemonitoring. The results of the pilot clearly demonstrate fewer hospitalizations for patients in the experimental group.2

New Brunswick3

The Telediabetes Monitoring Initiative in Regional Health Authority B of the Horizon Health Network (Zone 3) was implemented for 45 patients in the zone, including the Oromocto First Nation. Telemonitoring via telephone captured physiological data for analysis and review by central health professionals. The patients reported that they:

- Had better knowledge of diabetes (87% agree and strongly agree)
- Felt that they are more able to control their blood sugar (73%)
- Had changes made to their medication to help control their diabetes (64%)
- Their health related to diabetes has improved (86%).

Mean A1C level dropped in enrolled patients from 9.4% baseline to 8.3% at their six-month follow-up visit, compared to a control group who dropped from 7.8% baseline to 7.4%. All results were statistically significant.

The New Brunswick Extra-Mural Program (EMP) studied the impact of hospitalizations among CHF and COPD patients. The study reported a 63% decrease in all-cause hospitalization during the three month Telehomecare intervention compared to the three month period prior to the intervention. Importantly, the decrease in hospitalizations was maintained following the

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1 Canada Health Infoway, “Telehealth Project Summaries,” September 20, 2010, 27
2 Pare et al., 2006.
3 Telediabetes Monitoring Initiative in Regional Health Authority B of the Horizon Health Network, Evaluation performed by Atlantic Evaluation Group Inc.
Telehomecare intervention with the study reporting a decrease in hospitalizations in the three month period after the intervention of 71%, compared to the three month period prior to the intervention. The study also assessed the impact of Telehomecare intervention compared to usual homecare and concluded that the incremental impact of Telehomecare was an additional 23% decrease in all-cause hospital admissions above that observed with standard EMP services; that is the reduction in all-cause admissions with standard EMP services was 40%, compared to the 63% for the Telehomecare intervention. The reductions observed in admissions due to CHF and or COPD were of a similar magnitude: the Telehomecare approach was 25% more effective in keeping clients with CHF and/or COPD out of the hospital than the approach used by standard EMP services.¹

**Current Value**

Telehealth oriented toward chronic disease management has taken many forms, ranging from telephone support to monitoring technologies in the home. Typical disease focus areas include cardiac disease, diabetes, oncology, mental health and nephrology. These forms of Telehealth have been very successful both in improving the patient quality of life and in achieving better outcomes. In each of five different studies across the country, more than 70% of providers strongly agreed that quality of patient care was better. In most patient studies, the vast majority of patients (typically more than 80%) were very satisfied, felt that care was better and that their quality of life was improved, including their knowledge of their condition, their confidence in managing their condition and their ability to self-manage.

It has also been reported that Telehealth systems enable clinical staff to be in regular contact with larger member caseloads compared to standard telephonic models for individuals with complex chronic conditions. On the patient side, each member is connected to the Telehealth system, is assessed, given feedback and positive reinforcement when needed — a model that is not feasible by traditional models of telephonic clinical management (because of personnel capacities necessary and related costs), even for individuals at high acuity levels.²

**Future Value**

Telehealth will continue to become an important part of the lives of patients living with chronic conditions. This will be true for all beneficiaries of Telehealth, though will be especially true for rural patients, for many of whom Telehealth is not merely a supplement or replacement to current treatments, but instead access to health care that was not previously realistically available.

There is strong evidence that, through education and monitoring, patients spend less time visiting health care professionals and in hospitals.

Patient satisfaction and understanding of their condition is very high with the use of the technology.

Measurable health and quality outcomes (e.g., drop in mean A1C levels) increase significantly.

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¹ Seymour et al., 2006; Seymour et al., 2006

² European Coordination Committee of the Radiological, Electromedical and Healthcare IT Industry, February 2010, COCIR Position Paper For a better deployment and use of Telehealth.

