Health Canada Santé Canada

Evaluation of the Canada Health Infostructure Partnership Program

Integrated Evaluation Report

Presented to

Health Canada
Departmental Audit and Evaluation Committee

November 2005

Canada

EVALUATION OF THE CANADA HEALTH INFOSTRUCTURE PARTNERSHIP PROGRAM

ACTION PLAN IN RESPONSE TO THE EVALUATION RECOMMENDATIONS

CONTEXT AND BACKGROUND

Canada Health Infostructure Partnership Program

The Canada Health Inforstructure Partnership Program (CHIPP) was launched in 2000 to promote the use of advanced information and communication technologies (ICT) through the support of large scale multi jurisdictional ICT enabled health care delivery applications. CHIPP was preceded by the Health Infostructure Support Program (HISP) which provided funding for pilot testing of innovative and advanced ICT applications in health service delivery. The program emerged in response to the opportunity to consolidate and expand the use of ICT based solutions to address health system renewal.

CHIPP was designed to address some of the issues confronting the Canadian health care system such as increasing costs, shortages of health professionals and access to health services. CHIPP sought to address these issues through the support of ICT based applications in two key areas: the electronic health record (EHR) and telehealth networks. The 1999 Federal budget provided $80.5 million over three years and the program employed a cost sharing model to encourage the development of cross jurisdictional partnerships for the implementation of large scale projects. In the end 29 projects were funded from the 180 applications for resources, with 10 being EHR and the remaining 19 telehealth.

Canada Health Infoway

Canada Health Infoway (*Infoway*) was created in response to a commitment of Canada's First Ministers of Health to "work together to strengthen a Canada wide health infostructure to improve quality, access and timeliness of health care for Canadians". *Infoway* is an independent, not for profit corporation whose members are the deputy ministers of health from across Canada's federal, provincial and territorial governments.

Infoway's priority is interoperable EHR solutions and related telehealth development. *Infoway* invests with partners to develop, replicate and deploy robust, reusable and interoperable EHR solutions. *Infoway* focusses primarily on identifying investment opportunities and once funding decisions are made, the partner leads the development and implementation of the EHR solution. This partnership approach should allow EHR solutions to be developed faster and more cost effectively than any one party on their own and ensure alignment with jurisdictional priorities.

Infoway now has $1.2 billion in investment capital. The Government of Canada allocated $500 million in 2001 and an additional $600 million in 2003 following the 2003 First Minister's Accord on Health Care Renewal. These sizable investments would seem to indicate that *Infoway* in now the federal government's primary vehicle for advancing the use of ICT enabled applications in health care delivery.

EVALUATION REPORT FINDINGS AND CONCLUSIONS

The evaluation report concludes that CHIPP essentially achieved its objectives as laid out the original Treasury Board Submission.

The evaluation report concludes that CHIPP:

- advanced the development and implementation of ICT (telehealth and electronic health records) enabled health services in a way that has allowed for participation from all parts of the country;
- was able to adapt to provincial and territorial contexts where the ICT based applications were being implemented and mainstreamed;
- made a significant contribution to the application of ICTs in the health field and has helped Canada begin to create the necessary national infrastructure for the ongoing integration of ICTs into health care; and,
- succeeded in creating sustainable delivery programs and partnerships.

The report concludes that these sustained programs and partnerships are forming the foundation for the development and implementation of ICTs in health care. CHIPP has also contributed significantly to the mainstreaming of ICTs in health care with many telehealth and some EHR projects becoming fully integrated into provincial or regional health service delivery plans. For example many of the telehealth and some of the electronic health record projects have been fully integrated into provincial or regional health care service delivery. This has enhanced integration of services from both a patient and provider perspective and in some cases has improved the continuity of care.

The evaluation could not conclude that CHIPP improved the quality, accessibility or efficiency of health service delivery as the period of evaluation was not sufficient to capture the impacts of fully mature ICT enabled services. The evaluation does conclude that the acceptance of ICT enabled health services is high and this is an important precondition to the quality, accessibility and efficiency outcomes.

Finally, CHIPP has produced a large output in the form of tools, products, protocols, standards, best practices and lessons learned. These products, if appropriately disseminated will have the potential to accelerate pan-Canadian ICT development by building on previous learning and experience.

EVALUATION REPORT RECOMMENDATIONS AND HEATH CANADA=S RESPONSE

Evaluation Recommendation #1 - More and Longer Evaluation:
The evaluation efforts conducted under CHIPP, up to and including the present evaluation, can only provide a partial and early assessment of the impacts of ICT-Benabled services on health care and health systems. Most of the evaluation work to date has been through uncontrolled studies, with a lack of standardized approaches to measurement and an inadequate follow-up period. Long-term studies with appropriate controls rigorously assessing impacts on key outcomes (accessibility, quality and health system costs) are needed. Key stakeholders such as Canada Health Infoway, First Nations and Inuit Health and Primary Care branches of Health Canada, and the Canadian Society for Telehealth should be invited to collaborate in these evaluations, to ensure that their emerging concerns are addressed.

Departmental Response	Time Lines	Responsibility
The evaluation report identified knowledge gaps related to CHIPP performance in the area of cost effectiveness, patient out comes and the long term viability of CHIPP funded ICT projects. Further evaluation could address these gaps and could incorporate the following features: • Prolonged period of time over which both the costs and performance of the ICT based projects could be captured and assessed • Rigorous study design including a structured cost effectiveness analysis and the the used of standard protocols/tools by which projects in all jurisdictions would collect data that is complete, accurate and comparable • Continued participation by projects in the design and execution of the next evaluation study Health Canada is positioned to play a lead role in any further evaluation by way of its leadership in program evaluation, ability to coordinate at the national level and well established links to CHIPP projects, as well as external sources of expertise. To this end the Departmental Performance Measurement and Evaluation Directorate will include a proposal for further CHIPP evaluation in the draft work plan for 2006/2007 that will be presented to the Departmental Audit and Evaluation Committee (DAEC). It should be noted that inclusion of a proposed project does not necessarily mean that it will be undertaken as all evaluation projects are subject to a prioritization process for the allocation of limited resources. As program funding expired March 31, 2004, there is not currently funding for future evaluation. Should DAEC decide to proceed with further evaluation of CHIPP, resources will have to be identified and provided to the organization that will be responsible for the evaluation.	April 2006 Proposal re further evaluation of CHIPP to be included in the proposed 2006/2007 Departmental Evaluation Workplan.	Departmental Performance Measurement and Evaluation Directorate, CFOB Departmental Audit and Evaluation Committee

Evaluation Recommendation #2 - Improved Knowledge Transfer and Dissemination:

An effective coordinated approach to knowledge dissemination is required. This would include better communication among initiatives, to ensure that lessons learned and best practices are shared, as well as the development of knowledge transfer mechanisms to reach stakeholder communities including health system administrators and decision-makers, practitioners and their professional bodies, post-secondary training institutions, and product vendors, to name but a few. These mechanisms should also include feedback loops to ensure ongoing mutual learning from all sectors.

Departmental Response	Time Lines	Responsibility
The CHIPP evaluation notes the need for enhanced sharing of information amoung ICT stakeholders. CHIPP and CHIPP funded projects have produced a large number of products and the benefits of CHIPP could be enhanced through the dissemination of this information. Health Canada will play a role in the collection, organization and dissemination of CHIPP products through a one time effort. Health Canada will construct a webpage that provides links to authoring organizations for as many of the products of CHIPP as possible. The vast majority of products will be accessible via a link to the organization that developed the product as this is the best way to respect intellectual property and limit Health Canada's liability. Currently, all CHIPP project final reports have been posted on the HC website as well as a list of products generated by the project, a contact name and an email address. As this will be a one time effort for now complete CHIPP projects, Health Canada resources will not be required to update the page beyond the costs of its original construction. Health Canada will also make this content of the webpage available to *Infoway* to be used as it sees fit in its role as the Federal Government's funder of the development and implementation of ICT enabled health care services. Further, the content will be provided to the Canadian Society for Telehealth. The results of CHIPP projects as contained within the evaluation and final reports, have been extracted and stored in the CHIPP database. Contracts are currently underway to fund research papers based on CHIPP project results in areas such as evaluation, governance, privacy, and change management. These papers will be published as government policy documents and in relevant e-health publications. Dissemination of products resulting from *Infoway* funding would be the responsibility of *Infoway* and its partners.	March 2006 Web page to be implemented by the end of fiscal 2005/2006	Health and the Information Highway Office, CSB Health Canada Webmaster

Evaluation Recommendation #3 - National Leadership on Standards

The CHIPP vision was to contribute to the development of a health system, which, Canada-wide, is able to reap the potential benefits of ICTs in health care. Development, dissemination and support of national standards is a critical success factor for achieving this vision, and the CHIPP experiments can contribute a great deal to the emergence of this once their learnings have become consolidated. Standards are needed in the areas of privacy, interoperability, scheduling, multi-jurisdictional information transfer, personnel qualifications and training, organizational processes, and clinical protocol.

Departmental Response	Time Lines	Responsibility
Acting on this recommendation fall almost exclusively within the domain of Canada Health Infoway (for technology standards, e.g. interoperability) and Canadian Institute for Health Information (information standards). In its capacity as the principle source of funding for the development and implementation of ICT enabled health care services, it is *Infoway*'s responsibility along with its partners to set the standards to which funded projects and initiatives will be held. Health Canada is represented on the *Infoway* board and through that position will work to influence the corporation to take leadership on the development of national standards.	Ongoing March 2006 for the policy paper on ehealth standards	Health and the Information Highway Office, CSB

Evaluation of the Canada Health Infostructure Partnership Program (CHIPP)

Integrated Evaluation Report

Submitted to:

Innovation and Investment Division, Office of Health and the Information Highway
& Departmental Program Evaluation Division,
Applied Research and Analysis Directorate;
Information, Analysis, and Connectivity Branch
Health Canada PL 1904B1, Jeanne Mance Building
Tunney's Pasture
Ottawa (Ontario) K1A 0K9

Submitted by:

Natalie Kishchuk Research and Evaluation inc.
Natalie Kishchuk, Kaisa McCandless, Greg Finlayson, Jocelyne Picot, Robert Perreault, and Arto Ohinmaa
26 Oriole Drive
Kirkland (Québec) H9H 3X3
(514) 694-8995

Howard Research & Management Consulting Inc.
Dale Howard and Darren Mondor
#1105 – 10117 Jasper Avenue
Edmonton, Alberta T5J 1W8
(780) 496-9994

Division of Continuing Medical Education
Faculty of Medicine
University of British Columbia
#104-740 Nicola Street
Vancouver, B.C. V6G 2C1
(604) 639-5310

Table of contents

EXECUTIVE SUMMARY

CONTEXT

Launched in early 2000 as a two-year partnership between Health Canada's Office of the Information Highway (OHIH) and provincial and territorial partners, the Canada Health Infostructure Partnership Program (CHIPP) aimed to promote the use of advanced information and communications technologies (ICT) in health services. CHIPP supported 29 large-scale, multi-jurisdictional ICT-enabled health care delivery applications in a wide variety of settings across the country.

INFORMATION SOURCES

The evaluation of the overall CHIPP program synthesized information from several sources to address eight major issues. The information sources were: 1) systematic review of project-level evaluations, other project reports, and reports on horizontal program activities (about 10,000 pages of material); 2) key informant interviews with 76 stakeholders including project-specific respondents, government and regional officials, CHIPP representatives, subject matter experts, health care providers, senior health services managers, and representatives of non-governmental organizations; 3) in-depth case studies and cross-case analysis of six CHIPP projects, involving 39 key informant interviews; an online survey; review of 60 project reports and other documents; and 78 various other types of contacts; and 4) a structured literature review in each of the issue areas, to situate the findings in the broader knowledge context.

EVALUATION FINDINGS

Overall, the results of this evaluation show that the objectives of the CHIPP program have largely been achieved:

Objective 1: To support primarily large scale implementation model projects involving several jurisdictions for shared development and implementation

The main impact of CHIPP on health services and health systems has been to propel development and implementation of ICT-enabled health services forward in a giant step that allowed participation from all parts of the country, while adapting models and services to the provincial and territorial contexts where they are become mainstreamed and sustained. Although there are still many challenges, the CHIPP program has made a significant mark on the ICT landscape, helping Canada begin to create the necessary national infrastructure for ongoing integration of ICTs into all aspects of health care.

Objective 2: To facilitate collaboration and sow the seed for accelerated implementation of health service delivery renewal across the country

The CHIPP program model was particularly successful in several key areas where it is unlikely that such progress would have occurred in its absence. First, CHIPP succeeded in creating sustainable collaboration and partnerships, often across multiple jurisdictional boundaries. These partnerships, more than any other program outcome, will form the foundation for future development of ICTs in health care. The partnerships will also likely serve as models for new partnerships as the ICT landscape continues to evolve.

Second, CHIPP projects contributed significantly to "mainstreaming" of ICTs into health care systems, with

most telehealth projects and some EHR projects become fully integrated into provincial or regional service plans. It also contributed to enhancing integration of services from patients' and providers' perspectives, and may in some cases have contributed to improved continuity of care. This is an important evolutionary step in the development of ICT-enabled services, which until now have been very often piecemeal pilot projects, only loosely connected to mainstream provincial and territorial health systems. In many jurisdictions, the mainstreaming of ICTs is expected to contribute to ongoing health service renewal.

Objective 3: By supporting telehealth applications such as EHRs, telemedicine and telehomecare, to help improve the quality, accessibility and efficiency of health service delivery to Canadians

The evidence for the achievement of this objective is mixed, for two main reasons. First, although acceptance of ICT-enabled services (a pre-condition for other outcomes) is adequately high and some of the project evaluations provided relatively strong evidence of CHIPP impacts on accessibility, quality and efficiency of health services, as well as on patient health outcomes, in most cases the evaluation periods were not sufficient to capture the impacts of fully mature ICT-enabled services. Second, the challenges of conducting evaluations in this area resulted in evaluation designs that, while providing results that are suggestive of positive impacts, will need to be confirmed more rigorously.

The evidence that is available at this point does provide some useful hypotheses about the potential impact of ICTs on health service delivery to Canadians living in rural and remote areas. The evaluation findings suggested that most of the gains were through provision of already-accessible services more conveniently and at lower costs to patients, rather than by providing access to services that Canadians could not access before. Thus, the impact of ICT's on access to previously inaccessible services is more indirect than might have been foreseen, and may suggest that the problem of lack of access is less acute than had been assumed. The most impressive results in terms of impacts on increased access to care came from projects that used technologies to bring services directly to patients, rather than using them to facilitate distant access. There was also some evidence that some ICTs enhanced globality or comprehensiveness of care.

Objective 4: To help gain knowledge on ICT-enabled health care renewal through a comprehensive evaluation of individual projects supported by CHIPP and the program as a whole, and collection of lessons learned

The present evaluation study, with its several components, has aimed to build from the project-level evaluations to provide a comprehensive overall evaluation, as well as to identify best practices and lessons learned. CHIPP has also produced an enormous amount of information, in the form of tools, products, protocols, standards, best practices, and lessons learned, which if they are disseminated throughout the relevant user communities, have the potential to accelerate ICT development by allowing health systems to build on previous learning.

1. INTRODUCTION: BACKGROUND, RATIONALE AND STRUCTURE OF THE CHIPP PROGRAM

1.1 Purpose of this report

Launched in early 2000 as a two-year partnership between Health Canada's Office of the Information Highway (OHIH) and provincial and territorial partners, the Canada Health Infostructure Partnership Program (CHIPP) aimed to promote the use of advanced information and communications technologies (ICT) through support of large-scale, multi-jurisdictional ICT-enabled health care delivery applications in a wide variety of settings across the country. This document reports on the evaluation of the overall CHIPP program, as required by Treasury Board and Health Canada's departmental evaluation policy. Its primary aim is, for accountability purposes, to provide an external assessment of CHIPP's success in meeting its objectives, by responding to a comprehensive set of evaluation questions identified by program stakeholders.

Components of the evaluation were mandated to three teams of external consultants, under the guidance of a Program Evaluation Advisory Committee (PEAC), composed of academic experts, CHIPP project recipients, and Health Canada representatives (Appendix 1). This report integrates findings from all evaluation components.

1.2 Background to the creation of the CHIPP program

CHIPP followed the successful Health Infostructure Support Program (HISP), which starting in 1997 provided $8.8M to support pilot testing of innovative applications of advanced ICT in health service delivery. The response to HISP suggested that health systems in Canada were seeing the rapid and widespread emergence of ICT-based solutions to address health system renewal and as a result, significant expertise and experience were accumulating across the country. CHIPP emerged in response to the opportunity to consolidate and expand the emerging momentum by leveraging federal funding through collaboration with provinces, territories and other stakeholders.

Prior to CHIPP, there was therefore much interest and activity in developing ICT-enabled applications, with most provinces and territories already involved in various types of pilot and demonstration projects, some stimulated through the HISP. However, most of these projects were too small in scope to address complex cross-jurisdictional issues or to develop systems that could form the framework for system-wide adoption and full mainstreaming of ICTs into health care delivery. In addition, while important work on developing technical, privacy, and organizational standards had begun, there was no organized national focus or mechanisms to permit consolidation of learnings across the wide range of experiences. Meanwhile, health systems were widely recognized as being in crisis, and in need of innovative solutions including those offered through ICTs.[1]

[1] Romanow, R.J. Building on Values: The Future of Health Care in Canada. Saskatoon: Commission on the Future of Health Care in Canada; 2002.; Kirby, M. J. L. The Health of Canadians-The Federal Role, The Standing Senate Committee on Social Affairs, Science and Technology. November, 2002.

1.3 Program description

1.3.1 CHIPP's objectives

According to the program's preparatory documentation, CHIPP was designed to address some of the issues confronting the Canadian health system, including increasing costs, shortages of health professionals, and access to health services, particularly access to specialists for Canadians living in rural and remote communities. Based on consultations with provinces, territories and other stakeholders, it prioritized development and implementation of applications in two main strategic areas: electronic health records (EHRs) and telehealth. EHRs were seen as having potential to integrate information located in previously independent and incompatible information systems, and to streamline access and integration of information to enable important gains in efficiency, accuracy and completeness. Telehealth networks were viewed as a means to improve access to health services and address shortages and inequitable distributions of health professionals.

CHIPP's objectives, as approved by Cabinet and Treasury Board, were[2]:

- To support primarily large scale implementation model projects involving several jurisdictions for shared development and implementation;
- To facilitate collaboration and sow the seed for accelerated implementation of health service delivery renewal across the country;
- By supporting telehealth applications such as EHRs, telemedicine and telehomecare, to help improve the quality, accessibility and efficiency of health service delivery to Canadians;
- To help gain knowledge on ICT-enabled health care renewal through a comprehensive evaluation of individual projects supported by CHIPP and the program as a whole, and collection of lessons learned.

1.3.2 Key aspects of program design and implementation

The program design aimed to encourage the development of cross-jurisdictional partnerships in large-scale projects through a cost-shared funding model, with CHIPP supporting up to 50 percent of total project costs and with partners funding the balance. $80.5M was allocated in the 1999 federal budget to support the program, and the CHIPP contribution ceiling for each project was set at $20 million. Eligible partner organizations included provincial and territorial ministries of health, First Nations and Inuit organizations, regional health authorities, universities, hospitals, and voluntary associations. Their contributions could include in-kind personnel and infrastructure resources.

Applications for the CHIPP program were solicited through a Request for Proposals issued in June 2000, with a deadline of August 2000. Over 180 applications were received. An 11-member Program Advisory Board (PAB), consisting of academics, health system managers and practitioners,

[2] From: Proposed Strategy for the Evaluation of the Canada Health Infostructure Partnerships Program: document prepared for Advisory Committee meeting; and Proposed Strategy for the Evaluation of the Canada Health Infostructure Partnerships Program, detailed document with appendices, both summarizing the Treasury Board submission and Memorandum to Cabinet.

was created to provide advice on proposal evaluation and project selection. The multi-step project review and selection process involved:

1. Preliminary assessment of eligibility and compliance with requirements;
2. In-depth review, with two components:
    - Technical assessment conducted by teams of external technical experts using evaluation criteria covering issues of : project management, risk management, evaluation, financial management, information and communications technologies, partnerships, communications and awareness raising;
    - Peer review conducted by a team of ten external reviewers using a set of evaluation criteria assessing the project proposals in terms of potential impact on health care delivery and system.
3. Strategic Assessment, to identify a group or several groups of projects that would together provide the best value for money by taking into account: 1) the in-depth review results; 2) the complementarity among projects and 3) broad strategic criteria identified through Health Canada and Federal/Provincial/Territorial consultations and approved by the Minister;
4. Management review and PAB review of the results of previous steps, resulting in recommendation for Ministerial decision[3].

The evaluation criteria used to select CHIPP projects are shown in Table 1.

Table 1: Evaluation criteria used in selecting CHIPP projects

- Consistency with the principles of the Canada Health Act
- Aiming at the application of ICT for improving health care delivery
- Within the strategic areas of EHRs and telehealth (telemedicine and telehomecare)
- Using advanced ICTs
- Compliance with established ICT standards
- Involving other jurisdictions or, as appropriate, having plans for doing so
- Where appropriate, having endorsement of provinces and territories involved
- Including plans for sharing results and solutions
- Demonstrating the potential for national applicability
- Demonstrating the availability of matching funds
- Demonstrating capacity to complete the project and the ability to sustain ongoing activities beyond the federal funding period
- Having a detailed evaluation framework in keeping with the key goal of generating evidence on outcomes and impacts
- Adherence to an appropriate project and risk management framework.
- Strict adherence to the required accountability processes
- Clear indication that CHIPP is not simply an alternate source of funding for existing programs or projects and that CHIPP funding supports a new project or new dimensions/components of an existing project
- Certifying that the project will manage personally identifiable information in compliance with federal and provincial privacy legislation and in accordance with the principles of the Canadian Standards Association model code for the protection of personal information (CAN/CSA Q 830-96)
- Ensuring the spirit and intent of the Official Languages Act is respected when serving the public.

[3] CHIPP Proposal Assessment Process, Briefing Deck, August 2000.

The review process resulted in the selection of 29 projects (10 EHR and 19 telehealth). While the majority of the non-funded proposals were judged to have significant deficiencies, there were a number of proposals that were deemed fundable, but were not selected for funding in order to provide the best possible balance and greatest potential for learning across the projects.

Following the review process, $80M was approved for the 29 projects in February 2001. Due to the large number of applications, the need to ensure balance across the set of funded projects, and the judgments by the review committee that many were scalable, decisions were made to reduce the proposed funding levels of most projects. Resulting negotiations and project revisions among applicants occurred over the next several months, with most projects beginning formal operations by late spring 2001.

1.3.3 Program activities: funded projects and horizontal initiatives

Table 2 provides a summary of the 29 funded projects, as well as the federal and partners' contributions. CHIPP support ranged from 400,000 to $12 million, for a total of $71M. Partners contributed a total of $83M, making the total investment in the program $153.4M over three years. Funding for telehealth projects represented 72% of the total, while EHR projects received 28% of the total funds.

