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MBTELEHEALTH EVALUATION: FINAL REPORT

Volume I: Evaluation Methods and Findings

Prepared by Infotelmed Communications Inc

Revised version submitted April 15, 2003

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EXECUTIVE SUMMARY

CONTEXT AND METHODOLOGY

The MBTelehealth Network is a province-wide telehealth network managed by the Winnipeg Regional Health Authority (WRHA) and its partners. This external evaluation assessed the impacts of the network over the period from April 2002 to January 2003.

The evaluation gathered qualitative and quantitative information from a broad cross-section of stakeholders including patients, health service providers, health system administrators and other community stakeholders. Ongoing monitoring of system usage was conducted using web-based forms completed by telehealth coordinators. A total of 2,616 forms were submitted, pertaining to 1,610 distinct telehealth sessions. One-page questionnaires assessing satisfaction with the telehealth experience were completed by 177 patients residing in 50 different Manitoba communities. A total of 584 questionnaires were completed by participants in continuing education sessions. One-hundred and nine qualitative in-person, telephone and video interviews were conducted with stakeholders either individually or in small groups in all MBTelehealth locations, involving 179 individuals. Focus groups with patients in three different communities were also conducted.

KEY FINDINGS

1. Evolution of system usage

Usage levels of telehealth systems are a major determinant of their impact and cost-effectiveness. The evaluation found that:

- Overall usage of the MBTelehealth network is very strong and increasing steadily.
- Use of the system for patient care increased over the evaluation period. In June 2002, patient care sessions accounted for 36% of all sessions; by December 2002, this had risen to 55% of all sessions, with continuing education and other uses together accounting for most of the other half (44%)
- There are still many opportunities to increase use of the system for patient care, while use of the MBTelehealth system for administrative purposes has been in some ways unexpectedly strong. Many stakeholders, particularly in rural Manitoba, see enormous benefit from broad access to the telehealth network for administrative uses such as meetings and interviews.
- Usage rates in Manitoba are comparable to levels in other provincial telehealth systems.
- Connections to several out-of-province centers have generally proven to be successful.
- Strong interest was expressed in the ongoing development of the network:
 - o by increasing the number and in accessibility of telehealth sites
 - o by adding additional peripherals.
- The success of MBTelehealth's implementation has been so great that the coming months are likely to bring challenges in terms of responding to pressures to expand the network and to maintain an appropriate balance among different types of usage.

2. Technical success and quality

Technical success – including both reliability of the system as well as visual and auditory quality – is a key determinant of telehealth system usage and therefore its impact. It is also critical that telehealth

systems provide adequate visual and auditory quality to be appropriate for clinical use. The evaluation found that:

- The level of technical success was very high. Technical concerns have not had major impacts on service delivery and are being addressed by MBTelehealth.
 - The most frequent problems occurred with establishing communications and visual transmission quality, in 7.5% and 7.6% of user sessions, respectively.
 - The qualitative data showed that users generally found the technical quality of the system to be very good.
 - Most problems declined or remained stable in incidence from April 2002 through January 2003, with all problem types occurring in 6% or less of sessions by the end of this period.
 - Technical problems were more frequent in certain situations – in multipoint sessions, and in connections to sites with satellite connections.
- Training and technical support were shown to be highly satisfactory.
- Generally, clinicians had no problems with the quality of the information exchange over telehealth, but most also agreed that it was not quite as good as face-to-face care.

3. Impacts of the MBTelehealth network on patient and community access to needed, quality care

Improving Manitobans' access to care is a key driver of the MBTelehealth program. The evaluation therefore examined closely the impacts of the system on access to care, exploring how it is being used and the quality of the services provided through the system including their acceptability to patients and providers. It found that:

- The MBTelehealth system is being used to address wide variety of health issues
 - The professional specialties most often involved were: dermatology, Employee Assistance and mental health. Other specialties involved included: adult infectious diseases, cardiology, clinical dietetics, home nutrition, endostomal therapy, ENT, general pediatrics, genetics/metabolics, FAS/FAE specialists, oncology, orthopedics, pain specialists, pediatric neurology, physiotherapy, psychogeriatrics, and speech and language pathology and therapy.
- Telehealth is being integrated into the ongoing flow of care
 - The telehealth system is most often being used to discuss or confirm diagnoses, often in situations where a specialist would have been seen in a previous face-to-face visit.
 - Two-thirds of subsequent care episodes will involve face-to-face consultations.
- Patients are highly satisfied with all aspects of the telehealth experience, and express strong interest in using the telehealth systems again.
 - Patients have almost never refused to use telehealth.
 - Patients report that the telehealth session was the same or very similar to meeting in the doctor's office.
 - Patients have few concerns about protection of confidentiality in the MBTelehealth system.
- For patients and their families, the benefits of not having to travel to health appointments are a key impact, facilitating access to health care by making it more convenient and less costly.
 - 92% of patient care sessions resulted in travel avoided for the patient or his or her family.
- Timeliness of access to care through telehealth is good in some but not all speciality areas, with dermatology being a notable exception.

- Telehealth helps reduce barriers to compliance with recommendations and appointments, contributing to improved outcomes for patients.
 - This was said to particularly true for elderly and restricted-mobility patients, as well as some who have more difficulty with compliance.
- Generally, the MBTelehealth network is providing another way to access the same services that were already available in-person rather than increasing access to services people could not reach before.
 - However, in a limited number of situations, telehealth has permitted Manitobans to access services they could not before.
- Telehealth facilitates family involvement in patient care.
- Although it is clear that telehealth cannot meet all the health care needs of Manitobans, diabetes and mental health are seen as two areas where telehealth has the potential to play a larger part in promoting population health.

4. Role of the network in health services delivery

Telehealth's impact on health professionals

Because the MBTelehealth network has prioritized clinical uses of the telehealth network, physicians and other health professionals are among the key drivers of system uptake and utilization, and therefore of overall system impacts and cost-effectiveness. The evaluation found that:

- Local physicians' use of the telehealth system to access specialist clinical care can be enhanced.
 - Only a few local physicians have concerns about the appropriateness of telehealth for their patients.
 - Many physicians are interested in and have attempted to use telehealth, but have not found it possible to integrate it easily into their practices, sometimes because of unsuccessful initial attempts.
 - Additional supports from MBTelehealth seem to be required to ensure that the network's overall impact on access to services will not be constrained by lack of uptake from local physicians.
- Provision of continuing education through telehealth has been very successful, with strong uptake across the province.
 - Continuing education through telehealth is reaching all types of health professionals in Manitoba, including physicians, nurses and a broad array of medical and allied health professionals
 - For about half of the activities, participants would not have access to the information provided through continuing education.
 - Continuing education through telehealth seems to particularly benefit non-physicians and physicians in rural Manitoba.
 - Continuing professional education through telehealth has three main impacts:
 - reduced necessity to travel
 - development of closer ties among practitioners, increasing a sense of community and support
 - improvements in the quality of care delivered to patients.
 - Nonetheless, some aspects of the continuing education program could be improved.

- The CME formula of lunch-hour sessions was often not appropriate for community-practitioners.
- Some practitioners and administrators were unfavourably impressed by technical problems which resulted in delays and frustrations.
- Telehealth contributes to work satisfaction for professionals and may contribute to recruitment and retention in some cases.

Telehealth's impacts on work organization and service delivery

The evaluation of MBTelehealth attempted to identify the main impacts of the network in two key areas: workload and service delivery efficiency aspects, and impacts and implications of organizational structure and roles. It found that:

- Telehealth both saves and adds time to service delivery
 - o A main workload impact is time savings for professionals who do not have to travel. For administrative travel, efficiency gains are seen as contributing to increased productivity.
 - o There is general consensus that most types of telehealth sessions take somewhat longer than face-to-face sessions.
 - o Involving more of a patient's support system in case management – while having clear impacts on quality of care from the patient's point of view also consumes more resources from a system point of view.
 - o Overall, this is likely to increase pressure from administrative use while steepening the slope for clinical usage, unless additional incentives and disincentives can be built into the system.
- The ongoing complexity of scheduling telehealth sessions has been quite effectively managed, although some problems have occurred.
- Patient information management mirrors almost exactly the systems in place for regular consultations and shows no major problems.
- From the Regional Health Authority (RHA) administrators' point of view, telehealth has been implemented and managed effectively.
 - o The decision to coordinate the network centrally with MBTelehealth site coordinators situated in the RHAs has carried more advantages than disadvantages.
- Few impacts have been seen on the scope of professional practice.
- Some stakeholders are reflecting on alternative organizational models for telehealth which would move it more directly into the service of primary health care reform and away from the current model, which some see as physician-driven.

Telehealth's impacts on linkages among health care settings

The evaluation examined the impacts of telehealth in linkages among health care settings, within settings, among regions and with major centers, finding that:

- The telehealth network, especially continuing education and administrative use, has in some regions enhanced linkages among health professionals and agencies both within and among regions.
 - o Telehealth has strengthened relationships between local practitioners and specialist providers and educators, which in turn has increased support to and reduced isolation of local practitioners.
 - o Stronger professional linkages throughout the province have in some communities contributed to: improved managerial decision-making, and increased stakeholder participation and improved supports to improved practice

5. Cost implications of telehealth

A key driver of telehealth in most settings is the need to reduce health system costs, both directly by avoiding travel, and indirectly, through improving patient outcomes. The evaluation examined the first of these issues, by assessing the costs that were avoided through the telehealth usage occurring in the first nine months of MBTelehealth's operations. It found that:

- The cost savings associated with telehealth are quite large. A large proportion of these cost savings are enjoyed directly by patients. The telehealth network also resulted in considerable cost savings to the health system.
- During the evaluation period, the MBTelehealth produced potential savings of approximately \$1.1 million by eliminating travel-related expenses
 - This amount assumes that all of the activity that occurred over the network would have taken place with one or more people traveling from their home to another location.
 - Of this total, approximately \$98,000 would have been out-of-pocket expenses for individuals (that may or may not have been subsidized), and \$1 million would have been expenses to the health care system for travel of professionals and administrators.
 - As not all patients provided permission to use their data for this analysis, the total cost savings are understated. In addition to these direct costs saved, there are many indirect costs that are not easily measured.
- Examination of cost savings to patients showed that on average, the travel cost savings per session were:
 - \$568 saved per patient care session
 - \$526 saved per point-to-point and \$978 saved per multi-point patient care session
- Examination of cost savings to the system showed that on average, the travel costs savings per session were:
 - \$1130 saved per session for staff or practitioners
 - \$1634 saved for continuing education sessions
 - \$882 saved for administrative activities
 - Continuing education activities are often done over greater distances (e.g., northern Manitoba to southern Manitoba), while administrative uses are often associated with intra-regional activities.
- Data are not yet available to assess the impact of the telehealth network on the costs associated with the Northern Patient Transportation Program.
 - While stakeholders hope that there may be some savings resulting from a decreased need to travel for medical care, there was no indication of substantial savings to date.
 - It was noted the largest proportion of people who are transported through the program are not candidates for telehealth; but at least one region has established a review committee to assess whether or not individual cases can be handled through the system.
 - The impact of telehealth on this program will need to be closely monitored, and systems to do so will need to be considered in each region.
- The estimated cost for physician services provided through the network was \$12,570.
 - Although specific codes have been established by Manitoba Health for use by physicians who provide telehealth services, these were used for only 66 claims in 2002. The cost indicated is an estimate based on MBTelehealth reports of services provided.
- Telehealth capital and operational costs were not reviewed as part of this evaluation.

- Further study will be required to evaluate the long term sustainability of the MBTelehealth network.

CONCLUSIONS

The MBTelehealth Network has grown in a very short time to be one of the most extensive and comprehensive telehealth networks in Canada, covering a very large territory made up of rural, remote and urban sites with their different levels of technical infrastructure. Uptake of the MBTelehealth system has been rapid and broad. While some regions have experienced some lags in uptake, overall the evaluation data suggest that the system is being widely used in ways that are consistent with its objectives. MBTelehealth has ably managed a balanced approach to growing utilization of the network, and ensured that the services provided meet the needs of patients and communities. Overall, the MBTelehealth network has been remarkably successful in increasing patient and community access to needed, quality care, fostering linkages among practitioners and throughout the health care system, and becoming integrated into existing patterns of service delivery. Moreover, the network has generated enthusiasm in many sectors of the health care community, and a feeling of optimism that telehealth can contribute to addressing the many challenges facing Manitoba's health system.

1. INTRODUCTION: CONTEXT AND AIMS OF THE EVALUATION

The MBTelehealth Network is a province-wide telehealth network managed by the Winnipeg Regional Health Authority (WRHA) and its partners. MBTelehealth's mission is: *"to establish a multi-site telehealth infrastructure and support system that is sustainable, continuously improving and responsive to the needs of the caregivers and end-users."* This document reports on an external evaluation of the MBTelehealth network, mandated as part of the funding requirements of the Canadian Health Infostructure Partnership Program (CHIPP).¹ It assesses the impacts of the network over the period from April 2002 to January 2003. The evaluation was conducted under the guidance of an Evaluation Steering Committee, reporting to MBTelehealth's Advisory Board.² Grounded in the available research literature on the effectiveness of telehealth as health system organization intervention, it gathered qualitative and quantitative data from a broad cross-section of stakeholders including patients, health service providers, health system administrators and other community stakeholders

1.1 Context: Telehealth in the world, Canada and Manitoba

Telehealth today

Telehealth is an umbrella term used to describe healthcare services and information delivered using information and communications technology. Canada was one of the first countries to adopt telehealth and telemedicine, in the early 1960s (Picot, 1998). Telehealth systems are adopted to address uneven distribution of health care resources, inadequate access to health care for certain segments of the population, and rising costs of care (Bashshur, 1997). Two different technologies make up most of the telehealth applications in use: store and forward technology for transferring digital images over IP networks and two-way interactive videoconferencing equipment at two or more locations allow a 'real-time' consultation.³ Advances in technology now permit innovative applications including high quality real time multiple site video communications, wireless communications to overcome network infrastructure limitations, and even the use of telerobotics.

1.1.2 Telehealth in Canada

All Canadian provinces and territories have implemented, are developing or are enlarging existing telehealth networks.

- The NORTH Network, a network of 60 partners recently expanded with CHIPP funding to 75 sites linking communities throughout Northern and Central Ontario with two Toronto hospitals.
- The Eastern Ontario Telehealth Network, also partially funded through CHIPP, was established in June 2001, links 16 rural and community hospitals with three consulting sites.
- The Saskatchewan Northern Telehealth Network was a pilot project which, with CHIPP funding, has expanded to 10 sites and offers new services.⁴
- The Nova Scotia Telehealth Network grew quickly from a 1996 Pilot Project involving five sites in Nova Scotia to a 42-site network in 2000 covering Northern, Central and Eastern Nova Scotia. The Network is funded and managed by the Nova Scotia Department of Health and operates on an ISDN network (Nova Scotia Telehealth Network, 2003)⁵. A significant proportion of their activity is in teleradiology.
- Alberta Wellnet was launched in 1997, and currently links 226 sites across Alberta.

¹ This report follows an interim evaluation report, submitted in September 2002.

² The mandate of the Evaluation Steering Committee is found in Appendix 7.

³ Telemedicine Research Center web site April 2, 2003: <http://trc.telemed.org>

⁴ Health Canada OHIH website, updated July 2002: http://www.hc-sc.gc.ca/ohih-bis/about_apropos/chipp-ppics/proj/

⁵ Nova Scotia Telehealth Network - <http://www.gov.ns.ca/health/telehealth/>

1.1.3 Telehealth in Manitoba and the MBTelehealth Network

Organization of health care in Manitoba

Health Care in Manitoba is managed by 11 Regional Health Authorities (RHAs) – (mergers reduced the number from 12 when MBTelehealth was implemented). The RHAs are responsible for developing and managing an integrated approach to their own health care system. There are some 80 health care centres and hospitals in Manitoba. The range of populations served in each of the RHAs varies widely: from 56.7 % of the total population for the WRHA, to a low of 2.2% for the Nor-Man RHA and 0.1% for the Churchill RHA. ⁶ In 2001, Manitoba had 181 physicians per 100,000 population, 89 of whom were specialists, most being located in Winnipeg (CIHI, 2001). As of March 2003, nine of the communities linked to MBTelehealth had fewer than six physicians. ⁷

In 2002, Manitoba Health conducted an extensive public consultation to obtain the public's views and ideas for improving health care (Manitoba Health, 2002). Better service integration through innovative methods of service delivery were often mentioned as ways to reduce health care costs, but telehealth was one of the suggestions mentioned most often, to “link patients and specialists through advanced communication technology” and to allow “for continuing medical education and information sharing”.

The MBTelehealth network

The MBTelehealth network began implementation in the fall of 2001. Conceived with a view to long-term sustainability, the network was designed to deliver the community-based services that will be integrated into the normal flow of health care delivery, according to protocols based on proven best practices. ⁸ Less than two years later, the network has evolved from a project managed by a regional health authority (WRHA) to an operational program, with sustained funding and committed partners – including all of Manitoba's RHAs, Manitoba Health, and participating First Nation communities. It has built on some previous experiences with telehealth within the province, for example that implemented in Berens River in 2000-2001.

Consisting mainly of interactive video stations permitting live interactions among individuals in two or more sites, the MBTelehealth system is now being used to offer a diversity of clinical and educational services, including specialized medical and allied health services and continuing medical and nursing education. The remote telehealth sites are located in health care facilities throughout the province's health regions, with the cooperation and support of the RHAs. These sites were selected following a province-wide need assessment and consultation (Muttit, 2001). Local site coordinators – WRHA employees selected with input from the RHAs - work in each site to coordinate activities and promote the use of the system. Some site coordinators have clinical backgrounds, generally in nursing.

Most specialty services and continuing education on the network are offered from the Health Sciences Centre in Winnipeg, although some services are provided through centers such as St Boniface Hospital in Winnipeg, from Brandon, and from the Selkirk Mental Health Centre. Scheduling of sessions, overall system management, and technical support are handled centrally, through the MBTelehealth support team. MBTelehealth is supported by an Advisory Board, consisting of representatives of key stakeholders in the health system throughout Manitoba.

The College of Physicians and Surgeons of Manitoba has endorsed the use of telehealth, providing guidance for ensuring quality of care and acceptable standards of practice. Remuneration for physicians providing speciality services as receiving physicians and general practitioners assisting in consultations with specialists is provided for under the existing fee schedule (College of Physicians and Surgeons of Manitoba, 2002).

