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FINAL REPORT

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

Volume Two: Policy Report

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I EXECUTIVE SUMMARY

Telehealth has become widespread in the last two decades, despite the fact that scientific evidence to support its use has often been lacking. 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. It supercedes other telehealth meta-analyses due to its focus on the social, as well as the economic, impact of such technologies. Further, this study is unique in that it provides two documents that are closely linked – a State of the Science Report, and an accompanying Policy Report. This is the first such combined Report to date.

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 and policy 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 strengths and weaknesses in the telehealth research base, identifies gaps in the existing knowledge, and reviews policy implications. Specifically, this study addresses the following 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 optimal indicators and proxy indicators for the assessment of the impact of telehealth?
3. What are 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.

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. The literature demonstrates varying levels of scientific evidence of socio-economic benefit in various telehealth applications across these subject areas. The subject specific recommendations provided in this review reflect the areas where the greatest impact of telehealth can be achieved, based on this evidence.

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 indicators screened for in this review 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. Cost, cost savings or cost effectiveness were of common interest to many studies, but measurement of these were not consistent, with many studies using estimates as opposed to solid economic analysis. Moreover, benefits and costs were evaluated from different

points of view, for instance, the health system point of view versus the wider societal point of view. 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.

3. Recommendations for policy and decision makers

Based upon the evidence available, this study identified 40 general and subject-specific recommendations. Subsequent review found these to be congruent or complementary to Alberta and Federal health reform initiatives described in the recent Mazankowski, Kirby, and Romanow reports, each of which call for change and reform, not maintenance of the current structure. Telehealth is seen as an enabler of change and an innovative means of enhancing health care and health care delivery.

General recommendations arising from this study are:

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 resolution of 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.
5. Federal-provincial/territorial partnerships in telehealth should be established where there are opportunities to improve efficiency in health care and decrease duplication.
6. As telehealth continues to evolve, input from all key stakeholders (including patients, health care providers, and the public) into policy development is required. Consideration of needs as well as practical experience is essential for a meaningful exchange of information and views.

7. Consistent terminology and definitions around telehealth, e-health and related terms should be adopted across jurisdictions.

B. Technology

8. To facilitate access to many bandwidth intensive telehealth applications increased broadband connectivity is needed, particularly to rural and remote communities.
9. Given the evidence, the use of telephone-based telehealth applications should be re-examined.
10. 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

11. 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.
12. Suitable frameworks for economic analysis need to be developed that capture non-monetary and unintended consequences, as well as monetary measures.
13. Telehealth programs should be implemented and evaluated in a culturally aware and culturally sensitive manner.
14. Evaluations should include examination of the social, organizational, and policy aspects of telehealth.

D. Economic

15. Telehealth demonstrates sufficient evidence of socio-economic benefit to indicate ongoing investment is appropriate.
16. Sustainable telehealth ‘programs’ and not ‘projects’ should be targeted.
17. Full integration of telehealth will increase its use and decrease the per contact episode cost.
18. 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

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

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

Paediatric Telehealth (SOS pp. 26-31)

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

Geriatric Telehealth (SOS pp. 32-39)

24. Telehealth programs should be used to support palliative home care initiatives.
25. 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.
26. Geriatric telehealth applications should be strongly considered as a technology R & D and economic development opportunity.
27. The use of e-prescription applications should be used to increase self-efficacy and compliance, and to reduce adverse effects.
28. The use of low-cost technology solutions (e.g., the telephone) is strongly recommended for Geriatric telehealth where appropriate.

First Nations Telehealth (SOS pp. 40-44)

29. The recommendations provided in the Health Transition Fund project report of 2001 (Health Canada) 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.
30. Health services and information content should be delivered in a culturally sensitive context.

Tele-homecare (SOS pp. 45-50)

31. Telehealth should be considered for application in managing and monitoring chronic heart failure, chronic obstructive pulmonary disease, oncology, diabetes, wound care, asthma, anxiety, and cardiovascular accident.
32. 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 (SOS pp. 51-54)

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

Teleradiology (SOS pp. 55-59)

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

Renal Dialysis Telehealth (SOS pp. 60-62)

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

Rural and Remote Telehealth (SOS pp. 63-67)

38. Increased access to a broad range of clinical and educational resources should be provided to rural, remote, and underserved populations.
39. 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 (SOS pp. 68-73)

40. 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 information and communications technology 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 principal 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 makers and planners 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.

Integration, enablement of telehealth, and recognition and consistent evaluation of the significant potential benefits of telehealth, will greatly enhance health and socio-economic advantages for Canadians.

II INTRODUCTION

Telehealth has become widespread in the last two decades, despite the fact that scientific evidence to support its use has often been lacking. 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. This State of the Science Report supercedes other telehealth meta-analyses due to its focus on the social, as well as the economic, impact of such technologies. Further, this study is unique in that it provides two documents that are closely linked – a State of the Science Report, and an accompanying Policy Report. This is the first such combined Report to date.

Telehealth has been found to offer important quality of life, health and socio-economic benefits to the people of Alberta and Canada, and can reduce costs and utilization in the health system. This study describes the kinds of benefits that can be achieved and how. Specifically, this study addresses the following 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 optimal indicators and proxy indicators for the assessment of the impact of telehealth?
3. What are related recommendations for policy and decision makers?

Terminology in the field of telehealth is evolving with increasing global information-sharing and the growing presence of electronic media in the everyday lives of patients, the public and health providers. For the purposes of this study, telehealth, telemedicine, or e-health are used interchangeably and are defined collectively as “the use of information and communication technology (ICT) to deliver health services, expertise and information over distance, geographic, time, social and cultural barriers”(Reid, 1996). Telehealth encompasses Internet or web-based “e-health”, as well as video-based applications. Applications can be live (real-time) or store-and-forward.

The range of ICTs used in the delivery of telehealth includes:

- Telephone, also referred to in some studies as “plain old telephone service” or POTS.
- Videoconferencing.
- Image capture and transfer.
- Internet or Internet protocol (IP)-based / web-based applications.

Telehealth delivery may be supplemented by decision support software or other information/education sources.

Socio-economic indicators include social determinants of health: poverty, social isolation, education, life stress, early life, access to transport, nutrition, access to health services and care; and factors affecting the socio-economic performance of a community: economy, labour markets, innovation, environment, education, health.

The context for this study is the Canadian health care environment with its particular characteristics, including universal access to health care, a population that is aging, widely

dispersed (rural / remote), and diverse in composition with varying health needs (e.g., First Nations). Also implied in the study context is consideration of current strategic policy directions in the Albertan/Canadian health sector, such as the principles of providing care at the right time in the right place by the right provider, maintaining individuals' independence and community living, providing consumer choice, and trialling innovative projects in service delivery. These concepts, as well as the study investigators' experience and informed opinion regarding areas of promise for telehealth, led to the development of ten subject areas of focus for this study. These are:

1. Paediatrics telehealth
2. Geriatrics telehealth
3. First Nations telehealth
4. Tele-homecare
5. Tele-mental health
6. Teleradiology
7. Renal dialysis telehealth
8. Rural and remote telehealth
9. Telerehabilitation
10. Telehealth Reviews

A systematic review of the literature in each of these areas was undertaken, as well as a formal economic analysis of all pertinent articles within each subject area. In addition, a review of policy-related articles and sources was completed.