11.12 Telehealth supports application of leading practices

Indicators
- Provider perceptions on the application of best practices
- Demonstrated application of best practices

Rationale
Leading practices in health care tend to dictate when and how care is provided. For example, a best practice for retinal screening for diabetics is that patients should be screened every year for diabetic retinopathy. Best practices for wound care require regular monitoring and the type of dressing to use. Best practices in stroke care state that tPA should be administered within three hours after an ischemic stroke.

Because Telehealth connects referring providers with consulting providers, there is a great opportunity for consulting providers to provide mentorship in a particular discipline. As well, centralized scheduling encourages regular appointments when needed, and offers greater assurance of collaboration between providers.

Indicator Settings and Populations
Telehealth programs where the application of leading practices has been shown, or has been reported. This could include programs such as Telestroke, Telewoundcare and Teleophthalmology.

Known Evidence

British Columbia
In the Interior Health Authority Telewoundcare service, wound care patient information is linked to Meditech and flagged within PCI Meditech. In this way, care providers can practice evidence-based management of wounds by tracking patient progress. The evaluation of this program showed that Telewoundcare is not only an efficient use of resources, but it also promotes collaboration and just-in-time learning.¹

Ontario
It was found that the implementation of Ontario’s Teleophthalmology program helped to meet the best-practice guidelines of screening for diabetic retinopathy each year. Prior to its implementation, segments of the large diabetic population in Ontario did not go for screening at all, or did not have regular screening performed.²

Best practices in stroke care suggest that tPA should be administered within three hours and in some cases within four to four and one-half hours of the onset of stroke.³ A number of

¹ BC wound care notes.
² Teleophthalmology notes.
Telestroke programs have demonstrated that using Telehealth can enable the application of this best practice.¹

**Current Value**

Tissue plasminogen activator (tPA) has shown to be the first effective treatment for ischemic strokes, which are the cause of 80%–90% of all strokes.² Unfortunately, the thrombolytic treatment must be administered within 4 to 4.5 hours, and outcomes are inversely proportional to the administration time. In addition, due to the risk of secondary intracerebral haemorrhage, administration also must be preceded by rapid brain imaging and review by stroke experts, which tend to be limited to larger urban hospitals. Without Telestroke, this combination limits the effectiveness of this treatment to patients who are within 100 kilometres of a major hospital.

Telestroke methods have been shown to expand this population to include patients outside 100 kilometres of Telestroke-enabled hospitals. Through teleconsultations, doctors at local hospitals can interface with stroke experts at tertiary hospitals and administer the tPA treatment within the crucial time frame.

A Telestroke program at the University of Alberta was able to treat 21% of consultations with tPA, with outcomes comparable to patients treated at major hospitals. Besides the obvious benefits to the patients treated, the health care system realized benefits from the program:

- Hospital stays for those treated with tPA were reduced from seven days to three days, alleviating costs and utilization
- Transfers to a tertiary centre were reduced by 92.5% in one local hospital, reducing both the risks of transfers and moving care from a distant and expensive tertiary hospital to a local hospital

**Future Value**

Assuming that there are approximately 50,000 strokes annually in Canada, 40,000 of those are ischemic strokes for which tPA may be used. Also, assuming that the 20% rural population is not within 100 kilometres of a tertiary hospital that has the facilities to appropriately administer tPA, but one-half of those are within 100 kilometres of a local hospital which could, via Telehealth with a tertiary hospital, administer tPA, an additional 4,000 strokes could be treated that would not have been previously.