Table 2: Projects funded by the CHIPP program and their budget allocations

Project Title	Project description	CHIPP allocation	Partners' allocation
Telehealth Projects			
Alberta First Nations Project to Screen for Limb, I-Sight, Cardiovascular and Kidney (SLICK) Complications using Mobile Diabetes Clinics	The SLICK project deployed two vans equipped with advanced information and communications technologies to implement screening for diabetic complications in First Nations communities. Travelling to each community, technicians captured digital, three-dimensional, retinal images and transferred them to specialists in Edmonton for examination and diagnosis.	$0.8M	$0.9M
Application en milieu rural de la télémédecine de première ligne au Témiscamingue	The *Centre de santé de Sainte-Famille*, in partnership with First Nations, the Université du Québec de l'Abitibi-Témiscamingue, and private-sector technology providers implemented a primary care telemedicine and distance nursing network serving four sites, for consultations between physicians and nurses, 24 hours a day, 7 days a week.	$0.9M	$0.9M
BC Telehealth Program	The BC Telehealth Program implemented a multi-disciplinary, province-wide electronic network to provide telehealth services in several communities across BC. The services offered included clinical consultation with three main clinical streams (emergency/trauma; maternal and child health; paediatric palliative care.) and continuing professional education.	$3.0M	$4.1M
Central BC-Yukon Telemedicine Initiative	This telemedicine initiative implemented a high speed telehealth network for the rapid transmission of radiological images to enhance radiology services in rural and remote regions of British Columbia and the Yukon.	$2.5M	$3.4M
CLSC of the Future: Telehealth and Tele-home Care	Homecare services provided through a CLSC were facilitated by making comprehensive patient information available to all health care providers involved in a case, including homecare nurses (using portable technologies) and family physicians at remote locations.	$3.0M	$3.6M
Eastern Ontario Health Network (EOTN)	This initiative implemented a telehealth network linking 19 community and tertiary care hospitals throughout rural Eastern Ontario, aiming to provide clinical consultations in cardiac care, pediatric care, palliative care, complex continuing care and care of the elderly.	$3.0M	$3.5M

Health Infostructure Atlantic	This project extended the work of *Health Infostructure Atlantic* (HIA), created by the four Departments of Health in the Atlantic region in 1999. It had four components: a development of common standards for an Atlantic electronic health record (an EHR application, implemented in Prince Edward Island), integrated electronic case management systems (applied in Prince Edward Island's applied it to the provincial diabetes program, Newfoundland and Labrador's child welfare services and Nova Scotia's single-entry continuing care management system); and a teleradiology program implemented in Prince Edward Island (7 sites); Newfoundland and Labrador (11 sites); Nova Scotia (10 sites); and New Brunswick (8 sites).	$12.0M	$12.6M
IIU Network	Aiming to improve access to an expanded range of health and social services, continuing education, and contact among health service providers, the IIU initiative extended Nunavut's telehealth network to 15 communities, then to health care and education providers both in and outside of the Territory.	$3.7M	$4.2M
MBTeleHealth Network	The Winnipeg Regional Health Authority and its partners implemented a telehealth network linking 22 rural and remote communities. Services provided through the network were teleconsultation in a large number of health, allied health and social service areas, continuing medical and nursing education, and patient education.	$3.0M	$4.3M
NORad	The North Eastern Health Services Alliance's project involved replacement of existing analogue x-ray equipment with digital technology and development local and regional networks to connect imaging equipment at participating hospitals in the Cochrane District and James Bay regions of northern Ontario. This infrastructure allowed the secure transmission of high-quality medical images between hospital sites, supporting community based radiological diagnosis.	$1.0M	$1.5M
Northern Ontario Remote Telecommunications Health (NORTH) Network	In association with more than 70 partners, this project expanded an existing telehealth network from 14 to 47 sites throughout Ontario and provided a link to Winnipeg. The network provided these communities with access to medical services including consultations in more than 30 medical specialties, distance education activities, and educational programming for groups and organizations.	$8.5M	$9.3M
Project Outreach	Led by St. Joseph's Health Care London, Project Outreach integrated four psychiatric centres (hubs) with numerous remote municipal and First Nations sites to deliver telepsychiatric services by video-conferencing technologies.	$2.5M	$3.3M
Southwestern Ontario Telehealth Network (SWOT-N) (Videocare)	The SWOT-N/Videocare project implemented a network linking approximately 40 sites, building on successful regional telehealth applications already deployed in this region. Services provided focussed on real time continuing education, for indirect patient care (diagnostic imaging transmission, especially transmitting ophthalmological retinal scans), case disposition and case conferencing), education and administrative sessions.	$2.0M	$2.3M

Surgical Services Network	This project implemented tele-mentoring and tele-robotics to provide training and research for laparoscopic procedures, where laparoscopic surgery was conducted in geographically remote regions with access to expert advice during live surgery and tele-robotics.	$1.0M	$1.2M
Tele-Mental Health Project	The project developed telemental health services for rural and remote B.C. communities, where psychiatrists from the established outreach program used video-conferencing as a means of augmenting ongoing itinerant activities.	$0.4M	$0.6M
Tele-oncology: Model for a Comprehensive Cervical Cancer Screening Program using ICTs	This project involved implementation of comprehensive screening system for cervical cancer in New Brunswick to reduce the incidence and mortality of the disease among women living in rural and First Nations communities.	$1.2M	$1.2M
Telehealth Saskatchewan	Building on two existing telehealth pilot projects, this project enabled consolidation and expansion of a provincial telehealth network, providing distant consultation, emergency care, pediatric services and continuing education.	$1.0M	$1.6M
WestNet Tele-Ophthalmology Project	Through this project, WestNet Telehealth expanded its existing network to communities in the NWT. Using recent advances in portable digitized ophthalmology technology, the network provided annual dilated eye exams to diabetic clients in remote communities. Eye technicians were trained to use a portable digital fundus camera for image capture, storage and transmission to specialists for diagnosis, treatment and follow-up.	$0.4M	$0.5
Yukon Telehealth	In partnership with specialists in British Columbia and Alberta, the Yukon government established a telehealth network linking several Yukon communities through video conferencing. Service delivery focused on tele-mental health and tele-learning.	$1.0M	$1.0M
	Total: telehealth projects	$50.9M	$60.0M
		$110.9M	
	EHR projects		
Bridges to Better Child Health	This project developed and implemented a network infrastructure and an electronic health record accessible to authorized health providers in two sites for pediatric oncology patients.	$1.8M	$1.8M
COMPETE	This project developed and implemented tools for transmission of electronic health records, drug information, lab tests and up-to-date information to support the education and self-management of diabetic patients.	$1.0M	$1.3M
Development and Implementation of an Integrated Community Mental Health Information System (ICMHIS)	Involving the collaboration of multiple community and public agencies involved in mental health services in British Columbia, this project developed an integrated electronic health record software for use by mental health social service professionals ensuring compatible records management, linkage and data	$0.9M	$1.1M

Healthlink	This project created a database designed to assist seniors and health professionals in southern British Columbia in raising awareness of existing community services and coordinating health services for seniors	$0.4M	$0.3M
HealthNet/WHIC Provider Registry	The Western Health Information Collaborative (WHIC), involving the governments of BC, Manitoba, Alberta and Saskatchewan, created and implemented of a western-province provider registry. This system aims to be able to identify doctors, nurses, pharmacists, and other health care professionals in a national electronic health record system	$2.2M	$3.1M
Medical Office of the 21st Century (MOXXI)	MOXXI developed and evaluated a prototype of an integrated clinical information system for electronic prescribing and drug management. The system included shared electronic medical records to transfer relevant clinical information among pharmacists and primary care physicians.	$2.3M	$2.6M
Regional Clinical Oncology Information Highway Project	This project developed an integrated information system for the creation, storage and exchange of secure health data for cancer patients. The system was implemented in the Mauricie region of Québec.	$3.8M	$4.4M
Regionally Accessible Secure Cardiac Health Records (RASCHR)	RASCHR created and implemented a web-based, secure, regionally-accessible, cardiac health record system, building upon a pre-existing patient registry and tracking system. The system was implemented in several hospitals throughout Ontario.	$1.5M	$1.9M
SYNAPSE Multi-Jurisdictional Mental health Information System	With its partners, the North Shore Health Region of British Columbia implemented a comprehensive, standards-based electronic health record system to support the information management needs of mental health service providers.	$0.45M	$0.5M
Système d'information du réseau intégré de Laval –SI-RIL	This project expanded the use of information and communication technologies by general practitioners and specialists in Laval for sharing, consolidating, and processing clinical information, including diagnoses, test results and prescribed medications.	$5.5M	$5.6M
	Total: EHR projects	$19.9M	$22.6M
	Total	$42.5M	

The CHIPP program also identified some key areas where frameworks and guidelines could potentially benefit all or a large subset of projects and/or the program as a whole. A large number of horizontal activities, summarized in Table 3, were carried out in these areas.

Table 3: CHIPP program horizontal activities

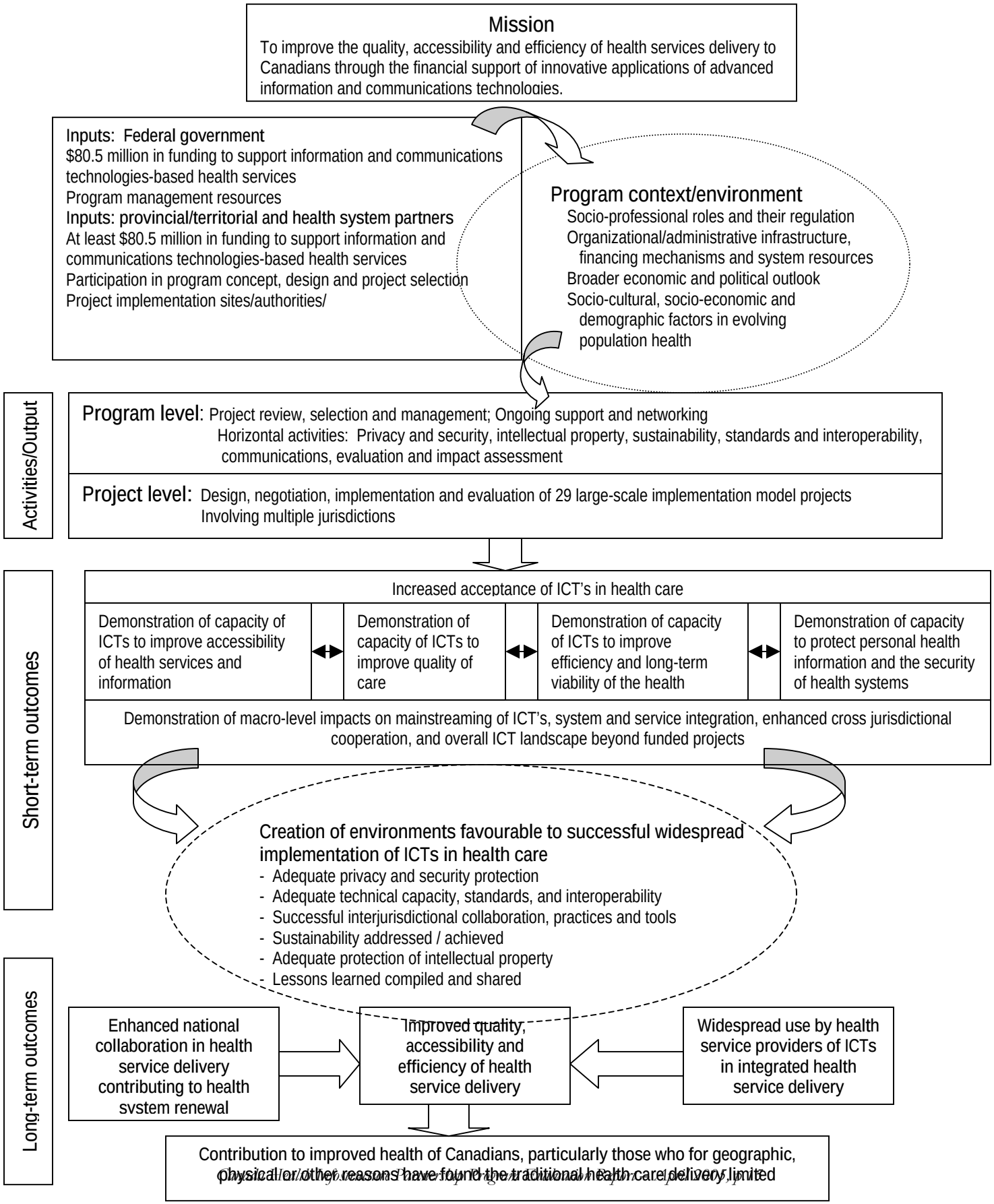
Horizontal issue	Outputs
Privacy and security	Survey report on privacy and security measures by CHIPP-funded projects, October 2002.
Intellectual property	Review of post-CHIPP intellectual property management options, date unknown
Sustainability	Sustainability guideline document for CHIPP projects Report on on-depth review of the sustainability of all CHIPP projects
Standards and interoperability	Report on survey of standards for telehealth and electronic health records, CHIPP Standards and Interoperability Advisory Committee, commissioned by the Canadian Institute for Health Information, December 2001
Communications	Communications and dissemination strategy plan; national and regional workshops (see below)
Regional coordination	Five regional and national workshops on evaluation, sustainability, lessons learned held in 2001 and 1002; ongoing consultation and liaison activities.
Risk management and project management	Guidelines and protocols produced in support of project implementation and program oversight, including Guidelines for the preparation of CHIPP Reports (Midterm. Final, Evaluation); Financial guidelines (for preparation of claims and Progress Reports; CHIPP financial guidelines and checklist (covering the financial aspects of managing contribution projects); guidelines for the disposition of capital assets); Risk management tools (project monitoring guide; risk scorecard toolkit template; risk assessment for amendments to funding agreements); communications primer; site visit protocols; and guidelines for the closeout process.

1.3.4 Expected program outcomes

The initial evaluation framework developed for the CHIPP program[4] included a logic model that identified the main expected program results, as well as longer-term impacts, in relation to the program's resources and activities. To help articulate the program's expected results and identify those that could be meaningfully addressed in this evaluation, this logic model was expanded into a more comprehensive conceptual framework for the CHIPP program, drawing on models available in the literature. This conceptual framework is shown in Figure 1.

[4] Health Canada - Information, Analysis and Connectivity Branch, Canada Health Infostructure Partnerships Program (June 2002): Results-based Management and Accountability Framework

Figure 1: CHIPP Program Conceptual Framework/Expanded Logic Model



It can be seen from the framework that results were expected from the CHIPP program at several levels. At the level of individual projects, the CHIPP program was expected to result in improved acceptability, accessibility, quality and efficiency of health care service organization and delivery. Because the program aimed to expand ICT implementation beyond the single-application, single site applications seen in previous generations of pilot projects, results were also expected in terms of the creation of large-scale networks and communications systems, with and across service delivery, administrative and professional jurisdictions. Finally, the CHIPP projects and overall program were of sufficient scope that the program was expected to product significant macro-level impacts, in terms of overall increased Canadian capacity to develop, implement, use and benefit from ICT-enabled health care delivery applications, and the potential for sustainability through permanent funding, mainstreaming of ICTs into health care delivery systems, and implementation of the necessary policy infrastructure to handle macro-level issues in multi-jurisdictional contexts, such as technical standards, privacy management, and practitioner licensing. Overall, the CHIPP program was expected to contribute to improved accessibility and quality of health services, while increasing efficiency and protecting the long-term financial viability of the health system.

The framework also takes into consideration the environment into which the CHIPP program was introduced, to emphasize the presence of both barriers and facilitators to program success. International experiences with large-scale ICT-enabled health care delivery applications have shown that first, the organizational and administrative infrastructure, including financing mechanisms and system resources, determine how readily these innovations can be introduced[5]. A key environmental challenge for CHIPP was the multi-jurisdictional, multi-stakeholder nature of the Canadian health system, in a context of limited resources. Second, in Canada as in many other countries, the impact of technology on the organization of health services delivery is closely tied to the socio-professional roles and regulation systems of health practitioners[6]. In particular, professional remuneration systems and definitions of practice can create major barriers to ICT adoption[7]. Finally, support and acceptance of ICT-enabled health care is at least partly determined by the broader economic, social and political context. This context was favourable to CHIPP in that public concern about health care system capacity, as well as about the aging population and inequities in health status of First Nations and other remote and rural populations, contributed political momentum for CHIPP to be viewed as a source of solutions to health system crises.[8]

The expected long-term outcomes of the CHIPP program, shown near the bottom of Figure 1, situate it as an element in the overall contributions of the health system to population health.

---

[5] Helitzer D, Heath D, Maltrud K et al. Assessing or predicting adoption of telehealth using the diffusion of innovations theory: a practical example from a rural program in New Mexico. Telemed J E Health. 9(2):179-87, 2003 Summer.; May C, Harrison R, Finch T et al. Understanding the normalization of telemedicine services through qualitative evaluation. J Am Med Inform Assoc. 10(6):596-604, 2003 Nov-Dec.

[6] Lehoux, P. (1995). Tracer les parcours d'influence de l'évaluation sur l'utilisation des technologies de la santé. Canadian Journal of Program Evaluation, 10(2), 33-50.

[7] Lim AC, See AC, Shumack SP. Progress in Australian teledermatology. J Telemed Telecare. 7 Suppl 2:55-9, 2001; Gassert CA. Telehealth: a challenge to the regulation of multistate practice. Policy, Politics, & Nursing Practice. 1(2):85-92, 2000 May; Lamonte MP, Bahouth MN, Hu P, et al. Telemedicine for acute stroke: triumphs and pitfalls. Stroke. 34(3):725-8, 2003 Mar.

[8] Romanow, R.J. Building on Values: The Future of Health Care in Canada. Saskatoon: Commission on the Future of Health Care in Canada; 2002.; Kirby, M. J. L. The Health of Canadians-The Federal Role, The Standing Senate Committee on Social Affairs, Science and Technology. November, 2002.

Essentially, this three-year program was intended to provide sufficient initial momentum to the creation of a pan-Canadian environment favourable to, and supportive of, successful widespread implementation of ICTs in health care, a momentum that would be sustained and enhanced once the program itself was over. This in turn was expected to contribute to broader health system outcomes including: enhanced national collaboration in health service delivery, contributing to health system renewal, and improved quality, accessibility and efficiency of health service delivery. In the very long-term, CHIPP was expected to contribute to improved health of Canadians, particularly those who for geographic, physical or other reasons have found the traditional health care delivery limited.

From an evaluation perspective, it is important to note that first, only the short and medium-term outcomes in the framework are measurable at this point. Second, the medium and long-term outcomes targeted by CHIPP are also determined by many other factors, among which the contribution of ICT-enabled health care delivery will only be a relatively small component.

2. EVALUATION DESIGN AND METHODS

2.1 Overall structure and issues addressed

Evaluation of the CHIPP program was conducted at two main levels: the project level and the overall program level.

At the project level, each project was required to conduct an evaluation, with the help of external evaluators. Plans for project evaluation were required in each proposal. Guidelines were provided in the call for proposals, to encourage standardization across projects. These guidelines included an evaluation framework that identified a set of evaluation questions and some suggested indicators. This framework was built on existing models of telehealth and electronic health records evaluations.

At the program level – that reported in the present document-- the overall evaluation strategy aimed to use the project-level evaluations as a primary data source, aggregating findings across the themes identified in the common evaluation framework that had been supplied to projects. To address issues that were too broad to be addressed within the evaluations of individual projects or that had not been covered on the project-level evaluation guidelines, this information was complemented and extended by additional data sources.

The program-level evaluation essentially addresses the extent to which the outputs and short-term outcomes of the CHIPP program, as identified in the expanded logic model, were produced as expected, while identifying lessons learned in the process of carrying out the overall program. Thus, the evaluation addressed 31 evaluation questions, organized under eight main issues. OHIH staff in collaboration with the PEAC and external stakeholders developed these issues and questions, over the course of the CHIPP program. They drew extensively from an evaluation framework prepared in 2001 by Howard Research and Management Consulting[9] and largely reflect those in the CHIPP

[9] Canada Health Infostructure Partnerships Program (CHIPP) Evaluation Framework to Assess CHIPP Outcomes, Howard Research and Management Consulting, January 2002.

program RMAF[10]. Several potential indicators were also identified for each of the issues and questions, and these were also subject to extensive consultation.

The final set of questions and indicators, developed at the outset of the present evaluation process, took into account: all previous versions of issues, questions and indicators as well as comments made on these by OHIH staff, a cross-referencing of project-level and program-level evaluation questions conducted by OHIH staff and external contractors, and a preliminary review of project documentation. It also addressed a recommendation by the PEAC to reduce the scope of the evaluation given its three-month timeframe.

The issues addressed in the CHIPP evaluation were:

Issue 1:	Impacts on acceptance of ICTS in health care
Issue 2:	Impacts on accessibility of health services and information
Issue 3:	Impacts on quality of care
Issue 4:	Impacts on efficiency and long-term viability of the health system, i.e., contribution to health system renewal
Issue 5:	Impact on privacy protection
Issue 6:	Macro-level impacts
Issue 7:	Contribution of program design to objectives achievement
Issue 8:	Lessons learned

A shared organizing framework was used by all three of the contracted consultants to identify the data sources for each of the evaluation issues and questions. Tables containing the detailed evaluation issues, questions, indicators and data sources may be found in Appendix 2.

2.2 Data collection, analysis and synthesis procedures

2.2.1 Systematic documentation reviews

Review of CHIPP project evaluations and other documentation. The main source of information for many of the evaluation questions was a systematic review of the documentation produced about the funded CHIPP projects. Although this review was initially intended to be limited to the projects' Final Evaluation Reports, it was extended to include each project's Final Report as well as additional documentation submitted by most of the projects as appendices or supplementary reports. This was done because the evaluation reports did not consistently provide information relevant to all of the evaluation issues and questions, and because the other documentation was usually able to provide relevant information[11]. Also reviewed were evaluation summary review tables and project review tables prepared by another external contractor for all projects that had submitted reports by December 2003. Although these summary tables had already abstracted some information relevant to the program-level evaluation questions, the correspondence between

[10]Health Canada - Information, Analysis and Connectivity Branch, Canada Health Infostructure Partnerships Program (June 2002): Results-based Management and Accountability Framework.

[11] For example, information on project sustainability was not generally provided within the evaluation reports, but sustainability plans were required elements of the projects' Final Reports.

project-level and program level evaluation issues was not complete, necessitating complete review of the original documents.

It is important to note that project documentation was not yet available on all of the funded projects at the time of the program-level evaluation. Some projects had been granted extensions, while others were late in producing reports. As of March 1, 2004 documents were available on 23 of 29 projects. Several projects had submitted either only the Final Project Report or only the Final Evaluation Report, in which case the corresponding project or evaluation review tables had also not been prepared. The following projects were not included in the systematic review:

- Application en milieu rural de la télémédecine de première ligne au Témiscamingue
- CLSC of the Future: Telehealth and Tele-home Care
- Regional Clinical Oncology Information Highway Project
- Surgical Services Network
- Telehealth Saskatchewan

Documentation from a final project, Système d'information du réseau intégré de Laval –SI-RIL, was received too late to be included in the formal analysis, although it was read by the evaluation team to ensure that no key evidence would be missed. (This project was also the subject of a case study – see below.)

The documents reviewed for each of the funded projects are listed in Appendix 3. The review was conducted with a project review template, to allow structured abstracting of information relevant to each evaluation question from each report.

Review of horizontal program outputs. Also reviewed for evidence related to the evaluation questions were the outputs of activities aiming to support horizontal program processes. These included most of the documents listed in Table 2, with the exception of the project management tools and guidelines.

In total, approximately 10,000 pages of program documentation were systematically reviewed.

2.2.2 Key informant interviews

A second important data source, providing data on program-level outcomes not available through the other sources, was key informant interviews with program stakeholders. Howard Research and Management Consulting conducted these interviews. Potential key informants were identified by OHIH, and included a wide range of project-specific respondents, CHIPP organizers and managers, government and regional officials, CHIPP representatives, subject matter experts, health care providers, senior health services managers, and representatives of non-governmental organizations. Over 100 potential informants were contacted. Teleconference interviews were conducted with 76 key informants, 60 of whom were connected to individual CHIPP-funded projects. The remaining 16 provided a broader perspective on CHIPP and ICTs in general.

The key informant instrument design and data analysis was guided by first, the evaluation issues and questions described above, and second, a broader framework developed by Howard Research and

Management Consulting for the overall assessment of information and communication technology. This framework is included in the overall report on the key informant interview component of the evaluation.

The interviews were conducted in English or French, according to the respondent's preference, and lasted on average 30 minutes. With the permission of the respondent, other evaluation team members were allowed to participate in the interview process.

The interviews were audio-recorded and transcriptions[12] prepared, except for those with five participants who preferred that the interviewer take written notes instead.

Analysis involved identification of themes and key meaning units within each interview. A second level of analysis was conducted to identify themes across responses from members of interviewees in the same category (i.e. project coordinators). A third level analysis was conducted to look at themes and meaning across the various categories of respondents. This multi-perspective approach provided some unity to the results gleaned from the entire key informant group. It also afforded a systems-level look at responses.

2.2.3 Case studies

Six case studies were conducted to help identify factors critical to the successful implementation, operation and sustainability of ICTs in the health system, as well as the transferability of the practices or approaches to other jurisdictions and applications. Case study research allows for a rich understanding and description of the processes of implementation within and across CHIPP projects. As a research strategy, case study research is optimal for understanding the "how" and "why" behind outcomes.[13] The case studies were conducted by the Division of Continuing Medical Education at the University of British Columbia.

The cases were selected from among the projects that had submitted reports by early February 2004. The cases selected aimed to represent funded CHIPP projects on dimensions of geographical range, geo-political span, health discipline, target population, project focus (EHR or telehealth), and project size (low: $0.40 to $1M; medium: $1.1M to $3M; and high: more than $3M). The following six projects were the subject of case studies:

- Health Infostructure Atlantic
- Southwestern Ontario Telehealth Network (SWOT-N), now known as VideoCare
- MBTeleHealth Network
- IIU Network Nunavut
- SYNAPSE Multi-Jurisdictional Mental Health Information System
- Laval integrated network information system (SI-RIL) .

[12] To accommodate tight timelines for reporting and transfer of data among evaluation components, verbatim transcriptions were not prepared.
[13] Yin, R.K. Case study research: Design and methods. Thousand Oaks, CA: Sage; 1994.

The case study data collection involved: 39 key informant interviews[14]; an online survey (19 respondents); review of 60 project reports and other documents; and 78 various other types of contacts (email, voice mail etc.).

Using a common framework based on the evaluation issues and questions, case reports were then prepared for each case. A case-matching analysis was then conducted to consolidate case information from all sources, highlighting best practices and lessons learned. The first step of the cross-case analysis involved content analysis of all case data to derive themes for the case comparison. The matrix was then populated by the authors of the case reports with evidence from the case data, noting disconfirming evidence and emergent categories. A seventh analyst then analyzed the six cases against this framework of categories and themes. Finally, the cross-case analysis was validated by the six case researchers.

The case study report provides complete details on the methodology and analysis procedures.

2.2.4 Literature review

Finally, a systematic literature review was conducted on each of the CHIPP evaluation questions, and the findings used to situate the evaluation findings in a broader knowledge development context. The review was conducted with a review template, and included systematic assessment of study quality using criteria derived from the Cochrane Collaboration Review system[15], DPED evaluation quality criteria, and Treasury Board standards. Insofar as possible, only studies of Cochrane level 4 and above were included; i.e., descriptive studies with no comparison data and opinion pieces were excluded.

A list of key search terms and synonyms was generated from the review template. Initial search terms were validated and "exploded" using the subject headings for *telehealth* and *telemedicine* in the CINAHL, MEDLINE(R), and PsycINFO databases. The final computerized search was run simultaneously across five databases using OVID Online. The databases included CINAHL, Healthstar, Ovid MEDLINE(R) In-Process, Other Non-Indexed Citations, Ovid MEDLINE(R), and PsycINFO. Abstracts were screened, and classified (tagged) by key words of the review template.

2.2.5 Synthesis procedures

The data synthesis was structured by the logic/model conceptual framework and thus the evaluation issues and questions. For each of the eight evaluation issues, all of the evidence from all of the available data sources (review of project evaluations, reports and documentation and of horizontal studies; key informant interviews, case studies; literature review;) was synthesized to produce:

- a summary of the key convergent findings and main divergences;

[14]The initial key informant interviews for each case, in most cases of the CHIPP project managers, were conducted jointly with the key informant study team; subsequent interviews were conducted by the case study team. Seven of the 23 interviews were conducted jointly.

[15] http://www.cochrane.org/consumers/sysrev.htm#levelsofevidence

- links of these findings to other elements of the conceptual framework and/or other evaluation questions;
- a brief description of how the findings converge or diverge with those found in the international literature; and
- identification of any areas where the findings are inconclusive within the overall CHIPP program findings.