⁶ <http://www.gov.mb.ca/health/rha/index.html>; <http://www.gov.mb.ca/health/annstats/12.pdf>

⁷ College of Physicians and Surgeons www.umanitoba.ca/colleges/cps as of March 25, 2003.

⁸ http://www.hc-sc.gc.ca/ohih-bsi/about_apropos/chipp-ppics/proj/mbtele_e.html.

Physicians are able to access a variety of CME activities through the telehealth network. The Faculty of Medicine of the University of Manitoba has organized a program which is designed to create “learning communities”, and through these, to foster interactive and peer to peer communications and improve patient care. A Continuing Nursing Education (CNE) program began in January 2003.

Table 1 describes the communities linked in the MBTelehealth network. These sites are classified as remote, rural or central, for purposes of later analyses.

Table 1: Communities linked to the MBTelehealth network, classified according to location, size and network access. (1)

	Urban, Rural, Remote or Central
Churchill	Remote: access by air or rail only; Churchill health centre facility serves surrounding and Nunavut communities. Satellite connection.
Berens River	Remote: 270 air kilometres north of Winnipeg; road access is passable in winter only. Recently renovated health centre. Satellite connection
Flin Flon	Remote: access by bus (743 km) or air from Winnipeg; Flin Flon Gen Hosp has 50 beds. Fibre connection
The Pas	Remote: 150 km South of Flin Flon, 450 km southwest of Thompson; access by road and air: 630 km north of Winnipeg. The Pas Health Complex includes a general hospital. Fibre connection.
Lynn Lake	Remote: access by rail, bus, and air. 100 km from Leaf Rapids access on 50% gravel road; 1000 km from Winnipeg. Small hospital less than 20 beds. Satellite connection.
Leaf Rapids	Remote: over 900 km by road from Winnipeg, access by road (includes bus service) and air; 220 km from Thompson on 50% gravel road. Leaf Rapids Health Centre is a very small facility with 8 beds. Satellite connection.
Gillam	Remote: 1000 km north of Winnipeg and access by road (320 km by mostly gravel road from Thompson), rail and air. Gillam hospital is a 10 bed facility. Fibre connection.
Thompson	Remote: 740 km North of Winnipeg; access by rail, by air and unevenly paved road (daily bus service); secondary referral centre, mid-size general hospital serves surrounding communities. Fibre connection.
Norway House	Remote: 330 km southwest of Thompson and 450 air km and 783 road km from Winnipeg. Access by air and road (13 hours approx). Bus service available. Small hospital. Planning for new facility. Fibre connection.
Swan River	Rural: 476 km northwest of Winnipeg, 172 km from Dauphin; access by air and road (daily bus service). Swan R Hosp is a 41-bed facility with planned expansion (2005). Fibre connection.
Russell	Rural: 338 km by road from Winnipeg, 176 km from Brandon. Health Centre is a 36 bed facility. Fibre connection.
Dauphin	Rural (though classified as a city): 360 km from Winnipeg and 175 km from Brandon, good access by road (bus service), air and rail. Dauphin Regional Health Center over 100 bed facility. Fibre connection.
Brandon	Central: 197 km by road from Winnipeg; Brandon Reg Health Center currently being expanded, has approximately 300 beds, a number of specialists and a full range of services. Fibre connections.
Killarney	Rural: 217 km by road from Winnipeg and 100 km from Brandon; Tri Lake Health Center is a spacious 26 bed facility. Fibre connection.
Portage la Prairie	Rural: 75 km by road West of Winnipeg; Portage Regional Health center is an older hospital with over 120 beds. 14 physicians are mostly GPs. Fibre connection.
Boundary Trails	Rural: 120 km southwest of Winnipeg. Boundary Trails Health Centre is situated midway between Morden and Winkler – a modern, brand new facility. Fibre connection.
Ashern	Rural: 160 km northwest of Winnipeg. Access by road only with bus service daily. Lakeshore Health Center a small facility with limited services. Fibre connection.
Pine Falls	Rural: 125 km from Winnipeg – access by road only. Pine Falls Health Complex a small facility offering a limited number of acute care services. Fibre connection.
Steinbach	Rural: 48 km from Winnipeg. Bethesda Hospital identified as one of 7 “major rural hospitals” 80 beds when fully operational. Fibre connection.
Selkirk	Central: 21 km from Winnipeg. Selkirk Mental Health Centre, provincial facility. Fibre connection.
Winnipeg	Central: six telehealth units are located in 3 health facilities. Fibre connection.

(1) **Rural** applies to those sites which are: under four hours driving distance of Winnipeg; linked to the MBTelehealth network via land lines (fibre) and H.323 standard; and located in central or southern Manitoba. **Remote** applies to those sites which are: over four hours driving distance of a major centre or can only be reached by air; presently linked to MBTelehealth network either by land line or satellite and are located in northern Manitoba; **Central** applies to those sites which are: located in urban areas or close to them: Winnipeg, Brandon, Selkirk; provide specialist and CME or CHE services to remote and rural locations; have a large population by comparison to rural and remote sites.

1.2 Evaluation of the MBTelehealth network: Questions addressed

With an understanding of the MBTelehealth network as a system-wide technical and administrative intervention affecting patients, health providers, and the overall population, the questions addressed in the evaluation were grounded in the existing research literature about the impacts of telehealth.

Question 1: What are the impacts of the MBTelehealth network on patient and community access to needed, quality care?

Access to care: One of the main drivers behind public investment in telehealth systems is an expectation that it will promote access to health services and reduce inequities in access experienced by remote and otherwise underserved locations. As noted above, this is a particularly acute issue in the current Canadian and Manitoba contexts, with chronic shortages of physicians, nurses and health technicians, as well as other resources, coupled with increasing public concern over health care access and against the backdrop of major demographic shifts with major health resource distribution implications (notably an ageing mainstream population, and a more rapid population growth in First Nations communities).

However, few studies exist assessing impacts of telehealth systems on community or population-level access to care in contexts similar to Manitoba, i.e., in remote and rural regions with sparse populations. While some studies suggest that telehealth can improve access to care in such settings (e.g., Brebner & Brebner, 2001); impacts on equity of access have not been examined (Jennett et al, 2000). Other studies do suggest that access is improved for rural patients because of reduced costs and inconvenience of travel (Reid et al., 1998; Brown-Connolly, 2002).

Quality of care: It is also of critical importance to ensure that the care and information provided through telehealth meets appropriate standards of care, relating to the visual and auditory quality of the information transmitted, and well as to the overall reliability of the system and the satisfaction of its users – both professionals and patients. Many studies have examined the accuracy and reliability of information and diagnoses provided through telehealth applications, showing relatively strong evidence that quality of information provided is comparable to that provided through usual channels (e.g., Kirkwood, Peck & Beeny, 2000; Elford et al, 2000; Doze et al., 1999; Kennedy & Yellowlees, 2000, Trott & Blignault, 1998; Phillips et al., 1998; Brennan et al, 1999; Harrison, Clayton & Wallace, 1999; Ruskin et al., 1998; Leshner et al., 1998), sometimes improving timeliness of care (Sable et al. 2002). There is also strong evidence that telehealth contributes to satisfaction for both patients and providers. Reactions among local providers (in most studies, general practitioners) are generally positive, and there is some evidence that telehealth can improve the quality of their services (Street et al., 2000). Patient satisfaction with telehealth is high (e.g. Brown-Connolly, 2002), and in studies where it has been assessed, patients report that their quality of life is improved by using telehealth. Moreover, in some types of applications, patients report that they feel more empowered or in control of their interactions with health professionals when using telehealth (Mair et al., 2000; Loane et al, 1998).

The evaluation examined the impacts of telehealth on community and patient access to care, and the extent to which telehealth is generating quality care and providing alternatives which are acceptable to patients and providers. Quality of care was examined from both the providers' and patients' standpoint, including assessment of patient satisfaction. Technical quality of the telehealth system was also assessed.

Question 2: What is the role of the network in health services delivery and how does it link to existing health resources in Manitoba?

The system envisaged by MBTelehealth sees telehealth embedded as an integral part of the province's overall health service structure. At the level of health systems organization, the research literature suggests that telehealth networks have the potential to improve health services delivery while maintaining patient health outcomes. However, most evaluation studies have been fairly short-term, and several authors agree that telehealth's sustainability within ongoing health care delivery systems has yet to be clearly demonstrated at a system-wide level (Hersh et al., 2001; Taylor, 1998; Crolla, 1998; Wootten et

al., 2000; Noorani & Picot, 2001). It does seem clear that at the local level, telehealth implementation is most successful when there is significant buy-in from key stakeholders, driven by strong perceived needs and with one or more local champions (e.g., Health Canada, 2001; Sjogren et al., 2001). However, it is not yet clear whether telehealth represents an overall improvement in the quality and accessibility of care, versus a shifting of the same care to alternative methods of delivery.

Organizational factors have been identified as critical determinants of telehealth system success (Whitten & Allen, 1995; Taylor 1998; Sjogren et al., 2001; Cook, Dolittle & Whitten, 2001). Some studies have documented changes in workloads and work organization for health personnel (Taylor, 1998; Tanriverdi & Iacono, 1999; Health Canada, 2001), and some research on the effects of telehealth on education and training for health professionals has provided some positive results (Sawada et al., 2000; Saeki et al., 2000; Mairinger et al., 1998). Health professionals' access to continuing education may be improved through the use of telehealth systems (Callas, Ricci & Caputo, 2000). Organizational issues are critical in ensuring sustainability of telehealth, especially in contexts where health system resources are already stretched, and where health human resources are in crisis – a situation common to most Western health systems. The evaluation therefore addressed the extent of MBTelehealth's adoption and integration into the existing organizational and professional systems, identifying barriers and facilitators to the creation and maintenance of sustainable linkages. It also examined how the introduction of telehealth has affected overall service utilization patterns, and the extent to which it has displaced, delayed, replaced or created health service utilization, according to rural, remote and urban locations and for different subpopulations.

Question 3: What are the cost implications of telehealth?

MBTelehealth and its partners anticipated that the system would allow cost savings through travel avoided for staff, administrators and patients. Because of the scope of this system, other types of direct and indirect costs and cost savings for patients, facilities, professionals and communities were also expected to occur. A particularly important issue in this context where some parts of the Manitoba population may previously have been underserved in terms of access to health services, is the extent to which telehealth increased the overall production of services by providing better access – and thus increasing overall system costs.

The literature on economic implications of telehealth is voluminous, but good quality studies are still scarce and their generalizability is limited (Hailey et al., 2002). While some studies have demonstrated the cost-effectiveness of various telehealth applications, they have tended to limit their assessment of costs to the time involved from the specialty physicians. More comprehensive studies including equipment, telecommunications, and organizational costs suggest that cost-effectiveness is not guaranteed, and at the very least must be assessed over a relatively long amortization period (Currell et al., 2000; Ohinmaa et al., 1998; Almazaan & Gallo, 1999; Taylor, 1998). Moreover, usage levels of telehealth systems, a major factor in cost-effectiveness, often take several years to reach their potential, meaning that cost-effectiveness implications cannot easily be assessed in the short-term (Agha et al., 2002; Haukipuro et al., 2000). Several authors conclude telehealth's cost-effectiveness, implementability and sustainability have yet to be clearly demonstrated at a system-wide level (Hersh et al., 2001; Taylor, 1998; Crolla, 1998; Wootten et al., 2000; Noorani & Picot, 2001).

The evaluation addressed the cost implications of telehealth, aiming to provide a portrait of travel saved and direct utilization costs.

1.5 CHIPP Evaluation framework

At the national level, CHIPP will be conducting an overall evaluation based on the roll-up of evaluation findings from individual CHIPP-supported projects. The framework for this evaluation is compatible with the framework used for the MBTelehealth evaluation, and focuses on the following evaluation issues and questions:

- Rationale: Why was this project considered a good idea? Should it be pursued further? What proved to be the most innovative aspects of this project?
- Improvements to health services: From the perspective of patients and providers, how does this project affect the quality of services/care provided? How does this project affect access to, or utilization of, health services?
- Integration of health services: In what ways does this project foster integration, coordination and/or collaboration of health services across the continuum of care (e.g. from primary care to acute care to community and home care).
- Health and related impacts and effects: What kinds of health and related impacts have occurred as a result of this project?
- Cost-effectiveness: Does the project contribute to a more cost-effective service than what is currently being provided, and how?
- Lessons learned: What lessons have been learned in developing and implementing this project, that might be useful to other jurisdictions/regions/settings, and to other programs? What are the positive and negative effects or results experienced during the life of the project and their consequences?
- Technology performance: How well has the technology met the project requirements?

Insofar as possible, each of these questions has been addressed in the evaluation of the MBTelehealth network. Appendix 8 provides a table indicating in which sections of this report each was addressed.

2. EVALUATION DESIGN AND METHODS

2.1 Ethics Review and Research Access

The evaluation plan and instruments were subject to research ethics approval from the University of Manitoba Research Ethics Board and the Selkirk Mental Health Centre Ethics Committee. Approvals were granted in early March 2002. Once the research ethics approval was granted, approval for research access was obtained from the 12 Regional Health Authorities (RHAs) and two First Nation Communities. Finally, the approval was sought for access to health information from the Health Information Privacy Committee (HIPC); this was obtained in May 2002.

2.2 Data collection tools and procedures

The evaluation of the Manitoba telehealth network was undertaken using a mix of qualitative and quantitative methods. While quantitative methods have been the mainstay of clinical research, qualitative methods are becoming better known and accepted (Pope & Mays, 1995) especially for innovative, evolving programs involving multiple stakeholders. Over the evaluation period, multiple data collection methods from multiple information sources were used to assess changes over time from the perspectives of patients, personnel, communities and other stakeholders.⁹ These are described below.

2.2.1 Monitoring of system usage

Ongoing monitoring of system usage was conducted from April 2002 through January 2003 of four categories of activities - patient care, patient education (which was later changed to group/public education and support groups), continuing education and other activities. Web-based forms were completed by telehealth coordinators during or soon after each telehealth usage and submitted to a secure server site established for this purpose. (Paper versions may be found in Appendix 2).

⁹ Additional data collection (increase in the number of key informants interviews from 82 to 109 interviews (179 individuals) and the conduct of the focus groups) was requested by the Evaluation Steering Committee in order to ensure a more fully representative portrait.

Web forms developed by the evaluation team and modified on the basis of suggestions from their users had three sections, two of which were mandatory for each session: 1) identification information: site, date and time, and person completing the form; 2) technical problems experienced, including communication, sound, visual and scheduling problems.

A third section was optional and required patient consent when the session involved patients. This section collected information on the nature of the consultations, the type and location of follow-up care required, and the nature of any travel avoided through the session. Patient consent was obtained by the site coordinator prior to the session using a specific consent form (Appendix 1). Although a simplified consent form had been developed, the requirements of the University of Manitoba REB resulted in a seven-page form. For pediatric telehealth patients, consent to participate in the evaluation was obtained from the child's parents or guardian. A unique identifier was assigned to each consenting patient, so that multiple uses of the telehealth system could be tracked over time.

A total of 2,616 forms were submitted between April 2, 2002 and February 7, 2003, pertaining to sessions up to January 31, 2003. These were imported into SPSS for analysis. Corrections submitted by coordinators were also incorporated and forms which appeared to be duplicates were removed. The submissions were then matched according to date, time and participating locations to create a database of distinct sessions. Among these, forms were received from only one end of the session in 848 cases (33%).¹⁰ For purposes of this report, these cases are included as distinct sessions. The 2,616 forms then pertained to 1,610 distinct telehealth sessions. Two hundred and thirty-six forms involved patients who had consented to the evaluation.

Among the 1,610 unique sessions reported, 1,250 (78%) were reported as two-point sessions and 360 (22%) were reported as multipoint sessions. The number of sites present in the multi-point sessions ranged from three to 13, with an average of 4.4 sites present (sd 1.6).

MBTelehealth collected usage statistics independently of this evaluation for its own purposes (reported at www.mbtelehealth.ca). Comparison of the two sets of data suggests that the evaluation captured approximately 79% of overall system usage.¹¹

2.2.2 Patient satisfaction questionnaires

From April 2002 through January 2003, one-page questionnaires (Appendix 3) assessing satisfaction with the telehealth experience were completed by consenting patients and mailed to the evaluation team. An initial version of this instrument was reviewed by the Evaluation Committee, who recommended that it be simplified for completion by low-literacy or second-language respondents.

A total of 177 questionnaires were received from patients residing in 50 different Manitoba communities. There are 73 more questionnaires than should have been completed, given the number of consenting patients indicated by the on-line form submissions. However, some patients may have completed more than one questionnaire and some may have completed the questionnaire without having had on-line data entered about them. In addition, although some patient satisfaction forms may have inadvertently been completed by attendees at continuing education or other types of information sessions, these were not possible to identify because of the anonymity of the questionnaires. All these data were entered into SPSS for the analyses reported below.

¹⁰ It is possible that some forms which should have been matched with others were not matched, because of inaccuracies in reporting of times and participating locations. This would have the overall effect of overestimating activity levels, by a maximum of 30%.

¹¹ The MBTelehealth web site reports monthly utilization rates which show steady increases in all categories of usage except for televisitations and network management usage. The most important increases are shown in clinical use which has grown from a low of 48 cases in April 2002 to a high of 161 cases in February 2003 and in continuing education, which has grown from 15 sessions to 60 sessions in the same period of time.

Of the 179 respondents, 61 (34.5%) were male and 111 (62.7%) were female (five respondents did not provide this information). Their ages ranged from 3 to 92 years, with an average age of 39.1 years. Seventeen questionnaires about children were completed by their parents.

2.2.3 Continuing education assessments

These two-page questionnaires (Appendix 4) were completed by consenting continuing education participants between April 2002 and January 2003 and mailed to the evaluation team. This questionnaire was reviewed by the Evaluation Committee, and their recommendations incorporated.

The questionnaires along with consent forms (Appendix 1) were distributed by site coordinators at all continuing education sessions. Stamped return envelopes were provided.

A total of 584 questionnaires were received from participants and entered into an SPSS database for analysis; these pertained to a total of 87 sessions held between April 16 2002 and January 31 2003.

2.2.4 Qualitative key informant interviews

In-person, telephone and video interviews were conducted with stakeholders either individually or in small groups in all telehealth locations throughout Manitoba in December 2002 and January 2003. The interviews were conducted using semi-structured interview guides that had been reviewed and approved by the Evaluation Committee (Appendix 5). Interviewees were identified with the help of local site coordinators and Evaluation Committee members, and site coordinators played a key role in organizing the interviews.

All interviewees completed consent forms prior to participation (Appendix 1). Three evaluation team members conducted interviews; two of these tape-recorded the interview with participants' permission, and one took notes. All interview notes and tapes were fully transcribed and the data organized into appropriate content areas for qualitative analysis.