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<th>CATEGORY</th>
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</tr>
<tr>
<td># of ischemic strokes</td>
<td>Assume 40,000</td>
<td></td>
</tr>
<tr>
<td>Percentage of rurality of Canadian population</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td># of strokes that could be treated with Telehealth (assume one-half could)</td>
<td>4,000</td>
<td>40,000 × 20% ÷ 2</td>
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</table>

¹ Telestroke notes.
If one-half of the 4,000 patients are positively affected by the drug, Canada could see the following benefits:

- 2,000 patients would have improved outcomes
- Each patient would have a reduction of four in-patient bed-days, which would reduce utilization by 8,000 days annually, or 22 bed-years
- 8,000 bed-days would also reduce the cost of healthcare by more than $7 million

Besides the improved outcomes and reduced costs and utilization, programs such as the Alberta Telestroke program require training for both referring and consulting providers. Training promotes structured communications between the two providers, which has its own benefits. Studies have shown reductions of complications and deaths of 40%.1 Combining the use of advanced medical procedures and treatments with structured communication has positive benefits for all patients.

11.13 Telehealth improves knowledge and skill development in local care providers

Indicators

- Perceptions of care providers on their skill development

Rationale

Telehealth contributes to education, training and mentorship of future, new and existing health care providers in a number of ways:

- Videoconferencing capability allows remotely located medical students and residents to participate in grand rounds, symposia and lectures in real time. They can also review previous sessions.
- The ability to engage with professors and peers when far away from campus allows medical students and residents to develop social networks in their placement communities. This is a proven recruitment and retention strategy, which results in the willingness of new physicians to stay in the communities where they trained.
- Through the use of Telemedicine, physicians can connect to education events and avoid the need to travel. Again, this is beneficial because they can remain in the communities and care for their patients readily.

Indicator Setting and Populations

- Providers who connected with specialists via Telehealth to treat their patients locally, or who receive education through webcasting and other services offered by Telehealth organizations

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Known Evidence

Quebec\(^1\)

A standardized methodology for treating wounds using real-time, portable, wireless audiovisual devices in 65 clinical rural sites in the Sherbrooke region yielded the following results:

- Nurses are more confident in treating serious wounds, as they obtain real-time assistance from a specialized clinician while treating patients
- Clinician can view the wound and help the nurses with treatment and/or specialized techniques

British Colombia\(^2\)

A provincial Telepathology project provided pathologists with remote access to cameras. This allowed the pathologists to participate in medical rounds with other non-pathology colleagues within their facilities, ultimately enhancing pathology services.

New Brunswick\(^3\)

Sixty-four percent (34 out of 53 respondents) reported improved access to continuing education and training activities. Staff can participate in short education sessions that they normally would need to travel to attend.

Ontario

In the Northern Ontario School of Medicine (NOSM):

- 73% increase in the use of webcasting for education during the last year
- 719 videoconference sessions delivered by NOSM reached thousands of participants in OTN-linked communities across the province

Also, Ontario Teledermatology participants indicated that Teledermatology has changed the way family physicians provide dermatology care. Improved access has meant that family physicians are more inclined to get a dermatology consult and less inclined to experiment with different, sometimes ineffective treatment. Consulting with dermatologists through Telehealth has allowed family physicians to continually build a repertoire of knowledge on effective treatments.

Virtual Intensive Care Unit (VICU) participants felt that using Telehealth to consult with intensivists led to better knowledge transfer and feelings of increased confidence. For each case managed through Telehealth, the VICU participants felt that they gained experience and knowledge in managing patients locally.

Current Value

Grand rounds are a large and important part of continuing education for both physicians who are engaging in ongoing professional education and for medical students who need to connect back to their school while on placement in rural areas. At these sessions, colleagues gather in

\(^1\) Quebec Telehealth Success Stories to Date, July 2010, 7.
\(^3\) New Brunswick Horizon Teleconferencing service assessment of staff satisfaction with videoconferencing, Zone 3.
medical amphitheatres to discuss the latest science. One of the ways that Telehealth supports educational events is through the webcasting of grand rounds.

Webcasting is a growing phenomenon in many jurisdictions — one jurisdiction reported growth of 73% in the use of webcasting for education during the last year. Via webcasting, remotely located medical students and residents can participate in these events in real time; they can also review previous sessions.

