Supporting the Development of Telehealth for British Columbia First Nations Living on Reserves: A Review of Existing Evidence

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The overall project was overseen by an Advisory Committee composed of:

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- Neil Hanlon, Ph.D., Assistant Professor, Geography Program, University of Northern British Columbia
- Elder Grace Rossetti, Prince George Dakelh Métis Elder and Co-Instructor, Health Sciences Program, University of Northern British Columbia

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## CONTENTS

Acknowledgements ................................. ii

Contents ............................................. iii

About the BCATPR .................................. v

Executive Summary ................................. vi

1. **Introduction** .................................. 1
   1.1 Primary Health Care Framework .......................... 1
   1.2 Positioning Telehealth within a Primary Health Care Framework ........................................ 3
   1.3 Focus of the Report .................................. 5

2. **Background: The British Columbia First Nations Community Health Care System** .......... 9
   2.1 Context ......................................... 9
   2.2 Other Programs .................................. 12
   2.3 Options for Community Control .......................... 13
   2.4 Evidence of Performance .......................... 14
   2.5 Summary ........................................ 19

3. **Methods** ..................................... 21
   3.1 Designing a Cultural Framework to Inform Telehealth Deployment On-reserve ............ 22
   3.2 Systemic Telehealth Review ......................... 20
   3.3 Ensuring Relevance ................................ 23

4. **Perspectives from the Elders and Knowledge Holders** ........................................... 26
   4.1 Exploring Key Values ................................ 26
   4.2 Representing the Themes Raised ..................... 28
   4.3 Telehealth Seen through a Cultural Lens ........... 29

5. **Lessons from the Literature** .................. 32
   5.1 Overview of the Literature .......................... 32
   5.2 Health System .................................. 33
   5.3 Benefit to Community, Families and Individuals ........................................ 43
   5.4 Discussion ...................................... 46
6. Conclusions and Recommendations

6.1 Key Findings

6.2 Conclusions and Recommendations

6.3 The Need for Further Research

6.4 Final Words

Appendix 1: Results of the Systematic Literature Review

Appendix 2: British Columbia First Nations Health Care Services

References
About the BCATPR

The British Columbia Alliance on Telehealth Policy and Research (BCATPR) is a multi-disciplinary health services research team that started out with an initial four-year grant from the Michael Smith Foundation for Health Research through the Health Services and Policy Research Support Network in 2005. It has since received funding from the Vancouver Foundation, the Heart and Stroke Foundation of BC & Yukon, the Canadian Institutes of Health Research, Vancouver Coastal Health, Provincial Health Services Authority, Northern Health Authority, Providence Health Care, and Pfizer Canada Inc. for its projects.

The BCATPR is a joint partnership consisting of academic institutions and provincial health authorities committed to provide relevant evidence and capacity building for integration of sustainable telehealth care services into routine health care practices within British Columbia. The BCATPR addresses key questions within three established research themes of particular importance to health authorities:

The Patient: Self-Managed Care, Technology Uptake and Behaviour
This theme addresses the use of Internet-support technology to deliver self-managed care to patients with cardiovascular disease directly into their homes to improve patient care and outcomes. The majority of management strategies for cardiovascular disease depend primarily on patient self-management, uptake and behaviour change with other factors such as blood pressure and blood glucose monitoring requiring active interaction with the patient care providers.

The Provider: Integration of Clinical Care
This theme addresses the use of telehealth to integrate clinical care to facilitate shared care between primary and secondary care providers. As a complex chronic disease, the management of cardiovascular disease involves physicians, nurses, allied health professionals and multiple health services. Clinical integration can be defined as the sharing of care between different levels of providers to improve health outcomes and create system sustainability.

Policy: Telehealth Policy and Health Human Resources
This theme addresses the implications of telehealth services on health care policy and vice-versa, and the impact of these services and policy on health human resources. The fundamental nature of telehealth is borderless electronic networking with the capability to transcend geo-political, socio-cultural and temporal boundaries. For telehealth to function effectively, a clear and supportive policy environment is required that facilitates and manages inter-jurisdictional telehealth and integrates it with existing health policy.

Institutional Partners

Simon Fraser University
University of British Columbia
University of Northern British Columbia
Fraser Health Authority
Interior Health Authority
Northern Health Authority
Provincial Health Services Authority

Vancouver Coastal Health Authority
Vancouver Island Health Authority
Executive Summary

Telehealth is increasingly portrayed as an effective way to improve access to primary health care in British Columbia’s First Nations communities. Federally funded community-based First Nations health services provide local access to some measures of culturally appropriate primary health care to First Nations living on-reserve. Access to services is however limited. Recruitment and retention issues and diseconomies of scale also combine to limit local access to a wide range of primary health care services. In addition, remoteness, bad roads, weather and limited access to public transportation limit access to services off-reserve.

While telehealth is generally viewed as an option to improve access to health care in geographically dispersed communities, the link between health inequalities, primary health care and telehealth has not been explicitly discussed in telehealth literature.

Key Findings

• Our review suggests that priority areas for telehealth deployment include mental health and youth suicide prevention programs, chronic disease prevention, pilot projects integrating acute care and community health services for First Nations, and the training of First Nations health care professionals.
• Discussion with a group of Elders revealed that they would welcome telehealth as an opportunity to improve and expand access to care locally, and to build on local assets, including local professionals, traditional knowledge and traditional medicine, and family members.
• The review of the telehealth literature we conducted suggests that telehealth interventions may be used successfully for triage, diagnosis and referrals. Telehomecare, chronic disease management and mental health are telehealth service areas deserving attention.
• Despite the key finding that telehealth service options must be built and integrated into the First Nations community health care system, we found few studies that could inform the deployment of these services into First Nations communities. We were also unable to locate studies documenting how telehealth has impacted the local workforce.

Conclusions & Recommendations

First Nations face considerable challenges in accessing appropriate care. Telehealth provides an opportunity to address some of these issues. However, it remains important to recognize that telehealth will realize its full potential as an intervention only if shortcomings in the financing of on-reserve health service programs are addressed. Shortcomings to the system itself should not be attributed to telehealth, nor will telehealth resolve these shortcomings. Researchers and practitioners working to promote telehealth in the First Nations environment need to take a whole system approach when assessing the potential health gains if improved outcomes for First Nations are to be accomplished.
1. Introduction

The purpose of this report is to explore how and where telehealth interventions may best meet the health care needs of First Nations living on reserves within British Columbia. Telehealth is increasingly portrayed as a key to improve access to primary health care in British Columbia’s First Nations communities. In November of 2005, the province of British Columbia, the First Nations Leadership Council and the Government of Canada signed the landmark Transformative Change Accord. The Accord has three objectives:

1. To close the gaps in the areas of education, health, housing and economic opportunities over the next 10 years;
2. To reconcile Aboriginal rights and title with those of the Crown; and
3. To establish a new relationship based on mutual respect and recognition.

To close the gap in health, the Accord proposes to prioritize investments in mental health and youth suicide prevention programs, chronic disease prevention, pilot projects integrating acute care and community health services for First Nations, the training of First Nations health care professionals and telehealth. The Accord also commits to improving cross-jurisdictional coordination through Health Partners Groups, and to improve Aboriginal participation in planning and decision-making.¹

Federally funded community-based First Nations health services provide local access to some measures of culturally appropriate primary health care to First Nations living on-reserve. Access to services is however limited by the remoteness and size of communities. Recruitment and retention issues and diseconomies of scale also combine to limit local access to a wide range of primary health care services. Remoteness, bad roads, weather and limited access to public transportation also limit access to services off-reserve.

While telehealth is generally viewed as an option to improve access to health care in geographically dispersed communities, the link between health inequalities, primary health care and telehealth has not been explicitly discussed in the literature. Further, to date and despite considerable discussions of the potential benefits of telehealth in improving access to health care on First Nations’ reserves,² we have been unable to locate a study or report that outlines the First Nations cultural and health system contexts in which telehealth interventions must be integrated. This is an important knowledge gap.

1.1 Primary Health Care Network

In this report, we recognize that health is a multi-dimensional concept that includes notions of individual and community well-being.³ Determinants go beyond access to care, and include other factors such as socio-economic conditions, genetic make-up, lifestyle choices, socio-economic conditions, environment, education, housing,

The emerging body of literature on Indigenous determinants of health explicitly recognizes that health is linked to a broad number of determinants, including access to land, language and self-determination. Recent work suggests that closing the gap in health will require a cross-sectorial approach, informed by Indigenous notions of determinants of health. In this context, we recognize that western health services alone are not sufficient to close the health gap that exists between First Nations and other British Columbia residents, but may contribute to the solution.

Despite the limited role primary health care interventions can play in addressing health inequalities, reviews by Starfield et al. and Mackinko et al. suggest that better access to primary care and primary prevention is associated with improved access to immunization; smoking cessation; better prenatal outcomes; decreased childhood morbidity; earlier detection of melanoma and breast, colon and cervical cancers; improved outcomes for patients with type 2 diabetes mellitus, hypertension and depression; improved management of asthma; and decreased all-causes of mortality. Table 1 provides a framework to help position primary health care in the broader context of health care delivery.

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3 The term Indigenous is used, when speaking of a collective experience that crosses national boundaries
6 The Inter-governmental Committee on First Nation Health (ICFNH) (2005). *Inter-governmental Primary Health Care Policy Framework on First Nation Health Care, Draft #1, version 2* Winnipeg.
8 First Nations Regional Health Survey National Committee (2005). *First Nations Regional Longitudinal Health Survey (RHS) 2002/03 Results for Adults, Youths and Children living in First Nation Communities* Ottawa: First Nation and Inuit Regional Health Survey National Committee. Reading et. al. (2007), op. cit.
9 Marmot et al. (1999), op. cit.
### Table 1: Health Care Framework

<table>
<thead>
<tr>
<th>Category/Sub-category</th>
<th>Definition</th>
<th>Example</th>
<th>Services off-reserve</th>
<th>Services on-reserve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tertiary Care</td>
<td>In-hospital specialized care</td>
<td>Chemotherapy</td>
<td>Large urban hospitals</td>
<td>N/A</td>
</tr>
<tr>
<td>Secondary Care</td>
<td>In-hospital care provided in regional hospitals</td>
<td>Post-operative care</td>
<td>Regional hospitals</td>
<td>N/A</td>
</tr>
<tr>
<td>Primary care</td>
<td>Out-patient treatment traditionally provided by general practitioners and more recently by nurse practitioners.</td>
<td>Prescription of antibiotics, PAP smears</td>
<td>Provided by Health Authorities, general practitioners and allied professions</td>
<td>Nurses working with an expanded scope of practice provide some measure of primary care in communities with Nursing Stations. Non-existent in all other communities unless arrangements have been made for a general practitioner to visit.</td>
</tr>
<tr>
<td>Tertiary Prevention</td>
<td>Tertiary prevention activities are designed to assist in the management of complications once they manifest themselves, to ensure that optimal autonomy is retained.</td>
<td>Physical rehabilitation support after an amputation</td>
<td></td>
<td>Very limited in communities with Nursing Stations, non-existent in all other communities</td>
</tr>
<tr>
<td>Secondary Prevention</td>
<td>Secondary prevention activities focus on assisting in the management of chronic illness to avoid or delay the development of complications.</td>
<td>Blood sugar monitoring and assistance in adjusting insulin</td>
<td></td>
<td>Limited in communities with Nursing Stations, non-existent in all other communities</td>
</tr>
<tr>
<td>Primary Prevention</td>
<td>Primary prevention activities refer to early interventions designed to prevent the onset of chronic conditions.</td>
<td>Education</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

These interventions may result in the improvement, restoration, maintenance or protection of health status.

### 1.2 Positioning Telehealth within a Primary Health Care Framework

The term telehealth, or telemedicine, refers to the delivery of health information, resources and services through technology. The e-Health Solutions Unit of the First Nations and Inuit Health Branch (FNIHB), Health Canada identifies the following key components:

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2. Mustard, C and Derksen, S (1997). A needs-based funding methodology for Regional Health Authorities: A proposed framework. Winnipeg: Manitoba Centre for Health Policy and Evaluation, Department of Community Health Sciences, Faculty of Medicine, University of Manitoba.
• Provision of: information, services, expertise, advice, consultation, education, training, images, voice and data;
• To: patients and health care providers;
• Using: Information and communications technology (ICTs);
• To address: social and cultural barriers;
• In: rural and remote areas.

Examples include
• **Real time video-conferencing consultations:** A specialist in Vancouver connects to a patient located in a rural British Columbia community hospital, using video-conferencing and specialized cameras. The use of high definition equipment allows the specialist to discuss the health problem with the patient, while preventing the need for travel. A nurse or general practitioner may be present to examine the patient, and relay information to the specialist.
• **Store-and-forward consultations:** With the use of a specialized piece of equipment, such as a dermascope for skin conditions, or an otoscope to look in the ear, a nurse or general practitioner takes a high definition picture, which is then sent to a specialist for diagnosis, using secure email. The specialist can email the diagnosis back to the general practitioner or nurse along with a treatment plan. This type of application may be used for patient triage and help confirm the need for a patient to travel to access more complex care, or provide an opportunity to confirm that local care is sufficient.
• **Web-based solutions:** for example, web-based educational programs.

Telehealth is increasingly seen as an integral part of the Canadian health care systems. Still, a 2003 review of 43 Canadian telehealth programs conducted for Health Canada showed that most telehealth programs considered themselves permanent, when in fact their funding was project-based. The report argued that,

> While the rhetoric around telehealth cites improved access for regions and persons more marginal in their ability to access services under the current system, our results suggest that complex, expensive technologies may inherently restrict ‘access on demand’ from remote sites through scheduling restrictions and control of technology. This shift may benefit consumers in remote areas (e.g., by simplifying their access to follow-up care), but policies and mechanisms should recognize that certain new technologies may move power towards the ‘centre’, i.e., to specialized sites.

The review provided in Table 2, below, suggests that most First Nations initiatives have been at the level of pilot or demonstration projects, with federal funding (most notably the Canada Health Infrastructure Partnerships Program, hereafter CHIPP). We acknowledge that the programs and projects listed in Table 2 is somewhat outdated. It does not include more recent InfoWay projects, Aboriginal Health Transition Funded telehealth projects, and more recent First Nations projects. A new list is being developed by FNIHB, and will be available in the spring of 2010. Still, the more recent developments have generally remained at the level of short term projects, rather than on-going programs with secure funding. Exceptions include the British Columbia First Nations Telehealth Expansion Project (Spring 2010), which has both Canada Health Infoway project initiation funding, and Tripartite sustainability commitments for ongoing operations.

While telehealth services have been extended to Inuit communities in Nunavut and Métis communities in Sas-

3 Health Canada (2003b), op. cit., p. 2
Katchewan, First Nations communities generally have not been prioritized for telehealth deployment. Here, Manitoba, Ontario and now British Columbia, are notable exceptions. A key issue for First Nations appears to be related to jurisdiction, in relation to both payment for infrastructure development and sustaining on-going provision.

1.3 Focus of the Report

This project was pursued with funding from the University of Northern British Columbia and British Columbia Alliance for Telehealth Policy and Research. Oversight for this study was provided by an Advisory Committee with representatives from the British Columbia First Nations Health Council, Northern Health, Carrier Sekani Family Services and the University of Northern British Columbia.

The objective of this report is to explore the role telehealth can play in improving access to healthcare on British Columbia First Nations reserves and to consider contextual issues as well as potential direct and indirect benefits. This report expands on the existing literature, in that it contextualizes a review of the telehealth literature with insights from Elders and Knowledge Holders, and well as the literature on the First Nations healthcare system. The report weaves together these three separate but related sources of information.

This report is organized in 6 sections. The report begins with a detailed review of the First Nations community-based primary health care system: we argue that telehealth interventions must be integrated and must complement these services in order to be successful (section 2). Section 3 outlines the methods used in this study. Section 4 outlines the rudiments of a cultural framework, based on discussion with Dakelh Elders. This is followed by a review of the telehealth literature, to identify what is known of telehealth interventions (section 5). The report concludes with recommendations.
<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Program</th>
<th>First Nations, Métis and Inuit communities’ coverage</th>
<th>Status as of December 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>National</td>
<td>First Nations and Inuit Telehealth Pilot Project</td>
<td>National pilot project to set up telehealth sites in 5 First Nations communities across Canada.</td>
<td>3 year pilot project, without sustainable funding.</td>
</tr>
<tr>
<td>Yukon</td>
<td>Yukon Telehealth Network</td>
<td>Linkage to 14 communities, including 6 First Nations community health centres.</td>
<td>Stable funding</td>
</tr>
<tr>
<td>Northwest Territories</td>
<td>Western Arctic Telehealth Network</td>
<td>All four hospitals have telehealth capacity, services to 6 remote health centers limited to teleconferencing. Linked to the deployment of the Alberta Health and Wellness. Telehealth Coordination and Scheduling System.</td>
<td>Stable funding</td>
</tr>
<tr>
<td>Nunavut</td>
<td>Ikajuruto Inungnik Ungaskitumi (IIU) Network</td>
<td>Services to all 25 Nunavut communities</td>
<td>Stable funding</td>
</tr>
</tbody>
</table>
| Northwest Territories & Nunavut   | WestNet Tele-ophthalmology                                             | - Telehealth Expansion Project under development following the adoption of the Transformative Change Accord First Nations Health Plan and the Tripartite First Nations Health Plan.  
|                                   |                                                                         | - Vancouver Island Health Authority/Inter-tribal Health Authority Tele-ophthalmology project (2 years).        | Project, 2001 to 2003     |

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Program</th>
<th>First Nations, Métis and Inuit communities’ coverage</th>
<th>Status as of December 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Columbia</td>
<td>• Six Clinical Telehealth Infoway projects:</td>
<td>- Telehealth Expansion Project under development following the adoption of the Transformative Change Accord First Nations Health Plan and the Tripartite First Nations Health Plan.</td>
<td>Sustained funding committed</td>
</tr>
<tr>
<td></td>
<td>- BC First Nations Telehealth Expansion Project with services to 58 sites</td>
<td>- Vancouver Island Health Authority/Intertribal Health Authority Tele-ophthalmology project (2 years).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- First Nations/Vancouver Island Health Authority Teleophthalmology Project</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- TeleOncology, TeleThoracic, TeleHomecare, TeleWoundcare British Columbia Telehealth Steering Committee</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The Central BC &amp; Yukon – Telemedicine Initiative</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Alberta           | Alberta First Nations Telehealth Program                 | - Deployed telehealth-based services in 21 First Nations communities.  
- Provided Internet Access to all Alberta First Nations communities through bidirectional satellite equipment.  
- 7 First Nations participating in NNADAP TeleConsultation pilot program.  
- 7 First Nations communities participating in Diabetes Foot Care TeleConsultation Pilot Program.  
- 7 First Nations communities participating in Diabetes Nutrition TeleConsultation Pilot Program.  
- Piloting a Dual Addictions Program in the Siksika First Nations community.  
|                   | Alberta First Nations Project to Screen for limb, l-sight, cardiovascular and kidney (SLICK) | - Increased accessibility to diabetes care of First Nations in 44 communities using mobile clinics.  
| Saskatchewan      | Saskatchewan telehealth provides services to 18 sites, another 12 under development | - Linkages to northern Métis communities and to the All Nations.  
- Healing Hospital (Fort Qu’Appelle).  
- No current linkages to First Nations communities.                                                                                                                                                                                                                                                               | Stable funding                                |
<p>| Manitoba          | MBTelehealth provides services to 21 rural and remote sites, and 6 Winnipeg sites | 10 northern and remote First Nations communities. Linkage also extended to Nunavut.                                                                                                                                                                                                                                 | Stable funding                                |</p>
<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Program</th>
<th>First Nations, Métis and Inuit communities’ coverage</th>
<th>Status as of December 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontario</td>
<td>CareConnect serves 27 partners at 45 provincial hospital sites for long term care and home care services</td>
<td>None</td>
<td>Stable funding</td>
</tr>
<tr>
<td></td>
<td>Videocare links 57 hospital-based sites</td>
<td>None</td>
<td>Stable funding</td>
</tr>
<tr>
<td></td>
<td>NORTH Network links 115 organizations</td>
<td>NORTH Network has partnered with Kee-waytinook Okimakanak (KO) since 2000.</td>
<td>Stable funding</td>
</tr>
<tr>
<td></td>
<td>KO Telehealth</td>
<td>21 fly in First Nations sites.</td>
<td>Project-based</td>
</tr>
<tr>
<td>Québec</td>
<td>The Réseau québécois de télésanté links 93 sites</td>
<td>The network includes two First Nations sites and 12 Inuit communities.</td>
<td>Stable funding</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>Tele-care Services links all hospitals for teleconferencing. Additional telehealth services are provided to provincial community health centres</td>
<td>None</td>
<td>Stable funding</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>Nova Scotia Telehealth Network links 32 provider organizations</td>
<td>None</td>
<td>Stable funding</td>
</tr>
<tr>
<td>PEI</td>
<td>Under development</td>
<td>None</td>
<td>Stable funding</td>
</tr>
<tr>
<td>Newfoundland and Labrador</td>
<td>Memorial University TETRA and NL Telehealth</td>
<td>None</td>
<td>Stable funding</td>
</tr>
</tbody>
</table>
2. Background: The British Columbia First Nations Community Health Care System

This section outlines a discussion of the British Columbia First Nations community-based health care system. The information contained in this section comes from three main sources, including a report entitled *The Evaluation of the First Nations and Inuit Health Transfer Policy*; a map of all First Nations community health services published by Natural Resource Canada; and the literature.

Our review details the community health care system as planned and funded by the FNIHB. It does not include innovations implemented in First Nations communities as a result of community control or other initiatives, or provincial Health Authorities' interventions. While important, this information results from local initiatives and is generally unpublished. Nor does this review capture recent innovations occurring as a result of the transformative efforts currently underway for First Nations Health in British Columbia through the advancement of the Transformative Change Accord: First Nations Health Plan or the Tripartite First Nations Health Plan.

We have included existing information on the health of British Columbia First Nations to illustrate where services are meeting needs, and where needs are not being met. We used statistics produced by Vital Statistics and British Columbia Ministry of Health. Where possible, we used data specific to British Columbia First Nations living on-reserve. When this was not possible, we used statistics related to First Nations living on-reserve in other regions.