The study consists of three volumes:

Volume One: State of the Science Report. The State of the Science Report contains a description of the literature search strategy and the process established for selecting and reviewing sources, and a thorough analysis of the literature in each of the subject areas, including systematic reviews. It also incorporates an economic analysis, organized and summarized by subject area, and a series of recommendations drawn from both reports.

Volume Two: Policy Report. This report includes background information on Alberta, Canada, and global telehealth policy, a summary of the results of the State of the Science Report, a description of the policy development process (the policy awareness and engagement process as well as the review process for the policy articles/sources), results of the policy review, and recommendations drawn from both reports.

Volume Three: Appendices. This volume contains four issues of appendices supporting Volumes One and Two. The appendices include detailed information about the study process and a systematic review of all articles in each subject area, as well as all economic- and policy-related articles included in this study.

III TELEHEALTH POLICY BACKGROUND

In its broadest sense, health policy refers to decisions for determining present and future objectives pertaining to the health care system. But when endeavouring to clearly identify what constitutes specific policy there is diversity of opinion. For example, statements of where a particular jurisdiction *intends* to go with telehealth is not the same as legislation that *prescribes* where that jurisdiction will go. Somewhere between these two extremes lie standards, guidelines, and regulations. ‘e-Health policy’ was recently defined as “*a set of statements, directives, regulations, laws, and judicial interpretations that direct and manage the life cycle of e-health*” (Scott et al, 2002).

Canada, and Alberta in particular, can be considered to have experienced considerable policy support for telehealth, but in terms of specific telehealth guidelines, regulations, or laws (e.g. addressing cross-jurisdictional licensing issues for healthcare professionals), limited policy exists. In general, remarkably few telehealth policy related documents or publications are available, and those that exist warn of the urgent need to address the issue.

This policy void is of concern. The introduction of any new technology that has the capability to permit easy cross-jurisdictional interaction, where previously there was little or none, will have profound impact on many health related policy issues. Telehealth, inherently, has the technical capability to transgress all existing geo-political, socio-economic, cultural, and temporal boundaries. As a consequence telehealth, if developed appropriately, offers unprecedented opportunity for increasing access and addressing issues of equity. However, achieving such goals is already being hampered and impeded by the lack of telehealth policy. Of greater concern is that introduction of hasty, uncoordinated, introspective, or restrictive policy could preclude cross-jurisdictional telehealth entirely.

1. Telehealth Policy in Alberta

Alberta Wellnet is most directly involved with telehealth activities, and is the umbrella for a series of province-wide and regional initiatives to build an integrated health information network in the province. Alberta is also a member of the Western Health Information Collaborative (WHIC). Initiated by the Western Premiers and Deputy Ministers of Health, WHIC exists to explore collaborative opportunities with respect to health infostructure initiatives, and might also serve as a nexus for collaborative policy development.

The most significant policy document for health in Alberta is the recent ‘Mazankowski Report’ (Premier’s Advisory Council on Health for Alberta, 2001) and the Alberta Government’s response (Government of Alberta, 2002). A review of the recommendations described in the Mazankowski Report shows many areas in which telehealth will have an impact. For example, of the ten groups of recommendations for reform, eight contain some element or specific recommendation related to telehealth or having relevance to development of telehealth policy. Examples would include: providing Albertans with better information about how to stay healthy; reducing waiting times by introducing centralized booking, posting waiting times for selected procedures on a website; investing in technology and establishing an electronic health record; providing long term funding for technology and information technology systems; continuing to support research, evidence-based decision making, and 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 organisations". This underscores the importance and value of well-conceived policy.

2. Telehealth Policy in Canada

Many telehealth initiatives are currently underway in Canada, both at a local and national level. Almost all federal, provincial and territorial governments across Canada have a strategic information systems initiative (e.g. HealthNet/BC, Alberta Wellnet, Saskatchewan Health Information Network, Smart Systems for Health, Inforoute Santé, Nova Scotia Telehealth Network).

Canada has enjoyed considerable policy debate and leadership with regard to telehealth. Our telehealth history formally began in 1994, when the Information Highway Advisory Council (IHAC; 1994-1997) was created and mandated to investigate the development and use of the information highway for the economic, cultural and social advantage of all Canadians. The 1995 IHAC report provided 300 recommendations, and also identified 15 public policy issues (Industry Canada, 1995). One recommendation called for the creation of an advisory council to identify new information technology applications for the health sector. Also, the National Forum on Health (NFOH, 1994-1997) concluded that a prime objective should be the rapid development of an evidence-based health system, and that a nationwide population health information system should be created (Health Canada, 1997).

In 1997, the Advisory Council on Health Infostructure (ACHI, 1997-1999) was established. Its final 1999 report reaffirmed the need and advantages of setting up a nationwide health information highway, particularly with regard to improving quality, accessibility, and efficiency of health services across the entire spectrum of care in Canada (Health Canada, 1999). That same summer, Health Canada also established the Office of Health and the Information Highway (OHII) as Health Canada's focal point for the use of information and communication technologies (ICTs) in the health sector. The strategic orientations for OHII were identified as knowledge development, partnerships and collaboration, and federal policy development.

Also in 1997, the Canadian Network for the Advancement of Research, Industry and Education (CANARIE, now CANARIE Inc.) issued a vision paper describing a Canadian health "Iway" (CANARIE Inc., 1997). In 1999 the Advisory Committee on Health Infostructure (ACHI; 1999-to date) was inaugurated by the Federal / Provincial / Territorial Deputy Ministers of Health. The ACHI has working groups that address five priorities: strategic planning, telehealth, protection of personal health information, health surveillance, and electronic health records (F/P/T Advisory Committee on Health Infostructure, 2000). A recent ACHI report (2001) contains recommendations and action steps intended to allow health jurisdictions to move forward significantly, and in a collaborative manner, towards the establishment of a pan-Canadian health infostructure (F/P/T Advisory Committee on Health Infostructure, 2001). Notably, this report also acknowledged that "the policies to enable telehealth are still not fully in place especially for provider reimbursement, clinical accountability and professional licensure. Regardless, telehealth implementations are increasing across the country, with a significant increase in activity during the past 24 months".

In 2001 the Government of Canada committed to an investment of \$500 million to create and fund an independent corporation mandated to accelerate the development and adoption of modern systems of information technology, such as electronic patient records, so as to provide better health care (OHIH, 2001). The culmination of this funding initiative was the founding of the Canada Health Infoway Inc. (Infoway) in 2002.

More recently, in November 2002, Roy Romanow, Chair of the Commission on the Future of Health Care in Canada and former Saskatchewan premier, released his report entitled, “Building on Values: The Future of Health Care in Canada – Final Report” (Romanow, 2002). The report provides a prescription for significant reform of the Canadian healthcare system. It outlines five special transfer funds to assist with health care reform:

- 1) a Rural Remote Access Fund,
- 2) a Diagnostic Services Fund,
- 3) a Primary Health care Fund,
- 4) a Home Care Fund, and
- 5) a Drug Fund.