Webcasting facilitates the delivery of educational events for students and physicians; it supports the placement of providers in rural communities; it enables life-long learning by medical residents and physicians; and it is a conduit for mentorship and skill development.

The ability to engage with professors and peers while located in rural communities helps medical students and residents develop social networks in rural communities, and encourages new physicians to stay in these communities as they begin their own practice.

Telehealth is also used for local or small group conferencing and learning. In British Columbia, access to cameras allowed remote pathologists to participate in medical rounds with other non-pathology colleagues within their facilities, ultimately enhancing pathology services. In Quebec, nurses treating wounds use real-time, portable, wireless audiovisual devices in 65 clinical rural sites in the Sherbrooke region to obtain real-time assistance from a specialized clinician while treating patients. In Ontario, emergency physicians can consult a neurologist for stroke treatment.

Beyond grand rounds, medical schools are now using Telehealth facilities to deliver lectures, symposia and other medical training. This is most evident in the NOSM. With campuses in Sudbury and Thunder Bay, and a decentralized teaching campus at the University of Western Ontario, NOSM relies on OTN to connect its students, physicians and educators for an integrated and robust learning environment.

Finally, there is anecdotal evidence that local care providers become much more knowledgeable and proficient after having interacted with remote specialists via Telehealth consultations. They then use this knowledge in day-to-day encounters to identify appropriate specialist consultations required and even potential treatment regimes.

**Future Value**

Videoconferencing shows distinct and significant benefits for provider education. These benefits will undoubtedly expand as current methods are expanded to more populations and become engrained in standard workflows. Also, as providers and instructors become more comfortable with the technology and find limitations of it, the use will lead to innovative techniques that will improve educational styles.

The anecdotal evidence also provides some support for the assertion that local care providers will be able to provide higher levels of care through extending their knowledge in close Telehealth-based interaction and consultation with a range of care providers with whom they would have normally had no access.
11.14 Telehealth improves care coordination

Indicators

- Patient perceptions of care coordination, as enabled by Telehealth
- Provider perceptions of care coordination, as enabled by Telehealth

Rationale

There are many patients who require the input and assessment of multiple care providers. For example, diabetic patients, in addition to their GP, may also need to see an endocrinologist, ophthalmologist and podiatrist, among others. Patients who are in the ICU may need assessment from the hospital physician and an intensivist. Other patients may require consultations from one or more specialists in addition to their GP. Care coordination is not as efficient as it can be. The basis of good coordination of care is communication. The use of Telehealth can improve care coordination, especially as it provides multiple ways for providers to communicate.

Known Evidence

Newfoundland and Labrador

In a Newfoundland and Labrador study on Telehealth, it was found that the majority of care providers who were surveyed felt that “Telehealth generally improves communication/information transfer among health care providers” — 33% (20) strongly agreed and 35% (21) agreed.1

Quebec

The study of SyMO, a mobile computing application used by registered nurses in nine ambulatory clinics, showed that the majority of care providers felt the application improved continuity of care (8.2 out of 10) and helped to communicate and obtain information on the clinical condition of the patient when changing shifts (7.8 out of 10).2

Current Value

The United States Department of Veterans Affairs is using Telehealth for the coordination of care between high-cost patients and care providers. Through the use of an Internet or phone line enabled interface, the patient and his care taker can provide daily information to his primary care provider or specialist and allow for only “just-in-time” needs-based provider visits. In one study,3 the use of this technology reduced the number of emergency department and inpatient admissions by one for each patient.

1 Newfoundland and Labrador Centre for Health Information, “Evaluating the Benefits — Newfoundland and Labrador Provincial Telehealth Program: Chronic Disease Management,” January 2010, 35.
3 Neale R. Chumbler, PhD; W. Bruce Vogel, PhD; Mischka Garel, MPH; Haijing Qin, MS; Rita Kobb, MS, MN; Patricia Ryan, MS, RN, Health Services Utilization of a Care Coordination/Home-Telehealth Program for Veterans with Diabetes: A Matched-cohort Study, Journal of Ambulatory Care Management, Vol. 28, No. 3, pp. 230–240.
Additional studies have shown that both the health outcomes and quality of life are improved through the use of Telehomecare that allows remote monitoring.¹,²,³ Physicians can ensure that patients are seen face-to-face when needed, but only when needed, and can tailor the monitoring to look for signs specific to the patients’ diseases.