2.1 Context

Ever since the early 1920s, on-reserve primary health care services have been the responsibility of the federal government. All secondary and tertiary care, as well as primary health care services for other Canadians have been the responsibility of the provincial governments. British Columbia health services are the responsibility of the British Columbia Ministry of Health and are delivered through the Health Authorities and physicians. On-reserve services are funded by the FNIHB.

Community-based primary health care services for First Nations in British Columbia are, to a large extent, limited to public health and health promotion interventions. In larger and isolated communities, services include a more extensive complement of primary health care services, delivered by nurses and support staff. Patients requiring access to physicians, secondary or tertiary care or emergency treatment are sent to the nearest provincial referral centre (for example, the nearest community where there is a general practitioner or local hospital). A limited number of First Nations communities have their own agreements or innovations providing for physician and/or nurse practitioner services.

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3 Since the 2006 restructuration of Health Canada/FNIHB, there has been considerable confusion as to the name of this department. Prior to February 2006, FNIHB referred to both the Ottawa head office, and to regional offices. Since February 2006, only the Ottawa office has retained the name FNIHB. Regional offices are known as First Nations and Inuit Health (FNIH). In this report, we will side-step the complexity of using different names, and use the name FNIHB throughout to reflect that all significant policy and financing decisions are made in Ottawa. Lavoie et. al. (2005), op. cit..
whose services may be paid by the province, to visit the reserves on a regular basis1. These are however exceptions. Other services such as eye care, medication, medical transportation and dental care are provided under the Non-Insured Health Benefits2 program which applies only to Status First Nations3.

Broadly speaking, the current complement of on-reserve health services is based on a 1969 study4 that recommended a greater focus on prevention. At the time, chronic conditions such as heart diseases and diabetes were undocumented. Mortality related to infectious diseases was however significant. The current complement of funded health services is based on community size, level of isolation (how far away the community is located from provincial health services) and presence/quality of roads. The criteria used by FNIHB are shown in Table 3. Communities that have reasonable access to provincial health care services are given limited funding for screening and preventive services (Health Office or Health Station). Communities located within a two-hour drive from provincial services are funded to provide local access to preventive, screening and emergency care provided by nurses. These services are generally funded on a weekly basis. However, there is no or limited funding for after hours coverage (Health Centre). Remotely isolated communities instead are funded for local access to screening, prevention, emergency and treatment services on a 24 hour/7 day basis, delivered by nurses (Nursing Station).

Based on these classifications, only nine First Nations communities in British Columbia are funded to provide primary health care services that go beyond screening, education and health promotion, and also include treatment. The remaining 101 are funded for public health programs five days a week or less focusing, largely on primary prevention (education) and testing. In these communities, people who already have a chronic condition have limited local access to the services they need. The remaining First Nations communities depend entirely on provincial health services. These are communities located at close proximity to provincial towns with health services. Table 4 provides a breakdown per Health Authority and level of care accessible.

2 This program provides access to medications, eye care and dental care. It also covers the cost of medical transportation for First Nations who live on-reserve.
3 The expressions “Status Indians” or “registered Indians” refer to those First Nations who are recognised by the federal government as Indians according to the definition provided in the Indian Act.
### Table 3: Facility Designation Criteria and Number of British Columbia Communities

<table>
<thead>
<tr>
<th>Type of Facility</th>
<th># of BC comm.</th>
<th>Community characteristics (the community should most of the following conditions)</th>
</tr>
</thead>
</table>
| Health Office     | N=2           | **Condition**: Population 0 to 750 total on-reserve, non-isolated and semi-isolated community (isolated under favourable conditions).  
**Health Services**: Other health services available in nearby communities/cities, hospital accessible by road in less than 2 hours.  
**Transportation**: All weather road/air access.  
**Community Services**: Satisfactory  
**On-reserve Health Services Funded**: Screening and prevention services only |
| Health Station    | N=71          | **Criteria**: Population over 100 on-reserve, remote isolated to semi-isolated community, over 150 km from a service centre but within 50 km of a nursing station or other FNIHB facility.  
**Health Services**: Hospital accessible by road less than 2 hours, occasional unavailability of local ambulance and first response services.  
**Transportation**: Accessible by air or road from FNIHB facility, poor road conditions.  
**Community Services**: Limited  
**On-reserve Health Services Funded**: Screening and prevention services only |
| Health Centre     | N=20          | **Criteria**: Population over 100 on-reserve. Non-isolated and semi-isolated community, less than 350 km from a service centre.  
**Health Services**: Hospital accessible by road less than 2 hours, occasional unavailability of local ambulance and first response services.  
**Transportation**: All weather road/air access, poor road conditions.  
**Community Services**: Limited  
**On-reserve Health Services Funded**: Emergency, screening and prevention |
| Nursing Station   | N=9           | **Criteria**: Population over 500 on-reserve. Remote or isolated community, over 350 km/3 hours travel to a service centre.  
**Health Services**: Nearest hospital more than 2 hours away, limited availability of local ambulance and first response services.  
**Transportation**: No year round road access to other health care facilities.  
**Community Services**: Limited.  
**On-reserve Health Services Funded**: Treatment and prevention |

### Table 4: Number of First Nations per Health Authority and Level of Services Provided

<table>
<thead>
<tr>
<th></th>
<th>Interior Health</th>
<th>Fraser Health</th>
<th>Vancouver Coastal Health</th>
<th>Vancouver Island Health Authority</th>
<th>Northern Health</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing Station</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Health Centre</td>
<td>12</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>27</td>
</tr>
<tr>
<td>Health Office</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Health Station</td>
<td>18</td>
<td>1</td>
<td>5</td>
<td>22</td>
<td>26</td>
<td>72</td>
</tr>
<tr>
<td>No Facility</td>
<td>29</td>
<td>29</td>
<td>8</td>
<td>23</td>
<td>17</td>
<td>106</td>
</tr>
<tr>
<td>Total per Health Authority</td>
<td>59</td>
<td>31</td>
<td>19</td>
<td>49</td>
<td>58</td>
<td>216</td>
</tr>
</tbody>
</table>

---

### 2.2 Other Programs

In addition to the core programs outlined above, FNIHB has invested in the development of a number of new programs since 1994. These are outlined in Table 5 below. They include community-based health prevention, health promotion, first contact treatment and home care programs. Most programs are focused on primary prevention (education and health promotion). The introduction of the First Nations and Inuit Home and Community Care Program was a major improvement, since this program focuses on some level of secondary and tertiary prevention. Although exceptions may exist, community-based services remain provided by nurses and community-based staff. Access to dieticians, physiotherapists and other allied professionals, remains largely unavailable unless provided by the Health Authorities. Few if any communities have access to allied professional care delivered on-reserve.

### Table 5: FNIHB On-reserve Health Programs

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Creation Date</th>
<th>Focus</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Primary Care</td>
<td>1970s</td>
<td>√, √, √, √, √</td>
<td></td>
</tr>
<tr>
<td>Vaccine Preventable Diseases (VPD - Immunization)</td>
<td>1970s</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Community Health Prevention and Promotion</td>
<td>1970</td>
<td>√, √</td>
<td></td>
</tr>
<tr>
<td>Support Services to Nursing</td>
<td>1970</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Community Nutrition Activity Promotion</td>
<td>1979</td>
<td>√, √</td>
<td></td>
</tr>
<tr>
<td>Communicable Disease Control</td>
<td>1979</td>
<td>√, √</td>
<td></td>
</tr>
<tr>
<td>Environmental Health Program</td>
<td>1979</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Non-Insured Health Benefits (transportation, vision, etc.)</td>
<td>1979</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>NNADAP Residential/Treatment</td>
<td>1984</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>NNADAP Community-based</td>
<td>1984</td>
<td>√, √</td>
<td></td>
</tr>
<tr>
<td>Environment Contaminant Program</td>
<td>1990</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Air Borne Diseases - Tuberculosis (previously the TB Elimination Strategy)</td>
<td>1992</td>
<td>√, √</td>
<td></td>
</tr>
<tr>
<td>Brighter Futures</td>
<td>1993</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Canada Prenatal Nutrition Program</td>
<td>1994</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>FASD (old FASD/FAE)</td>
<td>1994</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Building Healthy Communities</td>
<td>1994</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Youth Solvent Abuse Program</td>
<td>1994</td>
<td>√, √</td>
<td></td>
</tr>
<tr>
<td>Tobacco Control</td>
<td>1997</td>
<td>√, √</td>
<td></td>
</tr>
<tr>
<td>Dental/Oral Health Strategy</td>
<td>1997</td>
<td>√, √</td>
<td></td>
</tr>
<tr>
<td>FN/I Health information System</td>
<td>1997</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Aboriginal Head Start on Reserve</td>
<td>1998</td>
<td>√</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Creation Date</th>
<th>Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>FN/I Home and Community Care</td>
<td>1999</td>
<td>√</td>
</tr>
<tr>
<td>Aboriginal Diabetes Initiative</td>
<td>2000</td>
<td>√</td>
</tr>
<tr>
<td>Maternal &amp; Child Health</td>
<td>2005</td>
<td>√</td>
</tr>
<tr>
<td>National Aboriginal Youth Suicide Prevention</td>
<td>2005</td>
<td></td>
</tr>
<tr>
<td>Strategy (NAYSPS)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

New programs have been introduced over time. These have generally reflected national priorities that may or may not align with local priorities. For example, while some communities experience very high rates of diabetes, others do not. In addition, northern communities are more likely to have access to traditional food than southern ones. Therefore, programs need to account for the local needs and community context.

For some programs, including Aboriginal Head Start on Reserve, Fetal Alcohol Spectrum Disorder, Tobacco Control, Aboriginal Diabetes Initiative, HIV-AIDS Strategy, Environment Contaminant Program, funding is accessed through proposal writing. This means that, for these programs, access to services is linked to a community having the capacity to write good proposals. Communities that do not have this capacity may in fact have higher needs.

2.3 Options for Community Control

Since 1989, First Nations communities have been provided with three options of community control: transferred, integrated and non-transferred/non-integrated (NTNI). Details are shown in Table 6 below. The level of financial flexibility is determined by the model of service the community chooses. Transfer is the most flexible model. Under the transfer model, communities are funded to undertake a needs assessment which becomes the basis of their Community Health Plan. Communities that sign a transfer agreement (57 communities in British Columbia as of 2005) have their budget defined by the level of funding that was spent in their community in the past (historical expenditures). Communities can choose to allocate the funding they have based on local priorities. Population growth does not impact funding, which means that as communities grow, they have access to less funding per person every year. This impacts sustainability over time.

Communities that sign an integrated agreement (six communities in British Columbia, as of 2005) have less flexibility. They are required to spend their health funding based on their Community Health Plan. Any change to that plan, and associated expenditures, must be pre-approved by FNIHB. As with the transfer model, the level of funding is based on historical expenditures, and is not adjusted for population growth or emerging needs. In contrast, communities that have signed neither a transfer nor an integrated agreement (NTNI communities, 41 communities as of 2005) sign separate agreements for each program delivered on-reserve. Each agreement is rigid and comes with its own budget that may be based on a proposal, a funding formula defined nationally, or a formula developed regionally. This latter model gives the least flexibility to First Nations.
Table 6: Models of Community Control

<table>
<thead>
<tr>
<th>Model</th>
<th>Non-transferred/non-integrated</th>
<th>Integrated</th>
<th>Transfer</th>
</tr>
</thead>
</table>
| Duration of agreement | Up to 3 years depending on individual program authority                                     | Phase 1: Up to 1 year  
Phase 2: Up to 5 years                                                | 3 to 5 years                                                             |
| Description    | All transferable and non-transferable programs are funded under separate agreements.       | All transferable programs chosen by the community under a single 3 to 5 years agreement.  
Non-transferable programs under separate contribution agreements. | All transferable programs chosen by the community under a single 3 to 5 years agreement.  
Non-transferable programs under separate contribution agreements. |
| Budgetary line flexibility | No, unless prior written approval of FNIHB                                                    | With written approval of FNIHB                                             | Yes, among transferable programs. Cannot reallocate among targeted programs. |

Options for community control provide opportunities for communities to choose between less or more flexibility in the allocation of funding, in the design of programs and in setting priorities. These options do not address financial sustainability. At the national and regional levels, FNIHB’s budget has not been allowed to grow to keep up with population growth and the needs of these populations. Many communities have seen their health care budgets capped for years. As a result, all communities are on an impoverishment trend.

FNIHB recently released a new approach to funding. This new model, which came into effect in the 2008-09, regroups existing small programs under a single flexible agreement. This model will provide First Nations interested in taking part in this process a choice between four different levels of flexibility, termed set, transitional, flexible, and flexible transfer. This new approach is an improvement, in that it provides more opportunities to align services to needs at the community level. Another potential benefit claimed by FNIHB is that this model may eventually reduce reporting requirements. It however fails to address issues of financial sustainability.

2.4 Evidence of Performance

Health disparities or inequalities exist whenever the health of a defined population, in this case First Nations, lags behind that of the majority population (i.e. the general Canadian population). The need for primary health care intervention can conceptually be defined as the ability or capacity to benefit from health interventions. These benefits may be in the form of an improvement, restoration, maintenance or protection of health status. Preventable admission

3 Lavoie et al. (2005), op. cit.
5 Mustard et al. (1997), op. cit.
to hospitals\textsuperscript{1} indicates a potentially preventable complication resulting from limited access to responsive primary health care services. Further, a disproportionate rate of preventable admission among First Nations, when compared to other British Columbians, suggests possible inequity in access to primary health care\textsuperscript{2}, and the need for investment. This indicator has been endorsed by researchers and policy makers as a dependable indicator of the performance of primary health care services\textsuperscript{3}.

Access to primary health care We could not locate a study that shows the rates of preventable admission for British Columbia First Nations living on-reserve only. Figure 1, below, includes First Nations living both on- and off-reserve, compared to other British Columbians. The rates of preventable hospitalizations are lowest for other British Columbians in the Fraser, Vancouver Coastal and Vancouver Island Health Authorities. First Nations however experience lower rates of preventable hospitalizations in the Interior and Fraser Health Authority. Regions with the greatest disparities include Vancouver Coastal and Vancouver Island Health Authorities, suggesting that services are available but either not accessible or non-responsive to First Nations.

The 2007 report of the Provincial Health Officer reports that

\begin{quote}
compared to other British Columbians, Status Indians\textsuperscript{4} are more likely to be admitted to hospital for preventable admissions, which are conditions that can usually be managed in the community, without the need for hospital admission (e.g., diabetes, asthma, hypertension, neurosis, depression, or abuse of alcohol or other drugs)\textsuperscript{5}.
\end{quote}

The report further states that

\begin{quote}
although there has been a decrease in the rate of preventable admissions for both Status Indians and other residents in the past decade, a gap still remains between the populations. In 2006/07, the preventable admission rate for the Status Indian population was 54.5 per 10,000, compared to 32.4 per 10,000 for the other resident population. One reason for the gap could be the lack of access to primary health care for Status Indians in doctors’ offices, clinics, or other community settings\textsuperscript{6}.
\end{quote}

In fact, the British Columbia’s mortality rate for deaths due to conditions considered treatable is nearly four times higher

\begin{thebibliography}{9}
\bibitem{1} Preventable conditions refers to admissions for Ambulatory Care Sensitive Conditions. These are conditions defined as, (t)hose diagnoses for which timely and effective outpatient [primary] care can help to reduce the risks of hospitalization by either preventing the onset of an illness or conditions, controlling an acute episodic illness or conditions, or managing a chronic disease or condition. Billings J et al. (1993). Impact of socio-economic status on hospital use in New York City. Health Affairs, 12, 162-173.
\bibitem{3} Canadian Institute for Health Information (2006). Pan-Canadian primary health care indicators: Report 1, Volume 1: Pan-Canadian primary health care development project. Ottawa, ON, Canada: Canadian Institute for Health Information.
\bibitem{4} Canadian Institute for Health Information (2007). Health Indicators 2007 Ottawa: Canadian Institute for Health Information.
\bibitem{6} The report utilizes the terms Status Indians, and does not distinguish between Status Indians living on and off-reserve.
\end{thebibliography}
Figure 1: Preventable Hospital Admissions, Under 75 Years, Status Indians and Other Residents, by Health Authority, BC, 2006/2007.

Note: Preventable admissions are conditions that can usually be managed without the need for hospital admission. Data include Acute care level (including newborns). Residents of BC treated out of province are included and non-BC residents are excluded. Riverview Hospital cases with length of stay greater than 180 days are excluded. Data for 2001/2002 and onwards are based on ICD-10-CA, and previous years are based on ICD-9. Differences between these two systems may have impacted this analysis. Age calculated as of December 31; as a result, figures in this chart do not match figures in other ACSC reports. In 2006/2007, 203 other resident cases with an unknown location of residence were included in the provincial total.

Source: Discharge Abstract Database, Ministry of Health Services; prepared by Population Health Surveillance and Epidemiology, Ministry of Healthy Living and Sport, 2008.

for First Nations in comparison to other British Columbia residents.

The reasons for these disparities are numerous. First Nations people are more likely to report difficulties accessing health care services when compared to other Canadians. Despite documented health inequalities, First Nations use fewer long term care services and see a physician less often than other residents. In 2000-01, Status First Nations were hospitalized at a rate 1.6 times higher than other British Columbia residents. British Columbia’s First Nations are three times as likely to be admitted to hospital for diabetes, asthma, hypertension (high blood pressure), neurosis, depression and substance abuse. The over-use of hospital services for conditions that could be managed with timely primary health care in the community, as well as the under-use of long term care and physician services, suggest barriers to access primary health care.

The situation described above is not unique to British Columbia. Martens et al. studied Manitoba First Nations’ rates of consultations with physicians and specialists and total days of hospital care. The study documented (1) higher rates of ambulatory physician visits (6.13 for First Nations vs. 4.85 visits per person for all other Manitobans); (2) lower rates of overall specialist visits (0.895 for First Nations vs. 1,284 visits per person for all other Manitobans) and (3) a

2 First Nations Regional Health Survey National Committee (2005), op. cit.
4 British Columbia Office of the Provincial Health Officer (2002), op. cit.
5 British Columbia Office of the Provincial Health Officer (2002), op. cit.
6 Martens, P, Bond, R, Jebamani, L et al. (2002). The health and health care use of registered First Nations people living in Manitoba: a population-based study Winnipeg: Manitoba Centre for Health Policy, Department of Community Health Sciences, Faculty of Medicine, University of Manitoba.
higher rate of hospital separation (0.348 for First Nations vs. 0.156 separations per person for all other Manitobans). The authors concluded that First Nations health service utilization for general practitioners and specialists was lower than expected, given the disproportionate burden of illness this population experiences compared to other Manitobans, suggesting barriers in access. In Ontario, Shah et al. documented that on-reserve residents in northern Ontario have a much higher rate of preventable admissions than other residents of Ontario, reflecting poorer access to primary health care.

As was shown in Table 5, funded primary health care community-based services are focused on primary prevention: screening, education and health promotion. The current complement of services fails to meet needs, especially for those living with chronic conditions. This is the case for all First Nations communities, but may be more dramatic for communities that are not served by a Nursing Station. Communities served by a Health Office (N=2 in BC), a Health Station (N=72 in BC) and the 106 communities without local access. A survey of British Columbia First Nations by Ho and colleagues documented health services gaps in the areas of counselling, physician services, emergency medical care, dental care, and physiotherapy. Although Ho and colleagues acknowledged that communities have different access to care, they did not report their findings accordingly.

A recent study concluded by Lavoie and colleagues concluded that Manitoba First Nations communities with better access to on-reserve primary health care services (those served by nursing stations) have significantly lower rates of hospitalization for conditions that could be treated by primary health care setting if services were available. Increasing access is complex. Across Canada, First Nations communities are small. This is however particularly true in British Columbia, where the average population is 287 residents, and dispersed across over 400 communities, as shown in Tables 7 and 8.

**Table 7: First Nations and Inuit Community On-reserve Populations across Regions**

<table>
<thead>
<tr>
<th>Region</th>
<th>Mean</th>
<th>Median</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pacific</td>
<td>287</td>
<td>195</td>
<td>2166</td>
</tr>
<tr>
<td>Alberta</td>
<td>1198</td>
<td>720</td>
<td>7369</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>760</td>
<td>617</td>
<td>4536</td>
</tr>
<tr>
<td>Manitoba</td>
<td>1118</td>
<td>806</td>
<td>4345</td>
</tr>
<tr>
<td>Ontario</td>
<td>560</td>
<td>311</td>
<td>7981</td>
</tr>
<tr>
<td>Quebec</td>
<td>1110</td>
<td>742</td>
<td>7225</td>
</tr>
<tr>
<td>Atlantic</td>
<td>520</td>
<td>337</td>
<td>2995</td>
</tr>
</tbody>
</table>

1 Martens et al. (2005), *op. cit.*
3 Ho, K, Jarvis-Selinger, S, Dow, S et al. (2004). *The role of telehealth in improving access to health services and education in British Columbia’s rural and remote First Nations communities* Vancouver: UBC Continuing Medical Education.
4 Indian and Northern Affairs Canada, (2004). Indian and Northern Affairs Canada population figures, 1972 to 2002. Indian and Northern Affairs Canada. Ottawa, Indian and Northern Affairs Canada. It is very important to note that the INAC on-reserve population does not include the whole of the population served by on-reserve health services.
Table 8: Number of Communities Stratified by Level of Remoteness in Each Region

<table>
<thead>
<tr>
<th>Community Type</th>
<th>BC</th>
<th>AB</th>
<th>SK</th>
<th>MB</th>
<th>ON</th>
<th>QC</th>
<th>ATL</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non Isolated (road access less than 90 km from nearest physician services)</td>
<td>153</td>
<td>31</td>
<td>63</td>
<td>27</td>
<td>78</td>
<td>17</td>
<td>34</td>
<td>408</td>
</tr>
<tr>
<td>Semi Isolated (road access greater than 90 km from nearest physician services)</td>
<td>33</td>
<td>21</td>
<td>13</td>
<td>11</td>
<td>12</td>
<td>6</td>
<td>0</td>
<td>106</td>
</tr>
<tr>
<td>Isolated (flights, good telephone service, no road access)</td>
<td>14</td>
<td>3</td>
<td>8</td>
<td>24</td>
<td>27</td>
<td>29</td>
<td>6</td>
<td>115</td>
</tr>
<tr>
<td>Remote Isolated (no scheduled flights, no road access, and minimal telephone and radio)</td>
<td>8</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>22</td>
</tr>
<tr>
<td>Total</td>
<td>208</td>
<td>60</td>
<td>85</td>
<td>63</td>
<td>124</td>
<td>52</td>
<td>40</td>
<td>651</td>
</tr>
</tbody>
</table>

This creates challenges associated with diseconomies of scale and the recruitment of professionals. Recruitment and retention of professionals remain an issue for the majority of First Nations organizations, and is linked to financial constraints that undermined the idea of salary equity with other employers (the federal government, the Health Authorities) as well as other factors. Accessibility therefore likely varies from one community to the next, depending on recruitment and retention, local capacity, priorities and other factors.

