

**TITLE: Socio-Economic Impact of Telehealth:  
Evidence Now for Health Care in the Future**

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## **OBJECTIVES**

Telehealth has become widespread in the last two decades, despite the generally poor scientific evidence available to support its use. This study was undertaken to contribute to the Alberta Heritage Foundation for Medical Research (AHFMR) 'State of the Science Reviews' program, and provides an information base to assist policy- and decision-makers, and researchers, in their deliberations about telehealth.

Telehealth, telemedicine, or e-health is defined as "the use of information and communication technology (ICT) to deliver health services, expertise and information over distance, geographic, time, social and cultural barriers." Telehealth encompasses Internet or web-based "e-health", as well as video-based applications. Applications can be real-time or store-and-forward.

This report summarizes the health services scientific literature on telehealth. Based upon a comprehensive literature search and a critical review and appraisal of that literature, the report provides an overview of the areas of strength and weakness in the telehealth research base, identifies gaps in the existing knowledge, and reviews policy implications. Specifically, this study addresses the following three research questions:

1. What is the socio-economic impact of telehealth as a method of delivery of healthcare and information, compared to that of the status quo? For patients and their families? For providers, programs, institutions and regional health authorities? At the provincial and national levels? For the public in general?
2. What are the optimal indicators and proxy indicators for the assessment of the impact of telehealth?
3. What are the related recommendations for policy and decision makers?

The report consists of three volumes. Volume One describes the general areas of health benefit supported by proven telehealth applications from the literature. Volume Two summarizes the related policy implications and recommendations, and Volume Three provides appendices that summarize the literature and support Volumes One and Two.

## **METHODS AND RESULTS**

### **1. Socio-economic impact of telehealth**

Telehealth has been found to offer important quality of life, health, and socio-economic benefits to the people of Alberta and Canada and to reduce costs and utilization of the healthcare system.

Based upon existing literature, a total of 14 social determinants of health or socio-economic performance indicators for a community were identified for this study. Of these, the study identified nine areas of socio-economic benefit as most prominent in the telehealth literature: Access, Cost / Cost Effectiveness / Decreased Health Services Utilization, Education, Support, Social Isolation, Acceptability / Satisfaction, Health Outcomes, Quality of Care, and Quality of Life. Ten subject areas, representing the most promising areas of telehealth application, were identified for study: Geriatrics, Paediatrics, First Nations, Telerehabilitation, Tele-mental health, Teleradiology, Rural / Remote, Tele-homecare, Renal, and Systematic Reviews of telehealth. Using only those studies that provided a 'strength of evidence' ranging from 'Good' to 'Fair', Table E1 highlights those subject areas within which these socio-economic benefits have been found within this evidence framework. It can be seen that Paediatrics and Tele-mental health offer the most socio-economic benefits, whereas Renal Dialysis appears to offer none. The use of telehealth for Renal Dialysis does offer socio-economic benefits, but, to date, the literature review did not offer adequate quality of evidence. This reveals a gap in our current research base that requires further attention.

The benefits summarized in Table E1 accrue to one or more of the public, patient, family, providers, programs, institutions, or regional health authorities, as well as to the healthcare system at provincial, territorial, and national levels.

**Table E.1 Areas of Benefit of Telehealth Applications**

<b>Areas of Benefit:</b>		1	2	3	4	5	6	7	8	9
<b>Subject Area</b>	<i>providing good to fair evidence*</i>	<i>Access health services utilization</i>	<i>Education</i>	<i>Support</i>	<i>Social Isolation</i>	<i>Acceptability / Satisfaction</i>	<i>Health Outcomes</i>	<i>Quality of Care</i>	<i>Quality of Life</i>	
<i>Geriatrics</i>	16	8	6	3	4		6	3	2	
<i>Paediatrics</i>	24	3	9	1	3	1	2		3	3
<i>First Nations</i>	2			1						1
<i>Telerehabilitation</i>	5		2	1			2		1	3
<i>Tele-Mental Health</i>	16	2	2	3	3	1	2		3	1
<i>Teleradiology</i>	30	10	15					1	3	
<i>Rural / Remote</i>	7		1	1			4		1	1
<i>Tele-Homecare</i>	9	1	6				4		2	2
<i>Renal</i>	0									
<i>Systematic Reviews</i>	17	3	4				4	4	2	