Telehealth or e-health solutions can play a large role in these areas, as well as in other priorities defined within the Report; for example, the supply, distribution, training, and changing skills/roles/responsibilities of health care providers; waiting lists; electronic records; health technology assessment; and applied research. Directly related to this State of the Science Report, and in the context of transformative change, the Romanow Report underlines the important roles that research and evidence play in making informed decisions and in guiding future e-policy.

Throughout telehealth’s development in Canada, the need for appropriate policy has been acknowledged, and responsibility for its development has been given to various groups. OHIH has responsibility for several policy development activities, and is directly responsible for the development of federal telehealth policy. Their key policy areas are: Integrated Provider Solutions, Protection of personal health information, Telehealth issues of licensure and reimbursement, and Change management.

3. Global Telehealth Policy

The cross-jurisdictional nature of telehealth makes it imperative to develop domestic policy with an eye to international policy, and vice versa. For this reason, it is important to place Alberta’s and Canada’s telehealth policy position in perspective. All developed nations are facing similar healthcare issues and are equally concerned about their fledgling telehealth systems. For example, a recent report identified at least eight other countries that have national health information and technology strategies either in place or being developed: UK, New Zealand, USA, Italy, France, Japan, and Germany (F/P/T Advisory Committee on Health Infostructure, 2000). In other work, 20 countries were identified as having some defined telehealth policy or clear policy activity (Scott et al., 2002). Examples are:

Legislation

The US has legislation in regard to reimbursement policy, but in almost two years of implementation has reimbursed a total of only \$20,000 for 301 teleconsultation claims (Puskin and Kumekawa, 2001). Inter-State licensing issues are increasing in significance, and some compacts have been developed in an attempt to address this. In the world of global telehealth,

Malaysia stands out. It has a 20-year ICT plan termed the Multi-Media Corridor initiative, and is the only country to have clear legislation, with both a Telemedicine Act, and specific National Telehealth Policies (Malaysia, 2002a and 2002b).

Policy Guidelines

A few countries possess policy statements that guide their telehealth infrastructure development. For example, like Canada, Australia views telehealth as a priority, and has developed strategy documents to develop it further (National Health Information Management Advisory Council, 1997 and 2001). They have also investigated telehealth policy in other countries (Milstein, 1999). Within the European Union (EU) many telehealth activities flourish, funded by both national governments and the EU, but policy development lags (TELEPLANS WP4 Report, 2002). Nordic countries have developed guidelines, and the UK has some nascent guidelines. National telehealth policy in some countries is absent because telehealth is considered a responsibility delegated to regional authorities (e.g. Italy), which raises concern for consistent and complementary policy within some countries.

In summary, the vast majority of the world's 234 populated countries have no telehealth policy. Since policy is meant to guide, this telehealth policy void is a concern that must be addressed in an urgent manner.

IV STATE OF THE SCIENCE SUMMARY

This section briefly describes the evidence and policy implications from Volume One of this research study.

1. Areas of Benefit

Table 1 provides a summary of where the evidence of benefit exists for telehealth applications. The primary socio-economic indicators referenced in the literature are listed across the top row of the table. Subject areas are listed on the left side of Table 1, and the data in each cell represents the number of studies with Good to Fair scientific evidence (based on the 1995 Jovell/Navarro-Rubio rating scale (Hailey et al, 2002)) of the benefit of telehealth as compared to traditional health care delivery methods.

A brief explanation of each of the areas of benefit follows:

- 1) Access can refer to
 - improved access to health services (assessment, treatment or follow-up) for patients attributable to reduced time or travel costs, increased convenience; or
 - improved access to peer/professional support for health care providers.
- 2) Cost savings, cost-effectiveness, and reduced health services utilization are all economic benefits of telehealth which can accrue to patients, providers and/or the health system.
- 3) Educational benefits of telehealth have been proven for patients and families, and health providers.
- 4) Support can refer to emotional, spiritual and/or informational communication to patients or caregivers by professionals or peers. The quality of life benefits of support may include improved self-efficacy or coping skills, and the ability for individuals to maintain independent living arrangements.
- 5) Social isolation with respect to patients and families is recognized as one of the key social determinants of health. Professional isolation in a remote community can also be a socio-economic indicator putting the community at risk (i.e., of losing skilled professionals and health services).
- 6) Acceptability / client satisfaction reflect the perceptions of telehealth users, which can include patients, families and/or providers
- 7) Several studies have demonstrated improved clinical or functional health outcomes via telehealth as compared with traditional health care delivery methods.
- 8) Quality of care can be improved through telehealth via enhanced treatment and follow-up.
- 9) Quality of life can involve self-efficacy and self-care, improved access to information ability to return to work or to perform activities of daily living, reduced life stress. Improved social/emotional support, and reduced social isolation can also be classified as quality of life benefits; however, they are listed separately here because of the volume of studies dealing specifically with those issues.

Table 1 Areas of Benefit of Telehealth Applications

Areas of Benefit:		1	2	3	4	5	6	7	8	9
Subject Area	Number of studies providing Good to Fair evidence*	Access	Cost / CE / Decreased health services utilization	Education	Support	Social Isolation	Acceptability / Satisfaction	Health Outcomes	Quality of Care	Quality of Life
<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	

* Note: this denotes the number of studies within each subject area which demonstrated Good to Fair scientific evidence based on the 1995 Jovell/Navarro-Rubio rating scale (Hailey et al, 2002). A number of other studies that did not meet the Good to Fair criteria were also analyzed within each subject area, for content related to socio-economic implications of telehealth, but these studies are not included in this table.

The evidence of socio-economic benefit in each subject area is provided in greater detail in Volume One: State of the Science Report.

2. Telehealth Benefits to Stakeholders

Table 2 provides a summary of the various benefits to health system stakeholders as suggested in the literature.