**Mental Health**

Community-based mental health services currently funded by Health Canada are very limited. Of the funding provided, some falls within the scope of the Health Transfer Policy (the Building Healthy Community program includes some mental health funding) and some remains separate (emergency intervention funding provided under NIHB). Access to mental health services is an area that many First Nations agree lacks services and sufficient funding. Local analyses conducted in the context of the Evaluation of the Health Transfer Policy showed that the National Native Alcohol & Drugs Addiction Program (NNADAP) has not kept pace with the needs of community members. NNADAP workers are expected to intervene in issues of family violence, suicide attempts, community members in crisis, provide support and aftercare to members coming back from treatment, and community-wide support following tragedies. The consequences of multi-generational trauma have been well documented. Addictions are becoming more complex, with harder drugs being used. Gambling addiction is now recognized, and has specific therapeutic processes. The NNADAP program was not developed to meet these increasingly complex needs and there are few resources to help the workers develop skills to help community members. The training formula at the time of transfer included resources for Community Health Representatives (CHRs) and nurses, but not for NNADAP workers. The lack of services can be seen in the disproportionate rates of hospitalization for mental and behavioural disorders, shown in Figure 2.

*The Evaluation of the Health Transfer Policy* report noted some expansion of on-reserve mental health services. This was partly due to initiatives such as access to funding from the Aboriginal Healing Foundation. The funding from the Aboriginal Healing Foundation, which ended March 31, 2009, was proposal-driven. The program was not designed

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2 Lavoie et. al. (2005), *op. cit.*

to replace on-going mental health programming. The funding for mental health programming that is available through Building Healthy Communities is equally insufficient. For example, in the Pacific region, 76 communities received Aboriginal Healing Foundation funding in 2003-04, with an average level of funding provided to communities of $103,489 (per agreement). For the Building Healthy Community mental health program, the average was $23,733 and available to 36 (2003-04) communities. Although the Non-Insured Health Benefits program can provide short term funding for mental health services, this is available only at times of crisis.

2.5 Summary

In 2004, Jennett and colleagues completed a literature review to inform policy directions. A key recommendation was that telehealth interventions need to become fully integrated into the health care system, and for this to happen, they need be viewed as more than an add-on service.¹

For those living on-reserve, the community-based health care system is often the first point of contact with the health care system. This is a health care infrastructure on which to build, and to support but there are some challenges. The current impoverishment trend documented by Lavoie and colleagues² is a concern, and undermines local access to the primary health care services in the long run. Adding telehealth-based services to the existing complement of services may help increase access, especially in communities where services are limited to primary and secondary prevention, but sustainability is questionable. Still, the above discussion suggests that access to primary health care is is too

² Lavoie et al. (2007), *op. cit.*
limited and not meeting needs\(^1\). This is likely one of the main drivers for the higher rates of preventable hospitalization at a higher cost to the provincial health care system, and resulting in higher than necessary human costs.

Telehealth can provide an avenue forward, as long as interventions build on the strengths of the community-based health care system, and the limitations outlined above are addressed.

\(^1\) British Columbia Office of the Provincial Health Officer (2002), *op. cit.*
3. Methods

This report brings together information from two separate but related research activities. The first is the development of a cultural framework to inform the focus of this report and possible recommendations (section 4). The second is the systematic review of existing knowledge on telehealth (section 5). Each activity has its own methods, outlined below.

3.1 Designing a Cultural Framework to Inform Telehealth Deployment On-reserve

The Advisory Committee (see page ii) for this project recommended that we speak to Elders and Knowledge Holders to get their feedback on how they perceived how telehealth might improve access to quality care, from a cultural standpoint. This information then served as a lens to frame recommendations.

We recognize that designing a cultural framework that informs the concept of telehealth acceptability and requirements, and that is inclusive of all First Nations communities in British Columbia is problematic because many different First Nations make their home in British Columbia. These multiple Nations each follow protocols, governance values and priorities specific to their own Nation. For example, the Dakelh peoples of the central interior of British Columbia make up a large body of First Nations to the south, west and north of Prince George including ten distinct but culturally similar nations: Wetsuwet’en, Babine, Cheslatta, Stellat’en, Nadleh Whut’en, Nak’azdli’wt’en, Tlatz’t’en, Yekooche, Sai’kuzz and Lhéldlil T’enneh. Each of these nations speaks a dialect of the Athabaskan language that is commonly referred to as Carrier. It is this language that unites these many First Nations communities in the north. As a starting point, we opted to work with Elders located in L’heidli Tenneh territory (Prince George area).

We decided to involve Elders from this area for a number of reasons. Workers from Carrier Sekani Family Services had previously been named as a Co-investigator in this project. Carrier Sekani Family Services provides a wide range of health and wellness services to 11 Carrier and Sekani First Nations in North Central British Columbia covering a distance of 76,000 square miles between Smithers and Prince George and serving 14,000 Carrier and Sekani people. Carrier Sekani Family Services currently provides telehealth for rheumatoid arthritis patients across the north. A mobile unit travels to First Nations communities along highway 16 connecting patients with health care specialists through video conferencing.

What became clear in this process of constructing a cultural framework was the need to meet and negotiate a common language to fill the gap between the western medical model of service delivery and First Nations’ view of health. It was clearly an opportunity to dialogue between cultures about the mutual needs of First Nations people in remote and rural communities and the delivery of western medicine. We received ethical approval from the University of Northern British Columbia Research Ethics Committee in April 2009. The process we designed was inspired by the writings of Assistant Professor Willie Ermine, and followed these steps:

1. **Relationship Building**: A meeting was held to bring members of the advisory committee together to design a process for the development to a cultural framework for telehealth delivery specifically in Northern British Columbia.

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2. **Knowledge Building:** We set up a mock telehealth demonstration with 3 Elders at the Prince George Regional Hospital (PGRH) with the equipment (dermascope, stethoscope, ultrasound, exam camera, etc) to demonstrate and explain to Elders and Knowledge Holders what telehealth is and how telehealth is accessed.

3. **Focus Group:** We brought three Elders and Knowledge Holders to each of two sites (PGRH and Vanderhoof) to participate in and view a mock video-conference that emulates a medical teleconsultation. We also demonstrated the use of an exam camera. The mock demonstration of telehealth initiatives was limited to the exam camera and video clips. After viewing and experiencing the use of the exam camera, Elders and Knowledge Holders discussed their thoughts and feelings through teleconferencing between sites. This was followed by a dialogue. Specifically, we asked the following questions:
   - What are the values to guide how [telehealth] can be utilized?
   - What are the values that are grounded into your own cultural framework, into your own belief system, into your own priority setting?
   - Would you feel safer to ask questions of your doctor if you were in your home community?
   - Do you see a potential for better healthcare delivery through telehealth and what is better about it?

4. **Drawing the Framework:** We analyzed the information provided by the Elders and Knowledge Holders, looking for recurrent themes. We began drafting options to reflect and organize the themes identified. We then worked more closely with three Elders and Knowledge Holders to expand and refine our analysis, and to finalize the framework. We used this information to design a visual representation of the framework. Specifically, we asked the question,

   From what we have discussed in the video-conference, can you think of a story, a metaphor, or a symbol that could explain the important concepts and that could also embody a cultural framework for telehealth?

The results of this process are reported in section 4.

**3.1 Designing a Cultural Framework to Inform Telehealth Deployment On-reserve**

Telehealth appears to be a solution to many of the access issues believed to be a significant contributor to poor health outcomes, particularly preventable hospitalization, for the First Nations people. The purpose of this review was to systematically compile evidence from the published and grey literature to inform specific questions located at different levels of analysis:

1. **Health Systems Level:** Are health outcomes on reserve improved through the establishment of telehealth? In what areas? How is this quantified? How can on-reserve health services benefit from and integrate telehealth in current practices? Where are the gaps? Do the healthcare practitioners, professionals, and others involved in providing health assistance on reserve find telehealth beneficial to their professional capacity? In what way?

2. **Cultural/Local Level:** Do the clients, families and on-reserve communities benefit from telehealth? In what way? What must be in place in order to ensure that these benefits are realized?

This review focuses on studies that can inform the deployment of telehealth interventions in First Nations communities. We drew from the Cochrane Handbook for systematic Reviews of Interventions to frame the
The Criteria for Study Selection

For the purpose of this project, we have chosen to specifically focus on applications that can enhance a primary healthcare and public health settings, in rural and remote environments. We focused our review on,

a) Video-conferencing with or without the use of peripherals: peripherals are special cameras that can be used to assist in diagnostics. For example, a dermascope is a camera specially designed for skin examination. A dermatologist located in Victoria may ask a physician or nurse located in a small community to use a dermascope to examine a skin lesion for diagnostic. Other types of equipment exist to meet the needs of different types of examination.

b) Store-and-forward solutions: for example, where a digital picture of a skin condition is taken and emailed via secure email to a specialist for diagnosis.

c) Web-based solutions: for example, web-based educational programs.

The scope of the review was from 1998 (when telehealth developments began for First Nations) to 2008. The primary search terms include telehealth/telemedicine, as well as any other terms connected to,

a) Dimensions of telehealth utilizations such as economic analysis, effectiveness of specific applications, evaluation, performance, etc;

b) Rural or remote primary health care delivery; and

c) Terms related to the context at hand, such as First Nations, Inuit, Aboriginal and Indigenous.

The Process

The published and grey literature was collected by a review of five key databases/search engines:

1. Pub Med;
2. ISI Web of Science;
3. SpringerLink — Medicine, Business and Economics, Humanities, Social Sciences and Law;
4. CINAHL full text; and
5. Google.

We included articles on rural and remote communities in Canada and from Australia, Norway, Finland, as well as specific areas in the United States serving rural, remote, and/or Indigenous populations. We then translated these experiences to fit the First Nations on-reserve context. We also collected documents through attendance at First Nation/Inuit specific meetings and conferences\(^2\) or with the assistance of the FNIHB.

Outcomes

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2 Including meetings such as the Assembly of First Nations’ 2005 National First Nations Telehealth Summit, for example: Raincoast Ventures LTD (2006), *op. cit.*
The original search identified 199 peer reviewed articles and 14 reports fitting the criteria for the review. On further examination, a number of references were eliminated, based on the following criteria:

- We eliminated all economic evaluations and cost-benefits analyses undertaken outside of the Canadian context. The rationale for this decision was that each national healthcare system has its own criteria for health services coverage, resulting in a different balance between public and private costs. Issues such as geography, population density and remoteness add context that are key to the generalizability of such studies.
- We eliminated narratives of new services implemented that did not include an evaluative component.
- We included studies documenting the acceptability of specific telehealth applications (teledermatology, telepsychiatry) when studies were conducted in rural/remote settings and that could inform services delivery in First Nations communities. We reviewed literature reviews and systematic reviews that fit this criterion.
- We included all First Nations-specific studies.
- We also included studies that could inform workforce and work life issues, if conducted in settings comparable to the First Nations setting.

Overall, we found few articles actually addressing telehealth implementation on-reserve or in rural Indigenous communities. A final group of 68 peer reviewed references and 14 reports was retained based on their fit with the First Nations environment and this project. Of these, all 14 reports and 9 refereed publications focused on issues related to implementing telehealth interventions in Canadian First Nations or Aboriginal communities. One of these was a systematic literature review conducted by Jennett and colleagues, which included only one Canadian reference, a report discussing First Nations telehealth issues. We decided to review the report instead. Another report summarized the lessons learned from six telehealth programs, including the Alberta First Nations Telehealth Program, the Ikajuruti Ungasiktumi Network, the Keewaytinook Okimakinak/NORTH Network Partnership Pilot, the MCTelehealth Network, the Western NWT Health Network and the Yukon Telehealth Network. Since we had access to the original reports from these projects and/or to updates since 2004, we opted to rely on primary sources. Details are provided in Appendix I.

The final sample is outlined in Table 9. To supplement the 22 Aboriginal-specific studies, we also reviewed references from American Indians or Australian Aboriginal communities (n=2), rural and remote communities in Canada (n=21), and rural and remote communities in the USA, Finland and Norway (n=25). An additional 12 studies were reviewed to inform issues that were considered universal or understudied. This includes meta-analyses and systematic reviews.

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1 When reports resulted in peer-reviewed publications, we reviewed the publications.
A majority of references (n=60) focused on real time video-conferencing consultations. Only seven references addressed asynchronous consultations (store-and-forward options). Three references looked at mixed options for mobile clinics. Four discussed tele-homecare options. Others focused on policy issues. The findings are reported in section 5.

### 3.3 Ensuring Relevance

The discussion of the BC First Nations community healthcare system and the cultural framework provide a cultural lens to contextualize the findings from the review of the telehealth literature. The last section of this document brings these components together to provide recommendations. To ensure the relevance of these recommendations, draft recommendations were vetted with a working group at the ICT summit’s session entitled Informing Health ICT Strategy: Establishing a First Nations eHealth Knowledge Circle on March 20th 2010. Attendants were individuals actively involved in telehealth implementation in First Nations communities. Their input is reported in the final section of this report.
4. Perspectives from the Elders and Knowledge Holders

This section explores the themes raised by the Elders and the Knowledge Holders (hereafter the Elders) in our discussions, and summarizes their insights. We then use this information to formulate the lens which will be used to explore themes emerging from the literature review (section 5).

4.1 Exploring Key Values

Holism and Contextualized Care as a Culture Lens

The Elders discussed how care sought off-reserve is care that is provided based on a different cultural framework.

In Western health they take care of your symptoms and give everyone a little bandage and they treat everyone the same, which in our culture we don’t do that. We look at a person and you are an individual, one of a kind and we treat that person where in Western medicine they give you a pill and say take it with lots of water and have plenty of rest, everybody’s the same for them. They don’t look at you as a person that is what my doctor and I always argued about “I’m me eh, live in this body you have to listen to what I am talking about and what’s happening eh.” It’s sometimes very hard for doctors to understand that (Participant 3).

The pace and manner in which the care is provided may result in misunderstandings, unmet expectations and/or culturally unsafe care. The Elders discussed current challenges related to access to health services.

To be respectful of who that person is and to have compassion, understanding, respect and listening to that person instead of being the domineering person. Because a lot of our First Nations […] always tell me “I am not listened to, they don’t treat me as well as they should and they don’t have the respect understanding and compassion” (Participant 1).

Yes, because from my own experience my doctor sent me to a specialist and when I went to the specialist the first time he was sitting across from me and he said show me your hands so I put them out for him to see... I have rheumatoid arthritis and he looked at them from that distance and started prescribing pills for me. When he was done I looked at him and I said look here I had a bath before I came to see him, I changed my clothes, made sure my clothes were clean, I combed my hair and you can’t even take and hold my fingers and hold them and see what’s wrong with them. You’re prescribing medication for me from a distance. So the next time I went into see him he changed his attitude. He’ll hold my hands and check them out and see how I’m feeling and there is no more of that distance. I felt he was discriminating against me because I am native. It was disrespectful and a lot of Aboriginal people go through this kind of feeling and a lot of people don’t speak up like me. A lot of people don’t know what the doctor is prescribing or what the side effects are (Participant 1).

This care was contrasted with an ideal, which rests on care provided to the whole person, with knowledge of his and her
When we speak of holistic health we are speaking about the whole person. The holistic health is all about individuals and their entire support network and their communities... It’s just like saying it takes the whole community to raise a child. It takes the whole community to heal the person (Participant 4).

**Traditional Knowledge as an Asset**

The Elders discussed that communities have knowledge that assists individuals to heal.

There's lots of different kinds of Medicines. It is not only for the physical body. They have doctors in our culture to do work with the spiritual part of you, your mental part of you, your physical and your emotional part of you. So that’s the reason I say you have to search for them. It only goes by word of mouth who knows how to do this because I learned long ago that our doctors don’t put out shingles. You have to listen to people and they know you. When they want to find you they will find you. There are a lot of healers all over and they do different kinds of healing, eh? (Participant 3).

When I was a [Community Health Representative, or CHR] I’d teach people on traditional medicines. It’s been going on in my family since...oh, for generations. When I was a CHR I did both traditional and western medicines. I practice both (Participant 3).

Everybody in each reserve knows a medicine that’s our tradition to know cause we live off the land. Some people may have forgotten even through residential school. If I go to their community and talk about medicines somebody would say, “Oh, I remember my mom use to do that.” “Somebody in my family use to do that.” My mom said, “Everybody in each reserve had to know at least one medicine so if anything goes wrong you are there to help one another.” So you can’t tell me nobody knows medicine in any part of Canada. When you go to the reservation somebody has to know (Participant 3).

This knowledge was viewed as an asset, and also as important knowledge to share with doctors in the context of a health care encounter. Issues of language were also discussed in the context of knowledge exchange.

A lot of Elders do take traditional medicines. They go out and make their own medicines for their own illnesses and this might help the doctors understand that they are using an alternate medicine (Participant 2).

In the context of Western healthcare, where services are provided in a very short period of time, this knowledge is not brought up, either as a resource in the care plan, or as knowledge that might impact the care plan.

**Healthcare Staff and Families as Assets**

The Elders discussed the importance of training nurses and other community healthcare practitioners to act as facilitators, who can negotiate cultural protocols, advocate for individuals and families, prepare clients prior to the tele-consultation, and provide for language translation and interpretation. This was portrayed as key to building trust. While this may not prevent all instances of cross-cultural misunderstandings or culturally unsafe care, telehealth provide the opportunity for care plans to be contextualized in local reality, through the inclusion of family members and/or local
providers in the consult.

So if a member of your family was going to see a specialist via telehealth you might be in that room with that member right and so if I was your daughter and I was being told just take nerve pills you would say no I don’t think so! And it’s that ability to have a group to support. To have family to support you in a medical consult. So that’s how you might use it, not for yourself, but to advocate for your family members (Participant 2).

In this context, telehealth was discussed as beneficial because care is accessed locally, and does not require a geographical disconnect with family and community specialists.

Telehealth could help with that by having these types of technologies back in their own, respective communities where they have the entire support network (Participant 3).

As telehealth can facilitate care to be provided in the community, the family can come together when results of tests are provided, provide support when bad news are given, ask for clarification when the information provided is too technical, provide context to the discussion, and be in a better position to provide support.

**Overcoming other Barriers**

The issue of language was discussed in the context of language barriers.

The English is hard; they need someone to talk for them, to talk to the doctor for them and to explain what the medication does and how it affects them. [Telehealth] would work well if they were hooked up to a Pharmacy so they could talk to the Pharmacist and ask about the medications they are on and what the side effects might be? It could be like an education for both parties (Participant 1).

The only problems I had with [telehealth] were Elders that had a language barrier and nobody was available to help them. Sometimes they don't understand because most of our Elders just speak their Native tongue (Participant 3).

**Convenience**

Finally, the comfort of accessing care without travel was discussed.

It’s accessible, it’s easy. It saves travel especially for Elders (Participant 3).

Like even to go to Prince George it’s only 2 and 1/2 hours. To go there, see the doctor and come back again some of our Elders are too weak for that. So we have this then there might be less travel and more for them (Participant 3).

**4.2 Representing the Themes Raised**

An Elder from Nak’azdli First Nation explained that the spruce tree is sacred to the Nak’azdli First Nation.
All evergreen trees are sacred. They live all year round they don’t die like leaf bearing trees. Evergreen trees are the symbol of life. That’s what my grandmother told me. We use parts of the tree for medicines, we use spruce needles for medicine. It’s good for TB and lung problems like bronchitis. The pitch is good for sore throats, tonsillitis and healing sores (Elder Grace Rossetti).

She suggested that the spruce tree could serve as a symbolic representation of a cultural framework. The tree represents remote and rural communities and the growth of telehealth. The earth and the roots of the tree represent community grounded in mother earth. Telehealth is growing from that and connecting to the branches reaching out from the community and the earth to the spaces.

4.3 Telehealth Seen through a Cultural Lens

As discussed in section 2, research continues to show that despite efforts to provide culturally appropriate health services, many Aboriginal people continue to experience barriers to accessing health care\(^1\) that may include tacit and sometimes overt discriminatory practices\(^2\).

The Elders discussed the advantage of telehealth in terms of accessibility to quality healthcare, specialists and education. Retaining connectedness to community, family and support groups, as well as specialists who could offer continuity of healthcare were identified as important advantages for the elderly, for youth, for parents and for families. Having the ability to communicate with healthcare specialists as a family or in a group was recognized as an important feature in building advocacy for their own and family health problems.

\(^1\) Adelson (2005), op. cit. 
Canadian Institute for Health Information (2004). Seven Years Later: An inventory of Population Health Policy since the Royal Commission on Aboriginal Peoples 1996-2003 Ottawa: Canadian Institute for Health Information.

In her insightful article, Cartwright\(^1\) wrote, Telemedicine forges a new set of geographic co-ordinates and new definitions of remote peoples. She goes on to suggest that Getting wired means getting hooked into the safety net of health care, suggesting that telehealth provides an opportunity to expand access to care. The Elders discussed the opportunity to train local staff to act as facilitators, negotiators, advocates and interpreters. These roles were portrayed as key to building trust between patients and families, and distance providers.

Thus, “getting hooked” in the First Nations context is about accessing the safety net of healthcare while remained “hooked” onto the safety net of family, cultural experts and community. While this may not prevent all instances of culturally unsafe care or cross-cultural misunderstandings, Elders appear to expect telehealth care to provide the opportunity for care plans that are contextualized in local reality, through the inclusion of family members and/or local providers in the consult. The above discussion was pursued with Elders from a very small part of British Columbia. Their views cannot therefore, in any way, be construed as “representative” of all First Nations in Canada, British Columbia or northern British Columbia. It is however a starting point for conversation.