The results of the synthesis were reviewed by each contributing evaluation team, for consistency with their own analyses.

3. EVALUATION FINDINGS

The evaluation findings are reported below as responses to the evaluation issues and questions. The findings represent the key convergences and divergences that were identified in the data synthesis process. In order to give as much voice as possible to the individual projects and their experiences – the main source of evaluation information -- extensive citations are made of projects' reports as well as from the case studies to support and illustrate the findings that emerged from the synthesis of the data sources. All citations are made with permission.

Note on treatment of differences between EHR and telehealth applications: As noted above, the CHIPP program had two main technological foci: EHRs and telehealth. In general, EHRs serve as part of the skeleton or infrastructure underlying the flow of information that enables effective health service delivery, and are often largely invisible to patients while affecting internal organizational systems very profoundly. Telehealth networks (depending on the degree of real-time interactivity of applications) are more visible to patients and practitioners, and tend to more closely mimic existing organizational processes while extending them through connection to larger networks. While some of the evaluation questions apply similarly to both types of technologies, others apply in different ways or more or less directly to either, depending on the specific nature of the applications. In the findings reported below, distinctions between the two types of ICTs are made only wherever these are relevant[16].

[16] One project funded through the program – Healthlink -- ended up being neither a telehealth nor an EHR application, when an EHR component was dropped due to technical and organizational difficulties.

3.1 Impacts on acceptance of ICTS in health care

The extent to which ICT are accepted by those who are using them or otherwise affected by them was seen as an important pre-condition for achieving effective implementation and then impacts on health services. The evaluation examined acceptance from two perspectives. First, at the micro-level, it examined uptake of the ICT applications in CHIPP projects and the evolution in their usage levels and patterns. The acceptance of the applications was also assessed from the point of view of all key stakeholders.

3.1.1 What impact did the CHIPP-funded projects have on the acceptance of ICTs in the delivery of health services and information?

In the MBTelehealth evaluation, all but one of 175 patients who completed satisfaction questionnaires were satisfied, and all but one said they would use the system again (MBTelehealth Evaluation Report, p. 29). In the NorthNet evaluation, 96% of survey respondents were satisfied with their telemedicine consultation, 97% of survey respondents were comfortable talking with their telemedicine specialist, and 90% would be pleased or very pleased to have another consultation if recommended by their physician (NorthNet Evaluation Report, p. 84). The EOTN project evaluation reported found that over 95% of respondents indicated either that they agreed or strongly agreed that they were satisfied with telehealth in comparison to traditional clinics.(EOTN Evaluation Report, p. 33)

Patient acceptance. Those projects that directly assessed patients' reactions to ICTs in health care showed uniformly very high levels of acceptance. Patients and their families were generally highly satisfied with their experience with the ICT applications, and in all evaluations where this was assessed, the vast majority of patients stated they would agree to use the application again. The satisfaction rates found in the project evaluations (see box at left) are very consistent with those found in the literature, where patients are found to be highly accepting of ICTs in health care and overwhelmingly interested in using it in ongoing service delivery[17]. Anecdotal reports of patient satisfaction in evaluations where this was not assessed directly were also favorable. In two projects, as has been reported elsewhere in the literature[18], some patients expressed a slight preference for face-to-face services.

Note, however that these rates do not reflect the views of patients who had not consented to receive services using the technology[19]. Projects generally did not report consent and

[17] Currell R, Wainwright P, Lewis R. Telemedicine versus face to face patient care: effects on professional practice and healthcare outcomes. (Cochrane Review). In: the Cochrane Library, Issue 1, 2004 Chichester, UK: John Wiley & Sons, Ltd.; May C, Harrison R, Finch T et al. Understanding the normalization of telemedicine services through qualitative evaluation. J Am Med Inform Assoc. 10(6):596-604, 2003 Nov-Dec.; Williams TL, May CR, Esmail. Limitations of patient satisfaction studies in telehealthcare: a systematic review of the literature. Telemed J E Health. 7(4):293-316, 2001 Winter.; Mair F, Whitten P. Systematic review of studies of patient satisfaction with telemedicine. BMJ 2000;320(7248):1517-20.; Schopp LH, Johnstone BR Merville OC. Multidimensional telecare strategies for rural residents with brain injury. J Telemed Telecare. 6 Suppl 1:S146-9, 2000.; Gattas MR, MacMillan JC, Meinecke I et al. Telemedicine and clinical genetics: establishing a successful service.. J Telemed Telecare. 7 Suppl 2:68-70, 2001; Krousel-Wood MA, Re RN, Abdoh A, Bradford D et al. N. Patient and physician satisfaction in a clinical study of telemedicine in a hypertensive patient population. J Telemed Telecare. 7(4):206-11, 2001.

[18] Elford R, White H, Bowering R, Ghandi A, et al. A randomized, controlled trial of child psychiatric assessments conducted using videoconferencing. Journal of Telemedecine Telecare 2000;6(2):73-82.

[19] See section for a discussion of patient consent issues.

refusal rates, and none directly assessed non-consenters' reasons for not participating, although there were anecdotal reports of some patients feeling uncomfortable.

> *"While enthusiasm and acceptance of telelearning opportunities is generally positive, clinicians have approached clinical applications, particularly those involving direct clinical services to clients and their families, with some wariness". (Yukon Telehealth Final Report, p. 18.)*

Provider acceptance. Health service providers showed less consistent acceptance of the ICTs, although in many cases were quite satisfied with their experiences. In some cases, however, they presented important challenges to uptake. Resistance seemed to arise not necessarily from objections to the technology but rather from reductions in efficiency and convenience perceived to be caused by the introduction of the new systems. Acceptance among practitioners was strongest in those projects where the application design had been based on a thorough understanding of existing practices and was explicitly designed to support these rather than shift them. For example, the Case Study report on the SI-RIL project noted that system's success was due its having been designed for physicians by physicians.[20]

It should also be noted that many of the projects introduced the applications into systems and contexts that had had limited or no exposure to ICT–enabled health technologies. For example, the Télé-oncologie project evaluation noted that while the technology was judged quite easy to use, many of the physicians and nurses involved in the screening program found it challenging because they had little training or experience with information technologies[21]. As was pointed out in the key informant interviews, many sites had low levels of readiness for the new technology, and were thus facing steep learning curves [22].

Usage rates. For telehealth projects, acceptance of the ICT-enabled health services can also be assessed by examining the relative usage levels of the different types of services that can be enabled through interactive videoconferencing. Several comparable telehealth projects included delivery of three main types of services: clinical, continuing professional education, and administrative uses (for meetings, non-clinical training, interviews, etc). Consistent with the challenges noted above, clinical usage was often the slowest to develop and in some of the CHIPP projects was still very minimal at the time the evaluation was complete. However, the overall pattern was of increasing clinical usage over time, often with some sites in networks showing strong early uptake and others catching up as their technical problems were resolved. As shown in the example at left, Ontario's North Network provided a good example of strong clinical uptake. (The related issue of optimality of usage from a cost-effectiveness perspective is addressed in section 3.4.)

> *The number of physicians utilizing the NORTH Network for patient referrals and consultations increased 192% during the 2-year CHIPP period (April 1, 2001 – March 31, 2003) from 218 to 637 (NorthNet Final Evaluation report, p. 4)*

Continuing education usage. In several projects, particularly those serving northern, remote and rural communities, continuing professional education had high usage and participation levels, showing very high acceptance among users. Discussed further under the question of impacts on health practitioners, the strong uptake of continuing education, in the face of lesser enthusiasm for clinical applications, led one project to suggest that introduction of continuing education prior to clinical

[20] SI-RIL Case Study Report, p. 9
[21] Projet Téléoncologie Evaluation Report, p. 18
[22] Key Informant Interviews Report, p. 15.

activity may be a useful strategy for encouraging buy-in from professionals[23].

Administrative usage. Administrative uses of interactive videoconferencing also saw rapid growth in some telehealth projects, attesting to strong acceptance by administrators. Overall, this seemed to be a somewhat unexpected usage of the ICTs and in some evaluations was not systematically captured in usage data, even though key informants reported that it was an important contributor to overall system acceptance. More generally, support for the ICTs was high among health system administrators.

Key informant's views of CHIPP's impact on acceptance. From the key informant interviews with project respondents, it was difficult to discern what impact CHIPP has had on the overall acceptance of ICT in the delivery of health services, but CHIPP projects were seen to have reached a fairly large audience of providers and patients and therefore can be assumed to have increased the acceptability of ICT's within the health sector and the general population.[24] A common theme that emerged from the key informant interviews with project representatives was that the ICT's were more likely to be used by providers and provider organizations if they had some investment (emotional, financial) in the technology.[25]

3.1.2 What factors facilitated/inhibited the acceptance of ICT solutions?

Extent of implementation. One of the factors conditioning acceptance of the ICT applications was the extent to which they were fully implemented. There are two aspects to this issue: 1) whether the application that was finally deployed was that which had been planned and expected, and 2) whether implementation was significantly advanced by the time the initial project funding ended and reporting was required. The latter issue is important because acceptance of new technologies occurs gradually over a period of months or years, often following a typical diffusion-of-innovation s-curve[26]. In three projects, significant program components were dropped due to technical or organizational issues (e.g., concurrent major health system reform). In several others, program components were scaled back from original commitments to stakeholders due to reduced funding levels. However, most projects were implemented almost exactly as planned and announced, but had not been in operation long enough for acceptance levels to peak. The projects that had the longest implementation periods their CHIPP-funded lifetime were in place for 18 to 24 months. In others, the evaluation was based on inadequate periods to observe mature acceptance levels, in one case on three weeks of operation. Several evaluations reported low response rates to surveys of some participating sites, which also may be indicative of lack of adequate experience with the systems.

Support and communication. One of the consistent findings across projects where practitioners showed some initial resistance to accepting the ICTs was that regular communication and dedicated efforts to support use were effective in gradually increasing uptake. An example from one of the case studies, illustrating approaches used to facilitate acceptance from health professionals, is shown on the next page.

---

[23] Telemental Health Final Project Report, p. 22.
[24] Key Informant Interviews Report, p. 17.
[25] Key Informant Interviews Report, p. 15.
[26] Helitzer D, Heath D, Maltrud K et al. Assessing or predicting adoption of telehealth using the diffusion of innovations theory: a practical example from a rural program in New Mexico. Telemed J E Health. 9(2):179-87, 2003

"Some physicians found it difficult to integrate telehealth into their practices noting that telehealth sessions require more time to conduct, and in some cases required a change in venue for physicians. MBTelehealth staff responded by providing support and training for clerical support staff around workflow redesign. Information from the recent key informant interviews suggests that there is evidence that this situation is changing. At an increasing number of sites, providers have become familiar with the equipment and are now using telehealth equipment independently, without the assistance of a site coordinator. " (MBTelehealth Case Study report, p. 8.)

Development of understanding: EHR projects. For practitioners, challenges to acceptance of EHR projects were sometimes considerable. This seemed to be because EHRs require the development of a common view of the practice environment, before information can be meaningfully shared acceptance often meant extensive discussion, collaboration and negotiation of the way even very basic elements of information systems would be jointly understood, ranging from patient numbering systems, to the most fundamental nature of clinical activities. Not surprisingly, greater difficulties were encountered in EHR systems intended to link practice settings that had the greatest cultural and professional differences in practices, most notably in mental health information networks that involve many different types of community-based, medical and allied health professionals (for example, in the ICMHIS and Tele-mental Health projects).

In some cases, EHR projects reported that the process of developing this common understanding of each other's vocabularies and worldviews that were required for acceptance of the application had other important spin-off benefits in terms of greater mutual understanding and capacity for ongoing collaboration. An example of this is the WHIC Provider Registry, which was shown to have initiated significant reusable processes and that could support future collaborative efforts.[27] Another example is found in the Tele-oncologie project, where the project resulted in standardization of cytological nomenclature across technicians and pathologists in all the participating regions[28]. Similarly, in Bridge to Better Child Health project, the dialogue necessary to implement the EHR resulted in the standardized discharge form that is now being used in print version across the province reducing workload and improving clinical communications[29]. In the research literature, it has been argued that from a sociotechnical systems perspective, this step in system design should be viewed as an intervention in the organizational change-processes that constitute proper ICT development.[30]

Perceived loss or gain of efficiency. Acceptance of EHRs by practitioners seemed to be sensitive to the ease and speed of use of the technology; overall reflecting a pattern of acceptance that was first and foremost conditional on maintaining or increasing practice efficiency.

Summary: Impacts on acceptance

In summary, CHIPP has demonstrated the acceptability of ICT-enabled health services to all stakeholders, from patients through providers (although with some reservations and hesitancies), through regional and provincial health systems.

---

[27] WHIC Provider Registry Evaluation Report, p. 32

[28] Rapport Final, projet Télé-oncologie, p. 9.

[29] Bridges to Better Child Health Final Report, p. 7.

[30] Berg M, Toussaint P. The mantra of modeling and the forgotten powers of paper: A sociotechnical view on the development of process-oriented ICT in health care. Int J Med Inf. 69(2-3):223-34, 2003 Mar.

3.2 Issue 2: Impacts on accessibility of health services

3.2.1 What was the impact of the CHIPP-funded projects on accessibility of care and health information?

Increased accessibility to health services and information was a key objective of the CHIPP program. Impacts on accessibility were examined along several dimensions, including: 1) ease of access to services that were previously available at higher personal or system costs; 2) access to services or information that would not have been accessed before; and 3) access to services or information that would have been accessed partially or less comprehensively before. (The issue of waiting times for access to services, which is often regarded as another dimension of accessibility, is addressed in section 3.3: Quality of services).

"SLICK provided unprecedented access to screening services, visiting each community in Alberta at least once, and was made accessible even to individuals with undiagnosed diabetes." SLICK Project Evaluation Report", p. 13.

Ease of access to services that were previously available at higher personal or system costs. CHIPP-funded telehealth programs delivering services in rural, remote and northern communities generally had increased access as one of their main goals, and were usually very successful in achieving it. In those evaluations that measured it, both patients and providers were highly satisfied with the accessibility of services enabled by the technology. For patients in remote and rural areas, the impacts were greatest in terms of travel times and costs. For example, in the evaluation of the Tele-mental health project in northern BC and Yukon, 94% of patients surveyed stated that not having to travel was a benefit of the telehealth service[31]. The MBTelehealth project evaluation provides another example of impacts on access to services, stating that 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. Over 90% of patient care sessions resulted in travel avoided for the patient or his or her family[32].

Detection of new cases. An interesting secondary impact on accessibility noted in two CHIPP projects was that improved access to screening or examination for one type of health issue led to detection of cases of other health problems which could then be appropriately referred well they before they would have been in the absence of the ICT-enabled service. For example, in the WestNet teleophthamology project, a number of patients screened for diabetic retinopathy were found to have conditions such as potential retinal detachment, glaucoma and macular degeneration[33].

Access to services that would not have been received before. Overall, the pattern of evidence related to clinical services suggests that this outcome was actually relatively rare, as health systems generally had ways to ensure that citizens could eventually access most types of care. Exceptions to this are projects that involved increasing outreach for specific health issues, notably to provide better treatment and information for diabetic patients (in the SLICK and COMPETE projects). For

[31] Central-BC-Yukon Telehealth Project Evaluation Report, p. 31
[32] MBTelehealth Evaluation Report, p. 31
[33] WestNet Teleophthamology Project Evaluation Report, p. 6.

example, in the SLICK project, screening for diabetic complications among residents of remote First Nations communities led to detection of several previously undiagnosed kidney complications[34]. Other project evaluations concluded that their initiative had not affected accessibility to newly available services, although efficiencies through more appropriate referrals may have increased (see below).

> *"Access to the IIU Network is improving access to CME for health professionals, which is best described as a service that would not have been available otherwise." Case report, IIU Nunavut telehealth program, p. 13.*

Where CHIPP had its greatest impact on accessibility is in terms of increased access to continuing professional education for providers in remote and rural communities. In several evaluations, responses to practitioner surveys showed that a large proportion of the educational opportunities had not been accessible before, because of lack of travel funds, lack of backup support for absences in small stations and lack of awareness and motivation to attend. The impacts of this are discussed further in Section 3, but show a clear benefit of the CHIPP program. Accessibility to continuing professional education was enhanced mostly through linking professionals into existing distance learning programs delivered through major teaching hospitals or academic centers (see example at left). Uptake of these sessions was strong not only among physicians and nurses, but also among allied health professionals, depending on the settings. The key informants interviewed also emphasized the value of educational uses of technology, noting that telehealth projects often experienced greater success with the application of ICTs for administrative and educational purposes than for service delivery[35].

> *"Another exciting aspect of the technology was its use beyond the physician/medical model utilizing many other health professionals, and its use for case conferences, mental health worker and diabetic education in First Nations communities, televisitation, nurse practitioner support and telementoring applications. By improving access to other professionals, it further supports the multi-disciplinary team approach to care."NorthNet Final Project Report, p. 29*

Access to more comprehensive services and information. Some of the CHIPP funded telehealth programs resulted in more comprehensive access to health services, in that entire teams of practitioners could become simultaneously involved in patient care. This was seen as improving the communication among providers and increasing the continuity and coherence of care. An example, from the NorthNet project, is shown in at left. Similarly, the BC-Yukon Telehealth project reported that: "*Telehealth facilitates dialogue among these diverse people who are geographically separated and constitute a network of care and support*"[36]. Similar results were reported in the evaluation of eating disorders consultations in the BCTelehealth program[37] . In one evaluation that measured this aspect quantitatively, patients were not statistically more likely at the post-implementation measure to state that they were being looked at by a "team" after receiving care from SLICK, although this finding showed a trend in this direction[38].

While the EHR projects did not generally intend to increase access to services, they often aimed to increase the comprehensiveness of information available to practitioners, so that their care decisions

[34] SLICK Project Evaluation Report, p. 80
[35] Key Informant Interviews Report, p. 25.
[36] BC-Yukon Telehealth Project Final Report, p. 30.
[37]BCTelehealth Evaluation Report, p. 105.
[38] SLICK Evaluation Report, p. 76

would be better informed. For example the MOXXI electronic prescribing system alerted prescribing physicians to potential drug interactions from medications already prescribed to patients by other practitioners. In 219 cases, or 9.4% of all viewed alerts, changes were made to the prescriptions[39].

In a few cases, CHIPP projects also aimed to increase patients' access to health information. The COMPETE project's diabetes tracker provided patients with their status on 14 monitoring variables of diabetes care. Early results from a randomized trial showed that this might have resulted in improved follow-up with family physicians, important for preventing complications[40] . The SLICK project, through outreach in the course of mobile screening, transmitted information about diabetes complications that resulted in significantly improved knowledge about diabetes complications among First Nations patients and in a finding similar to that for COMPETE, increased physician visits, although this finding was not statistically significant. However, SLICK patients had significantly fewer emergency room visits after their participation. [41]

Evaluation of several of this type of CHIPP project showed that there were sometimes challenges, because practitioner uptake was negatively affected if the information was not seen to be more complete, global or comprehensive than that available through existing channels. For example, in the evaluation of SYNAPSE conducted in 2002, information about patients and from several clinically important sources was not yet available through the system, so some sites were keeping two sets of patient charts – on electronic, and one paper[42]. A similar result was found in the Bridges to Better Child Health project[43].

3.2.2 What impact have the CHIPP-funded projects had on referral patterns and referral efficiencies?

"In addition to providing more timely access to a retinal surgeon or ophthalmologist, the project resulted in patients being more appropriately referred. Specifically, patients that did not need to see a specialist, did not travel to see one, and patients that needed to see a specialist were seen in a timely manner. This resulted in a more efficient use of resources." Evaluation of the WestNet Tele-Ophthalmology Project, 2003, p. 69

Telehealth impact on referrals. Overall, the CHIPP-funded telehealth projects do not seem to have resulted in major shifts in referral patterns. Interpretation of this issue is complex, as many of the telehealth projects sought to maintain existing referral patterns, while improving the appropriateness and timeliness of referrals. Several examples of this type of impact were noted, including the one shown in on the left.

A few instances were noted where project components were not able to preserve existing referral patterns due to inter-jurisdictional issues. In these cases, acceptance and utilization of the ICT-enabled health services was reduced, compared to usage in other sites the same program. For example, in the HIA project, the lack of teleradiology services in some communities was seen as disrupting traditional referral and travel patterns and working relationships[44]. This suggests that referral patterns disruption will be

[39] MOXXI Final Evaluation Report, p. 67.
[40] COMPETE Evaluation Project Report, December 2003, p. 11.
[41] SLICK Project Evaluation Report, p. 75.
[42] Evaluation of a Mental Health Information System in Use (SYNPASE Evaluation Report), p. 29. Note that the case study showed that most of the problems had been resolved after the evaluation was completed.
[43] Bridges to Better Child Health, Final Report, p. 9.
[44] HIA Final Evaluation report, p. 46

most likely when existing patterns rooted in patient convenience are at odds with administrative boundaries, i.e., in settings on the borders between health jurisdictions, provinces or territories, and when the ICT-enabled services are not available in all jurisdictions. In the BCTelehealth program, disruption of referral patterns contributed to the decisions to not extend the ER-Trauma component of the program beyond the initial experimentation period[45].

EHR impact on information flow. An equivalent issue among EHR projects is designing systems that will mimic existing information flows, so that system users feel that information is moving through appropriate channels in the right order. For example, in the development of MOXXI electronic prescribing program, care was take to ensure that the existing relationship between the physician and the pharmacy would be preserved, even though this added considerable complexity to the system design[46].

Key informants' views. The key informant interview study results generally echoed these basically neutral findings. In general, telehealth project respondents viewed telehealth as a complementary method of health care service delivery, and did not feel it had a major impact on referral patterns. Respondents from EHR projects, however, frequently commented on the value of improved communication between providers."[47]

Summary: Impacts on accessibility

CHIPP has had impacts on improving accessibility to health services, in two important ways. First, it has reduced barriers to care for many patients, improving the capacity to detect and manage health problems. A perhaps surprising result is that some CHIPP projects increased access to more global or comprehensive care, which may ultimately influence case management, transitions between previously silo-ed health systems, and health outcomes. However, only a small subset of the ICT-enabled health services implemented through the CHIPP program have improved access to services that Canadians could not access before. This finding is important because it speaks to the underlying aim of the CHIPP program of reducing inequities in access to services, especially for residents of northern, remote and rural communities. The effect of CHIPP on access to previously inaccessible services is less than might have been foreseen, and may suggest that the problem of inequitable access is less acute than had been anticipated. However, by making services easier to access, compliance with and timeliness of services may be improved.

The most impressive results in terms of impacts on increased access to care came from projects that used technologies to bring services directly to patients, rather than using them to facilitate distant access (e.g., SLICK, WestNet, and COMPETE).

The EHR component of the CHIPP program improved providers' access to health information by improving the quality, completeness and ease of use of information delivered directly to health professionals in the course of their practice. In addition, a few projects made information about their health status more accessible to patients, improving their knowledge and ability to manage their own health.

---

[45] BCTelehealth Final Evaluation report, p. 96.
[46] MOXXI. Final Evaluation report, p. 29
[47] Key Informant Interviews Report, p. 25

3.3 Issue 3: Impacts on quality of care

As research in this area shows, quality of care can be understood along a number of dimensions, including accessibility, timeliness, comprehensiveness, and impacts on health outcomes[48]. Research consistently shows that patients' views of the quality of the interpersonal dimension of interactions with care providers are a key determinant of perceived services quality, thus making it important to ensure that patients' views of services quality are considered.[49] In this evaluation, accessibility was examined as a separate dimension, given its centrality to the CHIPP program objectives. Timeliness and comprehensiveness are considered in the section below, but measurement of impacts on health outcomes was generally not possible given the short time frame of the CHIPP program, the low rates of clinical usage in many cases, and the lack of appropriately controlled design of most project evaluations.

3.3.1 What impact have the CHIPP-funded projects had on the speed of service (wait times and timeliness)?

"Survey respondents indicated that they saw a specialist within a significantly shorter timeframe for a telemedicine consultation than they would have for in-person appointment. Forty-nine per cent of respondents who completed the patient survey had their telemedicine appointment within 3 weeks of referral." NorthNet Evaluation report, p. 3.

Impacts on wait times. CHIPP-funded projects in many cases significantly improved speed of services by reducing wait times. This effect was particularly notable in the teleradiology projects, where wait times to have films read were consistently reduced from one or more days to one day or less. A similar result was found for the applications requiring specialists to read diagnostic or screening images in a distant location (e.g., retinal imaging). For example, a study in one NORad site showed that average turnaround time for images to be processed and read was reduced from 68 hours to 16 hours[50]. The Central BC-Yukon Telemedicine Initiative showed a reduction in times to read images from seven days to 24 hours[51].

In several of the telehealth projects, patients surveyed reported that they were able to see specialists significantly faster than they had previously. An example from the NorthNet project is shown at left. Similar results were observed in the Eastern Ontario Telehealth Network, the BCTelehealth Program, and for some specialties in the MBTelehealth program. Two telepsychiatry projects noted significant reductions in wait times. Project Outreach saw reported wait time reductions surpass expectations, with waiting list time reduced to one week[52]. Similar results were found in the BC-Yukon Tele-mental Health Project evaluation, which also noted an additional impact of telehealth

[48] Clemes MD; Ozanne LK; Laurensen WL Patients' perceptions of service quality dimensions: an empirical examination of health care in New Zealand. Health Mark Q 2001;19(1):3-22

[49] Jun M; Peterson RT; Zsidisin GA The identification and measurement of quality dimensions in health care: focus group interview results. Health Care Manage Rev 1998 Fall;23(4):81-96.

[50] NORad Evaluation Report, p.25.