**Future Value**

No evidence was found which quantified this benefit in terms of quality of care, access or efficiencies. However, a number of surveys provide strong evidence that providers believe that Telehealth does support enhanced collaboration, communication and co-ordination of care.

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¹ Koff P et al. (2009), Proactive Integrated Care Improves Quality of Life in Patients with COPD, European Respiratory Journal, 33(5), 1031–8.


³ Darkins et al. (2008), The Systematic Implementation of Health Informatics, Home Telehealth, and Disease Management to Support the Care of Veterans with Chronic Conditions, Telemedicine & e-Health, 14(10), 1118–1126.
12.0 Appendix 4: Growth Model

12.1 Historical Data (where available)

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Source: Canadian Telehealth Forum except where highlighted (A Pan Canadian Environmental Scan of Clinical Telehealth Applications Submitted by Dr. Sandra Jarvis-Selinger, and Dr. Kendall Ho, University of British Columbia, 2004)

As illustrated in the examples above, Telehealth activity has been growing at a rapid pace across the country and has shown more than 35% annual growth since 2005.
13.0 Appendix 5: Study Contributors

13.1 *Infoway* Telehealth Study Working Group

- Simon Hagens
- Bobby Gheorghiu
- Krista Balenko
- Lak Parmar
- Christina Scicluna

13.2 *Infoway* Telehealth Study Advisory Panel

- Trevor D. Cradduck, The Keston Group
- Ernie Dal Grande, First Nations and Inuit Health Branch, Health Canada
- Liz Loewen, Manitoba Telehealth
- Don MacDonald, Newfoundland and Labrador Centre for Health Information
- Neil MacLean, Ontario Telemedicine Network
- Krisan Palmer, Horizon Health Network
- Laurie Poole, Ontario Telemedicine Network
- Guy Paré, HEC Montreal
- John Schinbein, Canadian Telehealth Forum of COACH, Canada’s Health Informatics Association

13.3 *Infoway* Telehealth Study Steering Committee

- Louise Beauchesne
- Luc Bouchard
- Maureen Charlebois
- Shelley Lipon
- Kirk Fergusson
- Jennifer Zelmer
### 13.4 Study Contributors

<table>
<thead>
<tr>
<th>Stakeholder Name</th>
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<th>Organization/Affiliation</th>
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<td>Sybil Young</td>
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<tr>
<td>Valerie Ashworth</td>
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<td>Sarah Robertson</td>
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<td>Neil MacLean</td>
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<td>Ernie Dal Grande</td>
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<td>John Schinbein</td>
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<td>Donna Williams</td>
<td>National</td>
<td>Assembly of First Nations</td>
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</table>
14.0 Appendix 6: List of Data Sets, Reports and Documents Reviewed

14.1 Data Sources

- Canada Health Infoway (Infoway)
  - Prior analysis, benefits evaluation studies and adoption reports
- Jurisdictions
  - Mostly from most-recent fiscal year
  - From prior periods when necessary
  - Both Infoway and non-Infoway-funded projects
- Extensive literature review
- Praxia and Gartner prior analysis
- Gartner research

14.2 Document Review

- More than 200 source documents
- Infoway Telehealth background documents
- Infoway Telehealth adoption reports
- Evaluation results of Telehealth projects across the country
- Telehealth Forum presentations
- Gartner research
- Relevant prior Praxia and Gartner engagement deliverables
- General literature searches conducted by Infoway, jurisdictions and the Praxia/Gartner project team
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