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5. Lessons from the Literature

Section 3 has provided an overview of the strengths and limitations of the First Nations healthcare system as funded by FNIHB. While eroded as a result of disinvestments, and underdeveloped in the area of primary care (in Health Offices, Health Stations and Health Centres), this system nevertheless provides an important foundation on which to build telehealth interventions. Section 4 explored the perspective of Elders who portrayed the community as a place of knowledge and support to those requiring care, emphasizing that trust was key. In the following review, we highlight findings and approaches that can support the community-based healthcare system and that build on local strengths in the context of telehealth development.

5.1 Overview of the Literature

Our initial read of the references selected for this review led us to conclude that research that is relevant to the First Nations context remains scarce. Although systematic reviews have been conducted, these were of limited utility. They are generally broad, and include many applications that may or may not be suitable in the First Nations context. For example, Hailey and colleagues\(^1\) conducted a systematic review of benefits of telemedicine, based on searches of electronic databases between 1966 and December 2000. They identified 66 scientifically credible studies that included comparison with a non-telemedicine alternative and that reported administrative changes, patient outcomes, or results of economic assessment. The authors reported that the most convincing evidence on the efficacy and effectiveness of telemedicine was given by some of the studies on teleradiology (especially neurosurgical applications\(^2\)), telemental health, transmission of echocardiographic images, teledermatology, tele-homecare and on some medical consultations. They reported that home care and monitoring applications showed convincing evidence of benefits, while those on teledermatology indicated that there were cost disadvantages to health-care providers, although not to patients. A lack of detail prevents us from being able to disentangle findings related to applications that may be realistically implemented in the First Nations context, from those that may not. This review was typical of the systematic reviews we encountered.

The quality and focus of the literature also remain quite limited. Most studies focus on interventions that have been in place for only a short period of time. Overall, few studies have been conducted in First Nations settings. Those that have been conducted have focused on a) factors facilitating and impeding telehealth deployment; b) narrowly defined perceptions of telehealth acceptability and needs; c) effectiveness of specific, albeit short-lived, interventions; and d) uptake, utilization and cost-effectiveness. The grey and published literature reporting on projects implemented in Canadian First Nations or Aboriginal settings are almost exclusively focused on justifying telehealth as an effective or cost-effective form of health services intervention, in view of supporting continued investments as opposed to informative studies demonstrating outcomes. These studies have small sample sizes. Although many studies document user and provider satisfaction, few used a control group, and fewer still included outcome measures. Numerous studies outline processes of implementation\(^3\), but very few provide convincing detail beyond that stage.

To some extent, this should be expected. Telehealth implementation remains in its infancy, especially in rural,

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2 These applications are outside the scope of this review.
remote and Aboriginal communities. Sample sizes in these environments are generally low. Initiatives have been short lived, and experimentation is still necessary.

This section summarizes the findings from these studies. Findings are organized in two broad sections. We first review health system-relevant findings, including e-health modalities, followed by specific clinical applications that have relevance to the First Nations context, ending with workforce issues. A second section focuses on findings that might echo themes raised by the Elders, including acceptability, relational care, timeliness and convenience.

5.2 Health Systems

5.2.1 E-health Modalities

Acceptability: A number of studies, none Aboriginal-specific, have shown that the quality of care remains the same or improves with telehealth.

Real Time Video-Conferencing Consultations: In a study of eight Canadian telehealth programs using videoconferencing to provide health care and health education, all projects reported improved communications between colleagues, better access to care, and a high level of patient satisfaction. A study undertaken in a rural Australian community suggested that 31 patients preferred face-to-face psychiatry services over psychiatry via telehealth. However, when rural patients were asked if they would rather travel for face-to-face services, or stay home and receive psychiatry services via telehealth, the rural residents chose to use the telehealth services. A meta-analysis of services providers’ satisfaction with videoconferencing reported a high satisfaction rate among users and professionals. Randomized controlled trials have shown that diagnosis or treatment provided via telehealth was similar to face-to-face consults. Finally, Fitzgerald and colleagues evaluated the impact of a monthly series of multidisciplinary case discussions in child development. The project intended to provide a forum for clinical discussion of complex cases, peer review, professional development and networking for allied health professionals and pediatricians. Despite some early difficulties with the technical aspects of videoconferencing, the evaluation demonstrated the participants’ satisfaction with the project and its relevance to their everyday practice. Questions related to work practice received lower mean scores. Comments stated that local staffing and service issues made it difficult to change practice and access multidisciplinary teams.


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teledermatology\(^1\), teleophthalmology\(^2\) and post-acute burn care\(^3\). Store-and-forward technology was shown to increase efficiency for the on-site clinician who was able to fit cases into available time slots such as when the clinician is waiting to begin an operation or a patient cancelled an appointment without notice. An Australian study documented the successful experience of parents of children who had experienced significant burns use of low resolution camera to communicate with a pediatric burns unit to monitor healing\(^4\). A systematic review suggested that store-and-forward interventions were the most cost-effective\(^5\). Peter and colleagues reported on real-time telemedicine screening for diabetic retinopathy\(^6\). A study population with representative examples of normal fundi and the different grades of retinopathy was chosen from existing records. The specificity and sensitivity of telemedicine diagnosis was compared with fundus photography and examination by an experienced ophthalmologist as a ‘gold standard’, in a blinded manner. Real-time telemedicine assessment was performed with live video and audio connections with the transmitting and receiving units set in different areas of the ophthalmology department. Findings showed that sensitivity of detection by photography (store-and-forward option) was considerably better than transmission of image via videoconferencing. Still, some studies focused on using videoconferencing for the diagnosis and treatment of conditions that might be more cost-effectively dealt with store-and-forward options, suggesting perhaps a lack of maturity in exploring e-health options\(^7\).

**Tele-homecare Options:** The studies of tele-homecare options we reviewed were for patients living with diabetes\(^8\), cystic fibrosis\(^9\), chronic respiratory failure\(^10\) and urinary incontinence\(^11\). In a review of 578 publications on tele-homecare, Koch\(^12\) identified that the majority of publications (44 percent) from the United States, followed by UK and Japan. Most publications dealt with vital sign parameter measurement and audio/video consultations (“virtual visits”). Clinical application domains have been mainly the management of chronic diseases, or the elderly population and pediatrics. They observed a trend towards tools and services not only for professionals but also for patients and citizens. However, their impact on the patient-provider relationship and their design for special user groups, such as elderly and/or disabled needs was not explored. We located no study exploring the use of tele-homecare in First Nations communities.

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**Equipment Specific Issues:** Most studies discussed equipment usability and reliability, which varied from satisfactory\(^1\), to dissatisfaction with technical difficulty\(^2\). Difficulties included the time required for case preparation, voice and picture delay between two sites due to satellite transmission, and the lack of ability to archive the consult. One study noted that working with telemedicine is tiring and may require redesigning jobs including planning and limiting the telemedical activity per employee\(^3\).

A few studies have focused on documenting factors facilitating and impeding telehealth deployment, in First Nations telehealth sites. These studies reported on initiatives that were in the process of being implemented, or that had been in place for a short period of time\(^4\). Managing change presents a considerable challenge, when introducing the technology in work practices. Policies governing the provision of health care are designed for face-to-face care. Jurisdictions have started adjusting these policies, but some work remains to be done. Current reimbursement and licensure policies, for instance, can make it difficult to remunerate providers, in turn making it a challenge to attract professionals. In addition, current financial processes are often not suited to multiple-partner arrangements characteristic of telehealth programs. Finally, logistical issues of timing things for busy clinicians with sometimes unpredictable schedules.

**Cost Effectiveness:** A handful of studies have focused on assessing the effectiveness or cost-effectiveness of specific, albeit short-lived, interventions: Jong and colleagues published an article on the utility of telehealth in the provision of rheumatology services\(^5\) and suicide prevention\(^6\); Schaalma and colleagues conducted a study of the cost

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6 Brown et. al. (2003), *op. cit.*
effectiveness of clinical support for maternal and child health, nursing and health education; Miller and Levesque reported on pediatric surgery care follow-up to remote communities; and Parker and Froehler studied the provision of education sessions to health promotion professionals. Finally, two studies evaluated the effectiveness of mobile diabetes care services which used tele-ophthalmology for diagnostic purposes. The evidence reviewed suggests that telehealth can be an effective mechanism to increase local access to health services, without compromising quality.

These studies also highlight that obstacles remain to the implementation of telehealth, and include inadequate telecommunications infrastructures; as well as shortages of human resources in rural and remote areas. Location of equipment and installation, proper training, and development of strategic approaches are also important factors limiting growth.

5.2.2 Specific and Clinical Applications

The following section focuses on four broad categories of applications that could be implemented in the First Nations context: triage and diagnosis; chronic disease management; mental health; and education.

Triage, Diagnosis and Referral: Telehealth is being used for the purpose of triaging patients for specialist care. Jaatinen and colleagues conducted a randomized case control study of referrals from a primary care centre in Finland. All the consultations and referrals from seven general practitioners were dealt with by internists and surgeons at two hospitals over five months were included. The responsibility for treatment was maintained in the health centre in 52 percent of cases using teleconsultation, without any visit to hospital being required. Telereferral increased the possibility of the general practitioner maintaining responsibility for the treatment. Although the study concluded that significant cost savings should be realized, these were not quantified.

We encountered studies documenting use for dermatology,

3. Parker, NK et al. (2000). Voices in the wilderness: processes for identifying and resolving internet access barriers among Aboriginal health promotion professionals. 9th Annual Conference of the Canadian Institutional Research and Planning Association (CIRPA-ACPRI) Saskatoon, Saskatchewan, October 15-17 2000. Saskatoon: Canadian Institutional Research and Planning Association
neurology\(^1\), and rheumatology\(^2\). All were found to be viable options. Of the five teledermatology studies we located, two compared real-time teleconsultations and face-to-face consultations\(^3\) and found no significant difference in the concordance of diagnosis. Two studies compared the outcomes of store-and-forward teledermatology patients with those of patients seen face-to-face\(^4\), and found no significant differences in diagnosis. A final study by Lamminen and colleagues\(^5\) assessed the feasibility of providing real-time teledermatology consults using standard commercial videoconferencing equipment, a modified document camera and a dermatoscope. The authors reported a significant level of diagnostic concordance. While these studies provided options, we found no study assessing these options in comparison to one another, with regard to cost-effectiveness and effective use of human resources.

Chua and colleagues\(^6\) retrospectively reviewed the telemedical management of 65 outpatients from a randomized controlled trial (RCT) of telemedicine for non-urgent referrals to a consultant neurologist, and compared this with a) the management of 76 patients seen face to face in the same trial, b) with that of 150 outpatients seen in the neurology clinics of district general hospitals and c) with that of 102 neurological outpatients seen by general physicians. The telemedicine group did not differ significantly from the 150 patients seen face to face by neurologists in hospital clinics in terms of either the number of investigations or the number of reviews they received. Their results suggest that management of new neurological outpatients by neurologists using telemedicine is similar to that by neurologists using a face-to-face consultation, and is more efficient than management by general physicians.

We reviewed two studies that focused on the use of telehealth for rheumatology. Jong and colleagues\(^7\) undertook an intervention study, comparing three interventions: a) visiting rheumatologist clinics (8 weekly visiting clinics); b) email access to a rheumatologist (response time within 24 hrs, number of weeks not mentioned); and c) scheduled videoconference (once monthly). They reported that all general practitioners were mostly satisfied with the videoconferencing, which was preferred to visiting clinics (thus reducing general practitioner travels) and email follow-up, because videoconferencing provided an opportunity for immediate feedback to referring physician and patient, effective case-based learning and transfer of knowledge, and improved accessibility. Davis and colleagues\(^8\) evaluated the cost effectiveness, and acceptability of a telerheumatology clinic. The authors report that after the teleconsultation, no patient required a conventional face-to-face consultation. Apart from accessibility to specialist consultation, the greatest benefit was improved communication among patient, referring physician, and consultant. The process was determined to be efficient in both time and cost savings.

2 Davis et al. (2001b), *op. cit.*
3 Granlund et al. (2003), *op. cit.*
   Nordal et al. (2001), *op. cit.*
4 Knol et al. (2006), *op. cit.*
   Krupinski et al. (2004), *op. cit.*
5 Lamminen et al. (2000), *op. cit.*
6 Chua et al. (2002), *op. cit.*
8 Davis et al. (2001b), *op. cit.*
   Davis et al. (2001a), *op. cit.*
What emerges from these studies is a lack of clarity on the best modality for triage, diagnosis and referral. While preference and satisfaction were documented, their link to outcome was either non-existent or poorly articulated. We conclude that telehealth can be successfully used for triage, diagnosis and referral, but that more research is required to determine which modality is best.

**Chronic Disease Management:** Chronic disease management, primarily diabetes, was the focus of a few studies. Telehealth options included the use of mobile clinics to increase access in First Nations communities and home-based monitoring. In Alberta, a mobile clinic was set up to provide screening, using portable equipment and a digital retinal camera. Images were forwarded to ophthalmologists for diagnosis. Counselling was provided on site. A British Columbia-based program followed a similar model, with counselling being provided via video-conferencing. Both documented a high level of satisfaction. In addition, the Alberta initiative reported improved outcomes such as decreased number of visits to a doctor, decreased number of hospitalization, decreased number of visits to the emergency, increased knowledge, when compared to baseline (6-12 month follow-up). While both initiatives described adding valuable services to First Nations communities, neither study described how they integrated these services with community-based services already in place in First Nations communities, and whether these services (store-and-forward retinal screening, videoconferencing) might be provided by community health staff in the absence of a mobile unit.

Harno and colleagues conducted a randomized controlled trial of a tele-homecare application for diabetes management, with a total of 175 patients with Types 1 and 2 diabetes. The study group used a telehealth application with a diabetes management system and a home care link. Usual care did not involve telehealth, i.e. the patients made regular general practitioner visits about every three months. After 12 months HbA1c decreased significantly in both groups of patients. The differences were small, but HbA1c was significantly lower in the study group than the controls. Diastolic blood pressure, fasting plasma glucose, serum total cholesterol, serum LDL-cholesterol and serum triglycerides were significantly lower in the study than in the control group. This was achieved with fewer visits by study patients to doctors and nurses.

Tele-homecare options have not been fully explored in the First Nations context. Intuitively speaking, this may make sense. First Nations communities are small, and may already have local access to a healthcare facility (Health Office, Health Station, Health Centre or Nursing Station). In the context of small communities, where healthcare staff are socially engaged with community members, it may be difficult to justify tele-homecare as an option. However, as discussed in section 2 of this report, local access to care depends on the community, and communities served by a Health Office, Health Station or a Health Centre have access to services that remain largely limited to public health. Outcomes in these communities are poorer. Since improving access to a broader complement of primary health care services may be impractical because of differences in economies of scale, tele-homecare may provide an interesting alternative.

**Mental Health:** Telehealth has been used in many settings for the delivery of mental health services. Some studies

3. Harno et al. (2006), *op. cit.*
reported on psychiatric care in general\(^1\), while others focused on specific population or diagnoses, including the provision of psychiatric services to children\(^2\) and American Indians veterans with a history of post-traumatic stress disorder and comorbid conditions including alcohol and drug issues\(^3\), suicide prevention counselling\(^4\), childhood depression\(^5\), and family therapy for the treatment of anorexia nervosa\(^6\). Generally, studies reported a high level of patient satisfaction. Of all studies, only three\(^7\) also measured outcomes using standardized instruments (Short Form 12, Schedule for Affective Disorders and Schizophrenia for School Age Children—Present Episode, the Children’s Depression Inventory, Health of the Nation Outcome Scale). A fourth\(^8\) assessed outcomes based on number of hospital readmission. These studies demonstrated that telemental health services delivered via videoconferencing was as, or more, effective than face-to-face consults.

Three studies reported a preference for videoconferencing. Urness and colleagues\(^9\) reported that 42 percent of consumers indicated they would rather use telepsychiatry than see a psychiatrist in person. Authors posited that this may be due to feeling less threatened by potential boundary violations. Nelson and colleagues\(^10\) also reported a preference for videoconference, along with better outcomes (a significantly higher reduction in symptoms). Authors surmised that participants might have felt “special”, an effect that would taper over time. D’Souza\(^11\) reported greater treatment adherence and compliance in the telemedicine group than those in the control group. When compared with the control group, the telemedicine group reported significantly more satisfaction with their treatment and discharge planning.

A few studies documented provider satisfaction. Simpson and colleagues\(^12\) assessed a routine telepsychiatry service from the point of view of providers. Survey forms were used to document the perspective of professionals. Over two years, there were 546 consultations at the five participating general hospitals, although the level of use varied considerably between them. Health professionals expressed high satisfaction with the service. While there were equipment problems in 17 percent of all consultations in the second year, they did not seem to affect acceptance of the technique.

\(^1\) Health Canada (2003a), op. cit.
\(^4\) Jong (2004), *op. cit.*
\(^7\) Kennedy, C & Yellowlees, P (2003). The effectiveness of telepsychiatry measured using the Health of the Nation Outcome Scale and the Mental Health Inventory. *J. Telemed. Telecare*, 9, 12-16.
Nelson et al. (2003), *op. cit.*
Urness et al. (2006), *op. cit.*
\(^9\) Urness et al. (2006), *op. cit.*
\(^10\) Nelson et al. (2003), *op. cit.*
\(^11\) D’Souza (2002), *op. cit.*
Outcomes were not documented. Other studies also reported provider satisfaction. Elford and colleagues compared child psychiatry consults provided using video-conferencing through a personal computer. An independent evaluator concluded that in 22 cases (96 percent) the diagnosis and treatment recommendations made via the video-conferencing system were the same as those made face-to-face. Still, the responses from the psychiatrist satisfaction questionnaire showed that they preferred face-to-face assessments. The study did not further investigate the basis for psychiatrist’s preference for face-to-face consults. This is an important limitation of provider satisfaction surveys. We found no study using a standardized or validated instrument. Therefore comparison is an issue. Further we found no study pressing on the concept of satisfaction to tease out reasons.

We located one study that documented a single case study of family therapy in the treatment of anorexia nervosa. Family therapy was effectively delivered and contributed to patient recovery, as measured by objective criteria (weight gain, improved medical condition) and subjective clinical observations. Finally we were able to locate only one study documenting the use of videoconferencing for social support, in this case psychosocial support to women diagnosed with breast cancer. Satisfaction was assessed with a questionnaire to 50 participants through regional volunteers. A large majority agreed or strongly agreed that the teleconferencing sessions addressed their need for social support and information on breast cancer. Many indicated strong interest in attending future teleconferencing sessions and strongly agreed that it would be important for the teleconferencing sessions to continue. Many respondents commented that the program made them feel “not alone”. Others noted that the program offered an opportunity “to share and hear the experiences of others.” Several responses concerning the audio teleconferencing technology suggest that the participants were satisfied with its use and that the technology itself was not a deterrent or inhibiting factor for this self-help support network.

We conclude that videoconferencing is an option for the delivery of mental health services. Although this option includes some compromises (reading of verbal cues), most studies appear to indicate that this remains viable. The link to outcomes remain however unclear.

5.2.3 Workforce Issues

Fifteen of the references (the Canada Health Infostructure Partnerships Program or CHIPP projects, for examples) reviewed were evaluations of telehealth implementation projects that included clinical, administrative and educational activities. These references provide limited information on the effectiveness of telehealth for educational purposes, however, beyond number of sessions held and satisfaction.

Buy-in: FNIHB documented the experiences of five isolated First Nations communities with telehealth services. Staff turnover was highly problematic for implementation and telehealth program sustainability. Cornish et al. reported some difficulty in completing their study due to high staff turnover in the rural community. Successful implementation

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   Health Canada (2005d), op. cit.
2. Elford et al. (2000), op. cit.
   Elford et al. (2001), op. cit.
3. Goldfield et al. (2003), op. cit.
6. Cornish et al. (2003), op. cit.
Implementation requires community and staff taking ownership and responsibility, and this takes time\(^1\). A human resource “buy in” was reported as necessary for program success. While community members were showing an interest in telehealth, the majority were also waiting to see if any significant changes to health care delivery would result before endorsing the technology\(^2\). Staff resistance was found to be one of the most significant barriers to using a home video system because of concern of tele-homecare systems possibly resulting in replacement/job loss\(^3\).

**Better Use of Human Resources:** Aas\(^4\) and Cheung et al.\(^5\) report numerous benefits for health professionals who might otherwise travel to rural or remote communities if telehealth was not available. Specifics included less travel, more time for other activities thus higher productivity, avoiding travel in bad weather (equating to safer working conditions), new contacts (patients willing to consult because travel was not necessary), more confident employees with more readily available professional support and more satisfaction. Cornish and colleagues\(^6\) have argued that telemental health can help address shortages of mental health professionals, but these same shortages can constrain its growth.

Smith and colleagues\(^7\) conducted a feasibility study to test the hypothesis that, for an effective telehealth service, a full-time coordinator is required to act as a single point of contact for consultation requests. Data included clinical consult statistics. Their findings showed that by shifting the responsibility for telepediatrics from the referrer to the provider, the telehealth process became equally (or more) attractive as the conventional alternative. Results also showed that, within six months, telepediatric activity increased to an average of 8 hours per month. Certain health services became more accessible. At least 12 patient transfers were avoided to and from the tertiary facility, with an estimated minimum saving of $18,000 to the healthcare provider. Other studies have reported similar findings\(^8\).

Macduff and colleagues\(^9\) developed and evaluated a nurse-led telemedicine service over a six-month period, linking the senior citizens of a rural village with the town-based general practice. All of the patients initially found the videoconsultation experience strange but generally, patients found the nurses to have a pivotal role in explaining the service and interpreting their needs. All those interviewed said they would use the service again. The general practitioners spoke favourably of the service and said that it had saved them time. The nurses involved were positive about the service. Negative comments generally related to the technology, for example picture and sound quality.

**On-Going Capacity Building:** The three-way communication between physicians or nurses practicing in rural or remote communities, patient, and specialists located in urban centres was identified as allowing valuable continuing medical education in areas such as upgrading skills, improving knowledge, attitudes, and

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2. Cornish et al. (2003), *op. cit.*
6. Cornish et al. (2003), *op. cit.*
8. CRaNHR (2006b), *op. cit.*

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Additionally, consultants (specialists located in urban centres) found the insights into rural healthcare delivery beneficial. Some specialists however reported that depending on a physician or nurse to do the physical examination on their behalf could be problematic, because diagnoses require physical contact and delicate nuances that may not be picked up by the camera. Practitioners from rural settings expressed fears of a reduction in the number of opportunities for attending hands on training outside the region.