\* The five-point rating scale used included the following categories: Good, Good to Fair, Fair, Fair to Poor, and Poor, in terms of scientific evidence. The articles enumerated here rate between Good and Fair.

Twelve common themes emerged from the analysis, which together form the basis for recommendations that will ensure appropriate development of telehealth in the future.

- *A need exists for policy development.*
- *Policy leadership will greatly facilitate the use and integration of telehealth.*
- *Increased awareness and understanding of telehealth opportunities is needed.*
- *Increased connectivity to rural and remote communities is required.*

- *Many potential benefits exist for video consultation, including access, patient satisfaction, and cost savings.*
- *Strong evidence is lacking regarding the impact of telehealth on health services and human resource outcomes.*
- *Other than cost, access, satisfaction, and quality of life, extremely few true socio-economic indicators have been addressed.*
- *Telehealth provides benefits to patients and their families such as improved access to health services, avoidance of travel, and more rapid provision of care.*
- *There is an economic benefit in avoiding transfers to specialist centres and providing teleconsultations in some areas.*
- *Telehealth can save time for staff and save time data transfer.*
- *Telehealth can enhance educational opportunities for health care providers, patients, and families, improving clinical outcomes and reducing hospitalization.*
- *Simpler technology, such as the telephone, can be used successfully for patient assessment, triage, monitoring, reminders, or direct intervention, and can provide positive socio-economic benefit.*

## **2. Optimal indicators and proxy indicators**

A variety of outcome measures have been documented in the literature (access, quality of life, satisfaction, cost), but no studies clearly identified or defined specific socio-economic indicators of outcome. At this time there is no agreement on which quantitative or qualitative measures (i.e. outcome indicators) are appropriate, or of most value, when evaluating telehealth applications. The 'areas of benefit' identified for this study are based upon accepted determinants of health, but these are not as yet reflected as formal indicators in the telehealth literature. This study found no consistency in the identification or application of such indicators within, or between, studies in any subject area. As a result there is uncertainty as to the general applicability of some study data, and direct comparison of one study with another may be misleading. This finding highlights a critical gap in our current research process and capabilities. Appropriately focused research questions and designs, validated instruments and defined quantitative or qualitative measures are required.

## **Recommendations for policy and decision makers**

Based upon the evidence available, this study identified several general and subject specific recommendations. Subsequent review found them to be congruent or complementary to Alberta and Federal health reform initiatives described in anticipated (Romanow) and recent (Kirby; Mazankowski) reports, each of which call for change and reform, not maintenance of the current structure.

Saskatchewan premier Roy Romanow will release his findings in late November, 2002 (Commission on the Future of Healthcare in Canada). One finding in an interim report was that Canadians living in rural or remote areas frequently feel that they lack sufficient access to health services. To address this inequity of service one solution was to make “greater use of telemedicine and information technologies”. The Interim report also leaned toward a recommendation for developing a national homecare strategy, noting that “supporters of a national approach suggest that enabling patients to receive more treatment at home will improve quality of care, relieve pressure on hospitals, and result in significant savings”. Such a solution would be facilitated by telehealth.

Senator Michael Kirby's 11-member committee recently released the first of two major studies of the healthcare system in Canada. This report identifies securing timely access to care as being critical, along with the need for investment in health information technology. Also, one recommendation from this report is that post-acute homecare and palliative homecare be expanded, two areas where telehealth has been demonstrated as valuable.