[51] Central BC-Yukon Telemedicine Initiative Evaluation Report, p.10

[52] Project Outreach Evaluation Report, p. 22.

services: telehealth consultations were inserted in between in-person consultations, thus improving the continuity of care – which may be an important determinant of psychiatric outcomes[53]

"When the eye care professionals were questioned about whether the improved access was clinically beneficial for the patients, they indicated that for most patients the traditional delay in seeing the retinal surgeon, e.g. months, probably did not have a negative impact on the patients' health / vision." NWT Evaluation Final Report, p. 69.

Impacts on timeliness. Reduced waiting times does not necessarily mean improved timeliness, however, in the sense that for many conditions, longer wait times are not associated with any measurable change in outcomes. This is the case, for example, in diabetic retinopathy, where early screening will not necessarily result in reduced deterioration of eyesight (see example at left). Most projects did not assess timeliness of services in relation to health outcomes, and this remains an unresolved issue for the present evaluation. The existing literature does not address this issue in depth either, but existing evidence suggests that the positive consequences of the introduction of telemedicine systems include more rapid diagnosis and treatment and improved quality of service.[54]

On this issue, the key informants study concluded that some projects identified an ability to improve the speed and delivery of services. However, many projects did not, but suggested that these benefits were less important than those in other areas, such as accessibility and cost control[55].

3.3.2 What impact have the CHIPP-funded projects had on the quality of diagnoses and treatment?

This section of the results considers the extent to which the CHIPP program produced impacts on the quality of diagnoses and treatment, including the processes used to arrive at diagnostic and treatment decisions from the perspective of patients, families, and providers.

Patients' views. In all of the project evaluations that measured this quantitatively or qualitatively, patients' satisfaction with the quality of ICT-enabled services was very high. Patients were satisfied with the audio and visual quality of their interactions using videoconferencing, and felt as comfortable in video-conferencing sessions as they did in face-to-face sessions with the same practitioner. For example, in the EOTN evaluation, 96% of patients stated that they were satisfied with telehealth in comparison to regular clinics, and 81% said they were comfortable with the technology[56]. Positive assessments by patients of quality of care were also noted in the evaluation of the SLICK program, COMPETE, WestNet, IIU Network, MBTelehealth Network, BCTelehealth, EOTN, HIA's case management applications, NorthNet, Tele-oncologie, and Yukon Telehealth.

Providers' views. Provider satisfaction with quality of services was quite high for videoconferencing but less so with the EHR applications. For example, 95% of physicians surveyed in the EOTN evaluation felt that the telehealth program improved patient management. Ninety-one percent of nurses felt as comfortable assisting the doctor in the telehealth session as in regular clinic

[53] Tele-mental Health Project Evaluation Report. P. 19
[54] Bracale M, Cesarelli M, Bifulco P. Telemedicine services for two islands in the Bay of Naples. J Telemed Telecare. 8(1):5-10, 2002.
[55] Key Informants Interview report, p. 26.
[56] EOTN Evaluation Report, p. 35

settings.[57] Some difficulties were noted in some types of consultations, however. For example, results from some evaluations showed that some practitioners did not feel that video-conferencing always provided adequate information and interaction with patients[58].

Patient outcomes. One project, SLICK, documented some benefits to patients' knowledge and clinical outcomes. Specifically, SLICK screening activities identified complications in a greater proportion of people than reported having a previous diagnosis, especially in terms of: kidney problems (33-48% vs. 16%), high cholesterol (64% vs. 36%) and foot problems (30-39% vs. 25%). Between the pre and post-tests, there was a significant reduction in body weight among clients; and metabolic control, cardiovascular risk factors, foot risk, and protein leakage from kidneys among females all slowed signs of improvement. Doctor visits increased, suggesting that clients may have received improved follow-up and treatment[59].

Other projects' evaluations suggested that the ICT applications altered practices in more or less important ways, although the impact on patient outcomes is not known. As noted above, in the MOXXI electronic prescribing project, problem notifications resulted in changes to some prescriptions (as well as detection of cases of probable fraudulent prescriptions). In the BCTelehelth ER-Trauma application, 18% of ER situations resulted in a different course of action than would have been taken otherwise. This low level of impact was one of the factors contributing to the decision to discontinue this component of the project.

Other projects did not systematically attempt to measure patients' health outcomes. However, numerous projects reported through qualitative information sources that quality of diagnoses and treatment had not been affected other than by making them more timely or more easily accessible. For situations where travel was avoided for patients, reduced stress and effort were said to be important contributors to overall service quality.

Impacts on communication. Some of the project evaluations enabled examination of impacts on another dimension of quality of care, communication among components of care systems. For example, although the SLICK project showed that screening improved detection of diabetic complications, follow-up care was not necessarily more timely or effective[60]. This finding speaks to the need for continuity across the continuum of care, also addressed in section 3.6. This issue may have been specific to situations where case-finding enabled by the project-based ICT-enabled technology then required transfer of cases to another system of care, a situation not frequently encountered in the existing CHIPP projects. Other evidence showed the telehealth was useful for maintaining contact with an original care team: for example, patients surveyed in the BC Tele-mental health project reported being very satisfied with the opportunity to maintain links with the care team once the primary course of treatment was completed[61]. High satisfaction with post-surgical or post-treatment follow-up was also reported in the MBTelehealth evaluation[62].

Technical issues and service quality. There were only a few cases among CHIPP projects where technical issues may have affected quality of diagnosis or treatments. Most of these were addressed

[57] EOTN Evaluation Report, p. 39, p. 44.
[58] Yukon Telehealth Evaluation Report, p. 20; SWOT-N Evaluation Report, p. 13.
[59] SLICK Evaluation Report, p. 12
[60] SLICK Evaluation Report, p. 76; Qualitative Evaluation Report, p. 9.
[61] BCTelehealth Evaluation Report, p. 105
[62] MBTelehealth Evaluation, p. 28

through addition of quality assurance procedures. For example in the SLICK project, following problems with test reliability and validity during the initial stages of the program, the validity of clinical tests was subsequently maintained through a Quality Assurance contract with a reference lab[63]. In one project, clinicians' dissatisfaction with the quality of impacts obtained through the procedure (video eye examination) led to that arm of the project being dropped[64]. Teleradiology projects, on the other hand, were consistently reported to result in better technical quality of images than previous systems[65].

Quality issues in EHR projects. Data quality issues were sometimes a problem in the first-deployed versions of the EHR projects. These were generally in terms of data completeness, not data accuracy or validity. For example, in the Bridges to Better Child Health project, clinicians surveyed most frequently reported that the EHR system had not improved data completeness. In the ICMHIS mental health EHR project, the project evaluation reported that while the initial information categories provided adequate coverage for the environments in which the system was deployed during the initial deployment, not all clinical situations were adequately covered[66]. In this case, as in many other others, these issues were considered relatively uncomplicated to resolve – through either further refinement based on usage in the field, or by integration of additional data sources into the existing project architecture. Negative impacts on users of data quality problems were, however noted: *"At present, the project results are not seen uniformly by all stakeholders as having been worth the time, money and effort. This viewpoint may serve to limit the further take-up of the system and hence ultimately justify any perceptions of lack of value for money"* [67]. It was also noted that such systems need to be developed in an evolutionary way, continuously incorporating improvements.

Key informants' views. Overall findings from the key informant interviews also were also varied. Some projects found that there was no impact on the quality of diagnoses and treatment, whereas others noted a distinct improvement.[68]

In general, impacts of quality of care found in these evaluations are not inconsistent with those found in the literature, although very few studies of adequate quality exist. Despite the widespread use of telemedicine in most major medical specialties, there is strong evidence in only a few of them that the diagnostic and management decisions provided by telemedicine are comparable to face-to-face care[69]. Little evidence of systematic clinical benefits has been found[70], despite numerous positive reports in specific outcome areas. This suggests that given the non-controlled designs of the CHIPP evaluations, conclusions about their benefits on quality of care should be interpreted cautiously.

---

[63] SLICK Project Evaluation Report, p. 87
[64] WestNet Teleophthamology Project Report, p. 68.
[65] NORad Evaluation Report, p. 2; HIA Evaluation Report, p. 39; Central-BC Yukon Telemedicine Project Evaluation Report, p. 13
[66] ICMHIS Evaluation Report, p. 24
[67] ICMHIS Evaluation Report, p. 7.
[68] Key Informant Interview Report, p.
[69] Hersh, WR, Hefland, M, Wallace J et al. A systematic review of the efficacy of telemedicine for making diagnostic and management decisions. Journal of Telemedicine and Telecare 8(4): 197-209. 2002
[70] Currell R, Wainwright P, Lewis R. Telemedicine versus face to face patient care: effects on professional practice and healthcare outcomes. (Cochrane Review). In: the Cochrane Library, Issue 1, 2004 Chichester, UK: John Wiley & Sons, Ltd.

3.3.3 What impact have the CHIPP-funded projects had upon skills development and the recruitment and retention of health care providers?

The CHIPP program affected many different types of health care providers in many settings. This evaluation question addressed two of the most important types of potential impacts: on providers' skills and capacities, both with ICTs and in terms of their more general scope of practice, and on potential impacts on recruitment and retention of providers in remote and rural locations. Many project evaluations also examined providers' work satisfaction and satisfaction with the ICT applications as an indicator of their retention likelihood.

Impacts on providers' skills and capacities. Participation in the CHIPP projects enhanced skills in many domains. First, several projects mentioned that becoming introduced to the ICT technology improved computer skills, in many cases among staff in small or remote centers who had very little computer experience and skill prior to the program. Second, the very nature of the projects sometimes required development of more structured practices and information management. Almost as a spin-off effect, staff skills were said to have improved in areas such as structured data charting (COMPETE[71]), behavioral assessment (ICMHIS[72]), and standardized screening data recording (Téléoncologie[73]). Due to the complex nature of the projects, skills improvements were also reported in project management, financial management, complex data analysis, Web-based system maintenance and security[74].

> *"Most site coordinators were "assigned" their new roles, which were usually in addition to their other responsibilities within the organization…..It is apparent that the telehealth-related workload assumed by many site coordinators was generally underestimated, and that little consideration was given upfront for the need for local change management. A lack of awareness and appropriate support for a number of Site Coordinators on the part of respective health authorities resulted in a high rate of "burn out" and turnover in persons fulfilling this role. In fact, 9 of the 14 partnering BC Telehealth sites experienced at least one turnover in Site Coordinators during the first five months of the main roll-out."(Final Evaluation Report BCTelehelth May 2003, p. 121)*

Deskilling. One concern sometimes expressed about ICT-enabled service delivery is the potential for devaluing or deskilling of personnel in remote locations, where the new technology enables more direct contact between patients and higher-level specialists. This type of finding was noted in only one of the CHIPP funded projects, in the case of eye technicians in the WestNet Teleophthamology project whose broad role in patient care was not fully reflected in the design of screening and patient care processes[75]. On the other hand, one of the projects directly facilitated expansion of the traditional roles of certain health care workers: nurses in the Tele-oncology project, who assumed a much greater role in the screening process.[76]

In the research literature, some studies suggest that telemedicine increases capacities and professional autonomy among remote or rural providers.[77]

New roles and positions. ICTs may also have human resource implications in terms of the types

[71] COMPETE Final Project Report, p. 13
[72] ICMHIS Evaluation Report, p. 19.
[73] Projet Télé-oncologie, Rapport Final, p.9.
[74] COMPETE Final Project Report, p. 13
[75] WestNet Teleophthalmology Evaluation Report, p.
[76] Projet Télé-oncologie, Rapport d'Évaluation, p. 23
[77] Lamonte MP, Bahouth MN, Hu P, et al. Telemedicine for acute stroke: triumphs and pitfalls. Stroke. 34(3):725-8, 2003 Mar.; Bracale M, Cesarelli M, Bifulco P. Telemedicine services for two islands in the Bay of Naples. J Telemed Telecare. 8(1):5-10, 2002.

and nature of positions created to support implementation and delivery. The project reports detailed the impacts of CHIPP in terms of creating new positions, as an indicator of an emerging permanent infrastructure to support ICT development in health systems. Most telehealth projects created part-time positions (ranging from one day per week to half time) in each of the telehealth sites.

The site coordinator positions created through the CHIPP funding were in many cases very demanding, and not well –suited to a part-time status, with the result that there was high turnover among coordinators in many projects, contributing to slower implementation and acceptance. A typical example, from the BCTelehealth program, is shown on the left. The evaluation of this project attributed sharp increase in uptake of clinical activity on the system directly to the presence of dedicated full-time, rather than part-time, coordinators. Effective local coordination of telehealth was in fact recognized as a key critical success factor by many projects. More generally, lessons were learned about the competency profiles needed for effective site coordination. Two telehealth projects noted that site coordinators require both administrative and clinical competencies[78].

Impacts of continuing professional education. Many of the impacts of the telehealth projects funded through the CHIPP program on health service providers were associated with the continuing professional education programs offered using the interactive videoconferencing systems. Several types of impacts were consistently reported in these programs. The ICT-enabled continuing education programs greatly increased opportunities for professional development. In evaluations that measured it, a sizable proportion of the educational activity would not have been previously accessed by the service providers For example, in the MBTelehealth program evaluation, 45% of respondents attending continuing education sessions stated they had never participated in a video-conferencing continuing education sessions before, and 57% said they would not have been able to obtain the information any other way. [79]

In the Telemental-Health Project, 94% of the 681 respondents to a satisfaction questionnaire stated that there were comfortable with this type of presentation, and 87% stated they would recommend the presentation to others in their community (Telemental health project Evaluation report, p. 20). In the IIU Nunavut evaluation, 95% of participants in continuing education sessions were very satisfied or quite satisfied with the opportunity to learn (IIU Nunavut telehealth Evaluation report, p. 43. The SWOT-N evaluation showed that 80% of professionals were satisfied with videoconferencing for education sessions, and 99% would participate in future sessions. SWOT-N Evaluation Report, p. 12

Participant satisfaction. Participants in continuing education sessions were generally highly satisfied with them (see examples at left). However, none of the evaluations assessed the impacts of the education on learning or skills.

Overall, these findings concur with those found in the research literature. Referring physicians have been shown to be highly satisfied with the educational benefits of tele-learning[80]. Professional

[78] MBTelehealth Evaluation Report, p. 46; BCTelehealth Evaluation report, Supplement D

[79] MBTelehealth Final Evaluation Report, p. 42).

[80] Davis P, Howard R, Brockway P. Telehealth consultations in rheumatology: cost-effectiveness and user satisfaction. J Telemed Telecare. 7 Suppl 1:10-1, 2001.; Gilmour E, Campbell SM, Loane MA et al. Comparison of teleconsultations and face-to-face consultations: preliminary results of a United Kingdom multicentre teledermatology study. Br J Dermatol. 139(1):81-7, 1998 July.

education through videoconferencing has been shown to improved practitioners' knowledge[81], and in some cases, educational benefit has been associated with perceived improvements in quality of care.[82]

> *"The immediate popularity and acceptance of education sessions via telehealth was largely unanticipated ....The education sessions have proved popular with families, community members, teachers and emergency personnel, and position them to provide better care for clients in their local environment...Education applications are therefore not merely an add-on to the clinical sessions but are an essential clinical service" BCTelehealth Final Evaluation Report, p. 82.*

Types of participants. A finding noted in several of the telehealth projects regarding continuing professional education was the wide variety of professionals and community members who attended sessions, even if these were not part of accredited training program for them. For an example from the BCTelehealth program, see the example at left. Similar results were noted several other programs, including BCTelehealth, NorthNet, SWOT-N and EOTN. In the IIU Nunavut Telehealth program, attendees (in order of frequency) included: nurses, nurse practitioners and nursing students; physicians or medical students; social workers; administrators; nutritionists; community health representatives; physio or occupational therapists; pharmacists, and midwives[83].

Impacts on linkages and isolation. Continuing professional education through telehealth was also reported in several projects to result in closer ties among practitioners, decreasing their professional isolation: For example: "*Front-line workers in the communities reported reduced isolation and increased support in their work'*[84]. The MBTelehealth evaluation reported qualitative impacts of continuing education 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[85].

> *"Telelearning aided the establishment of constructive relationships between physicians in remote locations and telelearning instructors. This served in turn to enhance the capacity and the scope of local health care practices." Yukon Telehealth Evaluation Report, p.19.*

Several reports also a mentioned a collateral benefit of the contacts enabled through continuing education programs, in that specialists in the urban sites were becoming more aware of the situations and capacities of practitioners in remote sites, and were therefore more disposed to a more collaborative approach: *"Several psychiatrists reported that they established more effective consulting relationships with local service providers as a results of the introduction of video'*[86]. As well, remote professionals were becoming more integrated into larger practice systems (e.g., in the SWOT-N and MBTelehealth projects, where remote physicians were able to participate in rounds at the urban

[81] Schopp LH, Johnstone BR Merville OC. Multidimensional telecare strategies for rural residents with brain injury. J Telemed Telecare. 6 Suppl 1:S146-9, 2000.
[82] Ricci MA, Caputo M, Amour J et al. Telemedicine reduces discrepancies in rural trauma care. Telemed J E Health. 9(1):3-11, 2003 Spring.
[83] IIU Nunavut Telehealth Program Evaluation Report, p. 42
[84] NorthNet Project Evaluation Report, p. 72.
[85] MBTelehealth Final Evaluation Report, p. 72.
[86] Telemental Health Project Evaluation Report, p. 18.

centers). Increased networking among professionals was also reported in several projects (see example at left).

Informal learning. A finding that is also apparent from the evaluation reports is that while there was a strong focus on formal, organized continuing professional education, the CHIPP applications also enabled informal learning among practitioners, sometimes in unforeseen ways. For example, in the Central BC-Yukon Telemedicine Initiative, professionals from the remote and central sites were able to meet over speakerphone to discuss issues on specific digital images while viewing them simultaneously[87].

Impacts on satisfaction, retention and recruitment. Shortages of health care professionals and their inequitable distribution between urban and rural/remote regions was a driving justification for the CHIPP program. It was hoped that extended implementation of ICT applications could increase equity in access to the most advanced practices. As well, ongoing professional development would be expected to contribute to satisfaction and thus retention of practitioners in high-turnover environments; as well as to recruitment of professionals to staff those regions. Results from the CHIPP projects are equivocal on this question. In all the evaluations that measured it, provider satisfaction with continuing education was very high, and as noted above, substantially increased level of access. However, providers and health system managers consulted in the project evaluations were in general more circumspect about the potential for ICT-enabled services to directly influence retention or recruitment, although many stated they could be a contributing factor. Several projects, particularly in the area of imaging, reported that this type of technology is rapidly becoming the accepted standard worldwide, and that most new providers would expect to be working in sites where they could use it. Not being able to offer it would seriously prejudice recruitment especially of young practitioners. However, several projects mentioned anecdotes where in fact new providers had become recruited to the participating health centers health system at least in part because of the presence of the ICT-enabled services[88].

Summary: Impacts on quality of care

Among those patients surveyed, satisfaction with the quality of ICT-enabled services was very high. Qualitative information suggested that quality of diagnoses and treatment had not been affected other than by making them more timely or more easily accessible. For situations where travel was avoided for patients, reduced stress and effort were important contributions to satisfaction with service quality.

Health provider satisfaction with quality of services was quite high for video-conferencing. Continuing professional education (telelearning) provided through ICTs improved service providers' skills in many domains. Participants in continuing education sessions were highly satisfied with them, and telearning helped strengthen relationships among professionals working in different places.

Impacts of CHIPP on recruiting and retaining health professionals in remote locations were not

[87] Central BC-Yukon Telemedicine Initiative Evaluation Report, p. 13.
[88] For example: HIA Evaluation Report, p. 34

conclusive. Professionals were satisfied with the increased opportunities for continuing education, but direct influence on recruitment and retention was not judged to be very strong.

3.4 Issue 4: Impacts on efficiency and long-term viability of the health system (health system renewal)

Overall, this evaluation can provide little useful information on efficiency, cost-effectiveness and contributions to health system viability. This is because the project-level evaluation data on these questions is generally very limited and based on numerous untested and/or unstated assumptions. Of the 23 projects that were systematically reviewed, only 15 addressed cost issues directly. Most of these studies were judged to be of a Cochrane level IV or V in quality, meaning that they did not use appropriate comparisons or controls[89].

3.4.1 What has been the impact of CHIPP projects on the efficiency of health care providers and the services they deliver?

Efficiency was not systematically addressed in most of the project evaluations, with the exception, cited previously, of the teleradiology projects that measured reductions in processing times to have films read compared to pre-CHIPP times[90]. Some qualitative data suggested that the ICT-enabled services enabled greater efficiency for providers, while others were suggestive of negative impacts on efficiency. In the former group were several projects reporting that technologies reduced the number of steps of actions required on the part of providers. For example, the Central BC-Yukon Telemedicine projects reported that physicians were ordering fewer x-rays as they came to rely more heavily on the reports produced by radiologists[91]. The COMPETE project evaluation reported that the number of unnecessary telephone calls had been reduced because of the ICT application[92].

Another important source of support for the hypothesis that ICT applications would improve efficiency, -- but again, one that was not systematically quantified – comes from reports that telehealth projects reduced the need for practitioners (mainly physicians, but also some types of therapists) to travel, thus increasing the time available for patient care[93].

Finally, those projects which resulted in more appropriate referrals – in particular, more appropriate selection of those patients who need to travel for specialist consults – also noted that this increased overall efficiency of providers' services[94].

On the other hand, some projects reported that ICT-enabled consultations either took the same

[89] http://www.cochrane.org/consumers/sysrev.htm#levelsofevidence
[90] NORad Evaluation Report, p.25; Central BC-Yukon Telemedicine Initiative Evaluation Report, p.10
[91] Central BC-Yukon Telemedicine Initiative, p. 19.
[92] COMPETE Evaluation Report, p. 18.
[93] Outreach Evaluation Report, p. 25
[94] WestNet Tele-ophthalmology Project, p. 75

time or longer with patients[95] . Several of the EHR project evolutions reported mixed or negative views of the applications' impacts on efficiency of recording and retrieving information.[96]

3.4.2 How optimal are the usage levels of the equipment implemented in the CHIPP-funded projects?

Measurement issues. It is very difficult to assess optimality of usage levels across CHIPP-funded projects, as no standard metric was used for reporting usage. Some evaluations reported numbers of sessions, while others reported number of minutes of system usage. Some reported unique sessions, i.e., counting each group of connected sites only once, while others counted all participating sites (double- or multiple-counting the actual number of unique sessions); while others appeared not have made this distinction at all. Finally, some evaluations reported the quarterly or monthly evolution in usage levels over the course of the project, while other reported only the total or the levels in the last month. This issue is critical as projects generally reported a relatively slow uptake curve, with low levels of usage in the first few months and increasing over time, often supported by redoubled efforts to encourage practitioners to use the systems. However, the compressed time frame of many projects and the need to produce evaluation reports by the end of the funding period, means that for many projects an accurate portrait of the plateau level of usage was likely not yet achieved.

Clinical and educational usage. The most comparable sets of findings on usage levels can be obtained from a subgroup of similar telehealth projects, examining the proportion of total clinical and educational usage as a proportion of the total usage (however these are defined and counted). The results of this are shown in Table 4, but should be interpreted cautiously, as 1) there is no way to ensure that that definitions of "clinical" and "educational" are comparable across studies; 2) different phases of implementation periods may be being measured; 3) the evaluations captured usage data with different methods, which may account for some of the observed differences[97].

Table 4: Proportion of clinical and educational usage, selected telehealth projects

Project	Proportion of usage for clinical /patient care purposes	Proportion of usage for continuing educational purposes
BCTelehealth *(Evaluation report, Appendix F)*	18%	50%
Telemental Health Project *(Evaluation report, p. 10)*	35%	40%
MBTelehealth *(Case Study report, p. 3)*	55%	18%
IIU Nunavut Telehealth *(Evaluation report, p. 19)*	14%	39%
NorthNetwork *(Evaluation report, p. 4)*	88%	7%

Lower than expected clinical usage. The large differences between the levels across the projects

[95] EOTN Evaluation Report, p. 40; MBTelehealth Evaluation Report, p. 44.
[96] HIA Evaluation Report, p.; NORad Evaluation Report, p.; SYNAPSE Evaluation Report;
[97] Two telehealth projects, EOTN and SWOTN, did not capture usage levels systematically and relied on return rates of session assessment questionnaires as estimates of usage levels; because of uncertainty in interpreting these levels, their results were not included.

probably reflect both maturity of their implementation as well the implementation strategies used. However, it is worth noting that for many of these projects, expected levels of clinical usage were probably higher, reflecting perhaps an unrealistic view of telehealth as a panacea for increasing access to clinical services in remote communities. This view was echoed in the results of interviews with key informants with pan-Canadian perspectives, who tended to emphasize the clinical aspects of telehealth when discussing its potential impacts. Respondents viewed telehealth as a key strategy in improving access to health services to all Canadians, urban and rural—so that all Canadians receive equitable service. Not surprisingly, their perspectives focused on the increased availability of services to rural, remote areas where certain health services were scarce or non-existent.[98] Thus, the key informants component of the evaluation concluded that providing clinical services through telehealth has not been fully realized, but it has set the stage for further advancements.[99]

3.4.3 What has been the overall impact of the CHIPP-funded initiatives on costs for, cost-effectiveness and viability of the health system?

Challenges in economic evaluation. Two consistent themes emerge regarding the evaluation of costs associated with CHIPP-supported projects: the evaluation time-frame was too short to conduct a complete cost-effectiveness analysis, and under these circumstances it is more appropriate to do a cost analysis rather than a cost-effectiveness study. Several reviews present cost comparisons based on assumptions of alternative behaviour in the absence of CHIPP funding. One evaluation (Project Outreach) discusses a randomized trial, but does not provide sufficient description to permit assessment of the study.

Because of the timeframe involved in this evaluation, empirical evidence regarding costs is not provided concerning the impact of any of the programs on the final stage of the logic model. Instead, most evaluations focused on the "short-term outcome" stage, and where costs data are provided, suggest achievement of the relevant outcomes. This is a substantial limitation to our understanding of the value of the programs. Several evaluations note the importance of considering long-term outcomes; unfortunately for many of the projects collecting the data required for such an evaluation would take many years.