Table 2 Summary of the socio-economic impact of telehealth on stakeholder groups

<p style="text-align: center;"><u>Patients and Families</u></p> <ul style="list-style-type: none"> • Increased access to services • Personal cost savings, i.e., time and travel expense through substitution of telehealth for face-to-face treatment • Improved or equivalent clinical and/or functional health outcomes and quality of care (as compared with traditional care) • Increased empowerment, patient involvement and participation in care, positive perception, satisfaction • Enhanced self-care skills and potential for patients to live independently in their own homes, particularly for elderly and disabled persons • Quality of life benefits, including reduced life stress, improved access to information, social and emotional support, and reduced social isolation • Education 	<p style="text-align: center;"><u>Providers</u></p> <ul style="list-style-type: none"> • Improved efficiency in work <ul style="list-style-type: none"> – If it is the provider that travels to provide care to remote patients (e.g., satellite clinics), then telehealth can result in travel time savings and providers are able to see more patients. – If it is the patient that travels to a central site to receive services, then telehealth, which may represent increased convenience for patients, can have a positive impact on no-show rates. • Improved access to professional/specialty support, particularly for rural/remote providers, and associated with this: reduced social isolation and enhanced skills • Increased access to educational opportunities and skills development
<p style="text-align: center;"><u>Programs</u></p> <ul style="list-style-type: none"> • Improved cost-effectiveness of health programs delivered to specific populations. • Reduced costs of direct care, medication costs, etc. 	<p style="text-align: center;"><u>Regional Health Authorities / health organizations</u></p> <ul style="list-style-type: none"> • Cost-effectiveness, through, for example <ul style="list-style-type: none"> – reduced utilization of health services (i.e., reduced hospitalization rates, reduced utilization of outpatient services, emergency services) – reduced costs of patient transport from remote locations – reduced costs of service delivery • Alignment with strategic policy; for example: in accordance with patients’ preferences, enhancing their ability to live independently and stay in their homes as long as possible
<p style="text-align: center;"><u>The Public</u></p> <ul style="list-style-type: none"> • Retention of health services professionals; sustainability of health services in smaller, rural/remote communities; economic viability • Increased choice / more options in health care • Enhanced prevention and health promotion initiatives which can be offered via telehealth feasibly and cost-effectively 	<p style="text-align: center;"><u>At the provincial and national levels</u></p> <ul style="list-style-type: none"> • Positive impact on health human resources recruitment and retention • Alignment with current policy and strategic initiatives, including <ul style="list-style-type: none"> – support for primary care – new, innovative ways of delivering health services – prevention / health promotion – complementary to electronic health record (EHR) development and implementation

The State of the Science Report has led to the development of a number of recommendations specific to the subject areas identified in this study. In addition, there was valuable information from policy-related studies with respect to telehealth benefits, implementation and sustainability in general, and in relation to some applications in particular. The following sections V and VI describe the policy review and development process and the results found in the policy literature.

3. Applicability to Alberta

Alberta remains one of the most active and advanced provinces of Canada in terms of telehealth. It is essential that future plans take advantage of available evidence in regard to appropriate areas of telehealth for implementation or expansion. Each chapter of the State of the Science Report (Volume One) concluded with a section on its ‘Applicability to Alberta’. The main benefits identified in these sections were: improved access, cost effectiveness, improved clinical outcomes, enhanced quality of care, and satisfaction with care. These benefits accrued for several telehealth interventions. Those interventions that show the most promise for application or expansion in Alberta are summarised below.

Telephone-based interventions

Often overshadowed by more sophisticated applications, these were found to positively impact access, outcomes and quality of care. Relevant programs may include disease monitoring (e.g. blood pressure, temperature, glucometer readings), counselling and/or support, telephone triage, help lines, and automated reminder calls. Tele-echocardiography – that is transmission of echocardiograms via regular telephone lines – is well established and has been shown to be cost-effective for remote communities.

Videoconferencing

For some patient populations, videoconferencing can be used for remote clinical consultation for patient assessment, treatment, follow-up, and management. Potential socio-economic benefit has been shown, particularly in the areas of paediatrics, geriatrics, psychiatry, dermatology, and chronic disease management (e.g. telehomecare). Video consultation has been used effectively by health care providers and patients across the continuum of care, including emergency, acute care, rehabilitation, home care, and palliative care. Videoconferencing has also been used effectively for patient education, and for continuing education and support for professionals in remote areas.

Image transmission

Teleradiology and tele-ultrasound, with or without real-time video consultation, are widely used and accepted telehealth applications. A number of programs were found to offer cost savings and socio-economic benefits in the area of neurosurgery. Other clinical areas where teleradiology has been tested and could be applied in Alberta include emergency medicine, cardiology, urology, oncology and gynaecology. Tele-ultrasound might be re-addressed within Alberta.

Computers and the Internet

These can play a role in remote delivery of interactive health education and promotion programs, on-line support groups, and communication links between patients and providers for the purposes of education, monitoring, and/or follow-up. These applications can be designed and delivered for caregivers as well as patients.

From the perspective of this Policy Report, the most significant issues applicable to Alberta are the telehealth policy void, and the need to satisfy the telehealth / telematics commitments made in Alberta's response to the Mazankowski report. Many studies continue to highlight inter-jurisdictional policy issues (legal, ethical, privacy, etc.), and the current lack of leadership in this arena, as barriers to broader application of telehealth solutions. Eight of the ten groups of recommendations accepted by the Alberta government from the Mazankowski report contain some element inter-related to telehealth implementation or R&D. The applicability to Alberta of these aspects is clear.

V POLICY REVIEW PROCESS

1. Awareness and Engagement process

A local Policy team was assembled to develop and inform the policy section of the study. Members of this Policy team are listed in Appendix A.

Wider awareness and engagement were identified as critical aspects of the policy component of this study. An environmental scan, including discussions with the local team, was performed to determine existing frameworks for policy engagement. No established frameworks were identified. The local policy team thus developed its own strategy for engaging policy and decision makers, with assistance and feedback from Dr. Jacques Magnan and Dr. Doug Wilson, Alberta Heritage Foundation for Medical Research (AHFMR). The first five of the six steps of the policy strategy have been completed:

1. A list of awareness and engagement opportunities for key policy and decision makers was developed:
 - Participate with our team in the development of an optimal engagement policy
 - Obtain further information about the study, either in person or in writing
 - Visit our web site to receive ongoing bi-monthly progress reports
 - Receive executive summary of final report
 - Attend the Summer Telehealth Research Institute, which had a session dedicated to this topic
 - Engage in audio/video teleconferencing sessions around specific issues related to the study
 - Request open houses, road shows, presentations
 - Advise on appropriate press releases
2. Members of the local policy team identified key provincial/territorial and federal policy and decision makers.
3. These identified persons were sent a letter which described the study, suggested the opportunities listed above, and asked for their input, expertise, and participation in framing recommendations. These individuals in turn identified additional contacts, who were approached in the same way. The complete list of Policy Working Group Contacts is given in Appendix C.
4. All Policy Working Group Contacts were provided a study update in early October, 2002. A number of individuals provided feedback on the project.
5. Selected contacts with expertise in specific subject areas of the study were approached for guidance in developing content and in framing recommendations.
 - Sharlene Stayberg, Telehealth Director, Alberta Wellnet, and the Provincial Telehealth Geriatric group, regarding the Geriatric Telehealth chapter
 - Dr. Al Cook, Dean, Faculty of Rehabilitation, University of Alberta, regarding the Telerehabilitation chapter
 - Ernie Dal Grande, Telehealth Program Manager, First Nations and Inuit Health Branch, Health Canada, regarding the First Nations chapter

- Marty Landrie, Aboriginal Mental Health, Adult Services Coordinator, Alberta Mental Health Board, regarding the First Nations chapter
6. Other components of the policy awareness and engagement strategy include:
- Design a one-page summary of the project for circulation at upcoming conferences and workshops. Two abstracts and two presentations have been prepared and disseminated; one for the Canadian Society for Telehealth conference, Vancouver, British Columbia, October, 2002; the second for the National Telehealth Research Summer Institute, Calgary, Alberta, Summer, 2002.
 - Invite feedback from policy and decision makers on the Final State of the Science and Policy Reports (initiated in November with the interim report and to continue in 2003 after submission of the Final Report to the Alberta Heritage Foundation of Medical Research, January 17).
 - Circulate the State of the Science and Policy Reports through the SEARCH network (<http://search.cche.net>) and the Alberta Wellnet Provincial Telehealth Committee (web site). (Will be initiated at the end of October, 2002.)
 - Share the tele-homecare package with Canadian and German colleagues, as part of a Germany-Canada Telehealth commitment.