Tables 2 and 3 show the number of interviews conducted by types of stakeholder and by location. A total of 109 interviews were conducted with 179 individuals.

Table 2: Interviews by respondent type

Type of respondent ¹	No. of individuals participating in interviews
<i>Central/provincial</i>	
MBTelehealth central staff	7
Health service providers: medical specialists²	8
Health service providers: allied health professionals²	10
Health service providers: continuing education	3
Provincial government staff, professional associations, and institutional association representatives	5
<i>Remote sites</i>	
Site coordinators and their backups³	25
Local health system administrators (RHA or facility)	34
Local health service providers: physicians	29
Local health service providers: other health professionals⁴	36
Community stakeholders⁵	22
TOTAL	179

¹Some individuals had more than one function; only their main role vis-à-vis the telehealth system is counted.

² Includes service providers in Winnipeg, St Boniface, Brandon, and Selkirk: medical and allied health specialists in seven different areas.

³One site coordinator was interviewed twice but is counted here only once.

⁴ Includes facility-based and public health nurses, mental health workers, EMS workers, pharmacists, physiotherapists, psychologists, continuing education coordinators and midwives.

⁵Includes RHA board members, school board members, private sector representatives, citizens, municipal council members, representatives of other health and social service agencies and of First Nations communities.

Table 3: Interviews by community

Community	Individual interviews			Group interviews			Total
	In-person	Telephone	Video	In-person	Telephone	Video	
Ashern			2			2	4
Berens River					1		1
Boundary Trails	2			3			5
Brandon	4			2			6
Churchill	3			1			4
Dauphin	5						5
Flin Flon	3			1		1*	5
Gillam		1	3				4
Killarney		1					1
Leaf Rapids						1	1
Lynn Lake		1					1
Norway House	4						4
Pine Falls	4			2			6
Portage La Prairie	5						5
Russell	1	1		3			5
Selkirk	2	1		1			4
Steinbach	4			1			5
Swan River	5			1			6
The Pas	1	3		3			7
Thompson	4	1					5
Winnipeg/St Boniface	20	2		3			25
TOTAL	67	11	5	21	1	4	109

*A group interview with 13 participants, video linked with half the participants in Flin Flon and half in The Pas. This is counted only once in the table.

2.2.5 Focus groups with patients

Focus groups were conducted with patients who had used the telehealth system in three different communities. A separate submission was made to the University of Manitoba Research Ethics Board for this data collection procedure. All participants provided written consent (Appendix 1).

These 90-minute sessions focused on patients' reactions to and experiences with telehealth as part of their ongoing access to health services, as well as its impacts on their out-of-pocket costs. (The discussion guide may be found in Appendix 6.) Participants were identified and recruited by the telehealth coordinators in each of the sites. With participants' permission, the sessions were tape-recorded. The tapes were fully transcribed for qualitative analysis.

Three focus groups involving a total of 15 patients were conducted.¹² These data were interpreted cautiously, as supplementary to the other lines of evidence.

¹² Note that the sessions had been scheduled to coincide with the evaluation team's in-person visits to the sites, which coincided with a week of extreme cold weather in most of Manitoba. This affected participation in the focus groups in at least one site.

Summary of evaluation data

Table 4, below, summarizes the data that were collected for the evaluation.

Table 4: Summary of Evaluation Data Sources

Source	Number
On-line session monitoring forms	2,616
Patient satisfaction questionnaires	177
Continuing education participants' questionnaires	584
Key informant interviews	109
Number of individuals interviewed	179
Focus groups	3

Note on qualitative analyses and data presentation

The extensive amounts of qualitative data collected through stakeholder interviews and focus groups were analyzed using accepted techniques (Miles & Huberman, 1994; Pope, Zeibland & Mays, 2000; Mays & Pope, 2000). Findings extracted from the qualitative material are presented when they emerged from a significant proportion of stakeholders' interviews or when they were considered to be qualitatively important either because of the position of the respondents or because of their implications for the overall body of evidence. To make the results easier to read, only illustrative quotes supporting each of the findings are presented.

3. EVALUATION FINDINGS

3.1 How have usage levels of the MBTelehealth system evolved?

Usage levels of telehealth systems are a major determinant of their impact and cost-effectiveness, but uptake of telehealth systems is often gradual, taking several years to reach its maximum potential. We examined usage levels of the MBTelehealth system to assess their growth and characteristics over the first nine months of its operation. Because MBTelehealth has prioritized use of the system for patient care, particular attention was paid to this type of use as well as to the balance between clinical and other uses of the system.

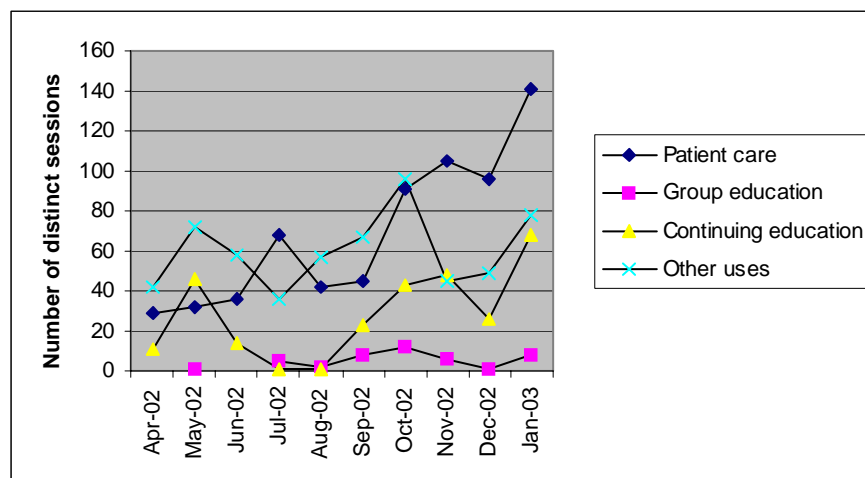
Evolution in types of sessions over time

The data shown in Table 5 below indicate that use of the MBTelehealth system for patient care, group education and continuing education has grown steadily over time. These data in graph form (Figure 1) highlight how patient care sessions have increased steadily over time, especially over the fall of 2002. In June 2002, patient care sessions accounted for 36% of all sessions; by December 2002, this had risen to 55% of all sessions, with continuing education and other uses together accounting for most of the other half (44%).

Table 5: Types of telehealth sessions (distinct sessions) by month, April 2, 2002 to January 31, 2003

Month of session	Type of session				Total
	Patient care	Group education ¹³	Continuing education	Other activity	
April 2002	29	0	11	42	82
May 2002	32	1	46	72	151
June 2002	36	0	14	58	108
July 2002	68	5	1	36	110
August 2002	42	2	1	57	102
September 2002	45	8	23	67	143
October 2002	91	12	43	96	242
November 2002	105	6	48	45	204
December 2002	96	1	26	49	172
January 2003	141	8	68	78	295
Total	685	43	281	600	1609

Figure 1: Types of telehealth sessions, April 2, 2002 to January 31, 2003



The general portrait of telehealth system usage described by key informants in the qualitative interviews mirrors the statistical portrait. Usage of the telehealth system has gradually increased over time. As the system has been promoted and supports have been developed for clinical uses, usage in this area has started to increase and even overtake some of the other types of uses in some settings.

Usage levels compared to other systems

To help put this usage levels into context, Table 6 shows activity levels from several other provincial telehealth systems, over their first year of operation. It can be seen the usage rates in Manitoba are comparable to levels in these other systems.

¹³ Care should be taken in interpreting the group education session data, as the definition of these sessions was clarified and modified in July 2002.

Table 6: Telehealth usage levels in MBTelehealth and other networks *

	Total distinct sessions	Total distinct clinical sessions	Total distinct sessions since beginning of operation
MBTelehealth ¹	1739	891	1739
Nova Scotia Telehealth Network ²	9473	217	62,324
Ontario's North Network ³	N/A	N/A	4000 ³
Eastern Ontario Telehealth Network ⁴	N/A	200	N/A
Saskatchewan (Northern Telehealth Network) ⁵	N/A	256	N/A
Alberta Wellnet ⁶	5921	1409	16,339

1 For period April 2002 to February 2003. The MBTelehealth reporting period is 3 months shorter than the length of the reporting period for other networks which is approximately 1 year.

2 For period 1998 to 1999. Total distinct session statistic for 1998-99 includes 8,706 teleradiology sessions, and total sessions since the beginning of operation includes 52,453 teleradiology sessions.

3 For period March 1998 to December 2002. Statistics were not available on NORTH Network's website distinguishing the first year of clinical activity.

4 For period January 2002 to December 2002. No published statistics were available for the total number of distinct sessions.

5 For period June 1, 1999 to June 30, 2000. 256 is the number of patients seen during 108 clinics. For the purpose of this table we have assumed that 1 patient is equal to 1 session. The total number of distinct sessions was not published.

6 For period April 1, 2001 to March 31, 2002. Except for the period October 2001 to December 2002, statistics include teleradiology sessions.

When interpreting the numbers reported in Table 6, it is advisable not to make direct comparisons because of numerous operational differences and differences in how telehealth utilization data is measured and reported by each network. Criteria for what constitutes a telehealth session are different and most networks do not necessarily define what is meant by a session. The number of sites on a network varies greatly from network to network. Some programs have received CHIPP funding, while others have not. The years of operation for which the statistics represent also varies depending on the particular project or program.

Usage levels according to locations within the province

One of the main factors driving the implementation of this network was ensuring equity of access to all Manitobans. The evaluation examined how patterns of uptake of the system varied according to telehealth site, as well as by type of region: rural, remote or central.

Using the classification of telehealth sites shown in Table 1, Figure 2 shows the proportion of each type of session for each type of region. Of note here is the relatively greater use of patient care sessions in rural Manitoba, compared to remote sites, and the relatively strong uptake of continuing education in remote settings as opposed to rural settings.

**Figure 2: Types of sessions according to types of regions,
April 2, 2002 through January 31, 2003**

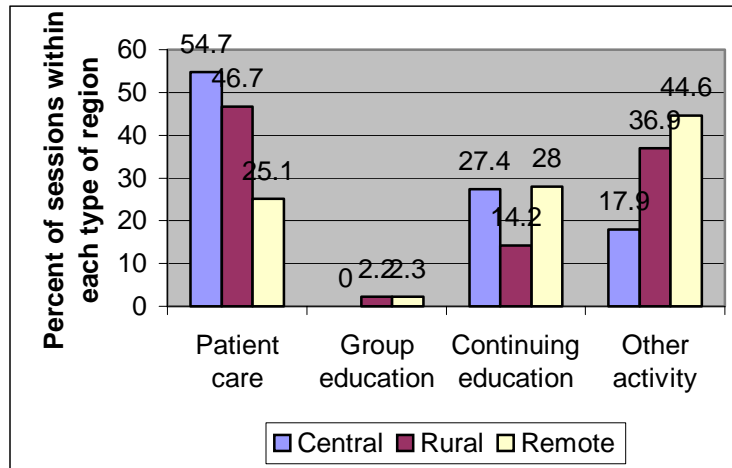


Table 7 provides more detailed data on usage of the MBTelehealth system, for each of the telehealth sites. It shows the number of times each community was involved in telehealth sessions, either as the originating or remote site.¹⁴ These data indicate quite wide variations among sites in their use of the telehealth system. According to key informants, several factors seemed to have influenced usage levels within sites, including population size, access to specialists within the region, and the presence of more than one telehealth center site within the RHA territory (which was associated with more frequent use of the system for administrative purposes: see below).

Table 7: Activity levels by site, April 2 2002 to January 31 2003

SITE	Number of forms submitted by site	Number of times mentioned as remote site in other sites' forms
Ashern	88	109
Berens River	0	6
Boundary Trails	76	86
Brandon	96	108
Churchill	42	71
Dauphin	207	261
Flin Flon	160	165
Gillam	71	65
HSC	549	843
Killarney	55	84
Leaf Rapids	0	34
Lynn Lake	12	97
Norway House	41	30
Pine Falls	38	70
Portage La Prairie	47	71
Russell	54	66
Selkirk Mental Health Centre	138	142
St Boniface Hosp	118	117
Steinbach	44	37
Swan River	267	254
The Pas	152	194
Thompson	330	338
Unknown	41	291

¹⁴ These data are likely somewhat underestimated, as participants in multi-point sessions are not asked to list all other participants.

Links to out-of province sites

A total of 131 monitoring forms reported connections to out-of- province locations (Table 8). Almost half of these (58 sessions, or 44%) were made to locations in Northern Ontario, likely through Ontario’s North Network. Key informants noted that connections to several out-of-province centers have generally proven to be successful, notably with pediatric cardiac surgery services delivered through Edmonton.

Table 8: Frequency of links to out-of- province sites

<i>Out Of Province Sites</i>	
British Columbia (Vancouver)	2
Alberta (Edmonton & Calgary)	28
Saskatchewan (Saskatoon)	14
Northern Ontario (Balmertown, Deer Lake, Dryden, Fort Francis, Fort Severn, Keewayin, Kenora, North Spirit Lake, Poplar Hill, Red Lake, Sioux Lookout, Thunder Bay)	58
Ontario (Ottawa and Toronto)	14
Nunavut (Baker Lake)	3
Québec (Montreal)	6
New Brunswick	1
Nova Scotia (Halifax)	4
United States (Chicago)	1

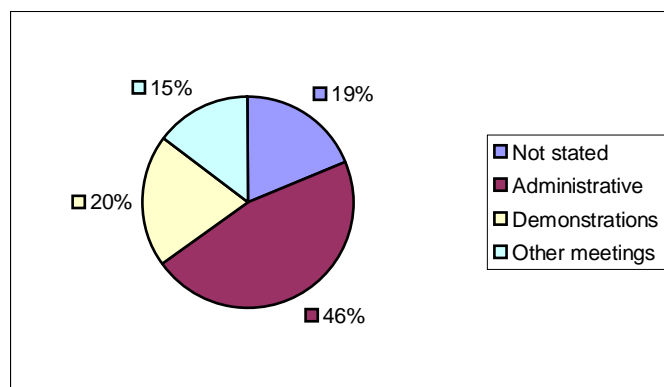
Providers from Manitoba have had a long-standing relationship with sites in Nunavut, providing specialist and generalist care to a number of northern sites and also seeing patients in those locations as well as in locations in the North of Manitoba. Nunavut has recently established its own telehealth network, and it is expected that service provision will continue through telehealth, although this usage was not captured in the present evaluation.

Balance among types of use

Although MBTelehealth has prioritized patient care in use of the system, many key informants – particularly health system administrators and site coordinators – commented on the difficult task of identifying and maintaining an appropriate balance among the types of usage. According to key informants in most regions, there are still many opportunities to increase use of the system for patient care, while use of the MBTelehealth system for administrative purposes was in some ways unexpectedly strong. Figure 3 shows the types of “other activity” sessions held between April 2, 2002 and January 31, 2003. Nearly one-half of these (46%) were for administrative uses, including: intra-or inter-regional meetings, interviews or non-CE training.

“We’ve really used it for administrative support, and its had a positive impact. We’re disappointed that we have to limit it... This is another part of the health system being exposed to telehealth. We have to keep in mind the potential, every use is an investment” – RHA manager

Figure 3: Types of other activity sessions



“We would like to have more sites in the region. I come to meetings at least once a week, and it’s one-hour each way. If I could hook on like that it would be a godsend.” – RHA manager

Many stakeholders, particularly in rural Manitoba, could see enormous benefit from broad access to the telehealth network for administrative uses such as meetings and interviews. This was particularly true in regions where the RHA staff travel regularly to meet with colleagues in other sites in the region. Some felt that this was leading to pressure on the RHA’s to consider adding more telehealth sites in their regions. Others

commented that as the clinical usage levels increase – the potential tension between the types of system use may be felt more keenly, and could lead to pressures for overall system expansion.

Summary

In summary, usage of the MBTelehealth network is strong and increasing. This strong uptake in its early months of operation will contribute to both its impact on the health system and the population, as well as to its cost-effectiveness. The success of its implementation has been so great that the coming months are likely to bring challenges in terms of responding to pressures to expand the network and to maintain an appropriate balance among different types of usage.

3.2 What is the level of technical success of the system?

Reliability of the system as well as visual and auditory quality are key determinants of telehealth system usage and its impact. The technical success of the system was assessed during the evaluation, both quantitatively (in terms of the incidence of technical problems) and qualitatively (in terms of users’ assessments of quality). Scheduling issues – often key in successful implementation of complex telehealth network – were also assessed. Overall, the data indicate a high level of technical success, with relatively infrequent technical problems except in multipoint sessions, and in connections to sites with satellite connections. The adequacy of training and technical support was also assessed and shown to be highly satisfactory.

Frequency and types of technical problems

The monitoring data capture forms included items assessing the presence or absence of technical problems during each of the telehealth sessions. Table 9 shows the frequency of each type of problem, with problems most frequently occurring with establishing communications and visual transmission quality, in 7.5% and 7.6% of user sessions, respectively. The qualitative data showed that users generally found the technical quality of the system to be very good, with many initial problems being worked out over the first few months of ongoing use.

*“The equipment itself is easy to use. We’ve had very few problems.”
– Site coordinator*

**Table 9: Frequency of technical problems, all reported distinct sessions,
April 2 2002 to January 31 2003**

Type of problem	Number of sessions	Percent of total sessions
Problems with visual images	122	7.6
Problems establishing communication	121	7.5
Sound problems	86	5.3
Scheduling problems	65	4.0
Problems maintaining communication	63	3.9
Other types of problems	55	3.4
Camera problems	11	0.7

Table 10 provides details on the types of technical problems as described by site coordinators on the monitoring forms, grouped according to their frequency. Various types of connection problems dominate in several of these categories.