The CHIPP projects faced the same challenges in conducting economic evaluations of ICT-enabled health services as have previously been identified in the literature. A recent review showed that of 55 published economic evaluations, only 24 studies met quality criteria justifying inclusion in a quality review, and 20 were restricted to simple cost comparisons. The authors of this review concluded that there is no good evidence that telemedicine is a cost effective means of delivering health care[100]. Another review concluded that specific telehealth applications have been shown to offer significant socio-economic benefit, to patients and families, health-care providers and the health-care system, but most studies are of limited generalizability[101]. The results of the CHIPP evaluation do not necessarily add substantially to this evidence.

---

[98] Key Informant Interviews Report, p. 33.

[99] Key Informant Interviews Report, p. 25.

[100] Whitten, PS, Mair F, Haycos A et al. Systematic review of cost-effectiveness studies of telemedicine interventions BMJ June 15, vol 324:1434-1437. 2002 http://bmj.bmjjournals.com/cgi/content/full/324/7351/1434

[101] Jennett, P.A, Affleck Hall, L., Hailey, D et al. The socio-economic impact of telehealth: a systematic review. J Telemed Telecare 9(6): 311-320. 2003.

Travel savings in telehealth projects. In terms of cost issues related to CHIPP-supported projects, the only consistent finding of the project evaluations is that travel costs are reduced for clinical consultation, administrative and continuing education activities. Examples of travel cost savings estimated in some CHIPP evaluation projects are shown in Table 5.

Table 5: Examples of travel costs savings from CHIPP projects

Project	Travel cost savings
SLICK *(Evaluation report, p. 116)*	$61,741 over 12 months
WestNet Teletophthamology *(Evaluation report, p. 54)*	$788,240 over 12 months
IIU Nunavut Telehealth *(Evaluation report, p. 51)*	$256,200 over 6 months
BCTelehealth *(Evaluation Report, p. 114)*	$455,851 over 12 months
MBTelehealth *(Evaluation Report, p. 48)*	$1.1M over 9 months
NorthNet (Northern Travel grants) *(Evaluation Report, p. 6)*	$1.26M over 2 years
SWOT-N *(Evaluation Report, p. 26)*	$73,698 over 24 months

Savings to the system and implications for viability. It is unclear how these cost savings translate into savings to the "health care system." Some travel costs are borne by individuals and some by various third party payors. Some of the evaluations distinguished between costs saved to patients and to these payors: for example, in the savings in Table 3 for the NorthNet program are those that accrued to the Northern Travel Grants Program; costs to patient and families were estimated separately. In the WestNet project, it was shown that 45% of patients' travel costs (included in the total presented above) were reimbursed by the Government of the Northwest Territories[102]. Existing studies have suggested that while telehealth does produce travel savings, economic benefits of telehealth favour the patient rather than the health-care system[103]. Project evaluations have mostly attempted to interpret available data, and without exception indicate that, based on certain assumptions, the CHIPP-supported projects would not increase costs to the health care system, and would result in similar or reduced future costs.

Another issue in assessing cost savings and their contribution to system viability is that the benefit of administrative and continuing education activities has not been measured, and assumptions of cost savings related to these activities may be challenged (e.g., for administrative activities, all the evaluations that estimated cost saving associated with administrative uses is assumed that the only alternative was a face-to-face meeting, rather than conference calls or deferred meetings).

Sustainability of teleradiology. Several projects involve Picture Archiving and Communication Systems (PACS). One evaluation suggests that the potential for costs savings exists[104] while others report qualitative data that indicate savings may not be realized[105]. Sufficient empirical data are not provided to interpret the divergent findings.

Impact of increased access on costs. Although not quantified by any of the evaluations, the

[102] WestNet Teleophthamology Evaluation Report, p. 51.
[103] Oakley AM, Kerr P, Duffill M, Rademaker M et al. Patient cost-benefits of realtime teledermatology--a comparison of data from Northern Ireland and New Zealand.. J Telemed Telecare. 6(2):97-101, 2000
[104] Central BC-Yukon Telehealth Program Evaluation Report, p. 25.
[105] NORad Evaluation report, p. 11.

potential impact of improved access or quality of care on long-term cost savings was raised in most evaluations. Whether it be the benefit of early access to mental health services or eye care, or easier access to health information, there is clearly a potential benefit to the CHIPP-supported activities. Considering the findings of neutral or decreased costs, and improved access or quality, in general there is indirect evidence of a worthwhile investment in the majority of these programs. However, as was noted above, empirical evidence is lacking to support this conclusion.

Key informants' views. At a broader level, key informants responding from a pan-Canadian perspective noted that while equitable access to health services is central to the philosophy of the Canadian health system, the system must also be sustainable. Both telehealth and EHRs were considered to be making significant contributions to sustainability[106].

Summary: Impacts on efficiency and long-term viability of the health system

The key finding of this review of cost issues associated with the evaluations of these CHIPP-supported projects is that the time horizon, like that on most existing evaluations,[107] was not sufficient to demonstrate any real cost-efficiencies. Those evaluations that showed cost savings (with improved service) based conclusions on assumed alternative use. While the economic models presented in several of the evaluations can help understand the relevant issues, they are all based on assumptions that may or may not be valid. None of the economic models included a sensitivity analysis to indicate how alternative assumptions would affect the conclusions.

3.5 Issue 5: Impact on privacy

3.5.1 How has CHIPP influenced privacy policy and procedures developments in Canada?

Review of the CHIPP-funded projects' accounts of the privacy policies and procedures developed during the course of project development and implementation suggested that CHIPP had some important implications for privacy policies at institutional and inter-institutional levels. Overall, however, the main impact of the CHIPP programs has not been to provide new privacy policies and guidelines but rather to increase consistency between existing guidelines and organizational practices. There is less evidence about its impacts on higher level policies. One specific instance was noted where CHIPP process may have influenced broader-scale policies: *"the Privacy Review by Health Canada has been passed on Interior Health's security manager to incorporate the recommendations into new policies"* [108] . Some provinces, notably Québec, Manitoba and British Columbia, have privacy laws or policies in place, which guided the projects.

[106] Key Informant Interview report, p. 33.
[107] Hailey D, R Roine, A Ohinmaa. Systematic review of the evidence for the benefits of telemedicine. Telemed & Telecare. Vol 8 Suppl 1: 1-30. 2002
[108] Central BC-Yukon Telemedicine Initiative, Final Project Report, p. 21.

Information Privacy Survey. One of the main horizontal activities of the CHIPP program was an Information Privacy Survey, assessing the extent to which each project was in compliance with an extensive set of high-level privacy standards, aiming to identify the strengths and potential gaps within the privacy programs of each project. This survey, conducted by an external expert firm, was completed in October 2003. A total of 19 CHIPP projects participated in the survey (no reasons was supplied for the lack of response form 10 projects). Its main findings were that:

- "Generally, very strong privacy practices with respect to the patient dimension of privacy exist throughout the projects.
- Overall, the people dimension of information privacy is also being handled well by the CHIPP projects, but there is more room for improvement in comparison to the patient area.
- The CHIPP projects have several sound processes in place to safeguard patient information, however weaknesses are present and resulting improvements are recommended in a few areas.
- The projects employ varying levels of safeguards to protect patient information.
- The privacy performance within the information management area is widespread, but generally very good. There are several projects requiring significant improvements (especially compared to their patients and people dimensions), and several with very few gaps".[109]

In their individual project reports, some CHIPP projects reported having received feedback from the survey either attesting to their full compliance with the standards, or suggesting areas for improvement. However, about half the projects reported not having received any feedback from the survey, although their response to these recommendations seems to have been a required element in their final project reports.

Standards and Interoperability Survey. The Standards and Interoperability Survey results showed that *"Six out of 18 projects stated that they had made changes to their privacy and confidentiality policies. Four of these indicated that these changes included statements that related to the on-site or off-site technicians who may participate in ensuring quality of service for the telehealth session. Only 4 out of 14 projects had undertaken a privacy impact assessment. Five out of 18 projects had undertaken agreements for ensuring confidentiality of patient information with their telecommunication providers".* The report concludes that "*this is an area where considerable work in the community is necessary, in education, consultation and consensus building, to establish common policies and approaches."*[110]

Privacy in telehealth. Telehealth projects required the development of several layers of privacy protections. First, at the level of the technology, there was a need to ensure that systems were secure and not vulnerable to unauthorized entry. In general, this seems to have been accomplished quite readily, with all projects reporting that adequate safeguards had been put in place. No breaches of security were reported. Second, there was a need to ensure to security of patient information as it was transmitted among sites.

Privacy in EHRs. In the EHR projects, privacy issues were considerably more complex, as systems had to be structured so as to ensure layers of protected access by multiple levels of system users. These issues required considerable efforts and technical expertise, sometimes resulting in major

[109] Personal Information Privacy Assessment of CHIPP Projects, PRIVA-C, October 2002, p. 7.
[110] CHIPP Standards and Interoperability Report. Part 1, p. 38

implementation delays due to system re-design. Particular problems were also encountered with security of wireless devices.

Patient consent management. The issue of patient consent to use the ICT-enabled systems -- and its implications in terms of security practices – raises some questions about the uniformity of policies across projects. In a Standards and Interoperability Survey of projects conducted as another horizontal activity in 2003[111], eight out of 18 participating projects stated that they had made changes to their explicit consent policies and/or procedures to accommodate telehealth, while two indicated that they had made changes to their implied consent policies. Eight out of the 18 projects retained consent at both the provider and patients' sites, seven retained consent only at the patient site, and two retained consent at the provider site alone. Project documentation shows that some projects did not feel that consent was necessary.[112] The underlying question regarding the need to obtain patient consent of course whether the service is considered an experimental alternative to usual care or another modality of delivering usual care, and whether there are considered to be any risks associated with it, for example in terms of transmission of incomplete or inaccurate information, or violations of privacy. This is an area where perhaps more national leadership could have been provided.

Lack of privacy solutions. In two cases (SLICK and WestNet Teleopthamology), no technological solution to secure transmission of patients screening data was found. Patient information derived from screening sessions was stored on CDs and delivered either by hand or by courier to the central site where the information would be processed[113]. In these cases, the solution was said to both satisfactory and cost effective, but also illustrates some lost potential in efficiency and in one evaluation, raised additional security concerns.

Privacy and mental health services. It was noted by projects providing services in the area of mental health that their client populations have special needs for privacy protection, because of their vulnerability, generally longer treatment time (resulting in greater exposure to privacy risk), and legal status in terms of capacity. This added layers of complexity to these projects.

Key informants' views. In the key informant interviews, most respondents saw CHIPP-funded projects as having been highly successful in managing privacy matters. They implemented business process protections (e.g., restricting who had access to which patient data, managing who was present for a videoconference consultation) as well as technological tools (e.g., encryption, password authentication) to control privacy.[114]

---

[111] CHIPP Standards and Interoperability Report. Part 1, July 2003

[112] E.g.: *"The Yukon Telehealth Network sought and received legal advice about specific consent for the use of televideoconferencing. In our opinion, no specific consent is required because the incremental risks associated with the use of telehealth were judged to be small, and procedures were in place to minimize those risks. Telehealth is a means of providing the patient/client with access to a service, and it is the responsibility of the individual service provider to ensure that the patient/client has consented to treatment."* Yukon Telehealth Final Project Report, p. 16

[113] SLICK Evaluation Report, p 13, p. 94; WestNet Evaluation report, p. 57.

[114] Key Informant interviews Report, p. 20.

3.5.2 What were clients' views on the handling and use of their personal information?

One of the most consistent findings across all the CHIPP-funded projects was that patients were satisfied with the handling and use of their personal information, in general voicing very few concerns. For example, 12 of 13 of parents surveyed in the Bridges to Better Child Health evaluation felt that the EHR would improve the security of their child's health information[115]. In the EOTN project, 90% of patients surveyed agreed that they felt confident in the security of the system[116].

It should be noted that in all the evaluations, these data pertain only to patients who had agreed to use the ICT-enabled services and/or to participate in the evaluation, and therefore may under-represent patients who declined to participate because of privacy concerns. However, several projects reported that refusals were quite rare. In the one study that compared consenting participants with non-participants (MOXXI) consenting patients were significantly more likely to be older women with higher income levels, prescription insurance and visits to more specialists[117]. This may be of concern in that differential participation rates among social strata has the potential to contribute to increased inequities in access to health care. Patient requests for withdrawal of their data from the information system were also raised in the SI-RIL Case Study as possibly needing investigation[118].

Across all the projects, providers tended to have more concerns than patients about privacy protection. For example, in the EOTN project, 63% of physicians said they had some concerns about privacy[119]. In the Synapse project, only 50% of service providers surveyed agreed that client information was more secure from unauthorized access than in the previous system.[120]

The key informants interviews study concluded that no project reported any major difficulties with patient privacy concerns beyond initial reservations that were ultimately addressed successfully.[121]

---

[115] Bridges to Better Child Health Evaluation report, p. 173.
[116] EOTN Evaluation report, p. 34.
[117] MOXXI Project Evaluation Report, p. 58
[118] SI-RIL Case Study, p. 4.
[119] EOTN Evaluation Report, p. 49
[120] SYNAPSE Evaluation Report, p. 33
[121] Key Informant Interviews Report, p. 20

3.5.3 To what extent did the privacy/confidentiality rules and guidelines impact on service delivery?

> *"Lack of adequate remote access, e.g., via laptop ("it was promised") and or palm technology is a "huge problem", and apparently prevented in part by the reported inability, due to firewall issues, to connect with SYNAPSE using a dial-up line." SYNAPSE Evaluation Report, p. 49*

Most CHIPP projects reported that privacy/confidentiality rules had little or no impact on service delivery, and the ICT-enabled services were developed within the parameters of existing privacy policy to mirror privacy practices in existing services. However, a few CHIPP projects reported that the services they had intended to deliver were affected by privacy issues, in that adequate levels of security could not be achieved, resulting in the abandonment of some aspects of the intended services. For example, privacy issues in the ICMHIS project precluded linkage to provincial client registry, meaning that both systems continue to operate in silos[122]. In the Tele-oncologie project, the need to store denominalized data has reduced the potential to conduct comprehensive data analyses for evaluating the health outcomes of the screening program[123] . In the Synapse project, functionality and usage were said to be hampered because of the inability to resolve the firewall problems for physicians accessing the system remotely (see example).[124]

There was consensus among the projects with teleradiology components that the Picture Archiving Systems (PACS) improved security over previous systems, because of the general lack of protection of stored films and the need for them to be constantly circulating among treatment sites. For example: *"Stakeholders have positive, albeit mixed, opinions of the potential for PACS technology to improve the privacy and security of patient information. Stakeholders acknowledge that use of a user identification name and password, and an ability to track and conduct audits of user activity should help to control and limit system access to only authorized personnel"*[125].

> *"One of the impacts of implementing the BCTelehealth project is the increased awareness, at many levels and in many organizations, of the issue of protection of privacy, confidentiality and security of patient information. The policies and procedures developed, along with a comprehensive Privacy Impact Assessment, provide for a strong framework for future use". BCTelehealth Project Report, p. 17*

In addition, some projects reported that the introduction of the ICT-enabled services had improved privacy practices in service delivery, in part because of the new procedures required, but also in part because of the increased sensitization of staff to general privacy issues that accompanied the project implementation[126] (see example at left).

In the one project (BCTelehealth) the involved emergency services intervention through telehealth, privacy concerns were a major issue due to the incompatibility of emergency ward physical design with the need for enclosed space to limit possibilities of overhearing speaker-enhanced interactions. This was a contributing factor to the suspension of the service in this project[127]

---

[122] ICMHIS Evaluation Report, p. 27
[123] Project télé-oncologie, Final report p. 18.
[124] Synapse Final Evaluation report, p. 49.
[125] NORad Evaluation Report, p. 31.
[126] See also: Project Outreach Evaluation Report, p. 32
[127] BCTelehealth Evaluation Report, p. 98

The existing empirical literature on privacy issues surrounding ICT-enabled health services is very thin. While numerous articles have pointed out problems and suggested avenues for action,[128] there seem to be virtually no empirical studies of impacts of privacy issues on services and outcomes, other than studies assessing patients' satisfaction with privacy protection[129].

Summary: Impacts on privacy

Overall, the evaluation results suggest that many individual CHIPP projects were influential in harmonizing existing policies among jurisdictions and institutions. While patients and their families do not appear to be concerned about privacy issues in ICT –enabled health services; their service providers sometimes are. Service delivery was generally not affected by privacy issues, as adequate solutions were found for most privacy protection problems encountered. A survey of privacy practices in CHIPP projects found that most projects had adequate patient and information protections in place, although there was some room for improvement.

3.6 Issue 6: Macro-level impacts

Through its support to a large number of large scale projects, CHIPP was expected not only to produce project-level impacts, but also durable impacts on the overall situation of ICTs in health services in Canada. This evaluation issue examines the program's impacts on several aspects of this overall situation.

3.6.1 To what extent and in what manner do the projects plan to continue and grow?

Most CHIPP-funded projects will become sustained through non-federal funding sources. Most are expected to expand, either in terms of the populations served, health issues addressed, or information systems linked.

Growth within the CHIPP funding period. One of the most striking findings from the review of CHIPP projects was that in many cases, the number of sites connected in the project's networks grew during the course of the project, sometimes quite a bit more rapidly than expected (for example: increases from three to 41 sites on the SWOT-N project; from nine to 16 sites in the RASCHR project, from 13 to 15 sites in the BCTelehealth program, from 20 to 72 sites in the Outreach project, from 22 to 24 sites in the MBTelehealth project.) This attests to strong acceptance of the ICTs within the health system, although it sometimes strained the limited project

[128] E.g., Von Tigerstrom B. Current Developments in Canadian privacy and information law: implications for telehealth. J Telemed Telecare. 6 Suppl 2: S2:83-S2:85; Goins RT, Kategile U, Dudley KC. Telemedicine, rural elderly, and policy issues. J of Aging & Social Policy. 13(4):53-71, 2001. ; Mills ME, Computer-based health care data and the Health Insurance Portability and Accountability Act: implications for informatics. Policy, Politics, & Nursing Practice. 2(1):33-8, 2001 Feb. Jennet PA, Watanabe M, Igras E, et al. Telemedicine and security. Confidentiality, integrity, and availability: a Canadian perspective. Studies in Health Technology & Informatics. 29:286-98, 1996. Stud Health Technol Inform. 29:286-98, 1996.

[129] E.g., Woods KF, Kutler A, Johnson JA et al. Sickle cell telemedicine and standard clinical encounters: a comparison of patient satisfaction. Telemed J. 5(4):349-56, 1999 Winter; Chan FY, Soong B, Lessing K et al. Clinical value of real-time tertiary fetal ultrasound consultation by telemedicine: preliminary evaluation. Telemed J. 6(2):237-42, 2000 Summer.

capacities*: "The size of a network can hamper its implementation: a manageable strategy may be to limit initial implementation to fewer sites with strong commitment and leadership"*[130].

Post-CHIPP growth and sustainability. All CHIPP projects were required to develop a sustainability plan according to a set of common guidelines[131] and submit this as a separate project deliverable, as well as to address expected future developments in their Final Project Reports. Indeed, demonstrated sustainability was one of the mandatory requirements for the program.

Sustainability status at the time of the projects' Final Reports was varied, but generally quite favorable. In most cases, funding proposals had been developed and submitted in accordance with the sustainability plans, and initiatives were waiting to hear about funding decisions. Most of these were situations where it was felt that some level of sustainability was assured, but that provincial governments were in the process of developing larger funding platforms into which the post-CHIPP initiatives would be integrated.

Expansion of the CHIPP projects was foreseen along several dimensions, sometimes all simultaneously. Most sustainability plans for telehealth projects sought to support significant growth in the numbers of sites connected, usually aiming eventually for complete coverage of a region or province/territory. This form of expansion would ensure greater reach of ICT-enabled services to greater proportions of the population. Both telehealth and EHR projects sometimes proposed expansion in the health issues that could be addressed, either by expanding the numbers and types of services available through the network (in the case of telehealth), or the number of health problems addressed by the EHRs. In Ontario, the three telehealth network projects funded through CHIPP were planning to evolve into a network of networks, to permit further exploration of opportunities, while continuing to develop links with networks in neighboring provinces and territories[132].

> *"As time and funding permit, it is planned to produce and enhanced RASCHR that will collect data on more procedures administered to patients at UOHI. Eventually RASCHR will be evolved to a full cardiac portal providing a range of cardiac information and services to both healthcare providers and patients". (RASCHR Final Project Report, June 2003, p. 26).*

Most of the EHR projects had been developed with a view to evolving into a broader regional, provincial or national standard in their particular domain, and so were planning to expand development by increasing intra- and inter-jurisdictional coverage. An example of this type of proposed development is shown above.

---

[130] SWOT-N Evaluation Report, p. 51.

[131] Office of Health and the Information Highway (OHIH) Health Canada. Telehealth and Electronic Health Record : A Guide to Sustainability. Tecknowledge inc, undated

[132] NORTH Network Program, Final CHIPP Project Report, June, 2003,p. 5

"The primary source funds to date has been the province of BC, although support has also been received from private sources, from federal granting agencies, from UBC, and from Regional Health Authorities. …Together with the Yukon and BC governments, UBC submitted an application for support under the multisjurisdictional envelope of the Primary Health Care Transition Fund. This proposed project builds on the work completed under CHIPP." Tele-mental Health Project Final Report, p. 46.

"The nature of the agreement between the provinces and HIA was such that the future sustainability of each of the eight projects was not an issue. The initiatives were funded 50/50 by HIA (CHIPP) and the provinces with the understanding that once the infrastructure was in place, the province would continue to fund it.…The overall administrative design of the HIA CHIPP project portfolio required provincial support for continued sustainability prior to project implementation. Therefore, early commitment of the governments, with the political and financial ability to perpetuate the initiatives, was a key element of success in sustainability beyond CHIPP". HIA Case Study report, p. 7.

In several cases, projects were being maintained at the status quo and monitored for another year, in order to permit a more robust appraisal of potential for sustainability and growth. Several projects reported that funding had already been obtained through Infoway, but most often ongoing funding was expected to come from provincial or territorial governments, regional health authorities, other public agencies, or private sector investment. Examples of intended approaches to ensure sustainability are shown at left.

Three projects in particular felt that their growth potential was limited, and for similar reasons: lack of acceptance or integration within their larger health systems. In two cases (Bridges to Better Child Health, Healthlink) the existing technical solution was not adequate for expansion of services, and expansion would have required a major systems development initiative from a key partner organization who was not prepared to do this in the near future. In the other (Project Outreach), growth would have required integration of the provincial-level system application within the regional health authority structure, which did not appear to be open to this[133]. Thus, in all these cases growth potential was limited not by technical or financial issues, but rather organizational challenges.

Sustainability of teleradiology. The CHIPP program funded several teleradiology projects and telehealth projects with major teleradiology components (e.g., NORad, HIA TeleI4; Central BC-Yukon Telemedicine Project). . Other projects involved digital transmission off other types of images (e.g, West-Net teleophthalmology; SWOT-N retinal scans transmission component). Of all the types of projects, these were most clearly in an excellent position for sustainability and expansion, due to the easily demonstrable costs savings that were expected to result in cost recovery over a period of a few years.

Private sector transfer. One of the CHIPP-funded projects, MOXXI, has been spun into a private sector initiative with investment from a university-based venture capital fund. Patent applications have been filed for two of the system's components, and the new company is in the process of developing a business approach and plan to support future development of the MOXXI concepts.

Key informants' views. Findings from the key informant interviews – conducted up to a year after the projects had terminated – showed that most CHIPP-supported projects have now transitioned to a more permanent program phase. Many have expanded their offerings to include additional sites or deliver a broader range of services and plan to continue doing so as they move forward. However, the key informants study concluded that funding continues to be a concern for many of

[133] CHIPP Project Outreach Evaluation Report, p. 4.

the initiatives. Even though they may plan to operate as an ongoing program, they may not have guaranteed financial support.[134]

3.6.2 How did CHIPP change the ICT "landscape" in health care in Canada, directly and indirectly?

Key informants' views. Key stakeholders interviewed view the CHIPP program as having propelled the ICT situation in Canada to a much higher level of overall activity, integration and common vision. Although challenges are still noted— especially in standards and integration – the overall impact of CHIPP is seen as one of enabling a jump up to a much higher playing field.[135]

Provincial developments. From review of the CHIPP project reports, some possible impacts on the ICT landscape of health care in Canada are discernable in that several of the larger projects are evolving toward becoming the core of province-wide systems, either in telehealth or various forms of EHR. For some of these projects, CHIPP seems to have been a primary factor propelling these jurisdictions into system-wide adoption of ICT-enabled health services. For other, attributing these changes to CHIPP may be overstating the case – it may be that particularly advanced jurisdictions, which were already closer to evolving a fully- developed ICT-enabled system, were able to successfully access the CHIPP funds as a tool for furthering their own development.

EHR impact on the ICT landscape. To the extent that the EHR projects were successful in developing systems that could become the backbone of more generalized systems, ready for system-wide implementation and inclusion of more complete ranges of providers, settings and health issues, they contributed to changing the ICT landscape in Canada. Several of the EHR projects could reasonably have been said to show this level of scope; these would include the WHIC provider registry, RASCHR, MOXXI, COMPETE, SI-RIL and the Case Managment system developed through HIA. Other projects were too small in scope and perhaps less successful, and so are unlikely in the short term to contribute to major, system wide changes.

De facto standards. Finally, the extent of changes in the landscape was reflected in observations made in several of the project reports that the de facto standard for a comprehensive services now in many areas includes ICT-enabled technologies. This was said to be true, for example: by the MOXXI project, for electronic prescribing systems; by the NORad project, for radiology practitioners; and by the SWOT-N project for general medical practice in rural areas. In the latter example, a respondent in the case study noted that one indicator of the changing landscape was that the health centers in the region who have participated in the telehealth program are using the availability of telemedicine as an enticement in their recruitment campaigns for physicians.[136]

[134] Key Informant Interview Report, p. 18.
[135] Key Informant Interviews Report, p. 34.
[136] SWOT-N Case Study Report, p.5.