2. Critique of Policy Sources

Policy sources were originally identified in the literature search which has been described in the State of the Science Report. The literature search grouped abstracts into 10 subject areas (see p. 20).

As investigators reviewed articles and sources in these subject areas, they referred policy- and economic-related sources through the central office to the investigators responsible for the policy and economic analyses.

The following information was abstracted from all policy sources included in this report, as per the Cochrane Collaboration Review Manager framework (website: <http://www.cochrane-net.org/revman/>):

- Article / Title / Author / Year / Country / Location
- Study Design
- Modality
- Participants: age / gender/ groups
- Intervention / Exposure
- Outcomes / Socio-Economic Indicators
- Strength of study
- Policy Recommendations
- Applicability to Alberta

Analysis of policy sources can be found in Appendix P: Critique Policy

The strength of the policy studies (level of evidence) was judged as low, moderate, or high based on the expert opinion of the reviewer, using predetermined criteria including:

- knowledge of telehealth and the Alberta context;
- logical and comprehensive flow of information in the paper; e.g., did conclusions relate directly to objectives?
- quality of the study and source.

Readers can refer to the reference sections in the State of the Science and Policy Reports or to Appendix R: Bibliography, for a complete list of articles and sources reviewed in the development of both Reports.

3. Strengths and Limitations of this Study

The primary strength of the study was the varied and extensive expertise and experience of the project team, which consisted of the principal investigator and five other investigators, a research librarian, a local policy team of eight telehealth, information and communications technology (ICT), public health, and epidemiology researchers, policy leaders and strategists; as well as project managers and assistants. The list of project team members, their titles and qualifications, can be found in Appendix A: Project Team Members, Advisors and Assistants.

Midway through the project (Summer, 2002), a Policy Working Group, consisting of federal/provincial/territorial policy- and decision-makers, was identified through key contact referrals. This group was made aware of the study, its purpose and objectives, and many of these individuals provided valuable contributions in terms of policy implications and interpretation, and development of the results framework.

A comprehensive and exhaustive literature search enabled the team to identify a consummate body of literature related to the two key subjects of the study: 1) telehealth and 2) Social Determinants of Health / socio-economic indicators. Clearly outlined research questions and review processes enabled the effective progression of the study.

There are three limitations to this study which should be mentioned. Firstly, State of the Science Program limitations precluded the ability to have two reviewers assess each paper in this study. Once abstracts were grouped by subject area (i.e., Paediatrics, telerehabilitation, etc.), the subject areas were divided amongst five investigators and the task of selecting and reviewing articles relied upon the individual expertise and experience of one of five investigators. To mitigate any potential differences in selection and review processes, criteria were developed and the team met regularly to review progress and to discuss and resolve particular issues or concerns.

Secondly, systematic reviews could not be assessed for strength of evidence as no rating system was available. The search strategy for telehealth review sources identified both systematic reviews and literature reviews, which are differentiated within the reviews analysis. A paper can be called a systematic review if it satisfies certain criteria, such as clear research question and associated transparent search strategy, and inclusion/exclusion criteria.

Thirdly, the subject areas identified for this study represent promising areas for telehealth application based on current health needs, initiatives, and recognized health system priorities. Consequently, evidence pertaining to each subject area and the ensuing recommendations cannot be generalized across subject areas or to the population as a whole. For instance, evidence and recommendations related to a medical condition in Geriatrics cannot be applied to the same medical condition in adults. Wherever evidence or recommendations have been provided which relate to a particular population group, this has been specified.

VI RESULTS OF THE POLICY REVIEW

The review of policy studies, as well as policy implications from the State of the Science Report, led to the development of six main strategies for successful and sustainable implementation of telehealth. These are:

1. Integration,
2. Policy goal-setting,
3. Recognition and resolution of policy barriers / challenges in telehealth,
4. Collaboration, partnerships and sharing,
5. Identification of high-impact areas for telehealth, and
6. Evaluation and research.

1. Integration

Telehealth projects are often conceived, implemented and evaluated as stand-alone initiatives. Health providers' and patients' experiences with pilot projects have further entrenched this view. It is necessary that policy and decision makers within the health system, as well as administrators, providers, patients and the public come to see telehealth as part of the bigger picture of health services delivery. Mitchell (2000) states that telehealth is more likely to be cost-effective and sustained if it is seen as part of the larger domain, that is, e-health – the use of telecommunications technologies (video-conference, telephone and Internet) with information technology (computer databases, image capture, electronic ordering, storage & retrieval systems).

Enhanced health and cost benefits can be achieved by leveraging telehealth programs with other emerging telecommunications / information technology innovations.

Examples of integrated telecommunications and information technology are:

- a nurse-managed telephone-based health monitoring and patient education program aided by a computerized decision-support system;
- an in-person local provider-patient clinical consultation, where a distant specialist attends or can be summoned if needed via video-conference; with biomedical telemetry to transmit clinical data;
- a support network for caregivers involving an informational computer program and e-mail communication with peers and/or professionals.

A key principle for integration is to make telehealth part of an organization's strategic plan, rather than just being introduced in a series of demonstration projects.

In addition, a communication plan, working to increase awareness of telehealth among health care providers, educators and consumers to better integrate telehealth into the health care system, will help in changing the perspective of it being an 'add-on' service, and in informing potential consumers of more choices in health care. A communication plan should include national and provincial policy statements, as well as research and evaluation findings on telehealth.

2. Policy Goal-setting

Ricketts (2000) found that in the hospital setting, market-driven changes are more dominant than policy-directed reform (in terms of implementing new technologies). One implication of this observation is that cost-effectiveness should be a key criterion in selecting telehealth applications. However, it need not be the primary nor even a major criterion in all cases. Menolascino (1989) emphasizes that establishing a guiding philosophy in planning a telemedicine program is key to success. Improving cost-effectiveness in health services delivery may be one example of this, but so may improving access to health care for remote/underserved populations. It is possible for the two principles of cost-effectiveness and access to be consistent, but improving access can also be seen as possibly increasing costs from a health system point of view – even if it reduces costs from a societal point of view (i.e., including private costs faced by patients as well as program costs). Such an example illustrates the need for a clear guiding principle that considers all of the potential impacts of a particular telehealth program. It also demonstrates the need to be clear about the perspective being adopted (i.e., patient, provider, health system, society).