Formal Professional Capacity Building: We reviewed in detail studies that reported on videoconferencing being used for training and education purposes. Parker and Froehler evaluated videoconferencing for skill development training among First Nations health promotion professionals (Community Health Representatives, or CHRs). The authors reported multiple anticipated and unanticipated barriers including limited technological literacy, lack of technical assistance, and no or limited access to a computer. They noted that hierarchical relationships in healthcare must be considered when implementing technological solutions: access to a computer was undermined in communities where more senior health care workers and managers did not have access to a computer themselves. They noted that support from the Band Council and community is essential.

Cornish and colleagues studied five urban mental health professionals from three disciplines who provided training and support via video-satellite and internet, print and video resources to 34 rural health and community professionals from 11 disciplines. Rural participants reported to be most satisfied with opportunities for interaction and least satisfied with the variable quality of the video transmission signal. Likewise Haythornthwaite evaluated a videoconferencing training program designed for those working with youth at risk. Criteria for evaluation included increased participants’ knowledge and confidence in relation to the training topics, and enhanced consultation between rural youth networks and a metropolitan-based youth mental health service. The findings showed some improvements in workers knowledge and confidence in relation to training topics following participation in the program. Rural participants reported high levels of satisfaction, and decreased feelings of professional isolation.

Fahey and colleagues reported on a tele-education program in child mental health for rural allied health workers. The program was delivered in two parts, each consisting of six sessions. Participants were asked to fill an evaluation

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3 Cornish et al. (2003), op. cit.
4 Davis et al. (2001b), op. cit.
5 Davis et al. (2001a), op. cit.
form after each session. Interviews were also conducted with 16 participants during and after the completion of the program. Finally, two focus groups were conducted. Participants consistently reported increases in knowledge and skills as a result of attending the program. The project resulted in a high rate of reported changes to practice. An unanticipated outcome was the value placed on the opportunities for local networking provided by the project for participants.

Rees and colleagues\(^1\) assessed the impact of a ten week course in cognitive behavioral therapy (CBT) which was delivered via video-conferencing. The course included role play, participant exercise and where possible, observation of actual cases. Those who completed the pre and post training knowledge test (11 out of 12) reported a significant improvement in knowledge. The majority were satisfied with the training they had received and indicated that it had increased their confidence in their ability to use the CBT intervention with their patients. Only three participants reported that they would have preferred face-to-face training.

5.3 Benefit to Community, Families and Individuals

Community readiness has been an important focus in Canadian rural and First Nations studies\(^2\). In the context of Jennett and her colleagues’ work, however, the word community has been used to mean the community-based health organization, and focused on infrastructure and policy issues. One study collected data from nine British Columbia First Nations communities where telehealth interventions were not yet deployed, to document the health services access, travel times, and telehealth readiness; interviews with key informants (n=21) and focus groups (n=9, one for each community)\(^3\). Community readiness was found to be more complex than generally acknowledged, and includes a series of factors such as technological capacity, but also socio-cultural, geographical, policy and cost factors. Findings also suggested that geographical accessibility to services did not guarantee cultural accessibility. Since telehealth services were not yet available in the nine communities studied, the perspectives expressed are based on impressions rather than experience.

In contrast to these studies, we will instead focus on community engagement, participation in and benefits from telehealth. Our review of the literature, whether from Aboriginal-specific studies or from the broader literature, yielded no study echoing themes raised by the Elders and Knowledge Holders. This is also true of the broader literature\(^4\). Most of the studies reported outcomes that tend to be from a healthcare administration point of view. We found no study focused on documenting community connectedness or opportunities for cultural knowledge to become acknowledged and discussed as a result of telehealth. The information we garnered from studies instead focused on acceptability, the relational care, and on timeliness and convenience.

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2 Ho et. al. (2004), op. cit.
5 Ho et. al. (2004), op. cit.
5.3.1 Acceptability

Elders and Knowledge Holders were enthusiastic about the prospect of receiving health services via video-conferencing. Studies that documented user satisfaction in Canadian First Nations or Aboriginal settings documented that 80 to 100 percent of users reported being satisfied by services received through telehealth. While some studies documented some concerns regarding the prospect of accessing services via telehealth, a number of studies from the broader literature have shown that rural patients are very satisfied with services provided via videoconferencing regardless of the type of consult (telepsychiatry, arthritis, multidisciplinary consult, etc.). Patients reported having no difficulty communicating their health concerns. They also reported confidence in the advice they received. Kokesh also reported that patients’ understanding of their child’s condition improved with telehealth. However, these studies did not document how data on user’s satisfaction were collected, beyond satisfaction questionnaires filled after the consult. Most studies did not use validated instruments to collect this information. Most did not include a control group, and outcome measures. It was difficult to identify whether patients are satisfied because a) they received services that were of equal or better quality than what would be received through a face-to-face consult; b) they received services in a timely manner; c) services were provided locally; d) services were not previously accessible; and/or e) services were accessed without incurring out of pocket expenses. Further, while patients may be less satisfied if the care they received was shown to be less reliable or effective. Similar limitations have previously been reported in the broader literature.

5.3.2 Relational Care

A key component of quality of care raised by the Elders was the context in which the consultation occurs. When consultations occur through telehealth, they anticipated that the presence of someone at the local level attend the consultation, either a clinician and a family member, to provide additional context to the clinical encounter. We did not find this

1 Brown et. al. (2003), op. cit.
Health Canada (2003a), op. cit.
Health Canada (2005b), op. cit. (The project documented patient satisfaction (96%, N=3,935). This was reported by First Nations patients as well (N not provided).
Health Canada (2005d), op. cit.
Jin et al. (2004), op. cit.
Jong (2004), op. cit.
Parker, NK et. al. (2000), op.cit.
2 Ho et. al. (2004), op. cit.
3 Aarnio et al. (2000), op. cit.
Cheung et al. (1998), op. cit.
Davis et al. (2001b), op. cit.
Linassi et al. (2005), op. cit.
4 Aarnio et al. (2000), op. cit.
Lamminen et al. (2000), op. cit.
this investigated in Aboriginal-specific studies, or the broader literature. Although most studies documented “patient satisfaction” which we summarized above under the label “acceptability,” we encountered no study that documented First Nations patients’ experience of relational care in a telehealth consult. We encountered no study that documented the number of consults in which a family member was present. Finally, we encountered no study that explored how care delivered via telehealth might improve opportunity for the integration of local knowledge in the care plan.

Only one reference discussed televisitation as an application. Manitoba Telehealth describes televisitation as linking patients with their families when medical needs have kept them apart for extended periods of time. This discussion was however limited to the need to set clear selection criteria. There was no attempt to determine the impact of televisitation on the health of those receiving care in a distant health care facility, nor was there an attempt to document the impact of this modality on the family and community.

5.3.3 Timeliness and Conveneince

Jennett and colleagues identified timeliness and convenience as the primary impact of telemedicine on the community of Drumheller, Alberta. Although all five nurses involved in the study, stated reduced time for consults had important positive impacts on access to healthcare services. This is a recurrent theme for many studies.

Many studies documented that patients reported satisfaction in relation to deferred travel and averted costs. Some researchers reported increased utilization as a result of improved accessibility. For example, Davis documented that 25 percent of the patients would not have consulted on their arthritic condition if a teleconsult had not been available. Others noted that not all telehealth consults resulted with a proportionate reduction in patient

5. Davis et al. (2001b), op. cit.
The question of decreased wait time is problematic, and not discussed critically by researchers. In most cases, interventions that were able to reduce wait time were doing so because “telehealth champions” or dedicated providers were willing to shift time from their practice to provide telehealth-based care. This was done specifically in the context of a study, emergent service or pilot project. It is possible that the consequence, at least in settings where wait time is related to scarcity of providers as in Canada, was not to increase the total episodes of care delivered to urban, rural and remote patients with a certain condition, but rather to reduce waiting time for some patients, while increasing it for others. We found no study discussing this point critically.

5.4 Discussion

The above review suggests potential avenues for telehealth planning in First Nations communities, in the following areas:

Triage, Diagnosis and Referral: Although the literature is not conclusive on the optimal modality to use (videoconferencing versus store-and-forward options), telehealth options have successfully been used for dermatology, neurology, rheumatology and referrals.

Chronic Disease Management: Although videoconferencing can no doubt be used for chronic disease management, we found no study detailing this application, whether with specialists, physicians, or allied professionals. Mobile clinics have been used successfully in the diagnosis (store-and-forward) and management (video-conferencing) of diabetes. The idea of mobile telehealth clinics may be valuable and suitable in the context of small communities where purchasing expensive and specialized equipment may not be cost-effective. Still, while both studies showed improved outcomes (decreased hospitalization), neither study addressed the cost-effectiveness of specialized technicians spending considerable time traveling to sites, or how the services provided via these mobile clinics integrated with local services. This requires more research. It may be an adequate transitional compromise. An alternative, especially in communities where services provided are limited to public health, telehomecare may provide opportunities. We found no study exploring this option in a First Nation setting.

Mental Health: The feasibility and benefits of providing telemental health services to patients and providers have been demonstrated repeatedly in this country and abroad, but as with many other telehealth applications, its economic impact remains to be shown. This is largely due to the fact that the services still are not fully imbedded in the daily care processes, and cannot therefore be properly assessed within a regular budgetary framework.

Workforce Issues: A key issue for this review is to find telehealth options that build on and integrate into the First Nations community health care system. Workforce issues are key. The importance of buy-in and having local staff that are experienced in using the equipment has been documented. Other studies have reported clinical skill building in consultations involving community staff and specialists. Finally, studies have explored educational and training opportunity. What is missing is a study documenting the impact of telehealth on the community-based workforce in First Nations communities. Given the context reported in section 2, this is seen as particularly important.

Perspective from the Elders: Studies to date have not documented key issues raised by the Elders, namely how teleh-

1 CRaNHR (2006a), op. cit.
2 Health Canada (2004), op. cit.
6. Conclusions and Recommendations

This Section summarizes the findings from this report, and provides recommendations to inform the deployment of telehealth initiatives, as well as recommendations for further work.

6.1 Key Findings

The Transformative Change Accord: First Nations Health Plan seeks to close the gap that exists between the health status of First Nations and that of other British Columbia residents. Specific strategies include investments and actions

- in mental health and youth suicide prevention programs,
- chronic disease prevention,
- pilot projects integrating acute care and community health services for First Nations,
- the training of First Nations health care professionals, and
- telehealth.

Based on the review provided in Section 2, these areas for investment are key: our review has confirmed that services are either lacking, or access to existing services may be compromised. However, as also discussed in section 2, financial investments in First Nations community-based health services have been capped for many years. Most British Columbia First Nations communities have access to a very limited complement of services on-reserve. This results in higher rates of preventable hospitalization, and a high human cost. Research shows that despite efforts to provide culturally appropriate health services, many Aboriginal people continue to experience barriers to accessing health care. For example, the BC Provincial Aboriginal Health Services Strategy notes,

> Aboriginal British Columbians consistently have identified a lack of access to services, the lack of meaningful participation or control in how services are delivered, and the absence of working relationships with health service providers

as persistent barriers. Research also shows that tacit and overt barriers, rooted in differences in cultural practices and are reflected policies continue to marginalize many Aboriginal people in the mainstream healthcare.

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1 Lavoie et al. (2007), op. cit.
2 Adelson (2005), op. cit.
3 British Columbia Office of the Provincial Health Officer (2003), op. cit.
4 Canadian Institute for Health Information (2004), op. cit.
5 British Columbia Ministry of Health (2004). *Provincial Aboriginal health services strategy* Victoria, BC, Canada: Government of British Columbia., p. 1
6 British Columbia Ministry of Health (2004). *Provincial Aboriginal health services strategy* Victoria, BC, Canada: Government of British Columbia., p. 1
system. Historical experiences have also resulted in distrust. This was explored at length in Section 4.

In Section 3, we reported findings from a discussion with a group of Elders who welcomed telehealth as an opportunity to improve and expand access to contextualized care that, because it is delivered locally, can build on local assets, including:

- the community-based, local health care;
- traditional knowledge and traditional medicine; and
- family members.

The review of literature (Section 5) we conducted suggests that telehealth interventions may be used successfully for triage, diagnosis and referrals. Telehomecare, chronic disease management and mental health are telehealth service areas deserving attention. We however found few studies that could inform the deployment of these services in First Nations communities. A key finding of this review is that telehealth service options must build and integrate into the First Nations community health care system. Still, we were unable to locate a study documenting how telehealth has impacted the local workforce.

6.2 Conclusions and Recommendations

Based on our review and discussions held with the working group at the Information and Communication Technologies Summit, we propose the following recommendations.

**Recommendation 1: Financial investments in First Nations community-based healthcare services are required to ensure sustainability**

First Nations community-based health services currently focus on primary prevention (education, screening). Once diagnosed, on-reserve services focusing on chronic disease management and rehabilitation are limited or non-existent. Investments must support secondary and tertiary prevention, as well as primary care.

Telehealth can play a role in improving community access to physicians, nurses, dieticians, physiotherapists, occupational therapists as well as other allied professionals. Improving linkages between on and off-reserve services will increase opportunities for cultural support and improve continuity of care. Improving access to applied professions may however require expanding human resource working on reserve, especially in communities served by a Health Office,

1 Benoit et al. (2003), op. cit.
Browne et al. (2000), op. cit.
Browne (2005), op. cit.
Browne et al. (2006), op. cit.
Culhane D. (2003), op. cit.
Dion Stout et al. (1998), op. cit.
Dion Stout et al. (2001), op. cit.
Smith et al. (2005), op. cit.
Smith et al. (2006), op. cit.
Varcoe et al. (2008), op. cit.
Health Station or Health Centre. The integration of telehealth into the on-reserve health care system will require addressing the issue of sustainability raised earlier.\(^1\)

**Comments from the Working Group:** First Nations communities also require investments to improve access to fiber optic connections, access to wireless and telehealth technology. Local capacity building and IT support for communities and providers are also key.

**Recommendation 2: Telehealth deployment must improve local opportunities to access holistic and contextualized care**

One of the potential benefits of telehealth for communities is enhanced contextualized care. With specialist consults occurring in the local Health Centre environment, clients will be able to draw upon their larger support networks, family and local providers, as part of the clinical encounter. Patient transportation benefit policy, and individual economic barriers, often limit the ability of clients to have accompanying supports. This is particularly true with regards to elderly clients who may have difficulty understanding or remembering communications occurring during a consult. Being able to draw upon their larger formal and informal support network at the community level has the potential to enable more holistic and culturally safe client encounters.

Studies to date have not documented key issues raised by the Elders, namely how telehealth will increase opportunities to access care that is holistic, and that build on local strengths and expertise.

Additional research is required to document if, how and how often telehealth services might provide an opportunity for care plan that blend traditional and western knowledge, and are more responsive as a result of local advocacy. Comments from the working group: The working group recommended that the term traditional medicine should be used instead of the word holistic health. We used the word holistic because the elders we worked with used this word.

**Recommendation 3. The development of telehealth interventions should consider modalities beyond video-conferencing and real time consultations**

Our literature review documented opportunities to use telehealth for a) triage, diagnosis and referral; b) chronic disease management; and c) mental health. The literature reflects a possible overemphasis on video-conference and real time consults. Additional research is required to determine the most appropriate modalities for specific applications. This includes exploring the potential of tele-homecare options in communities served by a Health Office, Health Station or Health Centre and the use of asynchronous communication.

**Comments from the Working Group:** The working group was concerned that the deployment of telehealth options may result in other services being withdrawn. They wanted to be clear that telehealth should supplement and enhance existing services, not replace them.

**Recommendation 4: Telehealth must integrate into local health services**

The community-based primary healthcare system is an asset on which to build. This resource is however already somewhat stretched. The feasibility and benefits of providing telemental health services to patients and providers have been demonstrated repeatedly in this country and abroad, but as with many other telehealth applications, its economic

\(^1\) Lavoie et al. (2007), op. cit.
impact remains to be shown. This is largely due to the fact that the services still are not fully imbedded in the daily care processes, and cannot therefore be properly assessed within a regular budgetary framework. We found no study documenting the impact of telehealth on the community-based workforce in First Nations communities. Given the context reported in Section 2, this is seen as particularly important.

Comments from the Working Group: The working group commented that communities currently have some links but few connections. While working group members supported the idea that telehealth should integrate into local health services, they also pointed out to the potential for telehealth to link First Nations communities nationally. A large part of the success of telehealth implementation requires comfortable, competent and confident use of this technology in the communities. A working group member suggested that communities start using existing technology in non-formal ways, to improve the comfort and use of the technology from the community end. This may be the vehicle to provide a certification for First Nations users (ehealth operators).

Working group participants were clear that continued discussions will be required at the province-wide, the regional and the local levels to ensure the successful implementation of telehealth in BC First Nations communities.

Some discussions are policy related. For example, the working group raised issues related to firewalls used by the Health Authorities that prevent First Nations telehealth networks from integrating into the provincial telehealth network. An example provided was that of electronic medical records (EMRs). As the system currently stands, EMRs (where they exist) cannot be accessed by providers working in First Nations communities, because of firewalls. This reduces the ability to deliver high quality care. Solutions are required to address lack of access to information at the community level, and the discontinuity that exists between on-reserve and provincial providers. The message was that EMRs should be accessible wherever the EMRs are, wherever the patient is, and wherever the provider is located. Another example includes payment mechanisms for physicians which currently do not enable reimbursement for the full range of telehealth services. These issues must be addressed at a BC-wide level.

Some discussions are regional in nature and include clarifying relationships between Health Authorities, other providers and First Nations communities.

Community-specific discussions must also take place, to help clarify values, priorities, and an implementation process that provide opportunities for communities to raise their level of comfort with the technology, and integrate telehealth services into existing programs.

6.3 The Need for Further Research

The result of this study points out to many gaps in knowledge, and for the need for further research. Keys questions include:

Integration of telehealth interventions into local processes of care: How have telehealth interventions integrated into local processes of care? What facilitate integration, what may be barriers? Are integrated telehealth interventions more sustainable, are they liked to better quality of care?

Integrations of local assets (traditional knowledge, traditional medicine and family) into Telehealth-delivered
Care: Is telehealth providing the opportunity to include local assets in the care process and care plan. How is this done? Are there enablers, barriers? Does this lead to culturally safer care? Better outcomes?

Telehomecare, chronic disease management, telemental health: Have telehealth initiatives in these areas yielded results, both in terms of safer care and better outcomes?

What modalities, beyond videoconferencing, may be used in First Nations communities, to improve access to care?

6.4 Final Words

First Nations face considerable challenges in accessing appropriate care. A key issue resides with the complement of on-reserve health programs funded by FNIHB, especially in communities that are not served by Nursing Stations. This results in avoidable hospitalizations, and increased health care costs for the provinces, that could be avoided at least to some extent with improved local access to secondary and tertiary prevention (Lavoie, 2008).

Telehealth provides an opportunity to address some of these issues. Arguing for the deployment of telehealth in First Nations communities is challenging. It remains however important to recognize that telehealth will realize its full potential as an intervention if, and only if shortcomings in the financing of on-reserve health service programs are addressed. Researchers and practitioners working to promote telehealth in the First Nations environment need to take a whole system approach when assessing the potential health gains to be accomplished. Shortcomings to the system itself should not be attributed to telehealth. And shortcoming to this system will not be resolved by telehealth. Both strategies are important, and must be pursued concurrently in order to improve outcomes for First Nations.
## Appendix 1: Results of the Systematic Literature Review