3.6.3 To what extent has CHIPP contributed to "mainstreaming" of ICTs in the health care system? (integration from a health systems perspective)

From a health systems perspective, CHIPP has contributed in important ways to the mainstreaming of ICTs into health systems. Most notably, as already discussed under the issue of sustainability, many of the CHIPP-funded projects are evolving into, or becoming integrated within, programs with ongoing funding from provincial and territorial governments and other sources.

British Columbia and Ontario provide examples among the several provinces where the landscape of ICT seems to be on the verge of full-scale mainstreaming[137]. In BC, CHIPP funded a total of eight projects, several of which were conceived as part of the development architecture for a province- wide system. As the BCTelehealth Evaluation Report noted: *"… development of a sustainable, interoperable and integrated telehealth network is well underway in British Columbia."*[138] In Ontario, the three large-scale telehealth projects, each covering different regions of the province, are working to establish an Ontario-wide network. At the time their project reports were written, these projects were expecting significant boosts in their overall networking capacity through delivery of the provincial secure data network (Smart Systems for Health - SSH).

Observations made in several evaluation and project reports suggested that project implementation was facilitated by the presence and/or development of strong regionalized health systems outside the ICT-development context. This suggests that in these cases, the CHIPP projects were amplifying the regionalization wave to bring standardization and integration within regions to the forefront of policy development and funding orientations. The clearest example of this is in the area of privacy policies, where the arrival of CHIPP served as the impetus for the agencies involved in the project to harmonize their overall privacy policies in line with provincial guidelines.[139] In other cases, the project's implementation had the unexpected benefit of strengthening organizational systems more generally. For example, the HealthNet Provider Registry produced a new project management standard now in the process of being adopted by the BC Ministry of Health.[140] In another example of how the CHIPP program contributed to system-wide change, the Tele-mental Health Project reported that "videoconferencing had emerged as a key part of mental health reform in the communities participating in the CHIPP initiative. [141]

> *"In establishing a regional telehealth network, VideoCare has helped to mainstream the use of ICTs for health by increasing use of existing technologies as well as implementing new technologies to support a wider-network of technology-supported activities across the region. …Since the end of CHIPP funding, the VideoCare team has continued to focus on mainstreaming use of ICTs in the health system. The Telemedicine Networks of Ontario partnership and establishment of an Ontario-wide telehealth network is one of the major activities working to incorporate the use of ICTs into health systems across the province". SWOT-N Case Study Report, p. 6.*

The case studies provided further information on CHIPP's impacts on mainstreaming of ICTs in the health care system. The example on the left illustrates how one project has progressed toward mainstreaming of telehealth into the ongoing service delivery model.

---

[137] Note that CHIPP project information was not available for provinces that either did not have large scale projects or for which project information was not available: this applies to Saskatchewan and Québec.
[138] BCTelehealth Final Evaluation Report, p. 46
[139] Central BC-Yukon Telemedicine Initiative Evaluation Report, p. 11.
[140] HealthNet/BC Provider Registry Evaluation Report, p. 25.
[141] Telemental Health Project Evaluation Report, p. 6.

3.6.3 In what manner and to what extent has CHIPP influenced the integration of service delivery? (integration from a patient/service delivery perspective)

> *"The NORTH Network presents an innovative opportunity to allow First Nations to have increased control over health issues by moving beyond historical jurisdictional barriers. As part of the NORTH Network program, the care for First Nations' patients will be seamless regardless of where the care is received (on or off reserve) or what referral centre they receive their care from (Ontario or Manitoba). To ensure integration with the larger telemedicine network, the Medical Director for the First Nations communities sits on the regional Telehealth Professional Advisory Committee. This is seen to enhance the potential for continuity of care for the communities of the region". NorthNet Evaluation Report, p. 40.*

CHIPP projects provided several demonstrations of positive influences on integration of service delivery from the point of view of the patients receiving the services and the providers who are networked around those patients to provide comprehensive, global care. This issue is closely related to that of quality of care, as evidence now shows that greater continuity of care is associated with better health outcomes[142]; and ICTs may be expected to impact all three mains types of continuity: informational, relational, and management[143]. These impacts were most clearly seen when the service involved transitioning patients from one care system to another, among systems that were formerly disconnected or only connected in very partial or fragmentary links. For example, in the BCTelehealth evaluation the enhanced cross—provider collaboration through videoconferencing resulted in more seamless transition to community care after release from hospital. Another example, in the context of integration of care systems for First Nations people, is found in the NorthNet project's evaluation (see inset at left).

Integration of services from the users' perspective may be especially beneficial in the case of patients who are unable to themselves ensure the information linkage between care settings (for example, patients with social or psychiatric problems who are unable to communicate their medical history or their medications to a new provider). The projects addressing these types of clients provided some useful examples of how integrated EHRs could alleviate some of the information incompleteness that permeates their care providers' work. For example, the SYNAPSE project case study provided an example of how the EHR allowed timely identification of an adverse reaction to medication that had been interpreted as a psychotic episode.[144]

However, as noted above, some continuity issues still arose when patients were transitioned out of the system that had been involved in the project, into mainstream care (see SLICK example, footnote 57.)

Communication and integration among CHIPP projects. An issue that emerged from review of the CHIPP project reports is that there was sometimes little communication and integration among multiple projects funded in the same provincial jurisdiction, even among those involving some

---

[142] E.g., Gill JM; Mainous AG; Nsereko M ; The effect of continuity of care on emergency department use. Arch Fam Med 2000 Apr;9(4):333; Mainous AG; Koopman RJ; Gill JM; Baker R; Pearson WS . Relationship between continuity of care and diabetes control: evidence from the Third National Health and Nutrition Examination Survey. Am J Public Health 2004 Jan;94(1):66-70

[143] Haggerty JL, Reid RJ, Freeman GK, et al.Continuity of care: a multidisciplinary review. BMJ (England), Nov 22 2003, 327(7425) p1219-21.

[144] Synapse Case Study Report, p. 8

common subsets of partners. This was the case in BC, where there was little interaction among the eight funded projects during the course of the CHIPP program, although some project final reports attested to a perceived need to develop this collaboration[145]. In Ontario, early communication among the telehealth providers was limited, but has since expanded.

One interesting observation comes from the Ontario projects, where a province-wide, crosscutting telehealth initiative was not successfully integrated with three region-based telehealth programs[146] (Box 36). While this may just be a question of individuals and project histories, it also may suggest the need to ensure that in provinces with strongly regionalized health systems, horizontal ICT-enabled services are developed so as to be deployable harmoniously within the regional structures. This echoes existing authors' warning that the main barrier to the widespread adoption of telemental health is the effort needed to integrate models of remote health care delivery into the wider health care system.[147]

3.6.4 How have the CHIPP-supported projects affected the communities and regions apart from health care?

Box 30: "In the HIA project deployment of Tele-i4 has the potential to allow for specialists to live and practice in almost any location they choose, possibly bringing them to rural locations. In fact, a small town in PEI attracted and retained two such specialists. Cases such as these are likely to have positive effects on the preservation of rural communities with diminishing populations." HIA Case Study Report, p. 10.

There is little direct evidence in the available data sources of CHIPP impacts on communities and regions apart from health care. If there are impacts, they are to be found in the smaller and remote communities that were networked in telehealth projects, rather than in the larger urban centers. Most of the telehealth projects linking remote communities reported some benefits of their continuing education programs through participation of community members and non-health workers in the sessions (see Section 3.3.3). It was also noted the CHIPP projects produced positive effects in some cases where the telehealth system had been used to support broader community processes.[148] There was also some evidence of strong community interest in using videoconferencing systems for public and community education (for example, in the Yukon Telemedicine Program[149]).

The key informant interviews addressed this issue to some extent, but found little evidence of impacts outside the immediate project environments.

The case studies identified a few examples of the projects' impacts on communities and region apart from health care. One of these is shown in Box 30, illustrating a potential impact on the sustainability of small communities.

---

[145] BCTelehealth Evaluation Report, p. 109.
[146] Project Outreach Final Report, p. 4.
[147] Darkins A. Program management of telemental health care services. J Geriatr Psychiatry Neurol. 14(2):80-7, 2001 Summer.
[148] MBTelehealth Evaluation Report, p. 49.
[149] Yukon Telehealth Evaluation Report, p. 28.

3.6.5 To what extent did CHIPP contribute to effective and sustained partnerships/ collaborations within and between jurisdictions?

CHIPP's contribution to the initiation and negotiation of partnerships was major. Achieving effectiveness of those partnerships was in many projects a singularly critical outcome, as the successful delivery of ICT-enabled services was predicated on it. Long-term sustainability of the partnerships remains to be seen, but in most cases partners appear to be committed to long-term, ongoing relationships either to sustain the CHIPP-supported projects, or to expand them.

Partnerships were created at many levels, and often at many levels within the same projects: among provinces, regional health authorities, institutions and agencies, and among sectors (public-private, community-public). The partnership models created by most projects were highly complex, and involved extensive initial and ongoing negotiation of partners' roles. Two typical examples of the linkage systems underlying CHIPP-project partnership structures are shown in the diagrams below: one for telehealth projects, and one for EHRs.

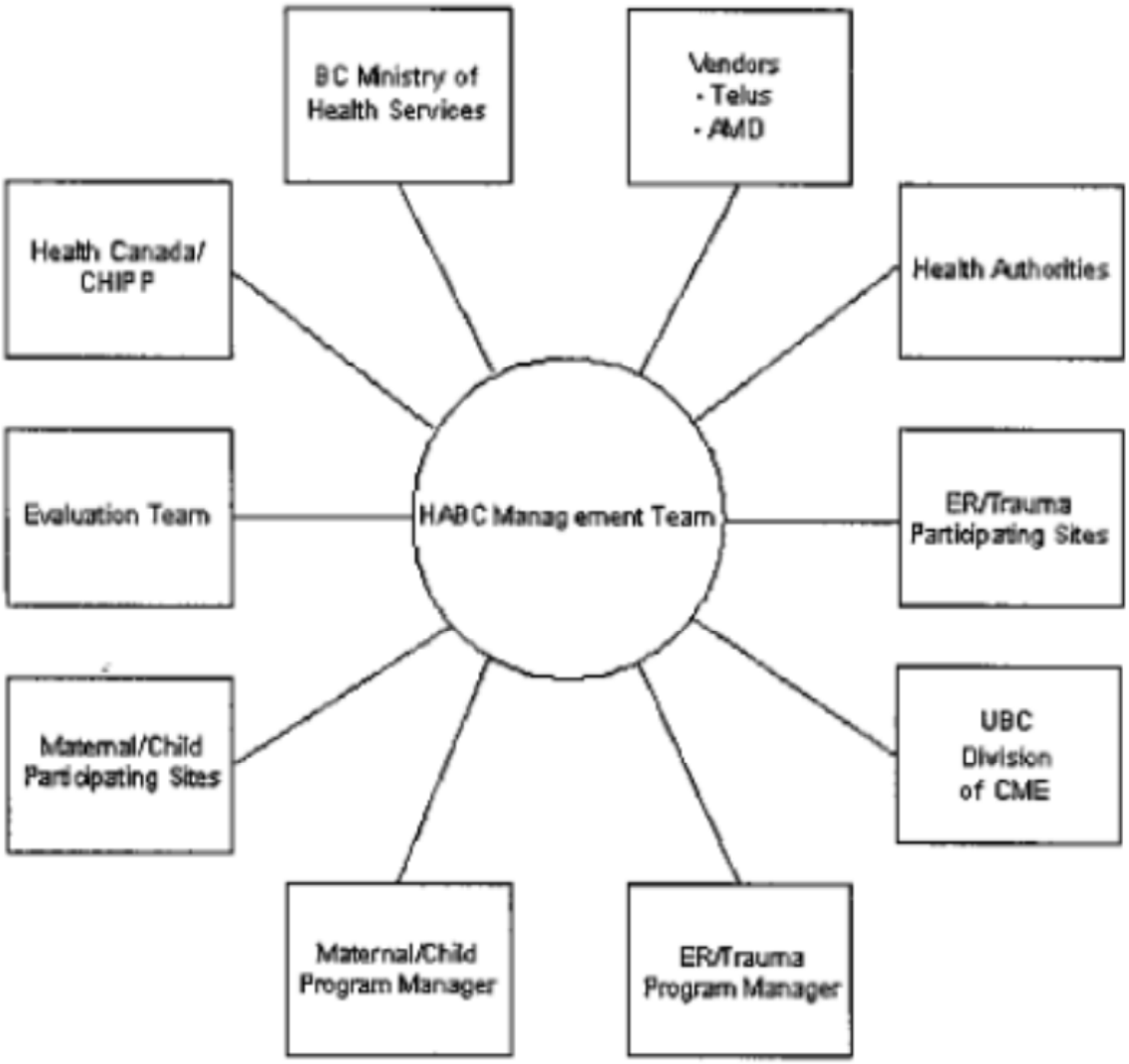


Figure 2: Fig. 20, BCTelehealth Evaluation Report, p. 129

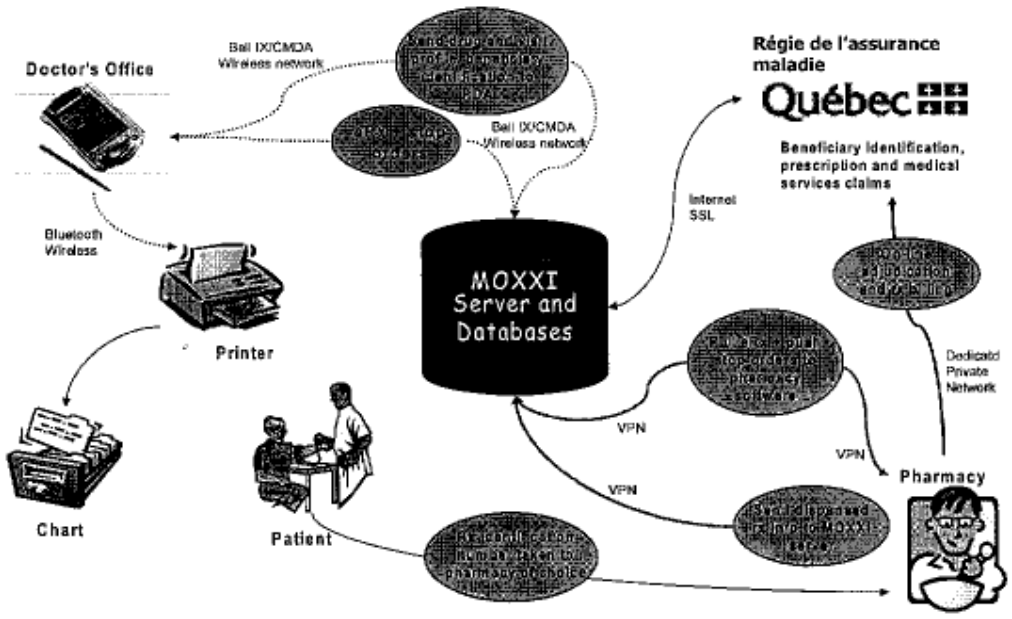


Figure 3: MOXXI Final project report, p. 69

"This project was an ideal example of integration, coordination and collaboration between health care providers located in different locations. It demonstrates that it is possible for different health professionals at different institutions in different communities to work together to provide a new service that benefits patients. The project facilitated interaction between different health professionals within the NWT, and between health professionals in the NWT and Alberta. The still image exam protocol resulted in improved communication between the eye technicians at the Eye Clinic in Yellowknife and the retinal surgeon at the Department of Ophthalmology, University of Alberta in Edmonton. This improved communication resulted in an improved triage service and streamlined eye care services between the Northwest Territories and the University of Alberta. Secondly, the still image exam protocol resulted in increased communication between the eye technicians and the local ophthalmologist at the Eye Clinic in Yellowknife." WestNet Ophthmalmology Evaluation Report, p. 74.

An example of a typically effective partnership structure, involving several different types of health professionals in several locations in two provinces, is shown at left.

Some interprovincial partnerships consolidated through CHIPP-funded initiatives will be key elements of the ICT landscape in future ICT developments in these regions. For example, the WHIC provider registry has enabled the integration of health information by demonstrating an effective multi-jurisdictional team process." [150] HIA, as a four-province partnership, identified similar benefits from the interprovincial partnership.[151]. In this case, an existing partnership was strengthened and expanded through the CHIPP program[152].

"CHIPP facilitated the building of new service partnerships and peer relationships not previously contemplated, which has strengthened the capacity of service providers at all levels BCTelehealth Final Project Report, p. 7.

Benefits of partnerships. According to the project evaluations, many benefits derived from partnerships, including most importantly: 1) better understanding of partners' environments, processes, and capacities, as well as increased mutual respect that accompanies better mutual understanding; 2) increased efficiencies, by reducing duplicate efforts and using shared tools, processes and insights; 3) improved capacities due to mutual learning (for example, at the level of services and providers (see illustration at left).

Governance. Governance was an issue that many projects came to grapple with in the course of multi-jurisdictional partnership. The experiences of several projects suggest that that partnerships were more effective when clear roles and responsibilities were negotiated among partners at the outset. Project charters were said in some cases to have facilitated this process, resulting in enhanced common understanding. In a few situations where the governance issues had not been adequately addressed, partnerships and hence project progress suffered. Two examples speak to the costs of ineffective governance. The first, Project Outreach, illustrates the tensions between involving and empowering partners, and the need for clear lines of authority and accountability. In this project, the governance structure was said to be diluted and lacking clear lines of authority [153]. Another, from the ER-Trauma arm of the BCTelehealth program (cited at left), evoked the same tension and added a nuance on the consequences of decentralized management in attempting to create a unified project team[154].

These examples might lead us to develop further hypotheses about the relative effectiveness of the various governance models adopted by the CHIPP projects. This was not an explicit issue for this evaluation, but could be examined in follow-up evaluation, where it would be of interest to compare the long–term success and sustainability of partnerships under more and less centralized governance models. For example, centralized project management was identified as a key success factor in the MBTelehealth project, while a networked membership model was seen as very effective in the NorthNet project – both of which were highly successful programs covering vast, neighboring regions.

[150] HealthNet/BC Provider Registry Final Report p. ii.
[151] HIA Final project report, p. 27
[152] HIA Case Study Report, p. 10
[153] Project Outreach Final Report, p. 35
[154] BCTelehealth Final Evaluation Report, p. 114

"We learned another lesson form our involvement with so many partners. Its important to include the potential players from the beginning, the beginning being the request for funding. This will not only give a chance for the partners to voice their opinions and concerns early, it will also allow them to include activities related to their project in their own timeline" (MOXXI Final Project Report, p. 51

Learning about partnerships. Many projects reported that much of what they had learned in the course of their projects was about partnerships. One learning that emerged from review of the project reports was a key, common condition required for successful partnerships: early involvement of partners at all levels (see example at left).)*".*

"These contractual evolutions were not only very time-consuming- extending the preparatory phase for almost a year into February 2002 – but also consumed significant resources that had not been budgeted for, including substantial legal fees. (BCTelehealth Final Report, p. 241).

Costs of partnership. The CHIPP partnership model also had its costs. In some ways, elements of the program design were mutually inconsistent: the relatively inflexible, short time frame, and the formal partnership requirement created pressure to rapidly negotiate multiple, complex agreements between numerous partners. As shown in the example at left. this often resulted in pushing back implementation dates, sometimes until just a few months before the CHIPP end date, as well as unanticipated costs. Another multi-province project noted that the time required for the design process likely exceeded that which an individual province might have taken. [155]

3.6.6 To what extent have the CHIPP contributions been augmented by financial and resource contributions from other sources, beyond the 50/50 contribution ratio agreement?

As Table 1 shows, the $83M contribution of partners to the CHIPP program was more than the CHIPP total of $71M. The percentage contribution per project varied. Eighteen projects received between 49% and 55% of their funding from partners, and 11 received more than 55% of the funding from partners. The highest level of partner contribution was 60% of the total.

Indirect evidence from the project reports suggests that partners may have made additional, undocumented contributions. The processes involved in negotiating and adapting the project designs when they required integration wthin existing systems, as well as the resources committed by information technology resources within deploying sites were not necessarily documented systematically.

Finally, this question is framed from CHIPP's perspective. If reframed from the point of view of those health systems which are integrating the results of the CHIPP projects into their ongoing service delivery and development plans, it may also be appropriate to ask how CHIPP has augmented provincial and territorial health systems' attempts to incorporate ICT-enabled services into the broader platform of ongoing funding, i.e., to examine what proportion of overall ICT

[155] WHIC Final Project Report, p. 16.

development activity in the funding period was supported or leveraged by CHIPP. As noted by key informant interviewees, even with the money invested in Infoway, a national strategy will require extensive investment and commitment on the part of government and industry.[156]

3.6.7 What impact did CHIPP have upon ICT initiatives and their sponsors that were not selected for CHIPP funding?

There is very little evidence in any of the evaluation data sources about this question. A planned survey of non-funded projects was set aside as a lower evaluation priority give the timeframe to complete the evaluation, but would have addressed the issue of what might have happened in the absence of CHIPP, and therefore help clarify to what extent observed changes in the ICT landscape can actually be attributed to CHIPP. This question remains largely unaddressed by the present evaluation. However, some key informants felt that the program had had an overall stimulating effect that extended beyond the 29 funded projects:[157]

Summary: Macro-level impacts

Based on the available data, it seems that CHIPP's impacts extended beyond the results of individual projects and help propel the ICT situation in Canada to a much higher level of overall activity, integration and common vision. The CHIPP projects contributed significantly to "mainstreaming" of ICTs into health care systems, with most telehealth projects are some EHR projects become fully integrated into provincial or regional service plans. It also contributed to enhancing integration of services from patients' and providers' perspectives, and may in some cases have contributed to improved continuity of care. CHIPP's partnership model has resulted in effective and ongoing partnerships within and between jurisdictions, and those partnerships were critical to project success. Governance in multi-jurisdictional partnership models emerged as an issue, with projects having varying approaches to, and degrees of success with, governance models.

3.7 Issue 7: Contribution of program design to objectives achievement

3.7.1 What difference did the program design elements make to participation in the program, the size and nature of projects, and the attainment of the program's objectives?

Matching funding requirement. The matching funding requirement was a key element of the CHIPP Program, and was clearly successful in promoting a collaborative approach to ICT development and implementation. The funding requirements guaranteed partner buy-in and joint ownership, recognized by many key informants and projects as a fundamental condition for advancing the ICT projects within their complex, multi-stakeholder settings. The key informant study noted that many respondents felt that the matching funds requirement encouraged implementation, rather than development – i.e., ensured that the goal was to implement and use

[156] Key Informant Interviews Report, p. 34.
[157] Key Informant Interviews Report, version 2.0, p. 20

functional systems in real, multi-stakeholder environments, rather than to develop new concepts or prototypes. Matching funding was also recognized as a key component of sustainability. It allowed ICT initiatives to move from the project-based funding mode to a mode where the partners most likely to be assuming sustainable funding could participate in an incremental fashion, from an early level of participation where they bear less risk, though to adoption of the final sustainable service when it has reached a certain level of maturity[158].

Cross-jurisdictional partnership requirement. There was a very varied interpretation of this requirement across projects, perhaps because its nature was not specifically prescribed in the mandatory requirements of the project selection criteria. Most projects worked to develop partnerships across geographical jurisdictions including provinces and territories, regional health authorities, and institutional catchment areas. Most also involved partnerships across professional jurisdictions, i.e., between different types of practitioners involved in health care delivery. There were few comments on this aspect of the program design across the various data sources, perhaps because the requirement was seen as fundamentally necessary for advancing ICT development. By one project it was noted that the requirements resulted in an "arranged" marriage among partners that proved difficult to manage[159].

Eligibility criteria. No evidence is available from any of the evaluation data sources that eligibility criteria in any ways affected projects' participation or nature, or constrained or enhanced their success. Of course, some of this information could only be obtained from teams that had looked to CHIPP for funding but did not meet the eligibility requirements. In general however, these requirements seem to have been non-problematic.

Selection process. Statements by several projects in their documentation or interviews suggested that the CHIPP RFP-based selection process was not necessarily well suited to this type of initiative, for two main reasons. First, the initial crafting of proposals required extensive consultation with stakeholders and partners. These discussions inevitably led to the development of expectations and relationships among organizations that had to be renegotiated when the proposal was modified substantially by Health Canada."[160] It would have been useful, according to these projects, to be able to engage in some early interaction with Health Canada about approaches and orientations, before going on to develop full funding proposals with full commitment from partners.[161]

A second issue identified was that the project-based RFP processes diminished the possibility of collaboration and mutual learning among funded projects: *"Several key informants commented that the RFP process had acted as a barrier to the sharing of best practices, because those competing for access to the same funding did not want to collaborate and share information. Similarly, a key informant commented that there had been a telehealth project preceding the current one, but that there was no access to the lessons leaned there."*[162]

A few comments made about the selection criteria suggested that some stakeholders felt too much emphasis had been put on regional representation, with a result that several meritorious projects were not funded.

---

158 Key Informants Interview Report, p. 22
159 BCTelehealth Evaluation Report, p. 108
160 HIA Evaluation Report, p.29.
161 HIA Final Project Report, p. 13.
162 SWOT-N/Videocare Evaluation Report, p. 43

Program Advisory Board. No information was available in any of the data sources about the Program Advisory Board. In particular, it was not mentioned as a support issue in any of the key informant interviews conducted.

Mid-term and final evaluation requirements. While there were many concerns expressed about the short timelines involved in the evaluation requirements, there was some evidence that the evaluation framework itself was helpful to projects that had not already fully developed an evaluation framework or model. The requirement for a mid-term evaluation was not seen as problematic, and in one case was said to have been helpful in some decision-making about subsequent project steps[163].