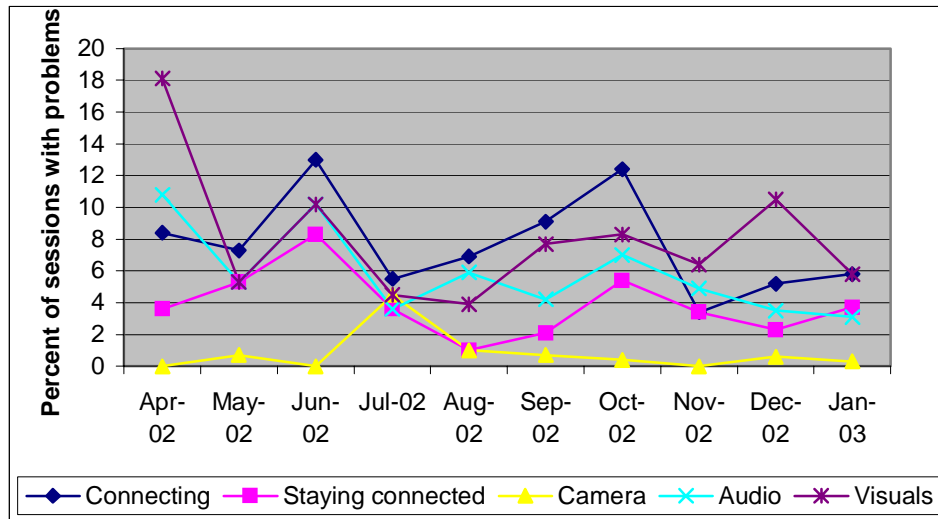
**Table 10: Types of technical problems, all reported distinct sessions,
April 2 2002 to January 31 2003**

Type of problem	Number of sessions
Scheduling problems (58 responses)	
Connection problems	18
Booking not made, made without enough notice, or double booked	13
Clinician late or absent	10
Late start due to technical problems	6
Satellite or bridge not booked or not ready	4
Connection not adequate	4
Patient not present	3
Problems establishing communication (103 responses)	
Could not connect	61
Poor quality of connection: video or audio	22
Switch, satellite or other element down	9
Was disconnected	4
Problem with room connections	4
Late arrival of participants	3
Problems maintaining communication (50 responses)	
One or more sites dropped or disconnected	26
Network or power down	6
Visual problems	6
Audio problems	5
No connection made	5
Problem with room connections	2
Camera problems (9 responses)	
Lost control of far end camera	4
Camera froze	2
Other	3
Sound problems (70 responses)	
Cutting in and out	10
Breaking up, cracking or choppy	10
Echo	9
Delay	9
Microphone problems	6
Poor quality	7
Distortion, fuzziness	5
Background noise	4
No audio	3
Static	4
Trouble hearing	3
Problems with visual images (97 responses)	
Image tiling, choppy, freezing, streaming or shadowing	67
Problems with peripherals: digital camera, otoscope	9
Packet loss	7

No video at at least one site	5
Images fuzzy or blurred	3
Color lost or fading	3
Other	3
Other types of problems (44 responses)	
Connection difficulties	18
Visual quality problems	6
Voice activation problems	4
Problems with lights	3
Laptop connection problems	3
Telco problem	2
Problems with digital images	2
Screen/document management	4
Other	2

Figure 4 illustrates the proportion of each month's sessions, among the total sessions that month, with each type of problem. Overall, these data seem to indicate that most problems declined or remained stable in incidence from April 2002 through January 2003, with all problem types occurring in 6% or less of sessions by the end of this period.

Figure 4: Proportion of each month's sessions with each type of technical problem reported

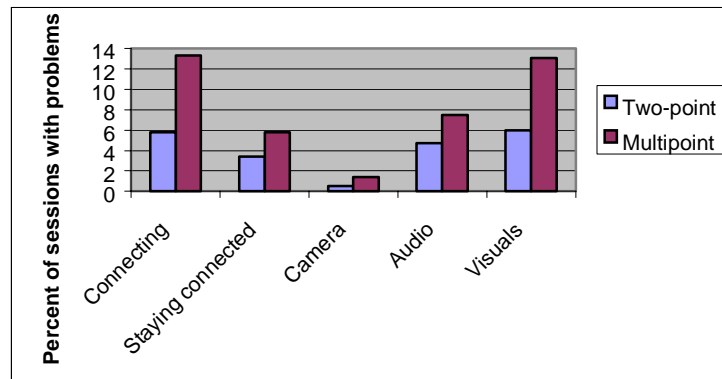


Specific problems: multi-point sessions and satellite links

Figure 5 shows the proportion of type of problem according to whether the session was two-point or multipoint. This shows clearly that all types of problems were encountered more frequently in multipoint sessions, especially in establishing communications and with visual quality.

"Multi-point is continually frustrating and people complain. The problems are different each time... The biggest problem in unpredictability, it's a surprise every session" – Site coordinator

Figure 5: Problem frequency according to type of session, all distinct sessions, April 2 2002 to January 31 2003

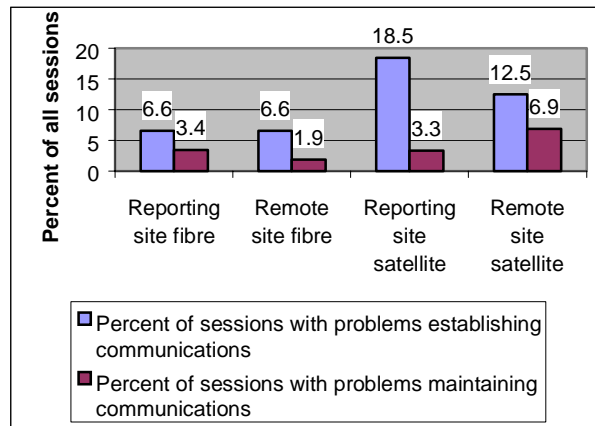


“Most of the glitches have been worked out, but there are ongoing problems with satellite links. Some sessions have been cancelled and can’t be rebooked” – Specialist physician

Figure 6 shows that connection problems – maintaining or establishing communications – were experienced more frequently in sessions involving sites with satellite connections. Key informants in the satellite-based sites complained that they were limited regarding which centers they can simultaneously connect with, and key informants

outside these sites noted the complications engendered by being unable to connect to two satellite centers simultaneously.

Figure 6: Frequency of communication problems by type of connection



Training and technical support

All interviewees who received training in the use of the equipment (mainly site coordinators and their backups) were, without exception, satisfied with the training received. Some respondents wished to receive extra training on computers, projectors, digital cameras, and troubleshooting so that they would not need to rely on the technical help desk to sort out any technical glitches. Coordinators’ backups (designated by RHA’s in almost all sites) were also very appreciative of the training

“The training was very good, and we have been to Winnipeg for updates. After the initial meeting Winnipeg has always been extremely supportive. I never feel I’ve been left in the lurch.” – Site coordinator

they had received, as well as of support manuals. Respondents were unanimous in their appreciation of the technical support. Response has been very effective and rarely have the users – usually coordinators – had to wait

“The staff in Winnipeg are helpful, they can do some troubleshooting one on one with us – they are very accessible.” – Local health service provider

for assistance. The coordinators also appreciate the fact that they can do some initial troubleshooting themselves.

Future technical developments

Many key informants expressed interest in the ongoing development of the network, in two main areas: increases in accessibility of sites, and in additional peripherals. Regarding the former, some stakeholders feel the network is not reaching all the remote and rural sites that need to be connected, while others would like to increase or the number of drops in their region, because they find it takes almost as long to travel to participate by video as they would have to travel to participate in the live session. As well, some would like to relocate or increase the number of drops in their hospitals, clinics or offices claiming that the different locations would enable them to provide a better access to care for patients. Regarding peripherals, interest was expressed in electronic stethoscopes, ultrasound (Doppler), other types of medical imaging, as well as access to electronic health records. (Some of these are currently being implemented, while others are under review.)

Summary

In summary, the technical quality of the MBTelehealth network and the technical support provided to its users have been highly satisfactory. Although some specific technical concerns are present, these have not had major impacts on service delivery, and are being addressed by MBTelehealth.

3.3 What are the impacts of the MBTelehealth network on patient and community access to needed, quality care?

3.3.1 How the telehealth system is used for patient care

Improving Manitobans’ access to care is a main driver of the MBTelehealth program. This was one of the key issues addressed by the evaluation: in what circumstances and for what types of health issues, it would be seen as useful, and how it might fit in to an ongoing sequence of interactions between patients and providers.

As stated above, the telehealth system was used for a total of 685 patient care sessions between April 2, 2002 and January 31, 2003, representing about 42% of all system use. Information on the nature of the clinical usage is available only from those patients who gave informed consent to participate in the evaluation, including having data pertaining to their specific clinical situation entered in the on-line forms.

Consent was provided for 142 of 685 sessions (20.1%) by a total of 104 unique patients. The frequency of use of the system by these patients is shown in Table 11. Most have used the system only once, but multiple uses have occurred for about 17% of patients. This suggests that for some patients, perhaps those with chronic conditions, telehealth can be integrated into an ongoing sequence of care.

Table 11: Frequency of use of telehealth system by consenting patients, April 2 2002 through January 31,2003

Number of uses	Number of patients (%) N= 104
One	86 (82.7%)
Two	10 (9.6%)
Three or more	8 (7.7%)

The patients participated in patient care telehealth sessions from a total of 16 different sites. Eighty-two were adults, and 36 were children. Consistent with the orientations of the system, only two sessions involved an urgent consultation.¹⁵

The telehealth system is most often being used to discuss or confirm diagnoses (Table 12), often in situations where a specialist would have previously been seen in an in-person consultation, and for follow-ups on previous visits or test results. These findings illustrate that telehealth is being used as an alternative means of service delivery in an ongoing sequence of care episodes, some of which will be in person and some of which will use telehealth. The relatively frequent use of the system for the Employee Assistance Program (EAP) partly reflects the ongoing nature of these services, as well as the popularity of telehealth for providing mental health services in general.

Table 12: Types of patient care, consenting patients, April 2, 2002 to January 31, 2003

	No. of sessions
Discuss or confirm diagnosis	52
Counselling/EAP	29
Follow-up on previous visit or test results	16
Pre/postoperative assessments	15
Case management/case conference	7
Speech therapy	5
Discharge planning	4
Medication adjustment	2
Genetic counselling	1
Patient education (individual)	2
Unknown	9
Total	142

In their qualitative interviews, providers indicated areas where they thought telehealth was having positive impacts. Successful experiences were reported in:

- assessments and diagnoses in children,
- assessments in psychology;
- pre-assessments for surgery
- decision-making about courses of treatment
- monitoring of health condition and adjustment of treatment
- follow-up appointments
 - o after surgery .
 - o cancer care
 - o wound management
- case conferences and for discharge planning:

“Where telehealth fits into the cycle of care depends very much on type of problems and the speciality: for some the first visit has to be hands on, others not – depends.” - MBTelehealth central staff member

Providers noted that the impacts of telehealth depend on the patient’s condition and the type of service being accessed. At the time of the interviews, some sites had used the network for very few clinical sessions, prompting respondents in those locations to comment that it is too early to speculate on the impact of the network on access to care, although they commented on its potential. As can be expected, providers who had used the network, or those who had referred patients to access services over the network, had more practical insight regarding its impacts.

¹⁵ Although emergency services were identified in the needs assessment, this area is complex and requires a mature infrastructure for wide-scale implementation. MBTelehealth has therefore not included it in the initial roll-out of services.

Follow-up to telehealth care

Site coordinators were asked to indicate, for consenting patients, whether follow-up care would be required after the telehealth session, and if so, whether that care would occur through telehealth. Table 13 shows that further care was requested in 84 of the 142 sessions. For 46 of those (33.3%), the follow-up session would involve telehealth. This suggests that telehealth is being used as part of an ongoing continuum of care, and that while it might replace an in-person consultation, two-thirds of subsequent care episodes will involve face-to-face consultations.

**Table 13: Follow-up to telehealth care, consenting patients,
April 2, 2002 through January 31, 2003**

	No. of distinct patient care sessions after which....
Further action is required	84
With telehealth	46/138
Without telehealth	92/138
Nothing further is required	36
Further action is unknown	18
Total	138

Summary: How telehealth is used in patient care

The on-line data should be interpreted cautiously, as they represent only one-fifth of all clinical sessions reported through the system (and likely a smaller proportion of all clinical sessions). Nonetheless, they suggest that the MBTelehealth system is being used to address wide variety of health issues and is being integrated into the ongoing flow of care, most often complementing in-person consults or interventions.

3.3.2 How patients react to telehealth

All the evaluation data converged on a key finding of this evaluation: patients are highly satisfied with telehealth. Table 14 summarizes the responses to the satisfaction questionnaires received from 177 patients. These indicate very high levels of satisfaction with all aspects of the telehealth experience, and strong interest in using the telehealth systems again.

**Table 14: Responses to satisfaction questionnaire, consenting patients,
April 2 2002 to January 31 2003**

Item	Yes	No
Understood what the TV equipment was for	176	0
Could hear clearly	175	1
Could see clearly	174	2
Felt respected	176	0
Liked using telehealth	175	1
Would use telehealth again	175	1

“Not one person has said they don’t like it – there is 100% satisfaction with telehealth. None have expressed concerns” – Site coordinator

Key informants corroborated that patient reactions were universally favorable. All types of patients find telehealth acceptable. Positive reactions were seen among elderly patients who dislike traveling to the city as well as among parents who are appreciative of not having to take time out of school or off work. Key informants report patients have almost never refused to use telehealth. Those few who refused did so for different reasons, including a lack of comfort with

the medium. These cases mostly seemed to concern psychiatric patients. The novelty and unfamiliarity of the medium were reported to intimidate some patients at the outset. Some key informants noted a small percentage of patients had “stage fright”, were self-conscious and did not like to see themselves on the monitor. Quite a few respondents noted that patients were hesitant at first but soon became comfortable with the medium.

Regardless of location, with one exception, patients have reported to health professionals and coordinators that the telehealth session was the same or very similar to meeting in the doctor's office. Providers report that patients respond the same way during a telehealth session as they would during a face-to-face session. In some cases the telehealth appointment had an additional advantage: patients had a longer visit time with the provider or specialist than they would have had during a face to face visit, and as a result had more time to ask questions. Note that some patients appeared to believe that using telehealth would facilitate access to physicians in Winnipeg on in-person visits, because a relationship would already have been established.

"It's great for the patients. It's convenient, and they can bring other family members with them"

"For myself it was a very positive experience and, I was a little apprehensive but when everything started going, I just relaxed and enjoyed the experience." - Focus group participant

Protection of confidentiality. Respondents were asked to indicate the extent to which, as far as they were aware, patients had raised concerns with confidentiality. It appears that the great majority of patients are not concerned about confidentiality, according to site coordinators. Only one or two patients had expressed some concerns, and these were assuaged during the introduction and consent procedure. Several respondents noted however, that staff and board members appeared more concerned than patients about these issues, suggesting a need to provide additional information to these groups.

Although some patients have expressed concern regarding the potential for the invasion of privacy over the telehealth network, some key informants noted some patients prefer telehealth because it seems to provide relatively greater anonymity. For example, persons accessing EAP services in small communities can do so anonymously over the telehealth link, whereas visiting the counsellor face to face would be more visible.

"In EAP, patients are not necessarily seen faster but their privacy needs are met better, and some might not access it locally because of confidentiality." - Site coordinator

Summary: Patient satisfaction

Overall, these data are consistent with previous findings about telehealth systems, where patients' reactions have consistently been reported as positive (Mair & Whitten, 2000; Loane et al, 1998). Moreover, there are no concerns about protection of confidentiality in the MBTelehealth system.

3.3.3 How telehealth affects access to care

The evaluation examined, from the points of view of all key stakeholders, how the MBTelehealth system has affected access to care. Two main types of impacts were seen: 1) improved convenience and reduced travel and life costs, and 2) in some cases, improved timeliness of care. More limited impacts were seen in a third area: making services available to patients that they had not been able to access before.

Improved convenience, reduced travel and life costs

The focus groups with patients showed clearly that the benefits of not having to travel to health appointments are a key impact, facilitating access to health care by making it more convenient and less costly. This was strongly corroborated in the key informant interviews, where practically all of those interviewed mentioned the benefits patients experience when they do not have to travel, including the fact that they can save money by not having to travel.

"Yes, it was after work, it was at four thirty, and I just came back up with my son and it was great. And then the doctor was in touch with me a couple days later with an appointment. So it was really good, it was awesome to not have to leave town and dish out all that money and spend a couple of days, two days to travel and, you know, maybe three days depending on when your appointment is and it may be to late to leave again, so that's another day there. It was awesome." - Focus group participant

These qualitative findings are strongly supported by the monitoring data. Of the 142 distinct patient care sessions involving consenting patients, 138 were said to have resulted in travel avoided, in most cases (131, or 92.3%) for the patient and his or her family. Travel avoided would most often have been by car (94 sessions, 66.2%). Thirty-nine sessions replaced a trip by air, while eight sessions replaced a bus trip and one an ambulance trip. An escort would have been required to travel with the patients on 55 of the trips. (The cost implications of these findings are discussed in section 3.7).

The respondents to the patient satisfaction questionnaire provided other information about the impacts of telehealth on travel for health care. Respondents live in a total of 50 different communities throughout Manitoba, and their usual caregivers are found in 28 different communities. For 52 of the 164 respondents who provided this information (31.7%), their usual caregiver does not live in the same community as they do, indicating that they would usually travel to receive care. However, for 69 of the 176 who provided these data (39.2%), the telehealth session took place outside their home community. For these respondents telehealth did not completely avoid travel costs, although it may have reduced them.

Focus group participants spoke of the impacts of telehealth in terms of adapting care to their needs and capacities, and of reducing the physical burden of travel.

“With my particular disease, I can’t do a lot things for myself. You know, going to Winnipeg and come back again, it would just take a lot out of me. With telehealth everything was right there, I was able to see the doctor, talk to the doctor and he was able to do likewise. For me, telehealth is just like a godsend.” – Focus group participant

Telehealth was viewed by key informants as particularly attractive to seniors who would choose telehealth over the inconvenience and expense of a long drive into the city. It was seen in some cases as increasing the overall level of care and support to families, by providing more accessible follow-up for ongoing monitoring of chronic conditions.

Improved timeliness of care

The data reveal mixed findings in relation to telehealth’s impact on the timeliness of care received.

Waiting times for appointments.

“Its been positive, because we can get an appointment fairly quickly, usually faster than going to Winnipeg” – Local physician

A significant number of key informants felt that telehealth has enabled patients to access services more quickly than through traditional channels. Providers see this as contributing to improved outcomes for some patients, where earlier treatment can slow progress of a condition or prevent further deterioration. However, the delay in getting an appointment with a specialist – a main way to measure the timeliness of health care provision --- seems to depend in part on the specialty

or service being requested. Many MBTelehealth sites reported that the waiting period to see a dermatologist by telehealth was considerably longer than obtaining a face-to-face appointment. For other specialties, for example oncology, psychology, and general surgery, respondents reported that access was very speedy. Since there is a wide range of responses to the question of timeliness in reference to specialist appointments, particularly dermatology, there may be a number of other factors involved.