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<tr>
<th>AUTHOR</th>
<th>E-HEALTH MODALITY</th>
<th>POP</th>
<th>FOCUS</th>
<th>DESIGN</th>
<th>SELECTED FINDINGS APPLICABLE TO THE FIRST NATIONS CONTEXT</th>
<th>LIMITATIONS</th>
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| 1. Hailey et al. (2005) | All E-Health | All residents of Nunavut, Canada, primarily Inuit | Allied health professions. Policy. | Secondary analysis of survey and utilization data from Government of Nunavut. | • Licensing was a challenge as a number of AHP are not regulated in Nunavut. The original policy was modified to state those providing telehealth services must be licensed and in good standing with the licensing body.  
• Medical liability was changed to include advice about the nature of informed consent. General medical negligence was modified to require AHP’s to exercise the degree of care and skill that could reasonably be expected of a normal prudent AHP of the same experience and standing. | Context specific results |
| 2. Jin et al. (2004) | Videoconferencing Store-and-forward | 22 First Nations communities in British Columbia, Canada | Diabetes | Evaluation of a mobile clinic. Satisfaction survey completed by 396 patients out of 402. 25 clinics were held at 22 sites, examining 339 clients with diabetes. | • Exit surveys showed high levels of client satisfaction. Mean cost per client (Cdn dollars 1,231) was less than for the alternative, transporting clients to care in the nearest cities (Cdn dollars 1,437).  
• 96% of patients reported being satisfied.  
• The mobile clinic is cost-effective and improves access to the recommended standard of diabetes care. | Pilot project implemented over a limited time frame. |
| 3. Johnston et al. (2003) | Videoconferencing | One rural community and one First Nations community in British Columbia, Canada. | Primary health care | Feasibility and usefulness of a videoconference link. Survey of professionals using the equipment, and assessment of the total number of videoconference hours logged. Only 9 videoconferences took place, and only 8 of them had a patient present. | • The primary health care professionals participating in the project rated it as a positive experience overall.  
• Health care providers felt that the ability to link with specialist colleagues via teleconferencing resulted in a sense of improved quality of care. The videoconferencing link was rarely utilized, so the service was not cost-effective. | Services rarely used because of design issues. Very limited data to draw from. |
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<td>4. Jong et al. (2004)</td>
<td>Videoconferencing, Email</td>
<td>Three rural communities in Newfoundland/Labrador, Canada.</td>
<td>Intervention study: comparison of three interventions: a) visiting rheumatologist clinics (8 weekly visiting clinics); b) email access to a rheumatologist (response time within 24 hrs, number of weeks not mentioned); and c) scheduled videoconference (one monthly).</td>
<td>• All general practitioners responded positively, to all interventions. They were most satisfied with the videoconferencing, which was preferred to visiting clinics and email follow-up. Video-conferencing provided an opportunity for immediate feedback to referring physician and patient, effective case based learning and transfer of knowledge, and improved accessibility. • The set-up for the videoconferencing was quite unique because it allowed for physicians other than the referring physician to participate and acquire knowledge (CME). This was not the case for other types of intervention. Still, the synchronous nature of the videoconferencing and the immediate feedback it provides was preferred.</td>
<td>Limited numbers of general practitioners and patients limits the generalizability of the study.</td>
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<td>5. Jong (2004)</td>
<td>Videoconferencing</td>
<td>Nain, Labrador, Canada.</td>
<td>Suicide prevention</td>
<td>Pilot project, cost comparison study between sending patients out for suicide prevention care, and providing psychiatric care via videoconferencing.</td>
<td>• The use of videoconferencing for mental health assessment for 71 patients in a remote northern community saved the Government of Newfoundland and Labrador $140,088. • Patients and health professionals were satisfied with mental health assessment via videoconference. • The provision of mental health assessments for patients in a remote community in Labrador, Canada by videoconference was found to be effective.</td>
<td>Cost-effective analysis is context specific.</td>
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<td>6. Miller et al. (2002)</td>
<td>Videoconferencing</td>
<td>Three northern (including Métis and First Nations) communities in Saskatchewan, Canada.</td>
<td>Pediatric surgery consults</td>
<td>Document the experience and patient satisfaction of providing pediatric surgery consults and follow up appointments to remote locations via videoconference.</td>
<td>• Of the surveys returned, 100% indicated that they would participate again and would recommend it to others. • The 17 families who did not complete surveys may not have been as satisfied as this report suggests. • The provider reported that the organizational structure was generally satisfactory and efficient with only minor technical problems. • The authors argue that the provision of pediatric surgery follow up is an effective way to provide services, and cost efficient for patients.</td>
<td>Limited numbers of general practitioners and patients limits the generalizability of the study.</td>
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| 7. Parker et al. (2000)| Videoconferencing  | 30 First Nations work sites in Alberta, Canada.                      | Skill development training for Community Health Representatives.    | Pilot of videoconferencing for skill development training among Aboriginal health promotion professionals. | • The outcomes of this project demonstrate the importance of formative evaluation practices and the need to re-examine assumptions about internet based learning opportunities.  
  • Multiple anticipated and unanticipated barriers were encountered included limited technological literacy, lack of technical assistance, no or limited access to a computer.  
  • Hierarchical relationships in health care must be considered when implementing technological solutions.  
  • Support from the Band Council and community is essential.  
  • Proactive support is essential. | Although this study may not be generalizable, it provides pragmatic insights. |
| 8. Virani et al. (2006)| Store-and-forward  | First Nations people with known diabetes, in 44 First Nations communities, Alberta, Canada. | Diabetes                                                              | Intervention study of a screening portable laboratory in Aboriginal communities, providing education and follow-up care and self-care. | • The SLICK project is designed to address the impact of diabetes by utilizing evidence-based Clinical Practice Guidelines with respect to screening for complications at the community level.  
  • Results of the project include improved clinical outcomes (decreased number of visits to a doctor, decreased number of hospitalization, decreased number of visits to the ER, increased knowledge), when compared to baseline (6-12 month follow-up). | Based on clients that are volunteer participants, thus possible selection bias. Follow-up occurred a short time after implementation (6-12 months). |
| 9. Health Canada (2005f)| Videoconferencing  | Expansion of telehealth from 14 to 78 sites, including 28 First Nations communities in northern western Ontario, Canada. | Clinical, administrative and education, activities                   | Summative evaluation of the NORTH Network, northern Ontario Telecommunication Health Network’s expansion including 28 Kewaytinook Okimakinak Telemedicine sites (First Nations). | • The project documented patient satisfaction (96%, N=3,935). This was reported by First Nations patients as well (N not provided).  
  • A total of 2,392 individuals participated in 67 NORTH-Network accredited Continuing Professional Development events.  
  • Implementation required adaptation of information and processes to fit the First Nations context, where coordinators are generally not nurses and are not supported by a hospital infrastructure.  
  • Key success outcomes included monthly consults at all First Nations sites, securing access to a Help Desk service, and receipt of bridge funding. | Kewaytinook Okimakinak Telemedicine sites were set up without guarantee of secure funding. Health Canada provided bridge funding to ensure continued services. Secure funding still an issue. |
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| 12. Health Canada (2003a)    | Videoconferencing | Communities in BC and Yukon, Canada, including Aboriginal communities. | Mental health          | Summative evaluation of a multipoint videoconference to clinical, educational, administrative activities in the area of mental health. | • Both patients (N=509) and providers (N not provided) reported being satisfied (97%).  
  • Still some providers reported that videoconference consultations fail to provide the same quality of information (compared with face-to-face where changes in facial coloring, information garnered during home visits, etc).  
  • Overall, professionals from 9 professions (nurses, addiction clinicians and physicians) reported being satisfied with various aspects of distance education opportunities (N=681).  
  • Training and support for professionals in the areas of management of secure and private information, presentation and interviewing skills adapted for videoconferencing is needed.  
  • Technical support to communities is also important.  
  • Supply of psychiatrist and other professionals limits opportunities for expansion.  
  • Continued funding was secured only for educational opportunities. | Clinical activities included only 7 Aboriginal participants. Despite the significant sample size, statistical analyses were not attempted. |
| 13. Health Canada (2005g)    |                   |                                                  |                        |                                                                     |                                                                                                                     |                                                                            |
| 14. CRAiHNR (2006a)          | Videoconferencing | 19 First Nations communities in the Sioux Lookout region, Ontario, Canada. | Clinical, administrative and education, activities | Summative evaluation of the expansion from 5 to 19 communities, 2003 to 2006. | • From April 2003 to Dec 2005, KO provided an average of 128 consultations/month. Clinical consultations comprised 42% of the sessions, followed by education (19%), administrative meetings (13%) and demonstration/systems/family visits (8%).  
  • Locally recruited Community Telehealth Coordinators were instrumental in promoting the services, and bridging cultural and language gaps. | Most comprehensive study. |
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| 15. Health Canada First Nations and Inuit Health Branch (2001) | Videoconferencing | Five First Nations communities located in 5 different provinces, utilizing telehealth services, Canada. | Clinical, administrative and education, activities | Formative evaluation of a pilot study implemented in 5 First Nations communities. | • Patients and providers reported being satisfied with the quality of the telehealth sessions. Not all consults prevented travel.  
• Concerns were expressed that telehealth might compete with other programs for resources.  
• Most specialists were comfortable with the quality of clinical care provided via telehealth. General practitioners were less comfortable, partly due to less telehealth experience.  
• An estimated 3220 sessions per year is required for the network to break even in investments vs cost savings. | Short lived pilot study, with no opportunities for sustainable funding thereafter. Findings are limited, and focused on implementation challenges. |
| 16. Ho et al. (2004) | All | 9 First Nations communities, British Columbia, Canada. | Community readiness and acceptability | Survey using convenience sampling in 9 communities (N=38) to document health services access, travel times, and telehealth readiness; interviews with key informants (N=21) and focus groups (N=9, one for each community). | • Community readiness was found to be more complex than generally acknowledged, and include a series of factors including technological capacity, but also socio-cultural, geographical, policy and cost factors.  
• Findings also suggested that geographical accessibility to services did not guarantee cultural accessibility. | Since telehealth services were not yet available in the 9 communities studied, the perspectives expressed are based on impressions rather than experience. |
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| 17. Health Canada (2005d)            | Videoconferencing | All of Manitoba, Canada, including several First Nations communities. | Clinical, administrative and education, activities | Summative evaluation of a CHIPP pilot study. | • The breath of implementation created challenges.  
• Resistance was encountered by some clinicians and clinic staff; lack of clinic staff created delays.  
• Challenges were encountered in the use of diagnostic imaging (store-and-forward) related to staff turnover/shortage, sustainability, and training needs.                                                                 | Report produced for the CHIPP program, very limited in scope and length, and does not address issues related to First Nations.                                                                                                                                   |
• Establishment of cross-jurisdictional processes.  
• Increased utilization of telehealth for clinical and educational services is seen as a positive outcome.                                                                 | Findings appear to speak to more than the data collected.                                                                                                                                                                                                           |
| 19. Health Canada (2005b)            | Videoconferencing | 15 Inuit communities, Nunavut, Canada. | Clinical, administrative and education, activities | Summative evaluation of the CHIPP project. | • The main impact of the project was to increase access to primary health care and to training opportunities.                                                                 | The project became operational March 2003. Findings are based on 6 months of operation and are therefore limited.                                                                                                                                                         |
| 20. Health Canada (2005a)            | Videoconferencing | Communities in the Témiscamingue area, including 1 First Nation community, Quebec, Canada. | Clinical activities. | Summative evaluation of the CHIPP project. | • Clinical services were implemented in the community of Winneway. Telehealth consultations have integrated into the local health services. Providers and patients have expressed satisfaction.  
• Access to services has improved fourfold.  
• Emergency services remain to be implemented.  
• The project was rolled into an Aboriginal Health Transition Fund Project First Nations of Quebec and Labrador Health and Social Services Commission, (2009). Regional AHTF review meeting. The Rising Sun Summer 2009. | The project encountered 18 months delay, therefore results are reported based on slightly less than one year of operation.                                                                                                                                          |
<p>| 21. Health Canada (2005i)            | Videoconferencing | 9 communities, including 3 First Nations communities, Yukon, Canada. | Clinical, digital imaging (x-ray), telefamily-visit | Summative evaluation of the CHIPP project. | • Accessibility of equipment is a key to adoption. Where possible, telehealth equipment should be located close to the users area of work.                                                                 | Few clinical sessions were conducted.                                                                                                                                                                                                                                    |</p>
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• Monthly psychiatric services from Vancouver were not implemented because of a lack of interest from the practitioners. | Delays were incurred in the implementation of the project. Therefore findings are quite limited. |
• 118 individuals were screened by ophthalmic technicians.  
• Images were compared to original, TIFF images for accuracy: ophthalmic surgeons concluded that images produced through the tele-ophthalmology were adequate for triage but less appropriate for diagnosis. | Very good study. |
| 24. Shore et al. (2005) | Videoconferencing | Indigenous communities, remote communities, Alaska, USA | Telepsychiatry to American Indians veterans with a history of PTSD and comorbid conditions including alcohol and drug issues. | Implementation and evaluation of a 6 step intervention to increase local access to telepsychiatric consults. Clinic one During first 36 mos – 452 telehealth clinic interactions: 38 new patient intakes, 282 individual sessions | • Timeline in implementation varied considerably based on the participation of the local organisations.  
• The lack of resources (no pharmacy onsite, lack of substance abuse treatment centre in the community) was raised as an obstacle.  
• Multiorganizational collaboration was found critical to designing and implementing the clinics. Implementation required additional personnel and seeking multiple approvals for implementation and changes. | The model failed to address economic factors involved in rural telepsychiatry. |
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<td>(about 50% therapy/case management, 50% medication management), and 164 group sessions = 623 patient encounters. Clinic two – for 18 mos. 314 telehealth interactions: 245 individual session (about 50% therapy/case management, 50% medication management), 54 group session = 437 patient encounters.</td>
<td>• In satisfaction survey of 19 first-time patient users, 100% were generally satisfied with the consultation, had no difficulty communicating with the doctor and were confident in the advice given. • None would have preferred travelling to the specialist appointment over the teleconsult.</td>
<td>It was noted that cost studies are missing in telepsychiatry specifically and telemedicine in general.</td>
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<td>Cornish et al. (2003)</td>
<td>Videoconferencing</td>
<td>Central-East region of Newfoundland, Canada.</td>
<td>Interdisciplinary mental health training and support to health professionals</td>
<td>Five urban mental health professionals from three disciplines provided training and support via video-satellite and internet, print and video resources to 34</td>
<td>• Satisfaction with the video-satellite presentations was high and stable, with the exception of one session when signal quality was very poor. • Rural participants were most satisfied with opportunities for interaction and least satisfied with the variable quality of the video transmission signal.</td>
<td>High staff turnover among rural professionals resulted in insufficient power to permit statistical analysis.</td>
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<td>Curran et al. (1998)</td>
<td>Videconferencing</td>
<td>Rural and remote communities of Labrador, Canada.</td>
<td>Psycho-social support to women diagnosed with breast cancer.</td>
<td>Evaluation of a short term pilot project. Satisfaction was assessed with a questionnaire to 50 participants through regional volunteers. Dimensions explored included age, education, community size and breast cancer experience; their level of satisfaction with the technology, the program format and delivery options, and the presence of certain therapeutic elements common to face-to-face support groups; their opinions regarding time and day of program delivery and design of the sessions and their preferences for the facilitation; and invited comments on participants’ perceptions of the advantages and disadvantages of the program and the use of audio teleconferencing for a self-help support network at a distance. Seventeen respondents returned surveys, for a</td>
<td>• Positive reports of the project impact included expanded knowledge and heightened sensitivity to mental health issues, increased cross-disciplinary connections, and greater cohesion among professionals.</td>
<td>Although the study reports a response rate of 34%, the authors acknowledged that the number of questionnaires distributed (50) was an estimate, thus the response rate may have been higher or lower. Self-selection is an obvious bias.</td>
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- Positive reports of the project impact included expanded knowledge and heightened sensitivity to mental health issues, increased cross-disciplinary connections, and greater cohesion among professionals.
- A large majority strongly agreed or agreed that the teleconferencing sessions addressed their need for social support and information on breast cancer. Many indicated strong interest in attending future teleconferencing sessions and strongly agreed that it would be important for the teleconferencing sessions to continue.
- Many respondents commented that the program made them feel “not alone”. Others noted that the program offered an opportunity “to share and hear the experiences of others.”
- Several responses concerning the audio teleconferencing technology suggest that the participants were satisfied with its use and that the technology itself was not a deterrent or inhibiting factor for this self-help support network.
- Disadvantages mentioned included that “the sessions were too short to allow everyone to talk.” One participant noted that she was “reluctant to speak due to unfamiliarity with the equipment.” One woman suggested that the “lack of follow-up support and face-to-face interaction” was a disadvantage.
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<td>28. Davis et al. (2001b)</td>
<td>Rural Canada</td>
<td>Rural communities in Alberta (Edmonton and High Prairie (pop. 2900))</td>
<td>Rheumatology consults</td>
<td>Evaluation of cost effectiveness, and acceptability of a tele-rheumatology clinic. Six telehealth clinics were organized between a rural health centre and the specialist rheumatology centre, which was about a 4 h drive away. Fifty-two new patients were seen. Their median age was 54 years (range 7-81 years). After the teleconsultation, no patient required a conventional face-to-face consultation. Apart from accessibility to specialist consultation, the greatest benefit was improved communication among patient, referring physician, and consultant. The process was determined to be efficient in both time and cost savings.</td>
<td>• Patients agreed that teleconsultation met their needs and care was as good as conventional care; 13 patients stated that if teleconsult had not been available they would not have bothered with a consultation. • Improved access to specialists for patients and referring physician, cost-effective, time efficient. • Three way communications between physician, patient, and specialist allows valuable continuing medical education experience: upgrading skills, improving knowledge, attitudes and judgement. • Consultants need to have confidence in the referring physician as they are interpreting findings and relaying those to the specialist. • Some patients are intimidated by the technology while others were intimidated by this type of consultation; potential insecurity of the process on the part of both physicians and patients.</td>
<td>Effectiveness of the consult was not assessed. The number of general practitioner involved was 2, making generalizeability quite limited.</td>
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<td>29. Davis et al. (2001a)</td>
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<td>30. Dick et al. (1999)</td>
<td>Videoconferencing</td>
<td>A rural community (Thunder Bay) in Ontario, Canada was linked to Toronto.</td>
<td>Telepediatric consults.</td>
<td>140 children at a rural site were seen during an evaluative trial of telemedicine consultations (TMC). The TMC visit was the initial encounter with the tertiary care specialist for 31 children. After consultation, each family was asked to complete an anonymous quality management survey that asked for estimates of cost savings and assessed their level of comfort.</td>
<td>• 104 of the 140 (74%) families responded. • Mean patient estimated cost savings was $1,318+/−677. The highest level of comfort was noted by 58% of respondents before TMC and by 77% after (P = .005). • On a 5-point scale, 71% scored 5 (completely satisfied). None scored less than 3. • The independent statistically significant predictors of satisfaction were concerns about privacy, comfort with the camera, and perceived specialist comfort.</td>
<td>The questionnaire used was not tested for reliability, discrimination or validity. As well, the perspective of the children involved was not systematically sought (and may or may not have been reflected by the parent).</td>
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<td>31. Elford et al. (2001)</td>
<td>Videoconferencing</td>
<td>Link between a rural community (Corner Brook) in Newfoundland, Canada to an urban centre.</td>
<td>Child psychiatry consults provided through a personal computer video-conferencing.</td>
<td>Twenty-three patients (aged 4-16 years), accompanied by their parents, completed two psychiatric assessments, one via videoconferencing and another face to face (FTF). The order of assessments was randomized. Questionnaires were used to record the diagnosis, treatment recommendations and the psychiatrists', patients' and their parents' satisfaction with each assessment. An independent evaluator concluded that in 22 cases (96%) the diagnosis and treatment recommendations made via the videoconferencing system were the same as those made FTF.</td>
<td>• The psychiatrists stated that videoconferencing assessments were an adequate alternative to face-to-face (FTF) assessments and did not interfere with diagnosis. Diagnoses provided via videoconferencing were independently verified and found accurate in 22 out of 23 cases. • The responses from the psychiatrist satisfaction questionnaire showed that they preferred FTF assessments. • No significant difference was found in the patients' or parents' satisfaction responses after the two types of assessment. The majority of children (82%) 'liked' using the telepsychiatry system and six (26%) preferred it to a FTF assessment. • Most parents (91%) indicated that they would prefer to use the videoconferencing system than to travel a long distance to see a psychiatrist in person.</td>
<td>The study did not further investigate the basis for psychiatrist's preference for FTF consults.</td>
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<td>32. Elford et al. (2001)</td>
<td>Videoconferencing</td>
<td>Link between a rural community (Corner Brook) in Newfoundland, Canada to an urban centre.</td>
<td>Child psychiatry consults provided through a personal computer video-conferencing.</td>
<td>Summative evaluation of a PC-based videoconferencing system used for child psychiatry assessments. Evaluation components included user satisfaction and a cost analysis. Thirty patients (aged 5-16 years), accompanied by a parent, completed a psychiatric assessment using the videoconferencing system. One of five child psychiatrists was randomly assigned to each assessment. Satisfaction questionnaires were</td>
<td>• The psychiatrists stated being 'very satisfied' or 'satisfied' with the telepsychiatry assessments. • All 30 parents (100%) and children stated that they 'liked' the telepsychiatry assessment and would use the system again. Twenty-nine parents (97%) indicated that they would prefer to use the telepsychiatry system to travelling to see a child psychiatrist in person. • Five out of nine children (56%) stated they liked the 'television doctor' better than the 'real' doctor; four said they had no preference.</td>
<td>The generalizability of the cost analysis is limited by a lack of detail, and unclear disclosure of the time frame.</td>
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<td>completed after each assessment by the psychiatrist, patient and parent. Parents also completed a cost questionnaire.</td>
<td>Nineteen adolescents (aged 13-16 years) participated and most were very satisfied or satisfied with the system. Seventeen of the 19 adolescents (89%) said they would prefer to see the psychiatrist on the videoconferencing system to travelling for an assessment, and the same number said that they would use telepsychiatry again.</td>
<td>Single case study. No comparison.</td>
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<td>33. Goldfield et al. (2003)</td>
<td>Videoconferencing</td>
<td>Rural Ontario, Canada.</td>
<td>Family therapy</td>
<td>Family therapy was delivered via telehealth in a therapeutic environment within a hospital setting, and was received in a telehealth facility in the rural community.</td>
<td>Family therapy was effectively delivered and contributed to patient recovery, as measured by objective criteria (weight gain, improved medical condition) and subjective clinical observations.</td>
<td>Validation of the literature review provided above.</td>
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<td>34. Jennett et al. (2003a)</td>
<td>All</td>
<td>Rural community, Canada.</td>
<td>Readiness of a rural community.</td>
<td>Sixteen semistructured telephone interviews (three to five in each domain) were carried out with key informants and recorded on audio-tape. Two community awareness sessions were held, which were followed by five audio-taped focus groups (with five to eight people in each) in the practitioner, patient and public domains. In addition, two in-depth interviews were conducted with community physicians.</td>
<td>There were six main themes: core readiness; structural readiness; projection of benefits; assessment of risk; awareness and education; and intra-group and inter-group dynamics.</td>
<td>Validation of the literature review provided above.</td>
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<td>35. Jennett et al. (2005)</td>
<td>All</td>
<td>Rural communitie s (less than 10,000), Canada.</td>
<td>Examination of telehealth readiness from an organizational perspective, focusing on four domains: namely, patients, practitioners, the public, and organization.</td>
<td>Qualitative phenomenological research approach, using semi-structured telephone interviews with four key informants (respondents).</td>
<td>- The data identified four categories of readiness in an organizational setting: core readiness, engagement, structural readiness, and nonreadiness. &lt;br&gt;• Core readiness: realization of needs and expressed dissatisfaction with the present situation and conditions. &lt;br&gt;• Engagement: active participation of people in the idea of telehealth. &lt;br&gt;• Structural readiness: establishment of efficient structures as a foundation for successful telehealth projects with an organization, for example, human, technical, training, policy and funding. &lt;br&gt;• Nonreadiness; perceived lack of a need or a failure to recognize a need for change and implementation of telehealth technology. &lt;br&gt;• Perceived risks and proposed solutions: telehealth is perceived as risky because of lengthy timelines, lag time for results to appear.</td>
<td>The study report includes no information on how the four key informants were selected. Given the sample size and the weight given to these opinions, this is an important limitation.</td>
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<td>36. Linassi et al. (2005)</td>
<td>Videoconferencing</td>
<td>Rural communities of north central Saskatchewan, with significant Aboriginal population.</td>
<td>User satisfaction of telemedicine assessment after amputee-related diagnosis</td>
<td>A group of 15 patients with amputee-related diagnoses were given a satisfaction survey after telemedicine assessment. Most of the videoconferencing sessions used an IP connection at 768 kbit/s. The patients were seen at four sites. The average connection time was less than 5 min and the average time for a session was approximately 40 min. Thirteen questions required scaled responses (poor, fair, good, excellent) and two required yes/no answers. The 13 categories broadly related to satisfaction with the telemedicine</td>
<td>In all categories approx. 97% of the respondents feel in the good to excellent range for telecons ults. &lt;br&gt;• Concerns were raised about ease of access to local telemedicine sites, connection waiting times and lack of familiarity with telemedicine technology. &lt;br&gt;• All stated they would use telemedicine again and would recommend it to another person. &lt;br&gt;• Other comments supported its continued use due to avoiding travel and money saved.</td>
<td>The sample size was small, therefore caution should be used in interpreting the findings.</td>
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<td>37. Moehr et al. (2006)</td>
<td>Videoconferencing</td>
<td>Rural communities in British Columbia, Canada.</td>
<td>Summative evaluation</td>
<td>Evaluation of a comprehensive telehealth project including two domains of clinical applications, as well as educational and administrative uses, and the project environment. The evaluation had to be carried out under severe budgetary and time constraints. We therefore deliberately chose a broad ranging exploratory approach within a framework provided, and generated questions to be answered on the basis of initial observations and participant driven interviews with progressively more focused and detailed data gathering, including perusal of a variety of existing data sources. A unique feature was an economic evaluation using static simulation models.</td>
<td>• The factors contributing to success include: Focus on chronic conditions which require visual information for proper management. • Involvement of established teams in regular scheduled visits or in sessions scheduled well in advance. • Problems arose with: Ad hoc applications, in particular under emergency conditions. • Applications that disregard established referral patterns. • Applications that support only part of a unit’s services. The latter leads to the service mismatch dilemma (SMMD) with the end result that even those e-health services provided are not used. • The problems encountered were compounded by issues arising from the manner in which the telehealth services had been introduced, in particular the lack of time for preparation and establishment of routine use. • Educational applications had significant clinical benefits. • Administrative applications generated savings which exceeded the substantial capital investment and made educational and clinical applications available at variable cost.</td>
<td>The design is exploratory, therefore caution should be used in interpretation.</td>
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<td>38. O’Reilly et al. (2007)</td>
<td>Videoconferencing</td>
<td>Ontario, Canada.</td>
<td>Telepsychiatric services.</td>
<td>A total of 495 patients in Ontario, Canada, referred by their family physician for psychiatric consultation were randomly assigned to be examined face to face (N=254) or by telepsychiatry (N=241). The treating psychiatrists had the option of providing monthly follow-up appointments.</td>
<td>• Psychiatric consultation and follow-up delivered by telepsychiatry produced clinical outcomes that were equivalent to those achieved when the service was provided face to face. • Patients in the two groups expressed similar levels of satisfaction with service. An analysis limited to the cost of providing the clinical service indicated that telepsychiatry was at least 10% less expensive per patient than service provided face to face.</td>
<td>It is unclear from this article whether there was any provision of services to the outlying rural communities.</td>
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<td>Persaud et al. (2005)</td>
<td>Videoconferencing</td>
<td>Nova Scotia, Canada</td>
<td>Cost analysis</td>
<td>Incremental cost analysis comparing telehealth with face-to-face consults. 215 questionnaires completed by patients (47% completion: 129 FTF, 86 teleconsults), 135 by specialist physicians (30% completion) and 8 by telehealth site and regional coordinators (100%). A) Fixed costs were equipment and telecommunication lines; b) variable costs for patients; c) specialist physician costs were calculated by wages plus an additional 16% to include costs associated with benefits and pensions and this figure was then reduces to a wage per minute; d) communication costs was a call charge multiplied by the average duration for each consult plus adjusted by the average of on technical problem (one per 3.5 consults) and the average troubleshooting time (7.2 minutes).</td>
<td>• Psychiatric consultation and follow-up delivered by telepsychiatry produced clinical outcomes that were equivalent to those achieved when the service was provided face to face. • Patients in the two groups expressed similar levels of satisfaction with service. An analysis limited to the cost of providing the clinical service indicated that telepsychiatry was at least 10% less expensive per patient than service provided face to face.</td>
<td>It is unclear from this article whether there was any provision of services to the outlying rural communities.</td>
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<td>Saqui et al. (2007)</td>
<td>Videoconferencing</td>
<td>Rural northern Ontario, Canada</td>
<td>Home parenteral nutrition</td>
<td>49 HPN patients in the program, 26 living in remote areas and only 21 that had the technology (81 VC since 2002 of which 73% were routine</td>
<td>• Return rate 11/13 — 84.6% • All patients generally satisfied with VC as alternate communication and care for new consultation, patient and family education, and follow-up</td>
<td>The selection criteria is not explained.</td>
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| 41.    | Videoconferencing | Rural British Columbia, Canada. | Clinical support for maternal/child, nursing and health education, administrative meetings and family visits. | Operating costs were computed by type of session (clinical, educational, admin regional meeting, admin NHA/Prince George meetings, NHA/Vancouver. Costs consisted of: scheduling fee, telephone charges, bridging fees and coordinators time at participating sites. | - Time and travel cost savings were substantial i.e. patient in Ft Frances (8315 pop.) would spend $724 for flight, accommodation, taxis and meals to meet with the team in Toronto.  
- Compared to her 14 km drive to a NORTH network site in her community — cost: $7 for parking and gas. | The selection criteria is not explained. |
| 42.    | Videoconferencing | Rural community in British Columbia, Canada. | Needs assessment for a tele-health link between a local community and a tertiary-care medical center | The assessment was conducted using multiple focus groups in a remote community and at a tertiary-care pediatric and women’s medical center. Participants were physicians and allied health professionals at both sites and the parents of pediatric patients. Data were analyzed for comment categories and thematic items. | - The focus groups revealed a number of important positive and negative attitudes regarding telehealth and priorities for implementation.  
- Uncertainty and trust were two themes that emerged from all groups.  
- The resulting design of the telehealth program incorporated these responses. | Recruitment issues were noted, and participation was 50% of what was anticipated. |
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| Simpson et al. (2001b)  | Videoconferencing | Rural Alberta, Canada | Patient perspectives of a routine telepsychiatry service | 379 questionnaires given to patients 230 returned. 31 follow-up interviews by telephone. Of 379 questionnaires distributed to patients, 230 (61%) were returned. Of the patients who completed questionnaires, 89% reported being satisfied with the service and 96-99% were satisfied with the equipment and the room. | - Twenty-nine of 31 patients who were interviewed by telephone preferred telepsychiatry to waiting for a consultation, were willing to use the service again and would recommend telepsychiatry to a friend.  
- While 25 of these 31 patients preferred telepsychiatry to travelling to a consultation, 15 indicated that they would prefer a face-to-face interview to telepsychiatry and a further seven were unsure.  
- Twenty-three of the 31 patients interviewed would have had to miss time from work or pay for child care in order to travel to a conventional psychiatric consultation.  
- The availability of telepsychiatry led to an estimated cost saving of $210 per consultation for patients who would otherwise have had to travel. | This is preliminary work. The authors recognize the need to measure outcomes with SF-12 or EuroQol in order to evaluate the quality of telemental health versus the face-to-face consultations. |
| Simpson et al. (2001a)  |                    | Rural Alberta, Canada | Assessment of a routine telepsychiatry service | Survey forms were used to document the perspective of professionals | - Over two years, there were 546 consultations at the five participating general hospitals, although the level of use varied considerably between them.  
- Health professionals expressed high satisfaction with the service.  
- While there were equipment problems in 17% of all consultations in the second year, they did not seem to affect acceptance of the technique.  
- A cost analysis comparing consultations provided by a visiting psychiatrist and telepsychiatry found a break-even point of 348 consultations a year.  
- However, when use of the videoconferencing network for administrative meetings was considered, the break-even point was 224 consultations a year, substantially below the actual utilization of telepsychiatry. Telepsychiatry appeared to result in increased access to community mental health services, suggesting future increased demand for these. | The methodology for assessing health professionals’ satisfaction is not clearly explained. Outcomes were not documented. |
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| 45. Urness et al. (2006) | Videoconferencing       | Rural hospitals in Alberta, Canada | Telepsychiatry   | - Forty-eight of the 62 initial responders (77%) were available for contact by telephone after one month.  
- Telepsychiatry clients demonstrated significant improvements on pre- and post-SF-12 mental health measures ($t = 3.7; P = 0.001$), while there was no change for the in-person group ($t = 1.0; P = 0.35$).  
- Telepsychiatry clients felt that they could present the same information as in person (93%), were satisfied with their session (96%), and were comfortable in their ability to talk (85%); this was similar to the in-person clients.  
- 42% of consumers indicated they would rather use telepsychiatry than see a psychiatrist in person. Authors posited that this may be due to a lessen threat of boundary violations.  
- They reflected slightly lower levels of satisfaction regarding feeling supported and encouraged than did the in-person clients. | Well designed study. |
| 46. Aarnio et al. (2000) | Videoconferencing       | Rural hospitals in Finland.  | Study of realtime videoconferencing for surgery follow-up. | - The equipment functioned well or very well in 96% (48) of the cases; quality of picture was good or very good in 40 of 41 where it was used.  
- Dr.s in the health centres considered the consult useful in 98% of cases (49) and satisfactory in 1; the consult was as reliable as outpatient appointment in 98% of cases; educational benefit of consult for the Dr was excellent in 76% (38).  
- Patient satisfaction overall was very good or good in 96% (45); 45 of 48 had as much confidence in the teleconference decision as in a normal appointment; most found the advice given during the teleconference excellent (23) or good (25);  
- Patients felt they received as much information about their disease as compared with a normal appoint- | No measure of effectiveness was included. |
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<td>Aas</td>
<td>Videoconferencing</td>
<td>Rural Australia, Finland, Norway</td>
<td>Work environment</td>
<td>Qualitative interviews with 30 people in Norway; 94% response rate. 12 telepsychiatry (3 psychiatrist, 1 general practitioner, 3 psychologists, 4 psychiatric nurses and 1 assistant nurse) the median consultations were: 9 telepsychiatry with an average of 80 meetings per month (955/12) of other kinds. All had participated in meetings of other kinds re: admission, follow-up, instructions and cross-professional input. Four had used equipment for administrative meetings. 6 teledermatology (3 dermatologists, 3 general practitioners) the median consultations were 81; average of 192 remote consultations per year. 9 telepathology frozen-section service (4 pathologist, 3 surgeons, 3 lab techs) average 10 consultations per year, they did not use telemedicine for any other use. 2 tele-otolaryngology (1 specialist, 1 general practitioner) participated in an average of 105 consultations per year; they did not use the technology for other Meetings</td>
<td>• Working with telemedicine is tiring and may require redesigning jobs including planning and limiting the telemedical activity per employee. • Benefits – less travel resulting in more time for other activities thus higher productivity, no bad weather travel, new contacts, more confident employees with more readily available professional support, more satisfaction from being able to see those they communicate with. • Several hours in the studio are tiring yet no one reported health problems related to telemedicine work. • Cooperation – technology made it possible to participate in daily and weekly meetings and meet new contacts. • More contact with specialists may give an increased feeling of professional security; also with more cooperation and more employees participating it is likely to increase quality of care. • Fixed schedules and difficulty of scheduling appointments without knowing the other telemedicine studios availability (appointment booked available on the web might help here) • Negatives – tiring and stressful however this may be overcome by limiting the volume of telemedicine per employee and/or distribution of telemedicine work tasks with good systems for planning the activity; • The most common suggestion for improving telemedicine is for respondents to have equipment in their own office which in turn may increase the use of the equipment.</td>
<td>More critical analysis needed : nothing about overtime/ safety issues or diagnosis while tired.</td>
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| 48. Bowater (2001) | Videoconferencing | Rural Australia, Finland, Norway | Provider experience | One orthopaedic group and one ophthalmologist participated in regular linkups | • Pathology observed included: corneal lesions, lens lesions; retinal lesions; skin lesions; cardiac problems; chest lesions and bone lesions. Over 75% of consults avoided travel to Perth  
• Participation in teleconsults improved the general practitioner skills through being the surgeons hands and eyes during examinations and observation.  
• Became able to deal with more common difficult pathologies by self. | Single providers experience. One of very few studies reporting provider skill building as a result of using videoconferencing. |
| 49. Chua et al. (2002) | Videoconferencing | District regional hospitals, Northern Ireland | Outcome differences between teleneurology and face-to-face consults. | In a retrospective review, the telemedical management of 65 outpatients from a randomized controlled trial (RCT) of teleneurology for non-urgent referrals to a consultant neurologist was compared with the management of 76 patients seen face to face in the same trial, with that of 150 outpatients seen in the neurology clinics of district general hospitals and with that of 102 neurological outpatients seen by general physicians. Outcome measures were the numbers of investigations and of patient reviews. | • The teleneurology group did not differ significantly from the 150 patients seen face to face by neurologists in hospital clinics in terms of either the number of investigations or the number of reviews they received.  
• Patients from the RCT seen face to face had significantly fewer investigations but a similar number of reviews to the other 150 patients seen face to face by neurologists.  
• Patients from the RCT seen by teleneurology were not managed significantly differently from those seen face to face by neurologists in hospital clinics but had significantly fewer investigations and follow-ups than those patients managed by general physicians.  
• The results suggest that management of new neurological outpatients by neurologists using teleneurology is similar to that by neurologists using a face-to-face consultation, and is more efficient than management by general physicians. | A limitation of the study was the exclusion of urgent patient referrals. Further, three comparative cohorts are relatively few. Further, referral practices differ from region to region, thus generalizability may be limited. |
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<td>50. D’Souza (2002)</td>
<td>Videoconferencing</td>
<td>Rural New South Wales, Australia.</td>
<td>Mental health intervention</td>
<td>The participants were 51 rural inpatients admitted to a tertiary psychiatric centre. Twenty-four inpatients (13 men, 11 women) were discharged using discharge planning by videoconference involving the general practitioner, case manager and a family member. Patients then received six sessions of the psycho-educational program. A control group of 27 inpatients (16 men, 11 women) were discharged with conventional discharge summaries to general practitioners and case managers and did not receive the psycho-educational program.</td>
<td>• More patients in the control group than in the telemedicine group were readmitted to hospital over a 12-month period. Significantly more patients in the control group reported medication side-effects than those in the telemedicine group. • Patients in the telemedicine group reported greater treatment adherence and compliance than those in the control group. When compared with the control group, the telemedicine group reported significantly more satisfaction with their treatment and discharge planning.</td>
<td>The time frame for this comparative study is quite short, the sample size also quite small. Finally, the response rate was 90% for the study group, and 70% for the control group.</td>
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<td>51. Fahey et al. (2003)</td>
<td>Videoconferencing</td>
<td>Rural New South Wales, Australia</td>
<td>Tele-education program in child mental health for rural allied health workers</td>
<td>The program was delivered in two parts, each consisting of six sessions. Participants were asked to fill an evaluation form after each session. Interviews were also conducted with 16 participants during and after the completion of the program. Finally, two focus groups were conducted.</td>
<td>• Satisfactory retention rates were maintained throughout. • Participants consistently reported increases in knowledge and skills as a result of attending the program. • The project resulted in a high rate of reported changes to practice. • An unanticipated outcome was the value placed on the opportunities for local networking provided by the project for participants.</td>
<td>The study reports a 77% response rate for the evaluation forms (175/227 distributed). The study does not adequately explain how the 16 interviewees were selected.</td>
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<td>52. Fitzgerald et al. (2000)</td>
<td>Videoconferencing</td>
<td>Rural communities in Queensland, Australia.</td>
<td>Monthly series of multidisciplinary case discussions child development</td>
<td>The project provided a forum for clinical discussion of complex cases, peer review, professional development and networking for allied health professionals and pediatricians. Six sites in Queensland participated in the project; each site presented at least one case for discussion. The videoconferences ran for</td>
<td>• The response rate for a questionnaire survey was 71%. • The respondents rated the effectiveness of case summaries and the follow-up newsletter very positively. • Despite some early difficulties with the technical aspects of videoconferencing, the evaluation demonstrated the participants’ satisfaction</td>
<td>Equipment issues created barriers. Although participants assessed the project positively, impact on practice, which was assessed via evaluation questionnaires,</td>
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<td>Gelber et al. (1999)</td>
<td>Videoconferencing</td>
<td>Rural Finland</td>
<td>Teledermatology</td>
<td>Evaluation of the outcome of both realtime teleconsultations and face-to-face consultations in dermatology. Forty-six patients were enrolled in an open controlled study. Twenty-nine patients (60%) answered the questionnaire sent to them after six months. Over the six-month follow-up, similar proportions of the two patient groups had visited a general practitioner or a specialist in the consulting hospital.</td>
<td>• At follow-up, overall patient satisfaction with the consultation, measured on a linear analogue scale (0-10), had fallen only slightly and to the same extent after both types of consultation, that is by 1.2 (SD 3.7) after realtime teleconsultations and by 1.4 (SD 4.5) after face-to-face consultations. • The proportions of patients who would prefer the same mode of consultation for their next appointment had decreased from 83% to 50% in the realtime teleconsultation group and from 83% to 62% in the face-to-face consultation group. • In neither group was the change significant.</td>
<td>Satisfaction was measured without outcomes measures.</td>
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<td>Granlund et al. (2003)</td>
<td>Videoconferencing</td>
<td>Rural Finland</td>
<td>Teledermatology</td>
<td>Evaluation of the outcome of both realtime teleconsultations and face-to-face consultations in dermatology. Forty-six patients were enrolled in an open controlled study. Twenty-nine patients (60%) answered the questionnaire sent to them after six months. Over the six-month follow-up, similar proportions of the two patient groups had visited a general practitioner or a specialist in the consulting hospital.</td>
<td>• At follow-up, overall patient satisfaction with the consultation, measured on a linear analogue scale (0-10), had fallen only slightly and to the same extent after both types of consultation, that is by 1.2 (SD 3.7) after realtime teleconsultations and by 1.4 (SD 4.5) after face-to-face consultations. • The proportions of patients who would prefer the same mode of consultation for their next appointment had decreased from 83% to 50% in the realtime teleconsultation group and from 83% to 62% in the face-to-face consultation group. • In neither group was the change significant.</td>
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<td>55. Greenwood et al. (2004)</td>
<td>Videoconferencing</td>
<td>Rural Australia</td>
<td>Telepsychiatry</td>
<td>Study to evaluate service comprising a face-to-face interview with a psychiatrist followed by a telepsychiatry interview with a Sydney-based psychiatrist. Thirty-one patients were referred to a specialist mood disorder clinic in a rural setting for consultation and assessment. A retrospective evaluation was made to determine the acceptance of the teleconferenced psychiatry and face-to-face psychiatry, as well as the overall patient response. 31 patients who experienced telepsychiatry and who were over the age of 16 were evaluated retrospectively. Twenty participants completed all evaluation components.</td>
<td>next appointment had decreased from 83% to 50% in the realtime teleconsultation group and from 83% to 62% in the face-to-face consultation group. • In neither group was the change significant.</td>
<td>Satisfaction was measured without outcomes measures.</td>
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<td>56. Harno et al. (2006)</td>
<td>Hoem management, store-and-forward</td>
<td>Rural Finland</td>
<td>Home e-health application for Diabetes management</td>
<td>A total of 175 patients with Types 1 and 2 diabetes in primary care and university hospital outpatient departments were randomized into a study group (n = 101) or usual care (n = 74). The study group used an e-health application with a diabetes management</td>
<td>• After 12 months HbA1c decreased significantly in both groups of patients. • The differences were small, but HbA1c was significantly lower in the study group than the controls. • Diastolic blood pressure, fasting plasma glucose,</td>
<td>Very good study.</td>
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<td>serum total cholesterol, serum LDL-cholesterol and serum triglycerides were significantly lower in the study than in the control group. • This was achieved with fewer visits by study patients to doctors and nurses.</td>
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<td>57. Hay-thorn-thwaite (2002)</td>
<td>Videoconferencing</td>
<td>Remote and rural regions of western Australia.</td>
<td>Training for those working with youth at risk, mental health</td>
<td>Evaluation of videoconferencing training for those working with youth at risk. The training program was run twice (in parallel) for two groups of participants: 17 workers (group 1) and 15 workers (group 2). The program consisted of seven 2h sessions presented over 12 weeks. Objectives of the training program centred on increasing participants’ knowledge and confidence in relation to the training topics. The initiative also aimed to enhance consultation between rural youth networks and a metropolitan-based youth mental health service.</td>
<td>• Analyses indicated that there were improvements in workers knowledge and confidence in relation to training topics following participation in the programme. • Comparisons of the improvements made by these rural participants, who accessed training via videoconferencing, and metropolitan participants, who accessed training face to face, revealed few significant differences. • Rural participants reported high levels of satisfaction, decreased feelings of professional isolation. Changes in practice were not documented.</td>
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<td>58. Jaatinen et al. (2002a)</td>
<td>Rural Finland</td>
<td>Teleconsultation for outpatient care.</td>
<td>Randomized case control study of referrals from a primary care centre in Finland. All the consultations and referrals from seven general practitioners (general practitioners) dealt with by internists and surgeons at two hospitals over five months were included. For patients in the control group, a conventional referral letter was sent to the hospital outpatient clinic. For patients in the intervention group, the general practitioners had to decide whether they wanted an electronic consultation with the hospital or wanted to refer the patient (i.e. to trans-</td>
<td>• All the patients treated by teleconsultation said that they wanted the same procedure in future and 63% of the control group said they would prefer a teleconsultation next time. • The doctors quickly learned to exploit the telemedicine model successfully. • The responsibility for treatment was maintained in the health centre in 52% of cases using teleconsultation, without any visit to hospital being required. • The general practitioners and the hospital doctors agreed on the follow-up</td>
<td>Although the study concludes that significant cost savings should be realized, these were not quantified. Some bias were noted at the time of randomization because doctors were not blinded to group selection.</td>
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<td>treatment. • Telereferral increased the possibility of the general practitioner maintaining responsibility for the treatment. • The reduced number of hospital visits in the telemedicine model should produce significant cost savings.</td>
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<td>Although the results are encouraging, the study was relatively small and should be replicated with a larger sample.</td>
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Families living in rural Queensland or New South Wales, Australia.  
Pediatric burns unit consults via email.  
The study investigated whether the parents of burns patients could capture suitable clinical images with a digital camera and add the necessary text information to enable the pediatric burns team to provide follow-up care via email. Four families were involved in the study, each of whom sent regular email consultations for six months.  
• The burns team felt confident that the clinical information in 30 of the 32 email messages (94%) they received was accurate, although in 11 of these 30 cases (37%) they stated that there was room for improvement (the quality was nonetheless adequate for clinical decision making).  
• The study also showed that low-resolution images (average size 37 kByte) were satisfactory for diagnosis.  
• Families were able to participate in the service without intensive training and support.  
• The user survey showed that all four families found it easy and convenient to take the digital photographs and to participate in the study.  