3. Recognition and Resolution of Policy Barriers / Challenges in Telehealth

There are a number of issues that are frequently mentioned in policy papers and in scientific studies that are limiting the success of programs and constraining the widespread adoption of telehealth. Some of the most problematic are:

- Professional issues of credentialing, licensing, and registration;
- Legal issues of privacy and security;
- Ethical issues of confidentiality, consent, and authorization (data access);
- Reimbursement and other operational (funding);
- Accreditation;
- Commercial issues of intellectual property and copyright;
- Interoperability (technical, professional, organizational);
- Communication issues such as cross-border acceptance, use of common ‘language’.

Policy and decision makers, and telehealth project leaders, are working to address these issues but comprehensive solutions have not been established. Professional associations need to continue to be involved in setting standards for the technology used in telehealth applications in specific areas (e.g.: teleradiology, telepsychiatry), and in resolving the issues of professional competence, credentialing and licensing in the provision of telehealth services. Health regulatory bodies also need to be involved in policy decision-making in order to expedite regulatory changes to move telehealth forward.

Ashcroft and Goddard (2000) address some of these challenges in their article “Ethical issues in teleradiology”. They recommend clear contracts between the user and provider of teleradiology advice, specifying:

- minimum standards of training;
- medical qualifications;
- liability, insurance and negligence;
- Total Quality Management (TQM) standards;
- clear and binding financial arrangements;
- standards of data protection and patient confidentiality;

- regular technology assessment, including economic evaluation.

This article is a concise resource for use when implementing a teleradiology program, or when developing research projects and/or policy.

Another challenge that needs to be addressed in implementing telehealth is the human factor. Development of strong, trusting inter-professional relationships and provider-patient relationships may require more time and effort, or different techniques, or may even be more essential in a telehealth setting, as opposed to traditional health care delivery settings. Without strong interpersonal relationships, telehealth programs may break down. In order to develop strong relationships, the following strategies may be useful:

- Understand provider and patient expectations;
- Communicate (and, ideally, achieve a common understanding of) the goals and objectives, rationale, benefits and limitations of the telehealth program to all users (patients, providers, technicians);
- Provide training and education.

Telehealth has an impact on human resources. Health and medical workforce implications associated with the advancement of information technology and telecommunications in health care include: overall numbers, mix of health care providers (HCPs), geographical distribution of HCPs, changing professional boundaries and changing skill requirements of HCPs (Swanson 1999). It is important that provincial and national policy and decision makers be forward-thinking in health human resources planning.

Another human factor in the success of telehealth is “readiness” of both communities and health organizations. Community readiness refers to the level of experience and acceptance that that public has with respect to technology. Campbell et al (2001) describe three levels of community readiness and suggest approaches to the introduction and implementation of telehealth in each case. In assessing readiness, it is important to understand perceptions of patients, as well as providers. From the provider viewpoint, telehealth has the potential to open up new markets for urban specialists. On the other hand, a US study reports that rural physicians facing competition from their urban counterparts may view telehealth as a threat to their livelihoods and resist implementation or use of telehealth programs in their community (Sinha, 2000).

Organizational readiness is related to the health delivery processes, procedures, and standards that are in place and how a telehealth program fits with these. It may be necessary to orient staff to new ways of doing things in order to effectively accommodate telehealth. Wheeler (1998) proposes that a critical success factor for telehealth will be redesigning the way care is delivered while maintaining or improving the quality of care.

Overcoming many of the barriers to telehealth that have been discussed here involves openness to change on the part of individuals, health care providers, health organizations / Health Regions, and provincial and federal governments.

A final point related to ethical considerations, introduced by Preston et al (1992), is the notion of an organization being held liable for NOT offering telehealth. This is a ‘new twist’ that Alberta may want to consider in terms of the legal implications of developing new programs and in policy planning.

4. Collaboration, Partnerships and Sharing

There are significant opportunities for improvements in efficiency and patient care through inter-jurisdictional sharing of skills and services via telehealth. Canadian health care decision makers need to examine existing stove pipes and take every opportunity to share resources across regions and to integrate existing systems and institutions

There can be advantages to collaboration between industry and health care organizations. These may include opportunities to trial technologies in a particular setting (e.g., if there are doubts as to the generalizability of the proven benefits of a given telehealth application to the local setting, or its interoperability), and the ability to communicate local needs and required adaptations to a technology provider.

There needs to be broader inclusion of the public in decision-making regarding telehealth options. There is evidence that the public is willing to trade-off some aspects of traditional health care (e.g., in-person specialty follow-up consultations) for the advantages of telehealth (faster access to care, less personal travel expense).

5. Identification of High-Impact Areas for Telehealth

Needs assessment

Evidence from the State of the Science Report indicated that telephone-based applications can be cost-effective and can improve access, outcomes, and satisfaction with care in certain populations. While video-based application tends to be the better known telehealth concept in Alberta, education and administration are currently the two greatest uses of these systems, with minimal growth in clinical services. This may be explained by some of the barriers identified previously, such as:

- unresolved medical-legal issues associated with video-based clinical consultation,
- inadequate/incomplete reimbursement for clinical consults via video,
- the need for better integration of the video-based clinical consultation with the electronic health record and data transfer in general.

However, the question remains as to whether education and administration are the areas of greatest need for telehealth services and if these are the areas where the greatest impact on health and social outcomes will be realized.

Improved access for remote and underserved populations is generally recognized as a priority in telehealth. Goldsmith and Ricketts (1999) devised a method of combining the designations of ‘Medically Underserved Population’ and ‘Health Professional Shortage Area’ based on the following variables:

- Population count,
- PCP count,
- Percent of population with income <200% of poverty level,
- Percent of racial minorities,
- Infant mortality rate and low birth weight,
- Percent of population linguistically isolated,
- Population density,
- Other variables.

This framework may be useful in assessing/determining need for specialized telehealth programs.

Risk Assessment

Risk assessment is an important component of program planning. While some program limitations can be anticipated and accommodated, there can be unexpected socio-economic impacts of telehealth on a community. Program evaluation must be open enough to capture these so that they can be investigated and understood.

An example is the issue of independence versus social isolation. Technology may lead to increased independence for patients, specifically in the home, but it also has the potential to lead to increased social isolation if the need to go outside of the home to seek services or support is obviated, or if carers are replaced with technology. This issue is particularly important in the context of tele-homecare. The implementation of programs must consider the needs and choices of individual patients in the wider social context.

Considering risk in a broader perspective, decision makers need to be cognizant of the policies being developed / recommended and of the ways in which these policies are expected to drive change in our health care system, versus actual effects. For instance, Taylor (1999) in the article: “Do Targeted Efforts for the Rural Underserved Help Kill Comprehensive Reform?” suggests that telehealth solutions in rural areas may suspend needed, larger scale response to the problems of equity in health care access. Associated with this concern is the following US-reported notion: that an unintended (possibly undesirable) long-term effect of telehealth may be to further concentrate health specialists and resources into urban centres, resulting in reduced direct access to health services for small/remote communities and increased isolation (Sinha 2000).

A concern presented by Swanson (1999) is that “the likely social effects of the advancement of information technology and telecommunications in the health care field in Australia are ‘location independence’ of a range of activities and widening gaps between the ‘information rich’ and ‘information poor’”. The suggestion is that most of the underserved groups will fit into the ‘information poor’ category.