“I have been using it for pediatric cases, skin lesions, but I would like to get it sooner:.... I would have sent the patient to Winnipeg to the first available dermatologist and he would have been seen by now.” – Local physician

In one focus group, it was apparent that patients’ overall perceptions of the impact of telehealth were related to their perceptions of the timeliness of receiving care, with the length of waiting lists affecting their perceptions negatively. Key informants also noted that some patients, given the choice, prefer to travel in order to have an appointment sooner.

Key informants noted that although telehealth may be an aid in facilitating quick access to certain services and specialties, patients may have to travel anyway for procedures like surgery or for some diagnostic tests. Thus if a patient has waited for an appointment with a specialist via telehealth and then

still has to book a face to face appointment for a more accurate diagnosis, access to treatment will take longer than what would have been provided traditionally. In such cases, telehealth offers no advantage in terms of timeliness.

Another measure of timeliness with reference to seeing specialists is with respect to adherence to scheduled appointment times, and according to key informants telehealth is perceived to have facilitated patients being seen on time, by comparison to the long waiting times spent in waiting rooms on face to face visits. (However, specialists have also been late for a number of telehealth appointments – see Table 10).

Timeliness and compliance. Some key informants noted that telehealth affects another facet of timeliness of care: increasing compliance by encouraging patients to consult a physician and to follow through with consultations and appointments. By reducing barriers to compliance with appointments, in some cases telehealth permits more frequent or evenly spaced consultations. This was said to be particularly true for elderly and restricted-mobility patients, as well as some who have more difficulty with compliance. Improved compliance is seen as contributing to improved outcomes for patients.

For those services which require a number of treatment visits over a period of time – mental health, nephrology, speech therapy, physiotherapy, for example – telehealth is seen as having the potential of providing access to

“Some patients want to link with telehealth because financially it’s a strain on their income to travel. Sometimes they have to miss appointments because of this.” – Local community mental health provider

ongoing care which might otherwise not be available to patients who live in remote locations.

“No-show patients are a huge cost to the system. Telehealth helps reduce no-shows – maintain compliance over repeated visits. It makes it easier to keep appointments, so there fewer opportunity losses or costs to the system.”- RHA manager

Timeliness: Unscheduled emergency access vs. scheduled access. Several key informants in different centers mentioned that the impact of telehealth would be increased were it available on the basis of 24 hours a day 7 days a week, so that

it could be used in the case of emergencies including accidents, strokes, heart attacks and difficult childbirths. In at least one instance, providers were able to coach health care professionals at a distance to provide the correct treatment in an urgent situation (see footnote 15).

In an ongoing research project linking one site (Thompson) to the Neonatal Intensive Care Unit at the Health Sciences Centre in Winnipeg, the system is being used to support the transfer of newborns at risk on an as-needed basis rather than a scheduled basis. This project is regarded as very successful. An innovation in the use of the telehealth system, it is likely to be expanded and is leading the way for other emergent or urgent care uses.

Providing access to previously inaccessible services

The majority of those who commented on access to specialists stated that access had improved for patients. However, most consulted agreed that the MBTelehealth network is providing another way to access the same services that were already available in-person rather than increasing access to services people could not reach before.

“In general this is more convenient access to services that already exist, not new access to services.” - RHA manager

Alternatively, some respondents stated that the network did make available certain services that were not available before, and this depended on a number of factors including the patient’s condition, age, location, and the specialty service or consult needed. Certain groups and sites have tried using the network in new ways – for example, providing a means for support groups to meet. A few examples of usage of the network for patient education were also noted,

“The sessions can involve community resources– social worker, physician, family, OT etc. Staff can see who’s there and connect with them – building a relationship. It bridges the distance, making it more possible to discuss and carry out ongoing follow-up”. - Specialist physician

in particular, diabetes education, instructions as part of preparation for surgery, or as follow-ups to specialist consultations. It was felt by several interviewees that the telehealth network was ideally suited for patient education because of its capacity to reach larger volumes of patients suffering from particular conditions such as diabetes, and that use in this area could be expanded.

Another important and innovative use of telehealth has been to allow a team-based approach to case management. According to key informants, improved communication and collaboration among health providers can improve comprehensiveness and appropriateness of care.

“There are better outcomes for children in this – collaboration among service providers has taken off, and the outcome is so much better.” - Local allied health professional

Telehealth has also expanded the range or nature of services available by facilitating family involvement for patients hospitalized in distant locations. In some cases, the telehealth network made it possible for family members to be present at medical consults providing patients

with needed support when they were receiving information about a bad prognosis. In one particular case, a telehealth session was organized which included the patient’s family (who were not in the same location as the patient), the specialist, and a local nurse so that the patient’s questions could be answered and therapeutic solutions discussed, as a group. Telehealth is also being used in some communities to help families become more involved in the treatment of foetal alcohol effects (FAE) and foetal alcohol syndrome (FAS) in children. Through the use of telehealth, the child does not have to be removed from the family environment and the child’s support network (parents and extended family, foster parents, teachers, social workers) can meet counsellors as a group, be informed and helped to become supportive. Televisitations among family members are perceived as having had a positive impact on patients, enabling families to make decisions about ongoing care, and promoting healing and well being for the patient.

Summary: impacts on access to care

The evaluation data show that telehealth has had impacts on patients’ access to care in several important ways: convenience and costs of accessing health services have been reduced, timeliness of care has been improved in some (but not all) specialty areas, barriers to compliance have been reduced, and in a limited number of situations, services have become newly accessible.

3.3.4 How telehealth technology affects the quality of information and interactions

The available evidence suggests that telehealth systems provide information and interactions that are of adequate technical quality. To verify this observation for the MBTelehealth system, key informants, particularly clinicians, were asked to what extent telehealth have impacts on the quality of care provided in terms of providing adequate information for clinical judgment.

Impacts on interaction and perceptual quality

First, key informants stated that telehealth is not always a suitable option. Some conditions require a face-to-face visit and a physical examination – including palpation, which cannot be done via telehealth. Generally, clinicians had no problems with the quality of the information exchange over telehealth, but most also agreed that it was not quite as good as face-to-face care.

“In integrating telehealth into everyday practice, you constantly have to use clinical judgement, if the quality is not good enough then you shouldn’t use it. This is where experience comes in – its an important element in a safe system.” - Local physician

Several physicians and other types of professionals commented on the need to make adjustments in interpersonal communications due to delays in communications, especially over satellite, and some difficulty in seeing facial expressions. For one mental health service provider, this meant that using telehealth was more taxing and so would not be a preferred mode for all service provision.

“This is the only drawback you can’t have an animated conversation because of the delay. I had to learn to nod a lot.” -Specialist physician

3.3.5 How telehealth has responded to community needs

At a broader level, the evaluation also examined the extent to which telehealth has responded to needs in the communities it is serving. This level of questioning attempted to gain perspective on MBTelehealth from a community or population health perspective.

Identification of needs and implementation –the process.

A complete needs assessment process involving 16 Manitoba communities was completed in September 2001, involving many of the present-day stakeholders. The majority of interviewees indicated that the process of identifying needs, selecting applications and implementing the network had been very effective and well managed. Several key informants indicated their satisfaction with the way in which the needs assessment was conducted, involving stakeholders from different levels within the community. The way in which the technology was introduced was also appreciated, although some stakeholders at the management level in RHAs had hoped for more information and better communications regarding the agreements and the technological choices. Key informants in several communities hoped that the process of identifying needs would be iterative, because some stakeholders had not been able to attend meetings due to time constraints, and that needs were evolving.

Response to needs

In the needs assessment, needs were identified in education, case conferencing and administration. Ten different clinical areas were given high priority for teleconsultation services. They were: psychiatry/mental health; tele-emergency, dermatology, radiology, cardiology, orthopedics, ENT, diabetes, pre-and post-operative assessments and pediatrics. Our interviews revealed that all of these areas except tele-emergency and radiology are being addressed by at least some parts of the network, while tele-radiology may become a reality across Manitoba in the near future. Moreover, a majority of key informants felt that the MBTelehealth network has the potential to address even more needs in the future. Some stated without reservation that the network is meeting its stated objectives and responding to needs.

“Telehealth hasn’t addressed community needs yet, but it has the potential to. For example diabetes ongoing management, this hasn’t occurred”. – Local physician

When asked about population health needs in their communities, key informants recognized some major health issues in Manitoba cannot be directly addressed by the telehealth network: most notably health determinants such as poverty. Additional potential for telehealth to meet needs was seen in disease prevention and health promotion. It was also frequently mentioned that diabetes is a huge health issue in Manitoba, and that telehealth has only to date had limited effectiveness in addressing it through certain aspects of clinical care and diagnosis. It was suggested that more could be done through screening, prevention, family education, more nutritional education for patients, multidisciplinary case conferences and increased access to specialist care. Other key informants offered suggestions such as using the network more for use by support groups, and providing more public and patient education activities.

Another need mentioned frequently was mental health – and use is being made of the network to reach counsellors, psychologists and psychiatrists. This too, is seen as an area where there are needs by patients in most age groups and in many different locations. It was also mentioned that this is a need for which telehealth is particularly well suited, although its use for this purpose is uneven across the province. Although respondents in one region noted that since their RHA was already paying a regional psychiatrist they did not wish to increase access to psychiatric services over the network, a psychiatrist in another region is making extensive use of telehealth in order to avoid travel inconveniences.

Synthesis: response to community needs

In summary, respondents indicated their satisfaction with the way in which the original needs assessment was conducted, involving stakeholders from different levels within the community. It was frequently mentioned that telehealth couldn’t meet all the health care needs of Manitobans, especially the health

problems that are related to poverty. Diabetes was mentioned along with mental health as two areas where telehealth has the potential to play a larger part in prevention.

3.3.6 How telehealth is putting patients at the center of the health system

The evaluation results suggested that one of the important impacts of telehealth has been to place patients at the center of the health system. Several success stories were recounted about how improved access to the network had speeded up diagnosis and treatment, helped bring teams of professionals together, or allowed families to be present during teleconsultations, offering support to patients. Telehealth was perceived by some as a way to increase the

“What’s happening here is a reversal. The question being asked by the provider is ‘do you like this telehealth and would you be willing to do this again?’ Instead of the patient coming to the provider, the provider is moving the other way.”- Site coordinator

range of care options open to patients. Some administrators and practitioners (mostly nurses) reflected that telehealth was a means of centering the organization of care around the patients, not for the convenience of medical practitioners.

3.4 What is the role of the network in health services delivery and how does it link to existing health resources in Manitoba?

3.4.1 How telehealth has affected health professionals

MBTelehealth network has prioritized clinical uses of the telehealth network, making physicians and health professionals the key drivers of system uptake and utilization, and therefore of overall system impacts and cost-effectiveness. This includes both specialist providers in the urban centers and general practitioners and allied health professionals in the non-urban centers. In addition, the provision of continuing education has been a key focus of the network, providing a CME program through the University of Manitoba since April 2002, and Continuing Nursing Education (CNE) since January 2003.

Accessibility of specialty services

The monitoring data attest to the wide variety of specialty services that have become available through telehealth. According to the on-line data, the professional specialties most often involved in the 142 clinical care sessions where patients consented to release this information were: dermatology (36 sessions), followed by EAP providers (23 sessions) and mental health (12 sessions). Other specialties involved included: adult infectious diseases, cardiology, clinical dietetics, home nutrition, endostomal therapy, ENT, general pediatrics, genetics/metabolics, FAS/FAE specialists, oncology, orthopedics, pain specialists, pediatric neurology, physiotherapy, psychogeriatrics, and speech and language pathology and therapy. Key informants in MBTelehealth noted that many efforts have been made to promote interest among providers in using the system, and to enlist specialists who will provide telehealth services. A list of 48 specialty areas has been prepared and circulated to the telehealth sites, ensuring, from their point of view, wide accessibility of specialty services. This list was updated and redistributed several times over the course of 2002.

In contrast, key informants in many communities outside Winnipeg expressed concern in the evaluation that usage of the telehealth system to access these services has not been higher. Respondents in several regions indicated that they fear their communities may lose access to telehealth if clinical usage does not increase. In most cases, the lower-than-desired usage rates are attributed to one or both of two factors: 1) the lack of uptake by local physicians and 2) the lack of access to desired specialty services.

“The physicians have to be encouraged to use it. It requires even more publicity, its been quite a job getting them on board. They have their habits, of needing to get to certain specialists”- Community stakeholder

The interviews with local physicians provided insights into both these issues. First, it is clear that in a small number of cases, local physicians are not favorable to telehealth, seeing few situations in which they feel its use would be appropriate. Key informants noted the challenge of encouraging local

practitioners to modify their referral processes, especially when they were unsure as to the suitability and availability of specialists on the telehealth list.

“From a patient care perspective you have to know if this specialist is suitable for the patient’s specific issues, and what are his waiting times compared to traveling to another one? This has implications for the patient – the ideal person has to be there. We are asking people to change referral patterns so they have to be satisfied with the alternative being provided.” – Local physician

Other physicians had been turned away from telehealth by an initial technically unsuccessful experience, or by long waiting times for dermatological consults. Several had lost their initial interest in using telehealth because of unsuccessful experiences using the list of specialists provided by MBTelehealth. Local physicians often reported that some specialty types they wanted to access were not available through telehealth: most

notably orthopedics, radiology, ophthalmology and nephrology. In several communities, local physicians recounted having tried to make an appointment with a specialist on this list only to find that the specialist (or his/her office staff) did not know they were on the list, said they had not agreed to be on the list, or were not prepared to provide services through telehealth. Other physicians explained that while they were not unwilling to refer patients to telehealth appointments, the referral system is not set up in a way that they can easily do so.¹⁶

Finally, a few local physicians appeared to be concerned about the legal aspects of practice with telehealth, and unfamiliar with the position of the Manitoba College of Physicians and Surgeons.

Summary: Accessibility of specialist services

In summary, the evaluation data suggest that many stakeholders in the telehealth system throughout Manitoba believe that use of the telehealth system to access specialist clinical care can be enhanced, and that the reasons for this lie in an incompatibility between local practitioners’ needs and how access to specialists is organized. While a few physicians have concerns about the appropriateness of telehealth for their patients, many more are interested in and have attempted to use telehealth, but have not found it possible to integrate it easily into their practices. Additional supports from MBTelehealth seem to be required: these would include expanding the range of specialty services available to meet local practitioners’ needs; validating the status of specialists on the list of those providing services through telehealth, and streamlining and providing specialist-specific step-by-step guidelines for local physicians about referral processes.

“The old system is slow but it works – I know how to access the specialists. The list of specialists – I tried to refer a patient to one and he said he didn’t even know he’s on the list. So then you feel stupid and won’t try it again.” – Local physician

Practitioners’ access to and assessment of continuing professional education through telehealth

As noted above, a main aim of the MBTelehealth system is to support practitioners in the delivery of quality services, by increasing their access to knowledge through professional development and creating linkages among remote and central health service centres. Several sources of data were used to describe and assess the impact of the continuing education through telehealth. On-line monitoring data and questionnaires completed by continuing education session participants, provided quantitative information, while key informants were asked to describe qualitatively, from their points of view, the usage and impacts of continuing education provided through telehealth. Overall, these data show that provision of continuing education through telehealth has been very successful, with strong uptake across the province.

¹⁶ Note that family physicians were provided with an updated list and given step-by-step instructions for accessing specialists in February 2003. Although this action would be consistent with physician’ expressed needs, the evaluators were not able to assess the adequacy of these instructions from the physicians’ point of view, nor whether the revised list had been associated with any other experiences with specialists not being on the list, as it was taken after the evaluation period.

Continuing education topics. MBTelehealth’s continuing education programs have provided a wide variety of formal and informal continuing education opportunities. A total of 117 different topics were mentioned in the monitoring submissions, and 27 in the continuing education assessment questionnaires. The on-line forms captured a larger number of smaller or more informal sessions, while the questionnaires seemed to have been most assiduously distributed and completed at official professional education events. According to both data sources, the topics addressed were quite varied, and included both formal CME sessions, delivered according to a planned schedule of sessions, as well as sessions designed for other types of professionals. Table 15 shows the topics covered in the sessions reported in the questionnaire data, along with the number of responses received about each.

Table 15: Questionnaire data: Continuing education topics, April 16 2002 through January 31 2003

	Frequency	Percent
Pediatric emergency	63	10.8
Acute psychotic agitation	48	8.6
Review of arrhythmias	44	7.8
Toxicology	34	6.1
Skin cancer diagnosis and treatment	34	6.1
Trauma care	31	5.5
Mood disorders	30	5.3
Renal outreach/dialysis	29	5.2
Dual diagnosis	25	4.5
Topical meds: optimizing use	24	4.3
Issues for international medicine	22	3.9
Acne pathogenesis and treatment	21	3.7
Pressure ulcer prevention and management	21	3.7
Delirium	20	3.6
Anxiety disorders	16	2.9
Withholding and withdrawing treatment	13	2.3
Behaviour Management - Autism	12	2.1
Wound care	12	2.1
Implantable defibrillators	11	2.0
Eczematous rashes	7	1.3
Child and adolescent mental health	5	0.9
Emergency medicine	4	0.7
Baxter infusion pumps- cancer care	4	0.7
Community mental health training	3	0.5
IV Therapy	3	0.5
Mental Health Act	2	0.9
Total	561	100.0

According to the qualitative interviews, participants were generally satisfied with the content of the sessions, although some felt that consumers should have more input into the choices of topics. The “Learning Communities” model described by central key informants as underlying the overall approach to continuing education did not seem to have penetrated to continuing education participants, as it was not mentioned or described by respondents outside Winnipeg.

Levels of and barriers to participation. All sites in the MBTelehealth network have been active in continuing education. According to the questionnaire data, the MBTelehealth continuing education sessions have reached participants from a total of 20 health centers, whereas on-line monitoring forms were received about sessions in 18 locations. The number of forms submitted from each location and the number of questionnaires received from each location are shown in Table 16, below. The discordance between the proportion of sessions reported in the monitoring data and the number of questionnaires completed suggest that some sites were more active than others in having questionnaires completed.