Other issues: More generally, an overall observation is that the CHIPP program could be said to have lacked some of the necessary business design tools to most effectively support the projects using an R&D business model. In such a model, there would be more flexibility to negotiate and renegotiate timelines within a non-competitive proposal development process, more emphasis on cross-project learning, and more administrative capacity to adapt to inevitable unforeseen technical, vendor, and collaborative challenges.

3.6.8 To what extent and in what manner did CHIPP's policies and implementation affect realization of the program's goals?

"Finalizing the Contribution Agreement with Health Canada took longer than originally anticipated. The original agreement had to be rewritten and resubmitted when the original funding request was accepted but for a decreased funding amount. This delay resulted in compressing the purchase of equipment, and implementation of Telehealth into a much shorter time frame than originally planned. This may have contributed to less user "buy in" which is a critical component of any change management plan". Yukon Telehealth Final Report, p. 12.

There was very strong consensus that some aspects of CHIPP policies and implementation may have worked against some individual projects' goal achievement.

Implementation delays. First, the selection process and resulting budget reduction were found by several projects to have resulted in delays that seriously compromised their ability to reach their goals within the time frame. In some cases, the submitted proposals had been the subject of lengthy negotiations among partners, which then had to be re-opened in light of the reduced funding. An example situation is shown at left.

Inadequate evaluation periods. A major consequence of the shorter experimentation was to reduce the meaningfulness and utility of the project evaluations, in a few cases to almost nil. This is exemplified in statement such as that found in the preface to the HIA Evaluation Report, stating that no reliable empirical information could be provided about the project[164]. HIA was a $24M program, so this lack of robust evaluation evidence is quite disturbing. This is a major shortcoming of the CHIPP program: many of the projects were unhappy with their external evaluations, because they had been done too hastily and/or had not been able to observe the project in a stage of mature implementation. At least 10 projects recommended extending the evaluation period so as to be able to conduct a more valid evaluation of projects' impacts. Key

[163] EOTN Evaluation Review Table, p. 12
[164] HIA Evaluation Report, p. vii.

informant interviews echoed this view.[165].

Project downsizing. In other cases, reduced funding meant elimination of one or more project components, which ultimately ended up reducing acceptance of the technology. For example, in the Yukon telehealth program, a planned radiology interpretation service was reduced to radiology support, which was regarded by practitioners as of questionable utility.[166]

CHIPP reporting requirements. An issue raised in many project reports and by key informant interviewees was that of the CHIPP reporting requirements, which were quite uniformly regarded as unexpectedly onerous, taking substantial resources from project time. This was especially difficult for the accounting of in-kind resources contributed by multiple institutions. "*The paperwork CHIPP required was excessive, both in terms of the volume and the detail required. I spent more time on the administrative requirements of CHIPP than I did on designing and operating the project. The paperwork was pretty much a full time job by itself."*[167] Several other projects noted that changes in reporting requirements over the course of the project as well as late delivery of tools and guidelines for reporting were not helpful; for example: "*In addition, it would have been helpful if the final format of forms and reporting procedures could have been reviewed with project administrators and finalized prior to the formal start of the project. As it was, changes in reporting processes and forms occurred throughout the project. In some cases this resulted in significant, unplanned expenditure and duplication of resources"*[168]. However, a minority of projects did seem to feel that the requirements were not unreasonable (some interviewees comparing them favourably to Infoway reporting requirements).

Support from OHIH. Reports from projects through interviews or their project documentation on the support offered by the OHIH team were mixed. Some were very positive, citing examples where the OHIH staff had been supportive and helpful[169]. The less positive reports came from projects that had experienced several turnovers in their OHIH liaison, and felt that this had had a detrimental effect on project timelines[170]

3.7.3 How effective were each of the following administrative features of the program in contributing to the attainment of program objectives?

Project leads: As discussed above, CHIPP project reports indicated general satisfaction with the support received from the project leads, feeling that the availability of a key point person within Health Canada enabled them to solve problems rapidly and effectively. There was some dissatisfaction with the turnover among project leads, as discussed above. No data sources commented on what might have happened in the absence of project leads, but it seems to reasonable to conclude that they were a helpful feature of the program.

---

165 Key Informant Interviews Report, p. 36
166 Yukon Telehealth Evaluation Report, p. 7.
167 Key Informant Interviews Report, p. 21.
168 ICMHIS Evaluation report, p. 48;
169 Key Informant Interviews Report, p. 18
170 Key informant interviews, p. 21.

Regional program coordinators. None of the data sources mentioned these resources, so it seems that they were not a very salient feature of the program. Their value to the program objectives cannot be assessed.

Horizontal activities in:

Project evaluation: As stated above, some of the projects reported that the evaluation framework itself was helpful if they had not already fully developed an evaluation framework or model. However, some views were expressed that the project evaluation materials should have been available sooner. Some projects would also have appreciated further support in the identification of a core set of standardized evaluation tools and measurable performance indicators, to permit better comparability among projects. Indeed, the project evaluation reports, despite the presence of a common framework, contain an enormous diversity of evaluation tools and indicators, and a lack of consistency in measurement of even the most basic outcomes such as system usage levels.

External vs. internal evaluation. Another issue that arose from the review of the project evaluation reports was the status of the evaluation team vis-à-vis the project team. While some projects had acted on the understanding that CHIPP required an external evaluation, others did not seem to have had this understanding. Eight of the 24 projects reviewed had conducted the evaluation themselves. Although these evaluations were not necessarily less rigorous – some of the least rigorous evaluations having been conducted by external evaluators – their objectivity may be open to question.

Privacy and security: The Privacy and Security Survey conducted was useful to OHIH for providing overall feedback on privacy and security issues. It was less helpful to the CHIPP projects however, as not all received feedback on their responses that would have allowed them to adjust their privacy and security practices. In those cases where feedback was received, adjustments were made resulting in high compliance with security standards. It is possible that this activity played a role in sensitizing CHIPP projects to privacy and security issues.

In another cases, the risk assessment process was said to have been helpful in analyzing and managing risks.

Intellectual property: The CHIPP program produced an internal document on intellectual property[171], reviewing the various policies, which might impact on intellectual properties produced by or in association with Health Canada. The document served as input into the preparation of the clauses related to intellectual property in the CHIPP Contribution Agreements. There is no other information available on horizontal activities with respect to intellectual property.

In their Project Reports, CHIPP project managers were asked to identify the documents and products generated in the course of the projects, the availability of these in paper or electronic form, whether a license fee is required for their use, and whether they have been or will be supplied to Health Canada. Each project generated at least 10 products, including include: project, implementation, business and sustainability plans, RFPs and contract templates for vendors, external evaluators and other external resources; job descriptions; model contracts; testing, training, technical, and operational manuals, guidelines and templates; clinical protocols, policies and procedures

[171] CHIPP Intellectual Property. Today-dated

manuals; evaluation tools; software applications, standards and minimal data sets; quality assurance procedures, consent forms; privacy and confidentiality procedures; and sustainability plans and analysis tools. An inventory of these pieces of intellectual property – all of which belong to the projects and/or their partners -- will be made available by Health Canada as part of the wider knowledge transfer associated with CHIPP. Those interested in accessing these will be asked to contact their proprietors. To the extent that this knowledge benefits other ICT initiatives, the intellectual property activities of CHIPP will have contributed to its objective of gaining knowledge on ICT-enabled health care renewal.

Sustainability. As mentioned above, CHIPP produced a set of guidelines for project sustainability[172] and required that each project submit a sustainability plan. Along with the matching funding requirements, this activity contributed to the overall high level of sustainability of the projects, by ensuring that sustainability was considered from the very initial phases of the project.

Standards and interoperability. CHIPP conducted several horizontal activities related to standards and interoperability. An inventory of standards was produced, and will be maintained by, the Canadian Institute for Health Information (CIHI)[173]. This inventory has four components: 1) the collection of health information standards and associated information; 2) a relational database to house and maintain the inventory; 3) a www. information kiosk permitting public access; and 4) a maintenance function to ensure update, security and functionality. According to the timeline in the report, this inventory was to have been online by October 2002.

Second, aiming to develop a coordinated approach to interoperability requirements for a pan-Canadian health infostructure, CHIPP conducted a survey of the CHIPP funded projects that sought to identify interoperability issues and solutions.[174] The survey report made a total of 18 recommendations under six issue areas: Ethical use of technology, Innovation, Standards and Interoperability, Convergence between telehealth and EHR, Education and awareness, and Collaboration and cooperation. It is not known what actions have been undertaken by relevant agencies (such CIHI, CSA, or Infoway) following these recommendations, but further follow-up could establish their impact.

In addition, the Standards and Interoperability group in CHIPP worked with individual projects to support the discussion and resolution of interoperability issues, contributing in some cases to successful implementation.

The key informant interview respondents mentioned the need for suitable national standards several times. While telehealth standards appear to be reasonable stable, the advancement of pan-Canadian electronic health records is believed to still require considerable effort.[175]

It should also be noted that several other initiatives with respect to standards and interoperability were conducted during the course of the CHIPP program, and that many CHIPP projects were very active participants in these. These included: a National Telehealth Interoperability Workshop by

---

[172] Office of Health and the Information Highway (OHIH) Health Canada. Telehealth and Electronic Health Record : A Guide to Sustainability. Tecknowledge inc, undated

[173] An Inventory of Standards for the Canadian Health Information System. Final report, January 31, 2002.

[174] CHIPP Standards and Interoperability Report. Part 1, Part 2 (Appendices), both dated July 2003.

[175] Key informant Interviews Report, p. 19

the Canadian Society of Telehealth conducted in February 2001[176], and the NIFTE guidelines (see below).

> *"The risk assessment and risk management processes were judged by the Project's Executive Committee and the Project Management Committee to have been a valuable and practical contribution to the overall management of the project." ICMHIS Evaluation Report, p. 49*

Risk management and project management: The CHIPP program produced a large number of projects and risk management tools and guidelines, a sample of which are: guidelines and protocols produced in support of project implementation and program oversight, including guidelines for the preparation of CHIPP Reports (midterm, final and evaluation); financial guidelines (for preparation of claims and progress reports; CHIPP financial guidelines and checklist (covering the financial aspects of managing contribution projects); guidelines for the disposition of capital assets); communications primer; site visit protocols; and guidelines for the closeout process. As mentioned above, many projects found the reporting requirements onerous, but there were few other comments on the utility of these tools. Risk management tools were also prepared (project monitoring guide; risk scorecard toolkit template; risk assessment for amendments to funding agreements); at least one project mentioned these as useful (see example at left).

3.8 Issue 8: Lessons learned

3.8.1 What contributions has CHIPP made to knowledge of best practices and key success factors?

This section of the report draws on the best practices identified through the key informant interviews and case studies, as well as some corroborating evidence from the project documentation.

Lack of existing best practice information. An emerging theme from the key informant interviews was that at the outset of the projects, there was little in place for ICT best practices in project management, risk assessment and mitigation, change management, protection of privacy, performance measurement and evaluation, sustainability, etc. specific to health care. While some of the CHIPP processes did help, many projects looked to project management best practices from outside industries. Many of the best practices that did emerge were often developed the hard way, through simple trial and error[177].

Best practices identified through overall information synthesis

Project /change management

Effective change management was consistently identified as the most critical factor in project success. Several best practices in change management can be identified through the various data

[176] A copy of the report is available at www.cst-sct.org.
[177] Key informant Interviews Report, p. 29

sources.

1. **Project managers and management processes.** The most critical element of effective change management was a competent and experienced project manager, familiar with the project's clinical and administrative environment, but with a primary skill set in managing large, complex projects. Numerous projects struggled with project management that was less than effective, resulting in midstream personnel changes that left them behind schedule. It was often noted that such individuals are very hard to find, and will continue to be in high demand as the field evolves. Development and nurturing of a cadre of such individuals and the creation of opportunities for their experiences to be valued and shared, might encourage the creation of a pool of available expertise for future generations of projects. Project reports contained many different suggestions for improvement, such as a more careful selection of project managers, the use of probationary periods to test their competence, better training, more experience, and employing a team of project managers rather than a single manager.

   One of the strongest themes expressed by respondents in the key informant interviews was that CHIPP projects were ultimately challenges in change management and business transformation. Information and communications technology, although certainly important, was simply an enabler[178]. In terms of best practices, the competent and experienced project managers described above should use effective project management processes, adapted to the networked, collaborative and fast-paced environment. CHIPP projects identified the following factors as key project management processes: 1) structured communications among all stakeholders based on a clear communications plan and protocol (see point 6, below); and 2) organized and consistent project management execution, with established timelines, milestones and reporting periods. CHIPP projects that began without a systematic project management approach soon found that they needed additional management resources.

3. **Distant-user support systems**. The stable presence of solid distant-user support systems can be identified as a critical success factor for ICT-enabled health services In telehealth projects, local site coordinators serve this role, and can be the key to unlocking uptake in the clinical community, as well as being indispensable local champions. In EHR projects, strong links to local users through liaison or interface teams were also important to ensure and maintain uptake.

   However, the CHIPP projects showed that these systems are often inadequately resourced. Enormous strain was often put on the individuals who had been selected for site coordination positions, and their employers sometimes failed to appropriately adjust for their increased workloads and responsibilities. Projects that suffered from high turnover among site coordinators due to these factors felt the consequences in terms of usage levels. The relative costs of staffing part-time positions may turn out to be greater for the overall organization than finding the resources for full- time positions from the outset, as part-time site coordinator positions tend to lead to burnout and turnover (from both part-time positions).

[178]Key Informant Interviews Report, p. 29.

4. **Clinical leadership.** The various data sources converged to suggest that experienced, sensitive and credible clinical leadership is essential for ensuring effective buy-in from professional communities. This leadership also has to be politically astute and experienced in dealing with complex jurisdictional and entitlement issues that surround adoption of innovations into health systems.

   This lesson was corroborated in the cross-case analysis of the case studies, where it was shown that buy-in or acceptance by physicians requires a physician champion. In addition, support of professional organizations or associations is also key to buy-in[179].

5. **Governance**: As noted above, projects achieved greatest success when there was a clear governance model or project charter from the start. Lack of these often led to delays and frustrations, and in some cases the effective collapse of partnerships. Adequate governance structures also need to be accompanied by accountability of project partners, with regular reporting of progress to all parties, and ongoing communications.

   As part of effective governance, partners should have a clear business plan for their involvement, so that they know what they expect to gain from, and contribute to, their participation. The governance structure should aim to balance 1) inclusivity of stakeholders; 2) the empowerment and participation of partners; and 3) the capacity for agile, efficient action. Highly elaborate committee structures wore project partners down and sometimes added confusion about responsibilities and mandates. More rarely, governance mechanisms that failed to adequately engage stakeholders resulted in resistance to change. No clear conclusion can be drawn by types of more and less effective governance structures, as several models used in the CHIPP projects appeared to be effective.

6. **Communication**. A best practice theme that emerged from the key informant interviews was the importance of communication and a shared vision: ICT development, introduction, and operation is an exercise in stakeholder collaboration. As such, strong communication between all parties is a critical success factor. In addition, it is important for stakeholders to develop the project vision early on and see that the message is properly communicated to all those involved. Some projects seemed challenged by the existence of multiple visions of what the project should be.

   This theme also emerged from the case-matching analysis. Across all six case studies, it was clear that effective internal and external communication were key to project success. Effective internal communication, whether it was firmly top-down such as in the SI-RIL project or focused on a central management component such as in the MBTelehealth project, was needed to build functional working relationships among team members. Effective internal communication was also important in building strong partnerships, an important element to all CHIPP-funded projects. It was also found across all six case studies that communicating with potential users of the system and with the general public during implementation was of utmost importance in building interest in the project and attracting

[179] Case Study Report, p. 140. See also Table 6.

users[180].

7. **Needs/practices assessment.** Review of the project documents suggested that needs assessment was as a key component of successful projects. In some cases, too hasty or incomplete needs assessment led to the design of projects that ultimately were less successful. The key informant interviews confirmed this, noting that successful projects tended to incorporate a thorough needs assessment, and spend the necessary time on systems analysis and design. In particular, they paid close attention to understanding users' existing work processes and looked for opportunities for improvement. Projects that had conducted a thorough analysis of existing situations – whether practice patterns, prescribing patterns, referral patterns, clinical vocabularies, work flows, information flows – were always more successful than projects that were missing information at the start that turned out to be critical later on. Successful projects also incorporated a feedback loop for users. Moreover, the costs, in both time and money, of revisiting sometimes considerable systems development work that failed to meet user or clinical needs on the ground, was much greater than the costs of having conducted a thoughtful needs/practices assessment at the outset.

   The cross-case analyses of the six case studies also identified needs assessment as a success factor. Needs assessment surveys acted to ensure that what was delivered via telehealth matched actual needs of communities. The inclusiveness of the process was found to be important for influencing the effectiveness of program design and success of user buy-in and expansion across projects[181].

8. **Stakeholder involvement**: Extending from the above, findings from the case-matching analysis showed that inclusion of stakeholders, partners, and collaborators in all phases of the project was considered a common best practice leading to success. Centralized management structure and rigorous project management set the stage for stakeholder representation and inclusion. A number of partnership-based strategies were used effectively to ensure sustainability and allow for future expansion[182]. The key informant interviews also suggested that successful projects were also careful to involve users -- physicians, patients, administrators, technicians --- throughout the project lifecycle, which helped to gain the required stakeholder support. Training was an important focus, as was ongoing support.

Risk assessment and mitigation

Best practices in risk assessment and mitigation that can be identified through the various data sources include the following:

1. **Risk assessment**: Those projects that conducted formal risk assessments found them both enlightening and useful. Thorough needs assessment and environmental scans can inform risk appraisal.

[180] Case Study Report, p. 142. See also Table 6.
[181] Case Study report, p. 140. See also Table 6.
[182] Case Study report, p. 140. See also Table 6.

2. **Planning for the unplanned.** Review of projects documents suggested that built-in flexibility in budgets and timelines to allow for contingencies was a characteristic of successful projects. Similarly, the willingness to adapt and be flexible was identified as a success factor in the key informant interviews: projects open to making adjustments on an ongoing basis were more successful than those who were not prepared to deviate from their original plans.

3. **Working with mature technology and common, open international standards.** Many of the risks encountered by projects were related to technology development and delivery. A key lesson learned from across these projects was that successful, timely and efficient implementation is best assured by working only with mature technology. Investment in embryonic or developmental technologies without guaranteed long-term support from a stable commercial vendor (as opposed, for example, to a university researcher/developer) was associated with many painful delivery and functionality problems. Projects that used open-source technology based on common international standards encountered fewer problems. In cases where existing standards do not provide the required functionality, time may be gained by waiting: for clear standards to emerge and for developmental products to pass the test of commercialization.

Protection of privacy

At the level of individual projects, much has been learned about best practices for protection of privacy in the context of specific ICT–enabled practices and specific technologies. Particularly on the EHR side, technological issues are still very challenging in the area of privacy, and will become more so as users begin to clamor for wireless technologies in ICT-enabled services.

Privacy protection procedures and practices have been easier to implement when the participating systems already have clear policies in place that the ICT-enabled services can adapt themselves to, or vice versa. Best practices would therefore include working closely, at the project design phase, with systems considering adoption of ICT-enabled services, to examine existing privacy policies, how they may interact with procedures foreseen, and how maximal harmonization can be achieved.

Performance measurement and evaluation

The quality of the project evaluations submitted as part of the CHIPP requirements varied greatly. Cochrane criteria[183] were used to rate the overall quality of each of the project evaluations. All the available evaluations would be considered Level IV or V, i.e. none used adequately controlled studies for their main evaluation reports. However, a few projects were conducting randomized trials or other controlled studies on particular issues, for which results were not yet available. In general, the evidence from CHIPP evaluations is based on more to less systematic surveying of project participants and stakeholders. A few more rigorous evaluations, which can be considered best practices, used either a pre-post design for key outcome measures, or comparisons to a previous or legacy system. In all other cases, comparisons were qualitative, based on respondents' perceptions of change.

[183] http://www.cochrane.org/consumers/sysrev.htm#levelsofevidence

As mentioned above, one-third (eight out of 24) evaluations were conducted by members of the project team. In several of these, the contents of the project final report and project evaluation report were almost identical, suggesting that the evaluation had essentially been driven by an internal management perspective. Two project evaluations conducted by the same external contractor also had some identical content, raising questions about the nature of the evaluation work conducted. Best evaluation practice would consist of external evaluation involving independent fieldwork and according to accepted standards[184].

Also as mentioned above, despite the presence of a common framework, there was little comparability among project evaluations even when they were addressing the same issues. Best practices would involve ensuring use of common, comparable indicators in future evaluations. The National Telehealth Outcome Indicators Project (NTOIP)[185] has established a web-based consensus building process to identify telehealth outcome indicators, which should help alleviate this problem in future evaluations.

The cross-case analysis also indicated shortcomings in the evaluation processes. Key informants and data sources from every project included in this case study analysis reported that project evaluations occurred too early in the project implementation period. For some projects, due to the short time frame for project implementation prior to evaluation, data derived from external evaluations is irrelevant, and therefore could not be used for lessons learned analysis and subsequent project expansion[186].

Sustainability

Three main best practices emerged from the evaluation data sources with respect to sustainability of ICT-enabled services:

1. **Partnered funding.** Clearly, partnered funding is a best practice that could be adopted generically throughout any new collaborative ICT initiatives, no matter the levels or institutional status of the partners. This seems to be a key determinant of sustainability.

2. **Early focus on sustainability:** Even though the CHIPP funding requirements were designed to encourage sustainability, some projects were clearly more focused on being able to sustain themselves post-CHIPP than others. The projects with an eye towards ongoing sustainability from the beginning were likely to be more successful than those who approached the project as more of a pilot initiative.

3. **Controlled growth of networks**. Many CHIPP projects found themselves facing demands for increased sites or applications beyond what they had initially committed to, and in all known cases tried to accommodate these (at least, no refusals were reported). In some

[184] Standards for Evaluation in Federal Departments and Agencies www.tbs-sct.gc.ca/Pubs_pol/dcgpubs/TBM_161/CHAP3-2_e.html ; Program Evaluation Standards, Joint Committee on Standards for Educational Evaluation, Sage Publications; www.twu.edu/hs/hs/hs5483/stdec.htm
[185] www.ucalgary.ca/ntoip
[186] Case Study Report, p. 139

cases, this growth created unmanageable demands on projects and their staff, while increasing the risks of failure. Best practices would call for a managed approach to sustainable growth based on a long-term vision of the fully developed network

Best practices and common issues identified in the cross-case analysis

Table 6, below, summarizes the best practices and common issues identified in the cross case analysis. These are grouped into six main themes that emerged from the comparative analysis across the cases.

Table 6: Best practices and common issues identified in cross-case analysis

Domains	Best practices and common issues identified
Project services and service goals	• Use of a Regional Clinical Advisory Team was useful to manage clinical applications and build upon best practices. • Lack of policy regarding physician remuneration for telehealth services meant that education and administrative activities were easier to implement, with clinical activities yet to be fully developed • Projects driven by people who were not clinicians did not adequately address issues that clinicians face in day-to-day consultations • Successful projects employed regional program coordinators or site coordinators to foster positive telehealth experiences for patients and providers • Telelearning applications enabled practitioners and administrators to participate in education and administrative activities despite common barriers to participation such as travel, weather, and scheduling. In addition, physicians in rural or remote areas noted that telelearning services helped to reduce some of the isolation they experienced and enabled them to develop closer ties with their colleagues. • Culture did not act as a barrier for the acceptance of telehealth in First Nations and Inuit communities and in some cases was a significant factor contributing to the success of the project. • Multijurisdictional projects required effective communication strategies, participation of relevant stakeholders, significant time and resources for planning and implementation, adoption of common standards and in some cases services provision agreements
Political and policy factors	• Success was dependent upon meeting the needs identified by partners, relevant stakeholders and end users • Projects were aided by political momentum through support of regional and provincial bodies that delegate project direction to an entity with the appropriate authority, mandate and experience. • Participation of senior management from partner organizations, rather than higher level political support, was also successfully used to foster a sense of ownership, contributing to user buy in and acceptance. • A key best practice with respect to policy development was employing a policy manager who not only developed policy, but became the link between the development team and the project team • While the submission process to the privacy commissions was laborious, having access to this type of review process was beneficial to both projects and provided valuable guidance
Assessment and evaluation	• Needs assessment surveys acted to ensure that what was delivered via telehealth matched actual needs of communities. • Project evaluations occurred too early in the project implementation period; as a result the utility of project evaluation data is questionable. There was no standardized measurement of cost effectiveness across the projects.
Champions, buy-in and user acceptance	• Having community champions as part of the project team was considered vital across the projects. Buy-in or acceptance by physicians required a physician champion and buy in by other clinicians was facilitated by support of their professional organization, association or local clinician champions. • User acceptance was considered a critical success factor across the six projects. Among the many key findings with regards to user acceptance, ongoing staff training was considered an important factor. Training also helped staff see the true value of the system as a whole. • User acceptance further increased when the system was user-friendly. The closer telehealth activities were integrated into practice, the greater the participation of health care professionals.
Collaboration, partnerships and integration	• The inclusion of stakeholders, partners, and collaborators in all phases of the project was considered a common best practice leading to success. Centralized management structure and rigorous project management set the stage for stakeholder representation and inclusion. • A number of partnership-based strategies were used to ensure sustainability and allow for future expansion. • Successful projects were governed by a steering committee of some sort which commonly contained high-level political representation steering committees that explicitly planned for sustainability

Communication and communication strategies	• Effective, well-planned communication strategies implemented early in the project were key to project success, to building functional working relationships among team members, and in building strong partnerships. • Best practices in internal communication strategies included: o Committees that meet frequently to manage various aspects of planning and implementation o Use of email and email attachments to circulate important documents and information o Project newsletter to keep staff and partners updated o Project website with information useful to project team (e.g., meeting minutes) o Project reports and logs o Training manuals, handbooks, reference guides, and site manuals for local staff use. • Communicating with potential users of the system and with the general public during implementation was of utmost importance in building interest in the project and attracting users.

.