6. Evaluation and Research

The telehealth literature tends to focus mainly on health system costs and personal time and travel considerations, as opposed to a broader range of socio-economic indicators. Of particular interest to this study, but also absent in the literature reviewed, is the direct measurement of the impact of telehealth on the social determinants of health, i.e., poverty, social isolation, education, life stress, early life, access to transport, and nutrition. New research should employ appropriate methodologies for studying and answering these questions. In addition, new frameworks for economic analysis need to be developed which can capture non-monetary and unintended consequences, as well as monetary measures.

The principal driving forces for telehealth have been financial, specialist clinical interest, and proof of technological feasibility. Patients’ views and interests, societal effects, quality controls and wider organizational effects are seldom considered (Roberts, 1998). There are, however, studies that note the importance of conducting telehealth research that is focused on aspects beyond financial considerations, suggesting the importance of considering patients’ views and

interests. Despite the rapid design, innovation and sleek, user-friendly devices, the redefining of health care delivery should still contain a significant application of compassion and caring (Albright and Slater, 2000). Additionally, Fisk (1998) states the need to maximize the acceptability and usability of telecare to meet the social objective of independent living. Also to be considered are the needs of special populations (including Aboriginals) (Lessing and Blignault, 2001), and those who do not have equal access to health care (Jukic and Bifulco, 1999).

Hayes (1998) suggests that there is a need for further research to explore the factors that contribute to organizational readiness for successful implementation of telemedicine. Campbell et al (2001) may be a useful resource in assessing readiness.

Because it takes time to observe a measurable change in socio-economic indicators and particularly in the social determinants of health, research on the impact of telehealth on these factors requires a longer time span in order to produce sound and quality evidence.

Research Questions

Preston et al (1992) is a useful resource regarding research design and development of researchable questions. Capalbo (1999) suggests that a key method of assessing the value and effect of telehealth is by observing how it affects the behaviour of consumers in terms of where and how they seek care. For example, what are the short-term versus long-term patterns of care-seeking; how do care patterns change when a service is altered / added / removed?

Evaluation Frameworks

Capalbo (1999) recommends 'benefit-cost analysis' (BCA) as a framework for analysis for telehealth, with consideration of the disparate distribution of costs and benefits on different parties, e.g., patients, physicians, other health care providers and tax-payers. Similarly, Baer (1997) suggests a framework for evaluation in a 3x3 matrix formed by accessibility, cost, and quality against client, provider, and society. Angaran (1999) is a good resource document for the development of an effects-oriented framework and risk analysis framework for evaluating telehealth.

It is important for professionals in this field to share information about their experience and to examine the results of evaluations to speed up suitable development work (Riva and Gamberine, 2000).

The following dilemma has been identified: on the one hand, decision makers need to use caution in implementing telehealth programs based on the quality of the existing evidence. On the other hand, evidence from some studies, despite the quality of the study design, can provide guidance on selected programs that appear to be appropriate applications. For instance, certain telehealth applications, which may or may not have proven cost-effectiveness, can benefit remote or underserved communities by increasing access to service.

7. Investment

In 1997, the Industry Canada Sector Competitiveness Framework Report predicted that Canadian governments would spend \$500 to \$750 million over five years in telehealth applications. This included new and on-going projects and their associated infrastructure. Investments have far surpassed this estimate! The 1998 Business Communications Company Report estimated that current U.S. market for telemedicine at \$65M, to reach \$3B by 2002. Alberta's strategy to grow its "innovation-based economy" into the 21st century targets total R&D investment of \$3 billion by 2010, and 0.5% of the global market around advanced networked environment products; i.e. the milieu in which telehealth sits.

Given the size of such endeavors, the Government's research and science strategy has recognized that "content and applications for the health care sector must be thoroughly researched and evaluated to ensure appropriate investment". That is, telehealth research, as in this SOS study, is critical to accurately assess Return on Investment or Return on Value, and to provide the needed evidence and guidelines for decision makers in Alberta to consider. In addition, as telehealth research provides the bridge between private sector and practice environments (by moving knowledge into practice, and new products into commercialization), it is viewed as a major key to advancing the area of investment.

Training and employment opportunities are an important element of "Investment". In the early 2000's, Industry Canada reported that over 350 Canadian Telehealth companies employed about 1700 people, and had annual revenues of nearly \$30 million. The private sector continues to hire in the telehealth field as it strives to conduct ongoing R&D to remain at the leading edge, commercialize telehealth products, and forge new markets. Business links in developing and implementing telehealth solutions provide hands-on training and industry exposure and contribute to the training of high quality personnel through internships, apprenticeships, mentoring, and field research exchange opportunities. Further, numerous job and career opportunities are available for telehealth trainees within the public, professional, and academic sectors. In a 2000 study of 42 Canadian health organizations, 59% had IT job vacancies and 66% had difficulty recruiting/retaining IT staff.

Taken together with the findings from this study, the above perspective leads to the conclusion that investment in telehealth is appropriate, and if performed correctly offers significant R&D opportunities.

VII RECOMMENDATIONS AND CONCLUSIONS

General recommendations arising from this study are:

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 resolution of 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.
5. Federal-provincial/territorial partnerships in telehealth should be established where there are opportunities to improve efficiency in health care and decrease duplication.
6. As telehealth continues to evolve, input from all key stakeholders (including patients, health care providers, and the public) into policy development is required. Consideration of needs as well as practical experience is essential for a meaningful exchange of information and views.
7. Consistent terminology and definitions around telehealth, e-health and related terms should be adopted across jurisdictions.

B. Technology

8. To facilitate access to many bandwidth intensive telehealth applications increased broadband connectivity is needed, particularly to rural and remote communities.
9. Given the evidence, the use of telephone-based telehealth applications should be re-examined.
10. 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

11. 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.

12. Suitable frameworks for economic analysis need to be developed that capture non-monetary and unintended consequences, as well as monetary measures.
13. Telehealth programs should be implemented and evaluated in a culturally aware and culturally sensitive manner.
14. Evaluations should include examination of the social, organizational, and policy aspects of telehealth.

D. Economic

15. Telehealth demonstrates sufficient evidence of socio-economic benefit to indicate ongoing investment is appropriate.
16. Sustainable telehealth ‘programs’ and not ‘projects’ should be targeted.
17. Full integration of telehealth will increase its use and decrease the per contact episode cost.
18. 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

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

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

Paediatric Telehealth

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

Geriatric Telehealth

24. Telehealth programs should be used to support palliative home care initiatives.

25. 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.
26. Geriatric telehealth applications should be strongly considered as a technology R & D and economic development opportunity.
27. The use of e-prescription applications should be used to increase self-efficacy and compliance, and to reduce adverse effects.
28. The use of low-cost technology solutions (e.g., the telephone) is strongly recommended for Geriatric telehealth where appropriate.

First Nations Telehealth

29. The recommendations provided in the Health Transition Fund project report of 2001 (Health Canada) 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 Infrastructure in order to leverage investments.
30. Health services and information content should be delivered in a culturally sensitive context.