Table 16: Continuing education participants' location, April 16 2002 through January 31 2003; according to two data sources

	Monitoring data: unique sessions	Questionnaire data: participants
	Frequency (%)	Frequency (%)
Churchill	5 (1.8)	29 (5.0)
Flin Flon	14 (5.0)	87 (14.9)
The Pas	11 (3.9)	26 (4.5)
Lynn Lake	0	1 (0.2)
Leaf Rapids	0	4 (0.7)
Gillam	8 (2.8)	58 (10.0)
Thompson	93 (33.1)	2 (0.3)
Norway House	4 (1.4)	13 (2.2)
Swan River	17 (6.0)	75 (12.9)
Russell	8 (2.8)	9 (1.5)
Dauphin	4 (1.4)	16 (2.7)
Brandon	11 (3.9)	4 (0.7)
Killarney	4 (1.4)	51 (8.7)
Portage la Prairie	4 (1.4)	22 (3.8)
Boundary Trails	11 (3.9)	87 (14.9)
Ashern	8 (2.8)	21 (3.6)
Pine Falls	6 (2.1)	68 (11.7)
Steinbach	9 (3.2)	1 (0.2)
Selkirk	26 (9.3)	6 (1.0)
Winnipeg	35 (12.5)	2 (0.3)
Not indicated	3	2
Total	281	584

As this table indicates, the level of participation in continuing education is quite variable across sites. Although the total number of eligible participants per site is difficult to estimate, the qualitative interviews suggested several reasons for differential participation in continuing education across sites. First, some sites adopted very open policies, encouraging participation by all types of professionals in all types of sessions. In some regions, access to alternative existing continuing (especially medical) education was reported to be easier, and the telehealth sessions, in competition with a number of other sources, not transferable to telehealth. As well, for some practitioners, their overall level of interest in continuing education whether provided through telehealth or other means was not high.

“The telehealth session hours are not set up so that our GPs can attend. At 8:00 they are here for rounds, then they go back to the clinic – they cannot come back here at 12:00 for sessions” – Site coordinator

It was also felt in several sites that the CME formula adopted of lunch hour sessions was not appropriate for community-practitioners, but had been organized for the convenience of the education providers. In several cases, providers reported that they would have liked to attend the sessions, but given that they would have to leave their location with its waiting room of patients in mid-day (their practices tending to begin at around 10:00 am and finish in the early evening) to attend the session, they found it impossible to fit it in.

“I love the educational things. I can't always attend – but would really like to.” – Local physician

Finally, some practitioners reported being unfavorably impressed by the technical problems encountered during their initial experiences, which resulted in delays and frustrations. Administrators also expressed concerns about this. Continuing education sessions are most often multipoint sessions, and as previously indicated, technical problems were more frequent in these. Indeed, 12.1% of continuing education sessions experienced problems establishing communications (compared to 7.5% of all sessions), and 11.0% had problems with visuals (compared to 7.6% of all sessions).

“I cannot overemphasize the cost of physicians sitting around waiting for a hookup.” RHA manager

Continuing education through telehealth is reaching all types of health professionals in Manitoba. As Table 17 shows, physicians make up the most frequent type of attendees, followed by nurses. The “other type” of participant category includes a broad array of medical and allied health professionals, listed in Table 18.

Table 17: Type of respondent role, continuing education participants¹, April 16 2002 through January 31, 2003

	Frequency	Percent
Physician	234	44.2
Nurse	167	31.5
Community mental health worker	24	4.5
Paramedic/EMS	16	3.0
Pharmacist	13	2.5
Medical student or resident	9	1.7
Social worker	6	1.1
Pharmacy student	5	1.0
Nursing student	5	1.0
Other	51	9.6
Unknown	54	--
Total	584	100.0

¹ Note that because continuing education participants may have completed more than one questionnaire, these data should be interpreted as describing participation rather than participants.

Table 18: Types of other participants in continuing education, April 16 2002 to January 31, 2003

<ul style="list-style-type: none"> • Administrative assistant • Administrator • Cancercare aide • Child development counselor • CMHA administrative assistant • CMHA support worker • Community mental health worker • Coordinator for RHA • Dietitian • Family intervention worker • Health Records Technician • Helper • Laboratory Technician • LPN • MB Health Policy Analyst • Mental health proctor 	<ul style="list-style-type: none"> • Nurse Manager • Nurses Aid • OT • Parent • Parent-School • Primary Care Giver • Proctor • Receptionist • Registered therapist • Respiratory therapist • RHA Board Member • Self help facilitator • Social work student • Support worker • Teacher • Teacher aide
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Role and impacts of continuing education through telehealth. Just over half of continuing education session participants (58.5%) had participated in continuing education on the MBTelehealth network prior to the session they responded about (Table 19). This indicates high levels of ongoing or multiple use of telehealth among those who completed questionnaires. Many participants (43.3%) had also previously used video-conferencing or other telehealth systems for continuing education. However, that 45% of MBTelehealth continuing education participants had never accessed video-conferenced continuing education suggests that it may be reaching a substantial audience who had not been able to access it before.

Table 19: Participated in continuing education using telehealth or video-conferencing before, April 16 2002 through January 31, 2003

	Through MBTelehealth Frequency (%)	Through other source Frequency (%)
No never	186 (31.8)	263 (45.1)
Once or twice	142 (24.4)	140 (24.1)
3 times or more	199 (34.1)	112 (19.2)
Unknown	57 (9.8)	69 (11.9)
Total	584	100.0

Four hundred and fifteen respondents (79.0%) completed their questionnaires about sessions designated as CME. For those who would get CME credit for these sessions (231 respondents), an average of 1.01 hours of CME credit were to be received (range between .5 and 3.5 hours), for a total of 233.5 hours.

Satisfaction with continuing education through telehealth. As the data in Table 20 indicate, participants are generally quite satisfied with the quality of the continuing education sessions attended. The most appreciated aspect is the opportunity to ask questions of the facilitator, afforded by the interactive technology. However, the interaction across and within sites was rated as relatively unsatisfactory. Other less satisfactory aspects (although still generally very positively perceived) were the sound and visual quality.

Table 20: Satisfaction with aspects of continuing education sessions, April 16 2002 through January 31 2003

ASPECT	Very dissatisfied	Dissatisfied	Neither	Satisfied	Very satisfied	Mean
Clarity of content	7	5	22	278	259	4.36
Opportunity to question facilitators	8	2	26	234	304	4.43
Interaction at own site	6	6	99	271	171	4.08
Interaction across sites	11	17	130	267	122	3.86
Relevance of material to own work	8	5	36	244	284	4.37
Quality of facilitation	8	7	31	265	261	4.34
Opportunity to learn	7	5	22	266	277	4.29
Length of session	7	13	24	288	241	4.26
Sound quality	6	20	41	263	248	4.11
Visual quality	14	30	59	253	222	4.12

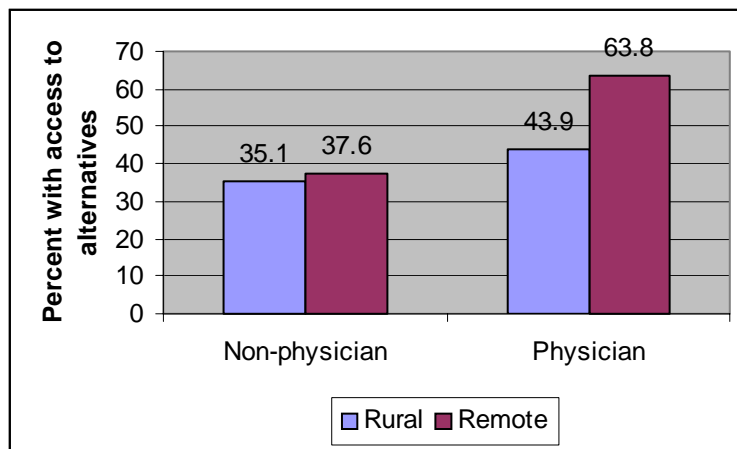
Alternative sources of continuing education information. According to these data, if the sessions had not been available, over half of respondents (273, or 56.9%) would have not been able to obtain the information some other way. Two hundred and seven participants (43.1%) would have obtained the information another way. The most frequently named alternative sources of information are listed in Table 21, for those respondents who provided this information (190 respondents): these are most often through the Internet or written documentation.

Table 21: Information sources for the same continuing education material, Continuing education participants, April 16, 2002 through January 31, 2003

Sources	Frequency (%)
Written material: books, journal, magazines, manuals	97 (51.1)
Face-to-face education	32 (16.8)
Internet	26 (13.7)
Direct contact with colleagues	20 (10.5)
Conferences or professional meetings	15 (7.9)

Figure 7 shows the perceived importance of the session as well as the respondents' access to the material through alternative sources according to respondents' location in remote or rural regions of Manitoba. (Too few responses were received from central Manitoba participants to include in these analyses.)

Figure 7: Proportion of physicians and non-physicians who would have been able to access continuing education another way, by type of region, April 16, 2002 through January 31 2003



These data indicate that in rural and remote locations, non-physicians are less likely than physicians to have access to continuing professional education. Somewhat surprisingly, physicians located in remote northern locations were most likely (63.8%) to state that if the telehealth session had not been available, they would have been able to access the information through another means.¹⁷ This suggests that it is rural physicians and other types of health professionals in general who are underserved in terms of access to continuing education.

In Table 22 are shown the data that respondents provided when asked to rate how well various modalities for continuing education meet their needs. MBTelehealth sessions are rated close to in-person classroom sessions in terms of this capacity, compared to all other types.

Table 22: Extent to which types of continuing education meets needs, April 16 2002 through January 31 2003

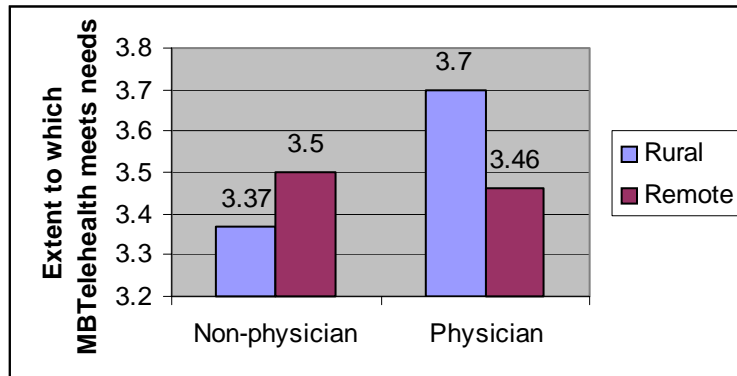
Type	Not at all well (1)	Not very well (2)	Quite well (3)	Very well (4)	Mean	Don't know
MBTelehealth sessions	3	11	206	268	3.51	20
In-person classroom sessions	1	26	199	250	3.47	25
Correspondence courses	54	148	146	72	2.56	74
Scientific conferences	37	105	164	92	2.78	89
Internet courses	64	124	111	57	2.45	131
Audio teleconferences	63	116	141	74	2.56	93

Consistent with the data reported in Figure 7, Figure 8 shows that MBTelehealth continuing education sessions are most likely to meet the needs of physicians in rural than remote Manitoba.¹⁸ On this figure, all responses are between 3 (Quite well) and 4 (Very well). The rural non-physicians have the lowest overall score.

¹⁷ The difference between rural and remote physicians is statistically significant, $t(210) = -2.8, p = .005$.

¹⁸ The difference between rural and remote physicians is statistically significant, $t(223) = 3.2, p = .001$.

Figure 8: Extent to which telehealth sessions meet needs of physicians and non-physicians, according to region, April 16 2002 through January 31 2003



Finally, Table 21 shows that continuing education participants would generally be willing to use telehealth for future continuing education sessions, although over 60% would not want to use it every time they participated in continuing education.

Table 23: Willingness to use MBTelehealth for continuing education, April 16 2002 through January 31 2003

	Frequency	Percent
Every time I have continuing education	202	40.9
Some times I have continuing education	255	51.6
A few times I have continuing education	36	7.3
Never	1	0.2
Total	494	100.0

Willingness to use MBTelehealth for continuing education is highest among physicians in rural Manitoba (mean score of 1.46 on the scale where 1 = every time I have continuing education and 4 = never) and remote Manitoba (mean of 1.55 on the same scale) than physicians in central Manitoba or other types of professionals in any region.

Impacts of continuing education on professionals. The key informant interviews enabled an in-depth appreciation of the impacts of continuing education on professionals and their practices. Many were highly appreciative of the opportunity to participate in continuing education. Analysis of these responses highlighted three main types of positive impacts: reduced necessity to travel, development of closer ties with other practitioners, and impacts on practices.

Key informants were virtually unanimous in citing reduced necessity to travel as a key impact of continuing education through telehealth. Some noted that because of budgetary restrictions, travel and continuing education resources have been considerably reduced in recent years, and telehealth was providing a means to compensate. Access to continuing education through telehealth was said to be particularly beneficial in the case of short sessions, where the cost of travel would not be warranted. Over and above the direct travel and lodging costs saved, administrators and practitioners were appreciative of not having to replace staff during out-of-town CME sessions.

“Its costly to attend sessions– we have to drive, and its usually after hours. Its very convenient to go to the telehealth sessions.” - Local physician

A less tangible but critical factor in improving quality of care is strengthening relations with other professionals which continuing education through telehealth permits. Of particular benefit was increased interaction with specialists in Winnipeg. This sometimes leads to increased awareness of the capacities and situations of practitioners in rural and remote

“ I have participated in all the CME. They have all been very good and it’s a good way to get to know the specialists” - Local physician

locations. In addition, participation in continuing education has allowed some practitioners to feel more closely connected with other colleagues, increasing a sense of community and support.

In terms of increasing local practitioners' capacities, some reported being very satisfied with the opportunity to keep abreast of latest developments in areas that they would have more difficulty following regularly. As some practitioners noted, increased interaction with specialists has had some direct impacts on patients. Non-physician

"It has a positive impact on professionals, has impacts on clinical practice – we would try only to do simple things here before, now we can get a definite answer more quickly. It improves quality of care. This would not have happened without telehealth".- Local physician

participants in some locations were concerned about quality of care in their locations and were hoping that changes to practice would be facilitated through the telehealth-based continuing medical education.

Both physician and non-physicians have participated in continuing education sessions offered through MBTelehealth. For the non-physicians — telehealth sometimes provides access to education that could not be found any other way. Their experiences with telehealth are generally positive, and some noted that presenters go out of their way to ensure that all participants feel included. However, views were mixed about the impacts on nursing staff. Key informants in some sites expressed concern about the lack of participation by nursing staff in continuing education sessions deemed open to all types of health professionals. Continuing Nursing Education (CNE) sessions begun in January 2003 may permit an increase in nursing participation.

Synthesis: Continuing education

The data collected to this point show that the MBTelehealth system is enabling a high level of professional development and continuing education activity. These involve a very broad spectrum of health professionals, including a large number of physicians. Participants in these sessions find them valuable and will continue to use the telehealth system in the future. For about half of the activities, participants would not have access to the information provided through continuing education. Continuing education through telehealth seems to particularly benefit non-physicians and physicians in rural Manitoba. Over and above strengthening the linkages among health professionals, the provision of continuing health education through telehealth is also believed to be having positive impacts on the quality of care delivered to patients.

Other impacts on practitioners: satisfaction, recruitment and retention.

In general, key informants —especially health system administrators -- felt that the presence of telehealth in a community could be a factor in recruitment and retention of professionals. Others felt that telehealth would be only one factor one among many, and more important in the recruitment than in retention. In terms of recruitment, respondents noted that the shortage among some health professionals created a backdrop of difficulty recruiting, and that telehealth could be a positive contributing factor especially for physicians from overseas. One physician from outside Canada did in fact confirm that telehealth had been a deciding factor in his choosing to locate in his particular community in Manitoba. Similarly for nurses, telehealth was seen as way to help nurses feel more comfortable with taking positions in more remote locations so that they could keep updating their skills.

The interview data suggested that retention issues play out differently for physicians versus nurses and other health professionals. The latter, according to key informants, often have longstanding connections to their communities and are less likely to be interested in relocation. For the physicians, it was clear that telehealth was not likely to be a major factor in overall retention, although it could help prolong tenure for some. This supports other statements about positive impacts of telehealth on professionals' work satisfaction.

"It has really helped our department. It helps us stay in touch, like our jobs better, maybe like our jobs longer." - Local allied health professional

3.4.2 How telehealth has affected work organization and service delivery

The organizational and administrative impacts of and implications for large-scale telehealth systems are not well documented. This evaluation attempted to identify the main impacts in two key areas: workload and service delivery efficiency aspects, and impacts and implications of organizational structure and roles.

Workload and efficiency

Time saved and added by telehealth. Key informants were asked to comment on the impacts of telehealth on workload and efficiency from a service delivery point of view. Telehealth appears to have both positive and negative impacts, but in different areas.

Foremost among global workload impacts is time savings for professionals who deliver clinical services, as well as RHA staff and other partners who attend continuing education or meetings through telehealth rather than travel. Currently, the impacts are minor in the first instance, as there are only very few situations where health professionals are delivering services through telehealth that would previously have been delivered in person – in the vast majority of cases it is the patient who would have traveled. In these cases, however, impacts were reported on the health and well-being of these practitioners, just as there are on patients who do not travel. Regarding administrative travel, efficiency gains are seen as contributing to increased productivity.

Against this overall backdrop of increased efficiency and productivity due to reduced travel, two factors work to limit the overall gains. First, there is general consensus from all parties involved that most types of telehealth sessions take somewhat longer than face-to-face sessions. More time is needed especially when peripheral equipment is involved.

“You do have to readjust – its not as fast as seeing them on the clinic. Its patient flow issues– its always slightly slower ” – Local physician

On-line data shows telehealth sessions vary in length from a few minutes up to eight hours (for one continuing education session). Table 24 shows the average length of connection times for telehealth sessions according to their type. The average overall length of telehealth sessions is almost exactly one hour (57.6 minutes).

Table 24: Average session length, by type, April 2 2002 to January 31, 2002

Type of session	Mean (hr:mins)	Std. dev. (hr:mins)	Minimum	Maximum
Patient care (n = 682)	:37	:32	:05	3:10
Group education (n= 43)	1:34	1:00	:15	4:45
Continuing education (n = 281)	1:23	:54	:01	8:00
Other activity (n= 596)	1:05	:53	:01	5:30
Total (n=1 602*)	57.6	:49		

* Several sessions with impossible start and end values were excluded; some data are missing; and some start and end times are approximate.

Second, the opportunity to involve more of a patient’s support system in case management – while having clear impacts on quality of care from the patient’s point of view (see section 3.3.3) —also consumes more resources from a system point of view. This is seen in two ways: the participation by various types of professionals in the telehealth sessions, and the time needed to coordinate the organization of the session – which may be considerable.