The recent Report of the Premier's Advisory Council on Health (Mazankowski Report) provides a framework for reforming Alberta's health system. A review of the recommendations described in this report show many areas in which telehealth will have an impact. It is notable that of the 10 recommendations for reform, eight contain some element or specific recommendation related to telehealth or have relevance to telehealth policy. Examples include: providing Albertans with better information about how to stay healthy; reducing waiting times by introducing centralized booking, and posting waiting times for selected procedures on a website; investing in technology and establishing an electronic health record (EHR); providing long term funding for technology and information technology systems; continuing to support research, evidence-based decision making, and continuing Alberta's role as a leading centre of health and medical research. Little is said about policy, other than to note that some health decisions “... are not necessarily guided by the best information, but are instead made for a variety of reasons including past experience, expediency, political influences, or to comply with the wishes of health professionals or other health organizations”. This underscores the importance and value of well-conceived policy.

### **A. Policy**

1. To be successful and sustainable, telehealth must be fully integrated into existing health structures and processes in a practical and policy manner.
2. Integration can be achieved through aligning telehealth initiatives with existing strategic health plans, policy goal-setting, accompanying action steps, and attention to policy barriers.
3. Establishment of a policy forum that focuses on telehealth policy would facilitate these needs.
4. Telehealth applications should incorporate capacity for education, research, and administrative functions, as well as health and clinical functions.

### **B. Technology**

5. To facilitate access to many bandwidth intensive telehealth applications increased broadband connectivity is needed, particularly to rural and remote communities.
6. Given the evidence, the use of telephone-based telehealth applications should be re-examined.
7. Technology modalities (broadband, narrowband, web-based) and applications (videoconferencing, data monitoring, telephone) should be viewed as synergistic, not competitive, and the most appropriate tool applied; i.e., hybrid connectivity solutions are recommended.

### **C. Evaluation**

8. Suitable outcome indicators, measures, and reliable and valid instruments for socio-economic benefit of telehealth must be identified, defined, and consistently applied within a recognized evaluation framework that asks relevant research questions.
9. Suitable frameworks for economic analysis need to be developed that capture non-monetary and unintended consequences, as well as monetary measures.
10. Telehealth programs should be implemented and evaluated in a culturally aware and culturally sensitive manner.
11. Evaluations should include examination of the social, organizational, and policy aspects of telehealth.

### **D. Economic**

12. Telehealth demonstrates sufficient evidence of socio-economic benefit to indicate ongoing investment is appropriate.
13. Sustainable telehealth 'programs' and not 'projects' should be targeted.
14. Full integration of telehealth will increase its use and decrease the per contact episode cost.

15. Investment in information and communications technology infrastructure should be considered as an investment not only in health, but in business, education, and other e-sectors.

#### ***E. Investment Opportunities***

16. R & D and economic development opportunities require pursuit.

Subject-specific recommendations arising from this study are as follows:

#### ***Paediatric Telehealth***

17. Telehealth programs that improve quality of care and offer economic benefit for 'at risk' paediatric populations (e.g., neonates, adolescent asthmatics) should be introduced.
18. Evidence would suggest decision makers should consider telehealth to achieve enhanced social environments for children, and staff efficiencies as related to data transfer.
19. The use of low-cost technology solutions (e.g., the telephone) is strongly recommended for Paediatric telehealth where appropriate.

#### ***Geriatric Telehealth***

20. Telehealth programs should be used to support palliative home care initiatives.
21. Remote, wireless monitoring (e.g., personal alerts, caregiver and patient support, 'smart' homes and clothing) should be investigated for both enhanced independent living and geriatric healthcare applications.
22. Geriatric telehealth applications should be strongly considered as a technology R & D and economic development opportunity.
23. The use of e-prescription applications should be used to increase self-efficacy and compliance, and to reduce adverse effects.
24. The use of low-cost technology solutions (e.g., the telephone) is strongly recommended for Geriatric telehealth where appropriate.