Tele-homecare

31. Telehealth should be considered for application in managing and monitoring chronic heart failure, chronic obstructive pulmonary disease, oncology, diabetes, wound care, asthma, anxiety, and cardiovascular accident.
32. 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

33. Tele-mental health, a proven and sustainable telehealth application, should be expanded.

34. The use of low-cost technology solutions (e.g., the telephone) is strongly recommended for tele-mental health where appropriate.

Teleradiology

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

Renal Dialysis Telehealth

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

Rural and Remote Telehealth

38. Increased access to a broad range of clinical and educational resources should be provided to rural, remote, and underserved populations.
39. 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

40. 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.

VIII SUMMARY

This policy report has looked into the literature for policy implications of telehealth related to socio-economic determinants of health and also for guidance on how best to integrate telehealth into the mainstream so that benefits can be realized and sustained in the long term. The literature has revealed a focus on certain socio-economic indicators, such as cost, access, and satisfaction. The significance of these analyses cannot be overlooked; however, other indicators that have not been addressed in the literature but where telehealth may have a strong impact on population health should also be considered, for instance, social isolation, life stress, and poverty. This indicates opportunity for research and policy analysis and development. In the broad social context, various stakeholders, including patients, providers, and health organizations, can benefit in unique but related ways from telehealth.

Telehealth must be seen by decision-makers and administrators, and by providers and patients, as more than an add-on service in order for it to become fully integrated into the health care system and for it to reach its full potential. There are various barriers and challenges to the advancement and integration of telehealth including confidentiality, reimbursement, legal and ethical considerations, but there are also important aspects of the “human factor” that need to be addressed, including patient needs and preferences, patient and provider perceptions, relationships, workforce implications, and community readiness. These are a challenge for all stakeholders.

Depending on the health program and goals, there are many different proven telehealth strategies that can respond. For instance, cost-effectiveness has been demonstrated particularly in the fields of teleradiology and tele-mental health. Improved access for underserved populations can be addressed by identified applications in rural / remote telehealth, geriatric telehealth and home telecare. Based on the evidence that exists, this report provides specific, program area recommendations regarding key directions for telehealth in Alberta and Canada. However, sound evaluation of new initiatives must be a component of any project, and avenues must be opened so that innovative solutions can be tested. Therefore, general recommendations pertaining to policy, technology, evaluation, and economic analysis are also provided in this study.

In conclusion, the awareness, but more particularly, the engagement process will continue following the completion of this project. Knowledge of the benefits of the socio-economic impact of telehealth will continue to be provided as we move forward in an eager attempt to engage policy and decision makers in discussion about the future of telehealth.

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APPENDIX A

Team Members

Dr. Penny Jennett – Principal Investigator

Head, Health Telematics Unit; Professor Faculty of Medicine, University of Calgary

Expertise contributed: Extensive experience as a telehealth and health researcher, including leadership positions in data and literature synthesis in telehealth, telelearning and medical/health education.

Role: Direct the project, coordinate the efforts of the investigators and provide independent verification of article selection.

Dr. Richard Scott – Co-Investigator

Associate Professor, Health Telematics Unit, University of Calgary; Fullbright New Century Scholar

Expertise contributed: Diverse experience in review and synthesis of literature; telehealth researcher.

Dr. David Hailey – Co-Investigator

Director, David Hailey and Associates, Canberra, Australia; Professor, Department of Public Health Sciences, University of Alberta, Senior Advisor, Health Technology Assessment, Alberta Heritage Foundation for Medical Research

Expertise contributed: Data synthesis and analysis gained over numerous projects, including three previous non-quantitative reviews in telehealth; specific cost-benefit experience.

Dr. Arto Ohinmaa – Co-Investigator

Associate Professor (Health Economics), Department of Public Health Sciences, University of Alberta

Expertise contributed: Expertise in the area of health economics; significant experience in performing systematic reviews in telehealth as well as years of front-line experience in telehealth research projects.

Dr. Roger Thomas – Co-Investigator

Family Physician; Professor, Faculty of Medicine, University of Calgary; Cochrane Collaboration Coordinator for the University of Calgary

Expertise contributed: Clinical experience; expertise in sociology, evidence based medicine and systematic reviews; particular expertise in the Cochrane review process.

Carol Anderson – Co-Investigator

Telehealth Consultant, CA Consulting

Expertise contributed: clinical experience; telehealth consultant

Dr. Barbara Young – Co-Investigator

Clinical Fellow in Internal Medicine; Chief Resident General Internal Medicine, McGill University

Expertise contributed: experience in clinical medicine and medical education; interest in rural clinical medicine.

Diane Lorenzetti

Research Librarian, Institute of Health Economics/Centre for Health and Policy Studies, University of Calgary

Expertise contributed: advisor on search strategy and Reference Manager software

Louise Affleck Hall

Project Manager, Health Telematics Unit (HTU), University of Calgary

Lorna Milkovich

Project Coordinator, HTU

Caroline Claussen

Research Assistant, HTU

Tara Perverseff

Research Assistant, HTU

Susan Brownell

Project Assistant, HTU

Ali Jadavji

Summer Student, HTU

Julianne Sanguins

Summer Student, HTU

Stephanie Yeo

Summer Student, HTU

Local Policy Team Advisors

Advisors will contribute specific areas of expertise towards implementing a rational review design and drawing relevant conclusions from the results. All advisors will contribute up to five hours per month, with the exception of Ms. Lorenzetti, who will contribute approximately 100 hours over the course of the review process.

Dr. Tom Noseworthy

Intensive Care Physician; Information Communications Technology (ICT) and Policy Researcher, Department of Community Health Sciences, University of Calgary

Expertise contributed: expertise in health care policy and management based on practical and academic experience on multiple administrative levels; special expertise in telehealth

Dr. Steve Edworthy

Rheumatologist; Telehealth Researcher, Health Telematics Unit, University of Calgary

Expertise contributed: clinical experience; special expertise in ICT solutions as applied to the management of chronic diseases and physician offices.

Dr. David Topps

Family Physician; Chair, WONCA Rural Information Technology Exchange; Chair, Rural Practice Committee, College of Family Physicians

Expertise contributed: clinical experience; expertise in systematic reviews and the challenges of rural medicine, specifically as these relate to ICT use in practice.

Janice Hopkins

Director, Knowledge and Policy Development Office, Office of Health and the Information Highway, Health Canada

Expertise contributed: expertise in national policy as it applies to ICT implementation in the public sector

Dr. Penny Hawe

Professor, Markin Chair in Health, Wellness and Society, University of Calgary

Expertise contributed: expertise in policy, public health, epidemiology, psychology and evaluation of health promotion programs

Steven Lewis

Adjunct Professor of Health Policy, University of Calgary; Health Policy Consultant, University of Saskatoon.

Expertise contributed: many years experience in national and provincial health policy research and research synthesis

Dr. Robert Hayward

Physician (Internist); ICT Researcher, Department of Public Health Sciences, University of Alberta

Expertise contributed: clinical and ICT researcher within the health sector