“From our end it’s been awkward to schedule all the people here for a session – parents, foster parents, all the workers – it takes a whole day to set up.” - Local allied health professional

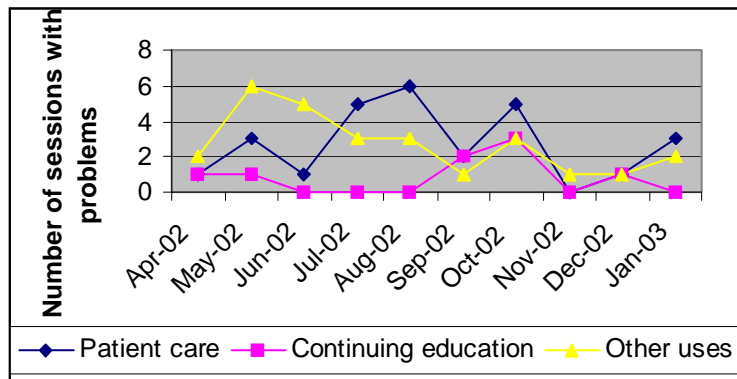
Finally, physicians’ use of telehealth has been affected by their perceptions of its efficiency in service delivery. Local physicians perceive that scheduling of telehealth sessions requires extra steps and paperwork, reducing the overall efficiency of their operations. Some specialists feel that the telehealth

facility does not have the same supplies and support systems as in their own offices, which could create delays and inefficiencies.

Scheduling of telehealth sessions. Scheduling of sessions is handled through the MBTelehealth offices in Winnipeg, as a centralized function. A scheduling software package, designed to automate much of the scheduling process, has proven a challenge to locate, adapt and implement, but it is expected that this will be fully functional in the near future.

The ongoing complexity of scheduling telehealth sessions has been quite effectively managed, according to key informants, although some problems have occurred. Figure 9 shows the number of scheduling problems for each type of session over time, again using the on-line data.

Figure 9: Number of scheduling problems by session type, April 2002 through January 2003



The on-line data indicate that scheduling problems have been more frequent in “other activity” (4.5% of all unique sessions) than in-patient care sessions (3.9% of sessions) and continuing education sessions (2.8%), although by all means not affecting a large number of sessions.

The qualitative data indicate that one source of difficulties related to scheduling is the amount of notice provided to site coordinators about upcoming sessions. Occasionally site coordinators have had very short notice, sometimes less than a day. According to coordinators, this is in part attributable to their part-time status – they are not always notified about sessions during the periods when they are on-duty as coordinators – and in part to an assumption on the part of the central booking staff that they will be available at all times even though on part-time status. This creates stress for coordinators. MBTelehealth staff expressed concern about this issue as well, indicating that the problem has been recognized although not resolved.

“We often have very short notice from the specialist’s office... In the outlying sites, there is an assumption from Winnipeg about availability of times and with part-time workers, this makes conflicts.”- Site coordinator

Patient information management. Key informants provided their views on the effectiveness of patient information management systems being used in the context of patient care. For the vast majority of respondents in almost all sites, patient information management mirrors almost exactly the systems in place for regular consultations, with exchanges of referral documents, consult reports and case notes occurring by fax or mail, and with duplicate copies kept in patients’ charts in both locations. However, a few respondents felt that the information system was unnecessarily awkward and raised some confidentiality questions, despite the steps put in place to ensure that fax transmissions are confidential.

Synthesis: Workload and efficiency

It is difficult to make an overall statement about the impacts of telehealth on workloads and efficiency, as some gains are offset by other losses. However, the longer overall length of telehealth sessions is likely to be a negative factor for service providers who do not access the gains provided by reduced

travel. Efficiency gains seem most likely to result from administrative uses of the telehealth system, particularly for meetings that would have involved travel. Overall, this is likely to increase pressure for administrative use while making the slope steeper for clinical usage, unless additional incentives and disincentives can be built into the system – such as, for example, cost recovery or parallel system development for administrative use, and/or increased compensation to practitioners to account for their real costs.

Organizational structures and roles

The evaluation also examined how the MBTelehealth system had affected organizational structures and roles. Of interest here was the balance between centralization and decentralization in the organizational structure of the network, as well as impacts on role definition among partners in the network

Balance between centralization and decentralization. Interviews were conducted with a total of 46 individuals in management positions either within the RHAs, MBTelehealth or the provincial government. From the RHA administrators' point of view, telehealth has been implemented and managed effectively. For these key informants, the decision to coordinate the network centrally with MBTelehealth site coordinators situated in the RHAs has carried more advantages than disadvantages. The advantages lie in the resources and coordination that were brought to bear, which respondents felt would not have been as available or as effective if the system had been more decentralized.

“Administratively it’s working well, I’m impressed with the training and support the local coordinator gets. It would not have been so smooth if it had been decentralized” – RHA manager

This is not to say that the organization is absent of all regional-central tensions. Two cases were reported where telehealth coordinators seemed to be sandwiched between their RHA and MBTelehealth. In another setting, an administrator confirmed that if the coordinator was not a WRHA employee, there would be pressure to use telehealth resources for other roles. Some disadvantages of the centralized system were also pointed out by RHA administrators, related to their desire to be able to manage telehealth at the regional level in support of regional priorities and needs.

“It’s a catch-22 as it’s taken human resources from my facility nurse and we are not really offering a clinical component... we are having a difficult time with nursing vacancies, so of we require more resources its going to start to be a problem”.- RHA manager

Impacts on scope of professional practice. Key informants were asked if they saw changes in the scope of professional practice related to telehealth. Few were noted, with the exception being some mostly hypothetical statements about the potential to broaden skill sets. Other changes noted seemed to be related to the broader context of health system reform, for example in the development of the role of nurse practitioners.

Respondents brought up the issue of the qualifications necessary for site coordinators. Most of these argued that, for patient care sessions, a clinical background is helpful to complement the coordinator role, in order to be able to provide support as needed either to the patient or to the physician. However, MBTelehealth noted that their approach will be to further develop and support the clinical skills of site coordinators, rather than adjusting job requirements, and have planned several interventions with this objective in mind.

Alternative organizational models. A few respondents raised some interesting questions about the existing structure of patient care through telehealth, set up to essentially mimic existing health service organization under a fee-for-service structure. In the context of primary health care reform, they wondered if an alternative service delivery model might not be more optimal for telehealth, avoiding the reproduction of existing problems in the

“We see a larger role for allied health services in telehealth, especially advance practice nurses. They have a role in creating links, creating appropriate opportunities, alternatives... the allied health professionals should provide consultation to our nurses, who would be doing the intake and case management – now it is just physician to physician.” - RHA manager

system. There was some feeling among these respondents that telehealth might exacerbate existing problems in the system (such as long waiting times due to specialist shortages) and fail to capitalize on opportunities for prevention throughout the continuum of care and on opportunities to develop multi-sectoral partnerships. These key informants often saw an expanded role for allied health service professionals, who would integrate telehealth into an approach designed to provide a global, comprehensive response to health care needs, with less emphasis on the specialist practitioner as the hub of the system.

Synthesis: Organizational structures and roles

In recognition of the complex roles which coordinators need to play – facilitator, administrator, health care professional, technologist, even promoter – MBTelehealth has succeeded in selecting outstanding individuals with a high degree of flexibility and a rare mix of skills to staff the position of coordinator role. This is part of the reason that the organizational structure adopted by MBTelehealth has been highly successful in maintaining a balance between the pressures for regional control and the need for an integrated, seamless system. Although these issues will likely be revisited as the program moves into successive waves of funding, when RHAs might be asked to contribute to operational costs. Impacts of scope of practice appear to be minimal, although some stakeholders are reflecting on alternative organizational models for telehealth which would move it more directly into the service of primary health care reform and away from the current model, which some see as physician-driven.

3.4.3 How telehealth has affected linkages among health care settings

Intra- and inter-regional linkages

Data from the key informant interviews suggest that use of the telehealth network, and most particularly the continuing education and administrative use components, has in some regions enhanced linkages among health professionals and agencies both within and among regions. This applied to links among professionals as well as to linkages among sectors of the health system. However, this did not apply to all communities.

*“Its been helpful linking tertiary to secondary care – making it more seamless.”
– RHA manager*

Some administrators also made a case for the benefits to the health system of creating stronger administrative linkages through the use of telehealth. As well, positive effects were cited in cases where the telehealth system had been used to support broader community processes.

“Linkages here in the region have been a real success.... It has increased democracy of our processes by increasing access to participation.” – RHA manager

It was noted as well that telehealth may require specialists in Winnipeg to interact with each other more, which has benefits for all patients in the telehealth sites.

Winnipeg-regional linkages

Impacts of continuing professional education (section 3.4.1) provide evidence that telehealth has had positive impacts in terms of developing stronger relationships between local practitioners and specialist providers and educators. These linkages have also grown out of telehealth sessions such as multi-participant FAS-FAE diagnosis and counseling, where telehealth has enabled the interaction between patients’ broader support networks and central, specialized practitioners.

One of the main impacts of telehealth resulting from the creation of new linkages was reported to be found in the access and support provided, along with validation from a broader professional community. This also resulted in a reduced sense of isolation among practitioners.

*“It makes me feel like I’m part of an expanded professional community” –
Local allied health practitioner*

Synthesis: impacts on linkages among health care settings.

Through their various forms of utilization of the system, MBTelehealth users have developed stronger professional linkages among counterparts throughout the province and with central providers. These linkages are perceived to have had impacts at several levels, depending on the community: improved managerial decision-making, increased stakeholder participation, increased support to rural and remote practitioners, and improved supports to improved practice.

3.5 What are the cost implications of telehealth?

A key driver of telehealth in most settings is the need to reduce health system costs, both directly by avoiding travel, and indirectly, through improving patient outcomes. The evaluation examined the first of these issues, by assessing the costs that were avoided through the telehealth usage occurring in the first nine months of MBTelehealth’s operations.

During the evaluation period, the MBTelehealth produced potential savings of approximately \$1.1 million by eliminating travel-related expenses. This total only includes savings for sessions in which permission was granted to use the individual’s information. This amount assumes that all of the activity that occurred over the network would have taken place with one or more people traveling from their home to another location. Of this total, approximately \$98,000 would have been out-of-pocket expenses for individuals (that may or may not have been subsidized), and \$1 million would have been expenses to the health care system for travel of professionals and administrators.

The estimated cost for physician services provided through the network was \$12,570. Similar physician costs would have been incurred regardless of the presence of the network if each person who participated in a telehealth session had traveled to have an “in-person” appointment. However, given that some people may have chosen not to travel, there are likely some additional physician costs associated with the network.

In the following sections, details concerning these savings and expenditures will be provided. This section will conclude with a description of how this information can be interpreted, and limitations that should be considered.

Table 25: Estimated travel savings

	Point-to-point sessions	MultiPoint sessions	Total
Total Travel Costs Avoided	\$615,000	\$494,000	\$1,109,305
Total patient travel costs avoided	82,000	16,000	98,000
Total professional travel costs avoided	189,000	298,000	487,000
Total administrator travel costs avoided	344,000	180,000	524,000
Average travel cost avoided for patients, per telehealth session	526	978	568
Average travel cost avoided for professionals, per telehealth session	1,023	2,634	1,634
Average travel cost avoided for administrators, per telehealth session	679	2,049	882

Table 25 summarizes the estimated travel costs saved as a result of the availability of the telehealth system. Average costs are calculated by dividing the total estimated costs for a group by the number of valid sessions for that group for which permission was given to use the data. Further explanation regarding these calculations is found in Appendix 9.

3.5.1 Patient-borne costs incurred and avoided

The on-line data collection system adopted for the evaluation of MBTelehealth provided the bulk of the data that were used in preparing these analyses. In particular, the system collected data regarding the

type of telehealth session (patient care, patient education, continuing education, other activity), the locations that were involved in the session (two or more locations for each session), and the types of direct travel costs (if any) that would have been incurred had telehealth not been available. For example, a record could indicate that a patient care session took place in Flin Flon for child who lives in Cranberry Portage—if telehealth was not available, the child and an escort would have needed to take the bus from Cranberry Portage to Winnipeg and stay overnight in a hotel in order to receive the medical care. Using this information, the out-of-pocket costs for the trip to Winnipeg were estimated. See Appendix 9 for details on the method that was used to assign costs to telehealth sessions.

Recognizing that not all patients provided permission to use their data for this analysis, the total cost savings are understated. Approximately 80% of patients are not included in the amounts presented here. On average, the travel cost savings for a patient-related telehealth session was \$568. People receiving patient care through telehealth saved about \$548 per session, while participants in patient education sessions saved \$630. Understandably, the travel cost savings for multi-site sessions are greater because travel is avoided for more people: the estimated savings for point-to-point sessions were \$447 and \$423 for patient care and patient education sessions respectively, compared to \$978 for multi-location sessions (there were no multi-location patient care sessions). These estimated values are based on a total of 172 patient-related telehealth sessions.

Patients who had been users of telehealth, being able to avoid travel costs was the most commonly reported saving. Likewise, health professionals and administrators recognized this as being a major benefit of telehealth. Avoiding child care costs and lost work, either for the patient or for a family member who accompanies the patient, were seen as additional cost savings. As part of the focus groups held in conjunction with this evaluation, participants were asked about these indirect costs. Although not directly related to costs, one patient spoke about not being able to take time off work (for financial reasons) to travel to appointments during certain times of the year, resulting in neglected health needs. Others spoke of the value of their time—time that would be spent traveling if telehealth was not available—that instead could be put to more productive uses. Related to this were comments about the “emotional cost” of needing to travel for medical appointments, including the impact of riding on the bus for five hours, attending a 10-minute appointment, and then getting back on the bus for another five hour trip.

This evaluation has not attempted to quantify the value (or cost savings) attributable to these less tangible impacts of telehealth. There was no indication of any new costs would be incurred by the patient as a result of telehealth—only cost savings.

3.5.2 Health system costs incurred and avoided

In addition to patient related activities, the telehealth network was used extensively for professional continuing education and for administrative activities. Costs were estimated for these activities using the same algorithm as was used for patient sessions, with the following additional step. Based upon earlier work, on average 2.8 people avoided traveling for each continuing education session while 2.5 people avoided traveling for administrative meetings. These values were used as multipliers of the estimated travel costs when determining the total savings for these activities.

The total travel costs avoided for the 893 continuing education and administrative telehealth sessions recorded during the evaluation period was a little over \$1 million, or \$1130 per session. Estimated costs avoided for continuing education sessions was higher at \$1634, compared to the administrative activities at \$882 per session. The data show that continuing education activities are often done over greater distances (e.g., northern Manitoba to southern Manitoba), while administrative uses are often associated with intra-regional activities.

These observations about the different use of the system for continuing education and administrative purposes were supported by comments in the interviews. Key informants noted that telehealth was decreasing the need to travel to meetings within their region. Others noted telehealth removed the need

to travel to, or bring someone in, from another region. Other comments from the interviews mirrored the indirect travel cost avoidance comments that were made concerning patients—telehealth means that additional childcare does not need to be arranged, and time is not taken away from work. This second comment relates more to productivity and potential savings for the health system. Indeed, reduced traveling time was a frequently mentioned benefit of telehealth. For people who are already experiencing heavy demands upon their time, being able to spend time more productively was seen as an important asset. Interviewees also described telehealth as a cost-saver for continuing education because it allows many more participants to receive training for the same cost.

See Section 3.5.3 for important qualifications regarding the estimated avoided costs.

Telehealth capital and most operational costs have not been reviewed as part of this evaluation. According to Manitoba Health, the telecommunications costs associated with MBTelehealth were \$782,729 for the period April 1, 2002 to March 31, 2003. This was an in-kind contribution by Manitoba Health towards the network, and includes both terrestrial and satellite costs. In the interviews that were conducted, several key informants raised concerns about the future costs of the program. Lack of secured continuing funding, increased demand from additional communities who wish to have access to the system, and requirements for physical space for operating telehealth effectively were all described as concerns. Incremental operating costs associated with additional “paperwork” (e.g., charting) within the facility, as well as the potential for increased utilization of medical services, were viewed as potential new costs of telehealth.

The other major direct costs of the telehealth system are those associated with paying physicians who are involved in providing care through the network. The fee-for-service system used in Manitoba allows for accurate determination of amounts that are paid to physicians for their services. Specific codes have been established by Manitoba Health for use by physicians who provide telehealth services. Unfortunately, these codes were used for only 66 claims in 2002—as a result it is impossible to directly report the physician-related costs for the telehealth network. As an alternative, a weighted average fee was calculated using a report from MBTelehealth of the count of different types of services, and the fees for these services that are specified by Manitoba Health for telehealth services. This indirect method lacks the precision of individual billing data and prevents the association of costs with a particular telehealth site, but it uses an accepted approach when detailed data are not available. The weighted average fee used in this analysis is \$91.07 per session. Applying this average weighted fee to sessions involving consenting patients resulted in total estimated costs for physician services of \$12,570 for services provided through telehealth. Had telehealth not been available, similar costs would have been incurred (in addition to travel costs) assuming the patient chose to have the appointment.

The Northern Patient Transportation Program (NPTP) is a publicly funded program that subsidizes travel costs for people living in northern Manitoba who must travel outside of their community for health care. The program is administered through the four Regional Health Authorities (Burntwood, Churchill, Nor-Man and North Eastman) that provide services in these areas. Data are not yet available to assess the impact of the telehealth network on the costs associated with this program. While there may be some savings resulting from a decreased need to travel for HEALTH care, it is also possible that additional demands will be placed on this program as a result of an increased need for follow-up care of conditions that are diagnosed through the telehealth network. The interviews that were conducted elicited mixed opinions concerning the impact that telehealth will have on the NPTP. In general, respondents indicated that funding for the program is very limited, and there is hope that telehealth will provide some reduced costs. However, there was no indication of substantial savings to date. It was noted that the largest proportion of people who are transported through the program are not candidates for telehealth; but at least one region has established a review committee to assess whether or not individual cases can be handled through the system. The impact of telehealth on the NPTP will need to be closely monitored, and systems to do so will need to be considered in each region.

3.5.3 Explanation and limitations of the cost-related evaluation

The cost-related information developed for this evaluation provides a useful snapshot of key components of the MBTelehealth Network. An online data reporting system captured data related to travel that was avoided as a result of participating in telehealth; the costs for physician services provided over the network were estimated using data from other sources; and qualitative interviews provided additional insights into the perceptions of various stakeholders concerning telehealth costs.