#### ***First Nations Telehealth***

25. The recommendations provided in the Health Transition Fund project report of 2001 should be implemented, viz:
  - Increase connectivity to rural and remote communities, and especially Aboriginal communities;
  - Undertake new research further to implementation of successful telehealth initiatives in First Nations and Inuit communities, and regarding the impact of telehealth on costs, health services and human resources;
  - Promote equality of opportunity for telehealth across First Nations and Inuit communities;
  - Increase awareness and understanding of telehealth opportunities among First Nations and Inuit stakeholders;

- Create linkages between telehealth and other initiatives of the Aboriginal Health Infostructure in order to leverage investments.
26. Health services and information content should be delivered in a culturally sensitive context.

#### ***Tele-homecare***

27. Telehealth should be considered for application in managing and monitoring chronic heart failure, chronic obstructive pulmonary disease, oncology, diabetes, wound care, asthma, anxiety, and cardiac vascular accident.
28. Home Telehealth programs should be used to assist with and transform the mode of delivery of home care. Such programs should be used to support change within the context of the continuum of care, and a comprehensive home healthcare program.

#### ***Tele-mental health***

29. Tele-mental health, a proven and sustainable telehealth application, should be expanded.
30. The use of low-cost technology solutions (e.g., the telephone) is strongly recommended for tele-mental health where appropriate.

#### ***Teleradiology***

31. Teleradiology, a proven and sustainable telehealth application in settings of appropriate workload and distance, should be expanded.
32. Teleradiology should be adopted in settings where the need to travel or poor speed of care provision present barriers to access.

#### ***Renal Dialysis Telehealth***

33. Teledialysis should be evaluated more comprehensively before commitment is made.

#### ***Rural and Remote Telehealth***

34. Increased access to a broad range of clinical and educational resources should be provided to rural, remote, and underserved populations.
35. Enhanced connectivity to rural and remote communities and residences should be a priority to improve economies of scale in future service and information delivery.

#### ***Telerehabilitation***

36. Telerehabilitation, which has been demonstrated to show benefits for health care and patients (e.g., speech pathology, transtelephonic exercise monitoring) requires more comprehensive economic analysis.

## CONCLUSIONS

Overall, valuable data and levels of evidence exist that support telehealth, and that can now be used by policy makers, decision makers, and researchers when making decisions specific to telehealth. These have been summarised in this report. However, evidence of high scientific quality for telehealth applications is still lacking. What has been clearly demonstrated is the feasibility of using telehealth in many clinical areas and for many health, clinical, educational, research, and administrative activities. Many of the same policy and research concerns, issues, and challenges in telehealth that are discussed in current sources existed 10 years ago. These issues should be addressed and decisions made.

Successful and sustainable implementation of telehealth exists when there is greater integration with other e-health initiatives, policy goal-setting, accompanying action steps, and attention to policy barriers. Benefits and successes often result when strategies and planning adopt human resource and user frameworks. For example, health and medical workforce and workflow are issues, together with readiness and ethical considerations. Collaboration, partnership and sharing are central to the advancement and sustainability of telehealth and its potential benefits, as are needs identification, risk assessment, enabling policy, and true public involvement.

Although project findings to date show broad benefits, these are generally associated with feasibility activity, and seldom measure the impact of telehealth on the social determinants of health, for example, poverty, social isolation, independent living, and identified needs of special populations. New evaluation and research activities should employ methodologies which enable the study of such factors. The reviewed literature suggests that the principle driving forces for telehealth have been financial, specialist clinical interest, and proof of technological feasibility. Patients' views and interests, social effects, quality controls and wider organizational effects are seldom considered. Our study shows that there are a growing number of evaluation frameworks for use by policy- and decision-makers when developing accepted evaluation approaches that could be consistently applied; for example, generic evaluation frameworks, benefit-cost analysis and consumer care pattern guidelines, as well as effects-oriented and risk analysis frameworks. These have been provided.