60. Kennedy et al. (2003)  
Rural Queensland, Australia  
Telepsychiatry  
Data were collected from 124 patients attending hospital and general practice facilities for mental health-care and then again at follow-up one year later. Thirty-two of the patients were provided telepsychiatric care. Two health status scales were used to measure effectiveness:  
• There was a significant difference between the initial assessment and follow-up groups on most subscales of the HoNOS, but no significant difference between the face-to-face and telepsychiatry groups.  
• Similarly, the MHI results showed a significant differen-
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|              |                   |                        | the Health of the Nation Outcome Scale (HoNOS) | administered by the practitioners; and the Mental Health Inventory (MHI), which was self-administered by the patients. | • There were few differences between the teledermatology and in-person groups.  
  • The main difference was whether there was any report in the record that the referring clinician took some action based on the consultation with the specialist: there were more reports of action being taken in the teledermatology group than in the in-person group.  
  • Reports of outcomes were found in only 6% and 8% of the records of the teledermatology and in-person groups, respectively. | one patient has a negative outcome and another has a positive outcome. |
| 61. Krupinski et al. (2004) | Store-and-forward teledermatology | Rural communities in Arizona, USA (US-Mexico border) | Retrospectively study of follow-up and outcomes of 50 store-and-forward teledermatology patients, and compared the findings with those from a control group of 50 patients who had been seen in person. Patient records were examined for a six-month period following the initial referral to a dermatologist. Variables examined included medical records from the referral, evidence of actions taken (e.g. biopsy), evidence of follow-up visits, and what (if any) clinical outcomes were noted. | - There were few differences between the face-to-face and telepsychiatry groups.  
  • Individuals who used and did not use telepsychiatry all had improved health outcome scores on the HoNOS and MHI during the study period. | The challenges of assessing outcomes in teledermatology for rural patients include patient loss to follow-up, lack of information in the patient records and low rates of patient return to the referring clinician for follow-up. |
| 62. Lamminen et al. (2000) | Videoconferencing | Rural Finland | 25 patients in 8 months of study (avg age 45). Consults were scheduled every other week at fixed times. Diagnoses were checked 16 months later. Immediately after consult, general practitioner, patient and specialist were asked to complete a questionnaire. | - All patients/parents felt they could communicate well in the teleconsults  
  • 22 stated they would like to participate in this kind of consult in the future.  
  • 24 had trust in VC as a Dr's aid. (3 excellent, 20 good, 1 satisfactory and 1 poor)  
  • General practitioner's state only 2 of 25 would they not have consulted a specialist if the VC was not available. general practitioner rated the consults 10 excellent, 14 good, 1 satisfactory.  
  • The education benefits for general practitioners rated good/excellent in 23 cases; and satisfactory in 2. specialists felt excellent in 18 and | Costs are included in this article however the average time spent travelling one way would be 80 minutes (45–105) to the university hospital. |