This report has presented two measurements of cost savings due to avoiding travel: total “savings” and average “savings.” Each of these measures has limitations that should be considered when using the values reported here for planning and budgeting purposes. In particular:

- Average costs use only those records for which valid data were available. If there were different travel patterns for those who refused consent or where invalid or incomplete data were available, the average costs could be different.
- Costs for multi-site sessions are based on the average costs for point-to-point sessions. A weighting factor is used for continuing education and administrative sessions to recognize that multiple people would be involved in each session. Different assumptions regarding multi-site sessions would affect the estimated costs.
- This analysis has assumed that all activity that occurred over the telehealth network would have occurred if telehealth were not available. Based on the qualitative interviews, telehealth generated additional activity. Meetings that previously were not held were scheduled over the system, additional continuing education activities that would not have been attended were attended, and people who would not have traveled for health care did receive the care in their home community. As a result, these estimates overstate the total costs that would have been avoided.
- Costs are estimated using Treasury Board guidelines for automobile travel and per diem costs. The extent to which these values represent actual costs will affect these estimates.
- Data quality issues could affect the results of this analysis, including the lack of availability of claims for fee-for-service physicians. If data were inaccurately or incompletely entered, captured or interpreted, the estimated costs and costs savings could be inaccurate.
- Indirect costs, including costs of child care, lost wages or productivity, and health system costs incurred as a result of needing to pay replacement workers while others are traveling have not been reflected in this analysis. Infrastructure, capital equipment and building costs, renovations and operating costs are not included in this analysis.

Further consideration must be given to who is avoiding the cost of traveling. The results that are reported here cannot distinguish between savings for individuals and those for the healthcare system. Travel costs for residents of northern Manitoba are often subsidized by the NPTP, subject to a per trip amount that is the responsibility of the patient. Under certain circumstances travel costs for escorts are also subsidized. Travel related costs for administrative activities (i.e., meetings) would normally be paid through the healthcare system. Continuing education travel would result in a mixture of individual and system savings—staff would often have travel costs paid or subsidized (although indirect or non-travel costs may not be paid), while individuals compensated on a fee-for-service basis would pay the costs as part of their professional expenses.

Synthesis: cost evaluation

In summary, the average travel costs avoided for patients would appear to be a reasonable representation of actual costs avoided, whenever travel would have occurred. Extrapolating the results demonstrated here to the 1,063 clinical telehealth sessions reported by the MBTelehealth network for the 12-month period ending March 31, 2003, the actual savings for patients would have been approximately \$600,000. The average costs for continuing education and administrative activities are good approximations of

actual savings, when these activities would have occurred, providing the assumptions of the weighting for number of attendees are correct. Total costs are understated due to incomplete data and lack of consent, and are overstated as a result of the assumption that all network activity would have occurred, even in the absence of the system. Because of the relatively large numbers of patients who refused consent, the total patient savings are clearly understated, while for the continuing education and administrative functions it is likely that the total savings are overstated based on comments from the qualitative interviews.

Two recommendations arise from the results of the cost evaluation. One, a mechanism should be implemented for evaluating the impact of telehealth on the NPTP, which is now managed by four RHAs, along with any other medical or health-related travel costs borne by other payers such as Health Canada. Monitoring these expenditures over time would provide a better demonstration of savings, which might be due to the implementation of MBTelehealth. Secondly, it is recommended that physicians be encouraged to use the telehealth tariff codes.

3.6 Critical success factors in sustainability

Key informants were asked to identify, from their perspectives, critical success factors for developing and sustaining the MBTelehealth network. These are summarized in Table 26.

Table 26: Critical success factors for sustaining telehealth, key informant interviews

Success factor (No of mentions) (n = 109 interviews)
<ul style="list-style-type: none"> • Getting local physicians on board and using it (21) • Promotion, marketing, public education communication (21) • Ensure reliability of technology, adequacy of training (13) • Increase the range and accessibility of specialist services (12) • Maintain/ensure excellent coordination and staff (11) • Increase availability of continuing professional education (10) • Adequate ongoing funding (8) • Continue to ensure increased access to services (7) • Demonstrate cost savings/cost effectiveness (6) • Increased demand from population (6) • Increase the number of sites (6) • Increase clinical utilization (4) • Provide additional administrative resources, streamline referrals (4) • Plan and manage growth effectively (4) • Make emergency medical/radiology services available (4) • Increase service hours (3) • Integrate within multi-sectoral, client-focused, primary health care framework (3) • Broaden and increase flexibility of utilization (2) • Increase buy-in from management (1) • Ensure confidentiality (1) • Ensure political support (1) • Expand links outside of province (1) • Learn more about how best to use it (1) • Ensure service provision to outlying areas (1) • Get other health professionals on board (1) • Ensure telehealth has champions (1)

These data echo many of the interview responses cited earlier. Two main factors are considered critical for successful sustainability of MBTelehealth’s network: ensuring the buy-in from local physicians and promoting the telehealth system throughout all sectors including the public. Regarding the former, we have already noted that the evaluation data suggest that buy-in from practitioners would likely be aided by the provision of several specific supports to their practices. Regarding the marketing and promotion

of telehealth, respondents were often suggesting that push from the service provision side needs to be coupled with pull from an aware and interested population in order to ensure that telehealth becomes a fully integrated component of Manitoba's health system. This can be encouraged through marketing, public education, and communication. Also frequently mentioned were two previously mentioned factors: ensuring the reliability of the technology and the adequacy of training; and increasing the range and accessibility of specialist services.

Overall, these responses to the open-ended question form a very broad and diverse set of stakeholders serve to illustrate the complexity of this system-wide innovation, and how it will require continued efforts on multiple fronts to ensure sustainability.

4. DISCUSSION AND CONCLUSIONS

In this last chapter, we again focus on the questions which have guided this evaluation, bringing all the available data to bear in the identification of some key conclusions.

4.1 What are the impacts of the MBTelehealth network on patient and community access to needed, quality care?

This evaluation of the MBTelehealth network aimed to examine the extent to which telehealth is responding to needs and access problems, generating quality care and providing alternatives which are acceptable to patients and providers. The evaluation findings show clearly that achieving potential gains in terms of patient and community access to care is a function of the complex interplay of organization, technical and socio- professional factors, with an overlay of regional differences. Overall, the MBTelehealth network has been remarkably successful in deploying the system, managing a balanced approach to its growing utilization, and ensuring that the services provided meet the needs of patients and communities.

Use of the MBTelehealth system for clinical care has, consistent with its organizational priorities, grown steadily over the last year, now eclipsing other forms of utilization which enjoyed easier initial uptake. By far the biggest impact of the patient care delivered through MBTelehealth has been improvements in patients' and communities' access to care. Telehealth has made services more convenient and less costly for patients who would have had to pay for travel to central locations, and through this may improve timeliness and compliance with care, as well as patient outcomes. This seems to be particularly noteworthy among the most fragile patients. Patients who have used the system are overwhelmingly satisfied with it. In the eyes of many stakeholders, MBTelehealth has succeeded in putting patients back into the center of the health care system

The findings also shed light on some of the tensions associated with the implementation of MBTelehealth. First, in most regions throughout the province, key stakeholders believe the clinical usage of the system to be undesirably low; and in a few communities, telehealth has hardly been used at all. Regarding local physician uptake of the system – believed by many to be a key critical success factor – the data indicate that while local family physicians are not necessarily resistant to using telehealth, many require a great deal of highly customized and specific support to be able to integrate it into their practices. Others may only adopt telehealth in response to demands from their patients. The network's overall impact on access to services will necessarily be constrained by these unmet needs, and there is some risk that initial hesitations and half-hearted attempts will deepen, at least for some practitioners, into a more serious scepticism and avoidance.

A second, related tension has to do with the balance between clinical and administrative uses of the system. As the cost data attest, the cost avoidance implications for administrative and professional uses are considerable, and together are greater than the cost savings to patients. Moreover, the main impact of clinical sessions – patient convenience – does not translate directly into savings for the RHAs. The lag or void created by lower-than-desired clinical can be quickly filled, with demonstrable gains – by health

system administration use. As mentioned earlier, the strategic use of incentives and disincentives may be required maintain an appropriate balance.

The MBTelehealth system has clearly accomplished its objective of providing access to needed, quality care – although some work remains to be done to maximize the gains for patients, communities and the health system.

4.2 What is the role of the network in health services delivery and how does it link to existing health resources in Manitoba?

The evaluation findings show that telehealth has the potential to become a fully integrated component of health services delivery in Manitoba. Although in some ways it is fully poised for this integration, in other ways some challenges remain.

In some communities and among some practitioners, use of the telehealth system for both clinical care and continuing professional education is becoming more and more regular and routine. Among those practitioners who have used it, qualitative impacts have been noted on the strength of relationships with specialists and with other practitioners in other regions, some of which may result in increased local competencies, reduced sense of isolation and increased sense of support, all of which may translate into improved quality of patient care. New relationships have been forged, enabling practitioners to work more effectively together in the interests of the patient.

Remaining challenges to integration seem to lie in some organizational aspects of telehealth, in order to encourage and sustain participation by practitioners. First, continuing professional education, shown to be a major vehicle for the creation of new linkages and the improvement of practices, is not accessible to many community practitioners because of its scheduling. Barriers to participation could be addressed so that all practitioners would have the opportunity to participate.

Second, from the rural and remote practitioners' and administrators' point of view, there is a need to streamline referral processes and harmonize them better with existing processes, ensuring adequate information flow (for example, about appointment waiting times) so that practitioners can make informed choices about what is best for the patient.

4.3 What are the cost implications of telehealth?

This evaluation has estimated that the cost savings associated with telehealth are quite large. A large proportion of these cost savings are enjoyed directly by patients. Many other intangible savings were also identified although not estimated. These include the reduced stress and risk of travel, as well as the indirect benefit of better or more timely compliance with medical appointments.

The telehealth network also resulted in considerable cost savings to the health system, through the costs avoided for travel for continuing education and for meetings. Unmeasured economic benefits include those stemming from improved decision-making and increased regional cohesiveness and participation. Overall, the data show solid economic justification for ongoing development of the telehealth network.

4.4 Conclusions

The MBTelehealth Network has grown in a very short time to be one of the most extensive and comprehensive telehealth networks in Canada, covering a very large territory made up of rural, remote and urban sites with their different levels of technical infrastructure. Uptake of the MBTelehealth system has been rapid and broad. While some regions have experienced some delays or lags in uptake, overall the evaluation data suggest that the system is being widely used in ways that are consistent with its objectives.

The MBTelehealth system has achieved a very high level of deployment and utilization throughout all the regions of Manitoba, increasing patient and community access to needed, quality care, fostering linkages among practitioners and throughout the health care system, and becoming integrated into existing patterns of service delivery.

Moreover, the network has generated enthusiasm in many sectors of the health care community, and a feeling of optimism that telehealth can contribute to addressing the many challenges facing Manitoba's health system.

“A general observation: as the CEO of a Health Authority I am usually not very impressed with centralized initiatives from government. This is a huge success. It's very well coordinated and it's taken right off. It's a model for other programs, the most successful health story in the province”.

5.0 REFERENCES

- Agha Z, Schapira RM, Maker AH. Cost effectiveness of telemedicine for the delivery of outpatient pulmonary care to a rural population. *Telemedicine Journal & E-Health*. 8(3):281-91, 2002 Fall.
- Almazan C, Gallo P. Assessing clinical benefit and economic evaluation in telemedicine. Barcelona: Catalan Agency for Health Technology Assessment; 1999.
- Brebner EM, Brebner JA. Implementation and evaluation of telemedicine for remote health-care--the European Northern Periphery Programme Project. [Evaluation Studies. *J Telemedicine & Telecare*. 7 Suppl 1:68-9, 2001.
- Brennan JA, Kealy JA, Gerardi LH, Shih R, Allegra J, Sannipoli L, et al. Telemedicine in the emergency department: a randomized controlled trial. *J Telemed Telecare* 1999;5(1):18-22.
- Brown-Connolly NE. Patient satisfaction with telemedical access to specialty services in rural California. *J Telemedicine & Telecare*. 8 Suppl 2:7-10, 2002.
- Canada's Health Care Providers, Canadian Institute for Health Information. 2001. www.cihi.ca
- College of Physicians and Surgeons of Manitoba, Statement 166 – Telemedicine. August 27, 2002.
- Cook DJ, Doolittle GC, Whitten PS. Administrator and provider perceptions of the factors relating to programme effectiveness in implementing telemedicine to provide end-of-life care. *J Telemedicine & Telecare*. 7 Suppl 2:17-9, 2001.
- Crolla DA. Health care without walls: responding to telehealth's emerging legal issues. *Health Law Can* 1998;19(1):1-19.
- Currell R, Urquhart C, Wainwright P, Lewis R. Telemedicine versus face to face patient care: effects on professional practice and health care outcomes. *Cochrane Database Syst Rev* 2000;(2):CD002098.
- Doze S, Simpson J, Hailey D, Jacobs P. Evaluation of a telepsychiatry pilot project. *J Telemed Telecare* 1999;5(1):38-46.
- Elford R, White H, Bowering R, Ghandi A, Maddigan B, St John K, et al. A randomized, controlled trial of child psychiatric assessments conducted using videoconferencing. *J Telemed Telecare* 2000;6(2):73-82.
- Harrison R, Clayton W, Wallace P. Virtual outreach: a telemedicine pilot study using a cluster-randomized controlled design. *J Telemed Telecare* 1999;5(2):126-30.
- Haukipuro K, Ohinmaa A, Winblad I, Linden T, Vuolio S. The feasibility of telemedicine for orthopaedic outpatient clinics--a randomized controlled trial. *J Telemed Telecare* 2000;6(4):193-8.
- Health Canada (2001) First Nations Telehealth Research Project: Evaluation Report.
- Health Choices: What Manitobans Said, Final Report, Manitoba Health December 2002.
- Hersh, W., Helfand, M., Wallace, J et al; Clinical outcomes resulting from telemedicine interventions: a systematic review, *BMC Medical Informatics and Decision Making* 2001 1:5, <http://www.biomedcentral.com/1472-6947/1/5>.
- Jennett PA, Person VL, Watson M, Watanabe M. Canadian experiences in telehealth: equalizing access to quality care. *Telemedicine Journal & E-Health*. 6(3):367-71, 2000 Fall.
- Kennedy C, Yellowlees P. A community-based approach to evaluation of health outcomes and costs for telepsychiatry in a rural population: preliminary results. *J Telemed Telecare* 2000;6 Suppl 1:S155-S157.
- Kirkwood KT, Peck DF, Bennie L. The consistency of neuropsychological assessments performed via telecommunication and face to face. *J Telemed Telecare* 2000;6(3):147-51.
- Leshner JL, Davis LS, Gourdin FW, English D, Thompson WO. Telemedicine evaluation of cutaneous diseases: a blinded comparative study. *J Am Acad Dermatol* 1998;38(1):27-31.

- Loane MA, Bloomer SE, Corbett R, Eedy DJ, Gore HE, Mathews C, et al. Patient satisfaction with realtime teledermatology in Northern Ireland. *J Telemed Telecare* 1998;4(1):36-40.
- Mair F, Whitten P. Systematic review of studies of patient satisfaction with telemedicine. *BMJ* 2000;320(7248):1517-20.
- Mairinger T, Netzer TT, Schoner W, Gschwendtner A. Pathologists' attitudes to implementing telepathology. *J Telemed Telecare* 1998;4(1):41-6.
- Mays, N., Pope, C. (2000) Assessing quality in qualitative research. *British Medical Journal*, 320, 50-52.
- Miles, M. and Huberman, A (1994) *Qualitative Data Analysis: an expanded sourcebook*. (2nd ed.) Thousand Oaks, CA: Sage.
- Muttit Sarah, Aggregated Telehealth Needs Assessment Summary for the MB Telehealth Network, Tecknowledge Professional Services, Toronto, September 2001.
- Noorani, H., Picot, J. Assessment of videoconferencing in telehealth in Canada. CCOHTA, 2001.
- Ohinmaa A, Hailey DM, Roine R. The assessment of telemedicine: general principles and a systematic review. Edmonton: Alberta Heritage Foundation for Medical Research; 1999
- Phillips CM, Burke WA, Allen MH, Stone D, Wilson JL. Reliability of telemedicine in evaluating skin tumors. *Telemed J* 1998;4(1):5-9.
- Pope, C., Mays, N. (1995) Qualitative research: Reaching the parts other methods cannot reach: an introduction to qualitative methods in health and health services research. *British Medical Journal*, 311, 42-45.
- Pope, C., Ziebland, S., Mays, N. (2000). Qualitative research in health care: Analysing qualitative data. *British Medical Journal*, 320, 114-116
- Reid D, Weaver L, Sargent J et al. Telemedicine in Nova Scotia: Report of a Pilot Study. *Telemedicine Journal* 1998; 4(3):249-258.
- Ruskin PE, Reed S, Kumar R, Kling MA, Siegel E, Rosen M, et al. Reliability and acceptability of psychiatric diagnosis via telecommunication and audiovisual technology. *Psychiatr Serv* 1998;49(8):1086-8.
- Sable CA, Cummings SD, Pearson GD, Schratz LM, Cross RC, Quivers ES, Rudra H, Martin GR. Impact of telemedicine on the practice of pediatric cardiology in community hospitals. *J Pediatrics*. 109(1):E3, 2002 Jan.
- Saeki K, Izumi H, Ohyanagi T, Sugiyama A, Sawada I, Suzuki K, et al. Distance education for health centre staff in rural Japan. *J Telemed Telecare* 2000;6 Suppl 2:S67-S69.
- Sawada I, Sugiyama A, Ishikawa A, Ohyanagi T, Saeki K, Izumi H, et al. Upgrading rural Japanese nurses' respiratory rehabilitation skills through videoconferencing. *J Telemed Telecare* 2000;6 Suppl 2:S69-S71.
- Sjogren LH, Tornqvist H, Schwieler A, Karlsson L. The potential of telemedicine: barriers, incentives and possibilities in the implementation phase. *J Telemedicine & Telecare*. 7 Suppl 1:12-3, 2001.
- Street RLJ, Wheeler EJ, McCaughan WT. Specialist-primary care provider-patient communication in telemedical consultations. *Telemed J* 2000;6(1):45-54.
- Tanriverdi H, Iacono CS. Diffusion of telemedicine: a knowledge barrier perspective. *Telemed J* 1999;5(3):223-44.
- Taylor P. A survey of research in telemedicine. 2: Telemedicine services. *J Telemed Telecare* 1998;4(2):63-71.
- Trott P, Blignault I. Cost evaluation of a telepsychiatry service in northern Queensland. *J Telemed Telecare* 1998;4 Suppl 1:66-8.
- Whitten PS, Allan A. Analysis of telemedicine from an organizational perspective. *Telemedicine Journal* 1995; 1:203-13.

Wootton R, Bloomer SE, Corbett R, Eedy DJ, Hicks N, Lotery HE, et al. Multicentre randomised control trial comparing real time teledermatology with conventional outpatient dermatological care: societal cost-benefit analysis. *BMJ* 2000;320(7244):1252-6.