77
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<td>Macduff et al. (2001)</td>
<td>Small community in north-eastern Scotland</td>
<td>Nurse-led telemedicine for seniors</td>
<td>Patients, doctors and nurses were asked to complete a questionnaire following video-link sessions. Interviews were also carried out at home with patients, while interviews with nurses and doctors took place in the workplace. Of the 173 consultations with villagers aged over 65, 29 (17 per cent) were conducted by video-link. All those who used this service were sent questionnaires and 18 were returned (62 per cent).</td>
<td>• Seven of the patients who had received one video-link consultation were interviewed in their homes. • All of the patients initially found the videoconsultation experience strange. • Generally, patients found the nurses to have a pivotal role in explaining the service and interpreting their needs. All those interviewed said they would use the service again. • The general practitioners spoke favourably of the service and said that it had saved them time. • The nurses involved were positive about the service. • Negative comments generally related to technology, for example picture and sound quality.</td>
<td>This study was based on a small sample, caution should be used in interpretation.</td>
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<td>Magrabi et al. (2005)</td>
<td>Australia</td>
<td>Feasibility of using home telecare for monitoring cystic fibrosis.</td>
<td>Five adolescents were asked to use a home telecare system during a routine hospital visit over one week. Frequency of use was measured from computer logs. Unacceptable measurements were identified by visual inspection. User impressions of home telecare and appropriateness of the system for managing CF was determined from observations of user interaction, survey and qualitative analysis. Patients used the system to record lung function measurements without any supervision and indicated that the system was easy to learn and use.</td>
<td>• The role of home telecare in supporting collaborative self-management appeared to be well understood. • Home telecare was seen as a supplement to standard care that would provide a link to the hospital between clinic visits. • Participants indicated that feedback provided by the system and ongoing clinical support would determine long-term use and compliance with the monitoring protocol. • Clinicians reported the usefulness of home telecare in maintaining a longitudinal record of their patient's health that would supplement verbal description of symptoms and further system refinement and evaluation is required to determine patient compliance with their customized monitoring protocol prior to assessing impact on clinical outcomes. The sample size also precludes generalization.</td>
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<td>65. Nodal et al. (2001)</td>
<td>Teledermatology</td>
<td>Tromso to Kirkenes Norway (10,000)</td>
<td>Comparison of dermatology diagnoses made by one dermatologist via teledermatology with those of another dermatologist made in a face-to-face consultation. The patients first underwent a teledermatology consultation and then a face-to-face consultation. A general practitioner was present with the patient in the videoconference studio. Videoconferencing equipment connected at 384 kbit/s was used. The doctor-patient relationship and the satisfaction of the patients and dermatologists in the two settings were assessed, as well as technical conditions during the videoconferences.</td>
<td>• There were 121 patients, with a mean age of 40 years (range 17-82 years). • There was a high degree of concordance between the two sets of diagnoses, with 72% complete agreement and 14% partial agreement between the two dermatologists. • A total of 116 patients (96% of those included) completed a questionnaire. • Both the patients and the dermatologists were in general satisfied with the videoconferences.</td>
<td>The authors discuss patient suitability at length. Videoconferencing was used instead of store-and-forward options because dermatoscopy or microscopy equipment was not available. Store-and-forward options with a dermatoscope might eliminate diagnosis differences. This is not explored.</td>
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<td>66. Peter et al. (2006)</td>
<td>Telemedicine screening for diabetic retinopathy.</td>
<td>Rural and regional Australia.</td>
<td>A study population with representative examples of normal fundi and the different grades of retinopathy was chosen from existing records. The specificity and sensitivity of teledermatology diagnosis was compared with fundus photography and examination by an experienced ophthalmologist as a ‘gold standard’, in a blinded manner. Real-time teledermatology assessment was performed with live video and audio connections with the transmitting and receiving units set in different areas of the ophthalmology depart-</td>
<td>• For teledermatology, sensitivity was 38% (95% CI, 35-40%) and specificity was 95% (95% CI, 91-99%). • For photography, sensitivity was 75% (95% CI, 71-79%) and specificity was 95% (95% CI, 91-99%). • In this pilot study, sensitivity of detection of CSME by photography was considerably better than for live-link teledermatology. This study tends to confirm the continued superiority of examination of the patient by an experienced ophthalmologist as the best method of screening for</td>
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| 67. Rees et al. (2001) | Videoconferencing | Perth, Australia             | Course in cognitive behavioral therapy was developed for delivery via video-conferencing. | 10 weekly training sessions each 90 minutes. Role play, participant exercise and where possible, observation of actual cases were used for learning purposes. 11 of the 12 participants completed the pre and post training knowledge test. There was a significant improvement in knowledge of CBT after the training. 10 participants completed the satisfaction questionnaire. | • The majority were satisfied with the training they had received and indicated that it had increased their confidence in their ability to use CBT intervention with their patients.  
• 3 of the participants would have preferred FTF training. This represents an area for further study. | The article did not delineate between sites thus we do not know how the training was perceived in the more remote site. The satisfaction questionnaire was not validated. |
| 68. Ruskin et al. (2004) | Videoconferencing | Rural US communities         | Telepsychiatric treatment                    | Randomized, controlled trial of 119 depressed veterans referred for outpatient treatment. Patients were randomly assigned to either remote treatment by means of telepsychiatry or in-person treatment. Psychiatric treatment lasted 6 months and consisted of psychotropic medication, psychoeducation, and brief supportive counselling. Patients’ treatment outcomes, satisfaction, and adherence and the costs of treatment were compared between the two conditions. | • Hamilton Depression Rating Scale and Beck Depression Inventory scores improved over the treatment period and did not differ between treatment groups.  
• The two groups were equally adherent to appointments and medication treatment.  
• No between-group differences in dropout rates or patients’ ratings of satisfaction with treatment were found.  
• Telepsychiatry was more expensive per treatment session, but this difference disappeared if the costs of psychiatrists’ travel to remote clinics more than 22 miles away from the medical center were considered.  
• Telepsychiatry did not increase the overall health care resource consumption of the patients during the study period. | The main limitation of this study was that patients self-selected, thus an important bias was introduced in the sample. |
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| 69. Smith et al. (2001) | Videoconferencing | Queensland, Australia | Telepediatric consults. | Feasibility study to test the hypothesis that, for an effective telehealth service, a full-time coordinator is required to act as a single point of contact for consultation requests. Data included clinical consultation statistics. | - By shifting the responsibility for telepediatrics from the referrer to the provider, the telehealth process becomes equally (or more) attractive as the conventional alternative.  
- Preliminary results showed that, within six months, telepediatric activity increased to an average of 8 h per month.  
- Certain health services became more accessible.  
- At least 12 patient transfers were avoided to and from the tertiary facility, with an estimated minimum saving of $18,000 to the health-care provider. | The method section of this study focuses on the implementation of the service. Little is stated on the data gathered and the analysis performed. |
| 70. Smith et al. (2004) | Mainly videoconferencing Store-and-forward Telephone | Rural Queensland, Australia. | Integration of post-acute burns care to a telepediatric services. | A retrospective review of our experience has shown that post-acute burns care can be delivered using videoconferencing, email and the telephone. Telepediatric activity records were used to analyse the type and frequency of activity that took place. Satisfaction questionnaires were used to document patient/care giver satisfaction. | - 293 patient consultations over 3 years, using VC, email, and telephone. Telepaediatric burns services have been valuable in two key areas.  
- Establishment of a program of routine specialist clinics via videoconference.  
- Ad-hoc patient consultations for collaborative management during acute presentations and at times of urgent clinical need.  
- The families of patients have expressed a high degree of satisfaction with the service. | The study mentions the use of videoconferencing, email and telephone for follow-up. The last two modalities were not discussed. |
| 71. Stormo et al. (2004) | Store-and-forward | Northern Norway. | Neurosurgical teleconsultations for teleradiology image transfer | Prospective study of the effect of neurosurgical teleconsultations on patient management. The total number of teleradiology image transfers during an eight-month study period was 723. Data on 99 (14%) of these teleconsultations was analysed (92 patients); the remainder were transfers to other departments at our hospital. | - The consequences of the teleconsultation and the eventual benefits of the image transfer were evaluated.  
- All 10 referring hospitals in the region used the service.  
- The median response time was 3 hours (range 1-21 hours) in emergency cases and 1 day (range 1-7 days) in ordinary consultations. | The benefits of neurosurgical teleconsultations by analyzing the evaluations made by the neurosurgeon on call, may have resulted in biases in favor of teleradiology. |
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|        | Videoconferencing | Not defined. | Meta-analysis of service providers satisfaction. | Telemedicine vs face-to-face (FTF) patient care: effects on professional practice and health care outcomes. Review of 7 randomized trials, controlled before and after studies, comparing telemedicine with face-to-face patient care. More than 800 people included. One trial - telemedicine in the emergency department; one with video consults between primary health care and hospital out patients; remaining on provision of home care or patient self monitoring of chronic disease. | - The response time was significantly shorter for patients with head injuries (median 3 hours) than for those with intracranial tumours (median 24 hours).  
- Image transfer was considered beneficial for the patient in 93% of the cases.  
- Avoidance of unnecessary patient transfer, changes of treatment at the referring hospital on the advice of the neurosurgeon and initiation of emergency transfer occurred in 34%, 42% and 13% of cases, respectively.  
- The studies did not show any detrimental effects of telemedicine but no unequivocal benefits were identified, nor did studies confirm the safety of telemedicine.  
- None with formal economic analysis.  
- Although there were high rates of satisfaction among users and professionals (i.e. > 90%) due to small sample sizes this may have represented a threshold limit or be a reflection of sampling bias (ie persons familiar with technology, self-selected volunteers etc).  
- The authors suggest that telemedicine may require different clinical skills such as specific communication skills and approaches to information giving that may substantially alter the nature of the clinical encounter and the relationship between patient and professional. | Further, benefits were not assessed in terms of better outcomes. Finally, the authors report that response time was available for only 48% of the consults.  
Differences in skill transfer from FTF and Telemedicine was not discussed, neither was the difference in practice (ie two physicians attending a patient at one time) and those possible effects on the perception of telemedicine. In addition the authors point out that there a number of different technology falling under the definition of telemedicine. The point needs to be made that the technologies are sufficiently different as to influence the outcome of some studies ie videoconferencing may be more comfortable for some professionals and... |
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|        |                   |     |       |        | **A systematic review of telemedicine assessments based on searches of electronic databases between 1966 and December 2000 identified 66 scientifically credible studies that included comparison with a non-telemedicine alternative and that reported administrative changes, patient outcomes, or results of economic assessment. Thirty-seven of the studies (56%) suggested that telemedicine had advantages over the alternative approach, 24 (36%) also drew attention to some negative aspects or were unclear whether telemedicine had advantages and five (8%) found that the alternative approach had advantages over telemedicine.** | - The most convincing evidence on the efficacy and effectiveness of telemedicine was given by some of the studies on teleradiology (especially neurosurgical applications), telemental health, transmission of echocardiographic images, teledermatology, home telecare and on some medical consultations.  
- However, even in these applications, most of the available literature referred only to pilot projects and to short-term outcomes. Few papers considered the long-term or routine use of telemedicine.  
- For several applications, including teleradiology, savings and sometimes clinical benefit were obtained through avoidance of travel and associated delays.  
- Studies of home care and monitoring applications showed convincing evidence of benefit, while those on teledermatology indicated that there were cost disadvantages to health-care providers, although not to patients. | Forty-four of the studies (67%) appeared to have potential to influence future decisions on the telemedicine application under consideration. A number of these had methodological limitations. Although useful clinical and economic outcomes data have been obtained for some telemedicine applications, good-quality studies are still scarce and the generalizability of most assessment findings is rather limited. This systematic review fails to distinguish between e-health modalities in its assessment. |
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<td>74. Hui et al. (2006)</td>
<td>Home-based women in Hong Kong</td>
<td>Comparison of telemedicine with a conventional outpatient continence service (CS) in community-dwelling older women with urge or stress incontinence.</td>
<td>After an initial biofeedback-assisted pelvic floor muscle training session, subjects were randomized to behavioural training for eight weeks via the CS (n = 27) or a telemedicine continence program (TCP) (n = 31).</td>
<td>• Participants in both treatment groups experienced significant improvement in their symptoms, namely, a reduction in the number of daily incontinence episodes (P&lt;0.001) and voiding frequency (P&lt;0.001), while the volume of urine at each micturition increased (P&lt;0.005). • Pelvic floor muscle strength as measured by the Oxford Score also improved (P&lt;0.005). • There were no significant differences in outcomes between the two groups. • Findings suggest that videoconferencing is as effective as conventional methods in the management of urinary incontinence.</td>
<td>Patients were self-recruited (response to an add). Further, the two groups were not matched for mean voided volume. The underlying pathology associated with incontinence was not explored.</td>
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<td>75. Jaatinen et al. (2002b)</td>
<td>Not relevant.</td>
<td>Literature review of teleconsulting applications.</td>
<td>From 1259 potentially relevant articles identified through Medline, 128 articles were selected for review. The majority of these had been published in the Journal of Telemedicine and Telecare (50 articles, or 39%). We analysed different user groups, equipment and implementation issues, and the type of connections.</td>
<td>• In 101 studies (79%) the teleconsultations were between doctors, in 11 they were between patient and doctor, in seven between patient and nurse, and in nine between nurse and doctor. • Studies of consultations between patients and health-care professionals were thus quite rare. • Surgery was the most common specialty in which teleconsultation was described. The teleconsultations were realtime or mainly realtime in 72% of articles. • In 39% of studies the primary focus was on videoconferencing. • The most common means of connection was by ISDN digital lines (38%). There were very few mentions of how to ensure data protection or to maintain patient confidentiality. • We conclude that, for the majority of teleconsultation needs, asynchronous communication</td>
<td>The review was limited to the published literature. Further, many interventions reviewed ended after the experimental period.</td>
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| 76. Jennett et al. (2001) | All | Canada | Policy | Not a study per se. No section on methodology. | Five key issues for optimal implementation were:  
- Needs analysis/strategic business plans/diverse partnerships  
- Equipment and Information Technology (IT) vendors  
- Strong professional, as well as technical policy standards, were also required.  
- Recognizing the importance of human factors and workforce implications, the change process, and the changing culture were also viewed as critical to successful implementation.  
- The importance of ‘best practices’, ‘lessons learned’, ‘buy-in’, inter-connectivity, interoperability, and sustainability issues was noted. Lastly, ongoing systemic evaluation was seen to be key to sustained telehealth programs. | More of a discussion paper than a study. It is included before of the lack of policy oriented studies in the sample. |
| 78. Jennett et al. (2004) | All | Not applicable | Policy directions regarding the socioeconomic impact of telehealth. | Literature review of fifty-seven sources, comprehensive literature search of electronic databases, the Internet, journals, conference proceedings, as well as personal communication with consultants in the field. |  
- The review revealed a focus on certain socioeconomic indicators such as cost, access, and satisfaction.  
- It also identified areas of opportunity for further research and policy analysis and development (e.g., social isolation, life stress, poverty), along with various barriers and challenges to the advancement of telehealth.  
- These included confidentiality, reimbursement, and legal and ethical considerations.  
- To become fully integrated into the health care system, telehealth must be viewed as more than an add-on service. This paper offers 19 general and 20 | Limited by gaps in the literature such as social isolation, life stress, poverty. |
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<td>79. Knol et al. (2006)</td>
<td>Rural communities in The Netherlands</td>
<td>Store-and-forward teledermatology consults</td>
<td>505 teledermatology consultations were carried out on 503 patients of 29 participating general practitioners (general practitioners) in the province of Friesland. One overview and two detail digital photographs of the skin problems were taken on a digital camera and attached to an email message containing standard clinical information. These email messages were sent to a dermatologist, who replied by email after evaluation. After a median follow-up time of 548 days, the general practitioners were interviewed about the dermatological referrals.</td>
<td>- The reduction in referrals was 51% (0.95 confidence interval = 47-58%) when the general practitioner had the intention to refer. - When the general practitioners had no intention to refer, there turned out to be a secondary traditional consultation in 17% of cases.</td>
<td>The study was not a randomized trial and the intention to refer for a life consultation was recorded post hoc. Thus recall biases may have been introduced. Some data on referral patterns was also missing.</td>
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<td>80. Koch (2006)</td>
<td>Not applicable</td>
<td>Home tele-health</td>
<td>The study is based on a review of the scientific literature published between 1990 and 2003 and retrieved via Medline in January/February 2004. All together, the abstracts of 578 publications have been analyzed.</td>
<td>- The majority of publications (44%) comes from the United States, followed by UK and Japan. - Most publications deal with vital sign parameter (VSP) measurement and audio/videoconsultations (“virtual visits”). - Publications about IT tools for improved information access and communication as well as decision support for staff, patients and relatives are relatively sparse. - Clinical application domains are mainly chronic diseases, the elderly population and paediatrics.</td>
<td>The study is constrained by the literature available on the topic. It reports that in general, evaluation studies are rare and further research is critical to determine the impacts and benefits, and limitations, of potential solutions and to overcome a number of hinders and restrictions, such as – the lack of standards to combine incompatible information systems; – the lack</td>
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<td>81. Nelson et al. (2003)</td>
<td>Home monitoring equipment.</td>
<td>Home monitoring for patients with chronic respiratory failure and with mechanical ventilation assistance.</td>
<td>Assessment of the feasibility of telemedicine for home monitoring of 45 patients with chronic respiratory failure (CRF) discharged from hospital. The patients transmitted pulsed arterial saturation (pSat) data via a telephone modem to a receiving station where a nurse was available for a teleconsultation. A respiratory physician was also available. Scheduled and ad hoc appointments were conducted. Thirty-five patients were on home mechanical ventilation, 13 with invasive and 22 with non-invasive devices. The main diagnosis was chronic obstructive pulmonary disease (COPD). The follow-up period was 176 days (SD 69).</td>
<td>• In all, 376 calls for scheduled consultations were received and 83 ad hoc consultations were requested by the patients. The actions taken were: 55 therapy modifications, 19 hospitalizations in a respiratory department for decompensated CRF, three hospitalizations in an intensive care unit (ICU), 22 requests for further investigations, 25 contacts with the general practitioner (general practitioner), 66 demands for respiratory consultations and 10 calls for the emergency department. • The mean time recorded for the 459 calls was 16 min/patient/week. In 82% of calls, a pSat recording was received successfully. • The nurse time required to train the users in the operation of the pSat instrument was high (mean time 30 min). • The results showed that home monitoring was feasible, and useful for titration of oxygen, mechanical ventilation setting and stabilization of relapses.</td>
<td>Feasibility study. No comparison group.</td>
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<td>82. Vitacca et al. (2006)</td>
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- The mean time recorded for the 459 calls was 16 min/patient/week. In 82% of calls, a pSat recording was received successfully.
- The nurse time required to train the users in the operation of the pSat instrument was high (mean time 30 min).
- The results showed that home monitoring was feasible, and useful for titration of oxygen, mechanical ventilation setting and stabilization of relapses for further investigations, 25 contacts with the general practitioner (general practitioner), 66 demands for respiratory consultations and 10 calls for the emergency department.

**LIMITATIONS**

Feasibility study. No comparison group.
Appendix 2: British Columbia First Nations Health Care Services

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