3.8.2 What solutions to policy issues, such as reimbursement, licensure, and liability, did CHIPP-funded projects develop?

Reimbursement:. Physician remuneration for ICT-based services was a major concern for many of the CHIPP projects, and it was frequently cited as one of the key barriers to effective use of telehealth systems for clinical purposes. The Standards and Interoperability Survey[187] of 18 CHIPP projects showed that practitioners in all projects were receiving reimbursement for providing telehealth services: seven via fee-for-service arrangements, four from CHIPP project funding, one from capitation, three via sessional fees or contractual arrangements with provincial or territorial governments, and three via salary.

Although most provinces were either working toward or had resolved provider remuneration issues during the course of the CHIPP program, at the time of completing these projects and writing final reports, there was no fee schedule for physician telemedicine consultations in Ontario nor BC. Provider payment, fee-for-service, remuneration or reimbursement is mentioned as a continuing unsolved issue in three of the telehealth projects, (BC Telehealth, EOTN and NORTH Network) and is seen as critical for the general adoption of on demand and emergency consultations. The NORTH network currently pays providers a fee for service, but advocates that "*physicians must be appropriately reimbursed*"[188]. The Ontario Medical Association is negotiating with the Ministry of Health and Long Term Care regarding inclusion of telemedicine on the OHIP fee schedule. It can be inferred that CHIPP funding has helped to push this agenda forward in these two provinces.

Licensure. The Standards and Interoperability Survey[189] showed that half of the telehealth projects (9/18) provided telehealth services to patients outside of their own province or territory. Of these, five considered that the telehealth event occurred within the patient's jurisdiction, while three considered that it took place within the provider's jurisdiction. Two projects failed to comment on where they considered the telehealth event to have occurred. Those projects involved in cross border tele-consultation provided such cross border service by ensuring that providers were licensed in the patient's jurisdiction (six projects), and/or through memoranda of understanding between regulatory colleges which dictated licensure requirements (four projects). There were no provincial/territorial frameworks in place related to cross-jurisdictional licensing issues and projects did not identify clear liability frameworks.

Further details on this issue were provided in two project reports, BCTelehealth and NORTH Network where "*licensed health care providers can practice only on patients they see in the province/territory in which they have a professional license*"[190]. An exception was granted for specialists in Manitoba to provide telemedicine consults to Ontario patients they would normally see in person, so Manitoba physicians do not need licensure in Ontario when providing advice or consultation to a patient referred from an Ontario primary care provider. In BC, the Provider Registry is seen by the BC Telehealth program as taking a critical step towards cross-jurisdictional licensure where a licensing body would grant licenses to provide telehealth services in defined jurisdictions.

---

[187] CHIPP Standards and Interoperability Report. Part 1 July 2003.
[188] NorthNet Evaluation Report, p. 8.
[189] CHIPP Standards and Interoperability Report. Part 1, Part 2 (Appendices), both dated July 2003.
[190] NorthNet Evaluation report, p. 41

Overall, there is clear evidence that CHIPP has stimulated the development of solutions to cross-jurisdictional licensure issues, although the multitude of approaches suggests that these solutions were negotiated on a case by case basis, and could benefit from sharing of experiences.

Liability: The term is implied in more than one project but specifically mentioned in only one: BCTelehealth. This project recommends a formal consortium agreement be drafted when there are multiple partners, outlining roles and responsibilities of all parties, and legal liabilities re: funding, intellectual property, voting and decision making. There is no other evidence that CHIPP contributed to the development of solutions for liability.

3.8.3 What contributions have CHIPP-funded projects made to the emerging standards and guidelines for telehealth and EHR?

The area of standards and guidelines for telehealth and EHR are currently experiencing much activity and garnering much attention, in part because of the issues raised through the experiences of the CHIPP projects and their clearly established need for more fully developed standard and guidelines. In Canada, the question of emerging standards and guidelines has been raised to a high level of salience for telehealth with the publication of the National Initiative for Telehealth Guidelines (NIFTE)[191], released in September 2003. The report lists 17 guidelines for clinical standards and outcomes, 15 for human resources, six for organisational readiness, 22 for organisational leadership, and 17 for technology and equipment. Following up on the results of the Standards and Interoperability Survey, the Advisory Council on Health Infostructure (ACHI)[192] has commissioned a white paper on electronic health record interoperability covering policy and program standards related to EHRs and telehealth and their integration.

A review article about guidelines and standards[193] states that standards are quantitative and prescriptive, implying technical compliance with rigid and defined criteria. Guidelines imply the following of recommended and flexible practices, and are more qualitative and voluntary. In the project reports, the term "standard" was frequently invoked but in many different contexts and meanings. In some project reports, the term was used very loosely, and in general few solutions were offered. In one large project, solutions were addressed by forming "standards committees" in collaboration with CIHI to create common standards for, e.g., a Client Registry and for home care programs (HIA).

Imaging and equipment standards: In telehealth, PACS systems and teleradiology must be compliant with the DICOM standard. Additional needs for standards were also identified, including incident reporting process; equipment ergonomics addressing noise, air conditioning, lighting, etc. Imaging standards are also mentioned in the transfer of ophthalmology images (Westnet Teleophthamology Project) in which it was found that the transfer of high-resolution still images on CDROM was adequate for diagnostic purposes.

---

[191] National Initiative for Telehealth Guidelines (2003). National Initiative for Telehealth (NIFTE) Framework of guidelines. Ottawa: NIFTE.

[192] http://www.hc-sc.gc.ca/ohih-bsi/chics/achi_fpt_ccis_e.html

[193] Loane, M and Wootton R, A review of guidelines and standards for telemedicine, Journal of Telemedicine and Telecare 2002: 8: 63-71.

The CHIPP-funded telehealth projects identified problems for which there are yet no standard solutions, and for which guidelines are needed. They worked to develop standardized approaches to:

- Interfacing IP and ISDN networks, migrating services from one to the other, integrating video and data networks;
- Scheduling - especially multi point sessions;
- Interoperability needed within provincial borders to ease cross-project communications (the creation of an Ontario network of networks is seen as facilitating this) and across provincial borders (such as in the WHIC Provider Registry).

With respect to network infrastructure standards, the NORTH network developed a standard called the Point of Presence (POP proposal), which defined requirements and architecture for hospitals linking into the Smart Systems of Health (SSH) network. This architecture was subsequently adopted by many hospitals across the province.

Information standards: For EHR projects, the HL7 standard is mentioned in at least five of the project reports. The immaturity or inappropriateness of the new HL7 (v3) standard was found to be a deterrent to its adoption in two projects (WHIC and ICMHIS). Slow pace of vendor compliance is mentioned as one of the reasons for HL7 v3 immaturity. These and other projects adopted XML as an interim solution and found it to be a flexible tool for transferring information and capturing data inside documents. One project claims the lack of standards available for documenting clinical encounters in primary care is a draw back (COMPETE). The widespread adoption and movement towards web-based technologies has also encouraged the adoption of XML.

Standards of practice: the need for standard operating procedures is mentioned – solutions include documentation, follow-up, and monitoring.

Training standards: In reference to training, the lack of appropriately trained personnel along with the lack of training resources for the Health Telematics sector is mentioned in many of the projects. Lack of ongoing, quality training and support may have prevented use of some systems to their full capacity, and many projects mentioned the need for continuous training for personnel. Two projects found that trained personnel had to be available on-site to assist staff in the full use of EHR systems. More university training in health informatics was recommended, as well as standards to verify the competency of staff in terms of equipment use. .

3.8.4 To what extent has the knowledge generated within CHIPP been shared with ICT stakeholders? What action needs to be taken to ensure that the knowledge gained is effectively disseminated to target audiences?

In their project reports, CHIPP projects identified communications made to internal and external stakeholders. These usually showed a high level of communication activity, although one or two projects kept a lower profile. Thus, communication at the project stakeholder level seems to have been active and effective. Many projects stated that they will also continue to be involved in dissemination, both locally and more broadly.

However, many projects and key informants see a role for a more centralized and coordinated

information sharing effort, so as to ensure more rapid and direct dissemination of lessons learned and advances among those with similar interests and concerns. According to the key informant interviews, the CHIPP program was seen as somewhat less active than it could have been in this regard:[194] In particular, it was suggested that the CHIPP findings be used to assist in the education of practitioners and the public concerning the potential impact of ICT-enabled services.

[194] Key Informant Interviews Report, p. 31

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Overall conclusions: impacts of CHIPP on health services and systems

Overall, the results of this evaluation show that the objectives of the CHIPP program have largely been achieved:

Objective 1: To support primarily large scale implementation model projects involving several jurisdictions for shared development and implementation

The main impact of CHIPP on health services and health systems has been to propel development and implementation of ICT-enabled health services forward in a giant step that allowed participation from all parts of the country, while adapting models and services to the provincial and territorial contexts where they are become mainstreamed and sustained. Although there are still many challenges, the CHIPP program has made a significant mark on the ICT landscape, helping Canada begin to create the necessary national infrastructure for ongoing integration of ICTs into all aspects of health care.

According to data recently presented by OHIH[195], there are currently close to 700 telehealth sites in Canada. The CHIPP program was responsible for creating at close to one-half of these, notably in provinces and territories where no capacity existed previously. With respect to EHR, CHIPP has enabled significant progress in key areas with potentially large-scale application such as client management systems, patient records, electronic prescribing, and provider registry.

Objective 2: To facilitate collaboration and sow the seed for accelerated implementation of health service delivery renewal across the country

The CHIPP program model was particularly successful in several key areas where it is unlikely that such progress would have occurred in its absence. First, CHIPP succeeded in creating sustainable collaboration and partnerships, often across multiple jurisdictional boundaries. These partnerships, more than any other program outcome, will form the foundation for future development of ICTs in health care. The partnerships will also likely serve as models for new partnerships as the ICT landscape continues to evolve.

Second, the CHIPP program has produced largely sustainable projects that are likely to, or are in the process of becoming, integrated into mainstream health systems. This is an important evolutionary step in the development of ICT-enabled services, which until now have been very often piecemeal pilot projects, only loosely connected to the mainstream provincial and territorial health system. In many jurisdictions, the mainstreaming of ICTs is expected to contribute to ongoing health service renewal.

Objective 3: By supporting telehealth applications such as EHRs, telemedicine and telehomecare, to help improve the quality, accessibility and efficiency of health service delivery to Canadians

[195] INFOWAY briefing presentation, July 2003

The evidence for the achievement of this objective is mixed, for two main reasons. First, although acceptance of ICT-enabled services (a pre-condition for other outcomes) is adequately high and some of the project evaluations provided relatively strong evidence of CHIPP impacts on accessibility, quality and efficiency of health services, as well as on patient health outcomes, in most cases the evaluation periods were not sufficient to capture the impacts of fully mature ICT-enabled services. Second, the challenges of conducting evaluations in this area resulted in evaluation designs that, while providing results that are suggestive of positive impacts, will need to be confirmed more rigorously.

The evidence that is available at this point does provide some useful hypotheses about the potential impact of ICTs on health service delivery to Canadians living in rural and remote areas. The evaluation findings suggested that most of the gains were through provision of already-accessible services more conveniently and at lower costs to patients. Situations where the ICT-enabled health services implemented through the CHIPP program improved access to services that Canadians could not access before were rare. Thus, the impact of ICT's on access to previously inaccessible services is more indirect than might have been foreseen, and may suggest that the problem of lack of access is less acute than had been assumed. The most impressive results in terms of impacts on increased access to care came from projects that used technologies to bring services directly to patients, rather than using them to facilitate distant access. There was also some evidence that some ICTs enhanced globality or comprehensiveness of care, which may ultimately influence case management, transitions between previously silo-ed health systems, and health outcomes.

Objective 4: To help gain knowledge on ICT-enabled health care renewal through a comprehensive evaluation of individual projects supported by CHIPP and the program as a whole, and collection of lessons learned

The present evaluation study, with its several components, has aimed to build from the project-level evaluations to provide a comprehensive overall evaluation, as well as to identify best practices and lessons learned. CHIPP has also produced an enormous amount of information, in the form of tools, products, protocols, standards, best practices, and lessons learned, which if they are disseminated throughout the relevant user communities, have the potential to accelerate ICT development by allowing health systems to build on previous learning and avoid previous mistakes.

This evaluation has focused on a relatively broad set of evaluation questions prioritized so as to provide key information within the available CHIPP time frame. However, there are obviously many other issues and questions related to the development, implementation, and impacts of ICTs in health care that could be explored through additional mining of the enormous amount of information produced by the CHIPP program. It would likely be of great value to encourage further analyses, at deeper levels, of all the data available to this evaluation.

4.2 Inconclusive and mixed findings: knowledge needs

This evaluation of the CHIPP program has found that, due to inconclusive and mixed findings, knowledge gaps remain. The gaps are primarily due to two factors: 1) the limited timeframe available for project evaluation post-implementation, and 2) weaknesses and inconsistencies in the project-

level evaluations. Knowledge is especially limited in the area of cost-effectiveness of ICT-enabled systems, and more generally, on their impacts on the efficiency and long-term viability of the health system. It is only through more complete and rigorous data collection and analysis that it will be possible to understand the cost-effectiveness of these programs.

To enable a better understanding of the cost implications of CHIPP-supported programs it would be valuable to implement a structured cost-effectiveness analysis in all projects. This would involve an ongoing review of costs that are collected and reported according to an established protocol over an extended period of time (2 to 5 years). Outcomes data would likewise be collected, and may involve use of data from outside of the CHIPP-supported program (e.g., health services use administrative data). Where possible, appropriate control groups should be identified—either using an interrupted time series design or a quasi-experimental design (with geographically distinct groups, for example).

Another main area of knowledge gaps is that of impacts on patient outcomes. As all stakeholders are already aware, assessing such impacts will also require longer term studies and appropriate controlled designs like those described above, ideally comparing outcomes obtained through the ICT-enabled services to those obtained in the general patient population, through health services utilization data. Although several of the CHIPP findings were suggested of positive impacts — especially in the area of diabetes care – further work is needed to confirm these findings.

One of the unexplained findings from this evaluation was differences among telehealth programs in their relative uptake of clinical uses of the videoconferencing systems. Given the high priority placed by decisions-makers on using telehealth to increase access to care, it would be worthwhile to further investigate and elucidate reasons for the differences among telehealth programs, and in particular the key drivers of clinical usage. The differences may simply be due to lack of adequate follow-up times for the systems to mature; but they may also reflect differences in approach to clinical practice through ICTs.

Finally, this evaluation was unable to accommodate systematic review of five of the 29 funded projects. It would be advisable to review these projects as completely as the other 24 to ensure that their findings do not invalidate the overall evaluation results.

4.3 Recommendations for advancing the potential of ITCs to enhance health, health care, and health systems

Overall, the evaluation findings suggest that there are three key areas where work is still needed to advance the potential of ICTs in Canadian health care systems.

1) **More and longer evaluation:** this merely reiterates what has already been said about knowledge gaps, and would help resolve probably the major weakness in the CHIPP program as a whole. Clearly, the evaluation efforts conducted under CHIPP, up to and including the present evaluation, can only provide a partial and early assessment of the impacts of ICT–enabled services on health care and health systems. Most of the evaluation work to date has been through uncontrolled studies, with a lack of standardized approaches to measurement and an inadequate follow-up period. Long-term studies with appropriate controls rigorously assessing impacts aims on key outcomes -- accessibility, quality and

health system costs – are needed. Key stakeholders such as Infoway, First Nations and Inuit Health and Health Policy branches of Health Canada, and the Canadian Society for Telehealth should be invited to collaborate in these evaluations, to ensure that their emerging concerns are addressed.

Although highest quality evaluations appear to have been conducted by teams located in or affiliated with university departments, some university-based evaluations were also quite weak. There is clearly a need to develop evaluation capacity in this area, both among university-based evaluators and private evaluation consultants. There is strong support for ongoing evaluation from the ICT stakeholder community:[196]

2) **Knowledge transfer and dissemination:** Also required is an effective coordinated approach to knowledge dissemination. This would include better communication among initiatives, to ensure that lessons learned and best practices are shared, as well as the development of knowledge transfer mechanisms to reach stakeholder communities including health system administrators and decision-makers, practitioners and their professional bodies, post-secondary training institutions, and product vendors, to name but a few. These mechanisms should also include feedback loops to ensure ongoing mutual learning from all sectors.

3) **National leadership on standards:** Finally and most centrally, the CHIPP vision was to contribute to the development of a health system, which, Canada-wide, is able to reap the potential benefits of ICTs in health care. Development, dissemination and support of national standards is a critical success factor for achieving this vision, and the CHIPP experiments can contribute a great deal to the emergence of this once their learnings have become consolidated. Standards are needed in the areas of privacy, interoperability, scheduling, multi-jurisdictional information transfer, personnel qualifications and training, organizational processes, and clinical protocol.

   The ideal organizational locus of this national leadership is not clear, as there are several entities that could play key roles. Health Canada/OHIH does not see itself as appropriately adopting a leadership role in developing standards, but may take the lead in coordinating the various stakeholders.

In conclusion, the major investments made by the CHIPP program partners has paid off in terms of major advances in the position of ICT-enabled health services with Canadian health care systems, and in the potential to reap many potential, but as yet not fully realized, benefits. Much was accomplished during the short life span of the program, and continued efforts need to be made to ensure that those accomplishments result in widespread sharing of what had been learned.

[196] Key Informant Interviews report, p. 40.

APPENDIX 1

Evaluation Advisory Committee Members

Wayne Boyce – Manitoba Telehealth

Jean Fratelli - Executive Director, Electronic clinical information network of the Agence de développement de réseaux locaux de serices de santé et de services sociaux.

Dr Penny Jennett – University of Calgary, Community Health Sciences, Faculty of Medicine

Dr Mo Watanabe – University of Calgary, Faculty of Medicine

APPENDIX 2

Detailed Evaluation Issues, Questions, Indicators, and Data Sources

Appendix 2: CHIPP evaluation - revised evaluation issues, questions and indicators – proposed final version Feb 6,2004

CHIPP Program objectives as approved by Cabinet and Treasury Board[1]:

- *The funding would support primarily large scale implementation model projects involving several jurisdictions for shared development and implementation;*
- *The program would facilitate collaboration and sow the seed for accelerated implementation of health service delivery renewal across the country;*
- *By supporting telehealth applications such as EHRs, telemedicine and telehomecare, the program will help improve the quality, accessibility and efficiency of health service delivery to Canadians;*
- *The program will help gain knowledge on ICT-enabled health care renewal through a comprehensive evaluation of individual projects supported by CHIPP and the program as a whole, and collection of lessons learned.*

Definitions:

Clients = patients, cases
Providers = health, social service or any other types of professionals providing any type of clinical or educational services
Users = people using the ICTs as part of their tasks; includes administrators and other non-clinical users; may also include providers who are not acting in their service-delivery role when using (e.g., nurses on a planning committee)

[1] From: Proposed Strategy for the Evaluation of the Canada Health Infostructure Partnerships Program: document prepared for Advisory Committee meeting; and : Proposed Strategy for the Evaluation of the Canada Health Infostructure Partnerships Program, detailed document with appendices, both summarizing the Treasury Board submission and Memorandum to Cabinet.

Revised evaluation issues and questions	Indicators[2]	Data sources
1.0 ACCEPTANCE OF ICTs IN HEALTH CARE[3]		
1.1 What impact did the CHIPP-funded projects have on the acceptance of ICT in the delivery of health services and information? What factors facilitate/inhibit the acceptance of ICT solutions by stakeholders, including providers, patient, administrators, and the general public?	Change in awareness of ICT role **Client and user satisfaction with ICT service: global, and satisfaction with ease of use, effectiveness, efficiency and economy** **Change in usage levels** Presence of systemic dis/incentives to acceptance/utilization	User and client satisfaction surveys: project evaluations Usage levels: project evaluations Stakeholder interviews/surveys: project evaluations Key informant interviews: all stakeholders[4]
1.2 To what extent and in what manner do the projects plan to continue and grow?	**Proposed changes in number of sites and range of services** Incorporation into permanent budgets	Conclusions of project evaluations Key informant interviews: project managers and partners
2.0 ACCESSIBILITY TO HEALTH SERVICES		
2.1 What was the impact of the CHIPP-funded projects on accessibility of care and health information?	Changes in utilization of health services/information Changes in travel time to access services Changes in travel costs to access services Changes in ease of access to services /information **Change in type and number of services available locally** **Provider and patient satisfaction with access** Perceived impacts on access to remote services	Health service/information utilization data: project evaluations Travel time and costs data: project evaluations Provider and client interviews/surveys: project evaluations Records of services available: project evaluations Stakeholder interviews/surveys: project evaluations User and client satisfaction surveys: project evaluations Key informant interviews with providers and relevant NGOs
2.2 What impact have the CHIPP-funded projects had on referral patterns?	.. Change in consulting specialist	Records of services available: project evaluations Records of specialist/referral center use: project

[2] Indicators in bold were given higher priority by CHIPP staff.

[3] Overall the evaluation should reflect a broader view of "health care" than clinical activity i.e. be grounded in a view of the health system that includes health determinants, prevention, protection and health promotion, as well as health system administration and intersectoral activity involving the health system.

[4] Key informant interviews will include projects' coordinators, leads, primary administrators, or managers; members of the Innovation and Investment Division (IaID); Members of the Office of Health and the Information Highway (OHIH); Medical Officers of Health; provincial health system leaders; relevant professional and other non-governmental organizations; vendors; aboriginal representation; ICT Critics; Health Canada (national policy perspective); and patient/consumer advocate groups.

Interview guides may vary by type of informant.

	Change in location of consulting specialist/ referral center Perceived impacts on referral systems	evaluations Stakeholder interviews/surveys: project evaluations Key informant interviews with providers and relevant NGOs
3.0 QUALITY OF CARE		
3.1 What impact have the CHIPP-funded projects had on the speed of service (wait times and timeliness)?	**Level of and changes in provider and client satisfaction with speed of service** Change in wait times for treatment Changes in waiting lists Perceived impacts on timeliness of services	User and client satisfaction surveys: project evaluations Records of wait list times: project evaluations Records of waiting list length and composition: project evaluations Provider interviews/surveys: project evaluations Key informant interviews with providers and relevant NGOs
3.2 What impact have the CHIPP-funded projects had on the quality of diagnoses and treatment?	**Provider and client satisfaction with quality of diagnoses and treatment** .. Incidence of adverse events/errors ..	Provider and client satisfaction surveys, project evaluations Key informant interviews: providers and relevant NGOs Records of adverse event/errors: project evaluations ..
3.3 What impact have the CHIPP-funded projects had upon skills development and the recruitment and retention of health care providers?	**Changes in satisfaction with opportunities for skills development** Perceived changes in scope of practice and professional autonomy Changes in staff turnover rates Changes in duration of employment	Provider interviews/satisfaction surveys, project evaluations Key informant interviews: providers, health system managers, relevant NGOs Records of staff turnover: project evaluations Records of employment duration: project evaluations
4.0 EFFICIENCY AND LONG-TERM VIABILITY OF THE HEALTH SYSTEM (HEALTH SYSTEM RENEWAL)		
4.1 What has been the impact of CHIPP projects on the efficiency of health care providers and the services they deliver?	**Efficiency in comparison to status quo** **Perceived impacts on efficiency** Changes to marginal cost of delivering service(s)	Cost-effectiveness data: project evaluations Marginal cost assessment data: project evaluations Key informant interviews: F/P/T stakeholders, health system managers Case studies
4.2 How optimal are the usage levels of the equipment implemented in the CHIPP-funded projects? To what extent is there a growing balance between opportunity costs, investments, and increased efficiencies? What opportunities exist for optimization and sustainability?	**Evolution in average daily/weekly usage by site by type of application/service: cost per usage over amortized equipment/infrastructure cost** **Perceived adequacy of usage and implications for optimal usage and sustainability**	Usage levels/equipment costs: project evaluations Key informant interviews: all stakeholders Case studies

4.3 What has been the overall impact of the CHIPP-funded initiatives on costs for the health system?	Changes in average per capita costs of delivering services **Changes in total costs of delivering and supporting service(s)** **Perceived impact on costs for the health system**	Cost-effectiveness data: project evaluations Total health system costs data: project evaluations Key informant interviews: F/P/T stakeholders, health system managers
4.4 What has been the overall impact of CHIPP-funded projects on the cost-effectiveness and viability of the health system?	Perceived impacts on service use appropriateness **Perceived impacts on cost-effectiveness** **Perceived impacts on health system viability**	Key informant interviews: providers, F/P/T stakeholders health system managers, relevant NGOs Case studies
5.0 IMPACT ON PRIVACY		
5.1 How has CHIPP influenced privacy policy and procedures developments in Canada?	**Perceived impacts on changes to fed/F/P/T privacy policies**	Key informant interviews: F/P/T stakeholders, relevant NGO's, CHIPP managers
5.2 What were clients' views on the handling and use of their personal information?	**Client satisfaction with handling and use of their personal information**	Client satisfaction surveys: project evaluations Key informant interviews: Patient/consumer representatives
5.3 To what extent did the privacy/confidentiality rules and guidelines impact on service delivery?	Changes in client and provider satisfaction with impact on service **Perceived impacts on services delivery**	Client and provider satisfaction surveys: project evaluations Key informant interviews: Patient/consumer representatives
6.0 MACRO IMPACTS OF CHIPP		
6.1 How did CHIPP change the ICT "landscape" in health care in Canada, directly and indirectly?	**Change in number and types of ICT-enabled services delivered** (clinical, educational, administrative) **Change in number and distribution of sites** **Change in size of population served** Incidence of ICT projects outside of CHIPP: no. of non-funded projects that proceeded anyway; no. of non-applicants that proceeded without CHIPP funding (secular trend/denominator) vs. no of CHIPP projects	Key informant interviews: F/P/T stakeholders, relevant NGO's, CHIPP managers
6.2 To what extent has CHIPP contributed to "mainstreaming" of ICTs in the health care system? (integration from a health systems perspective)	**Perceived impacts on mainstreaming:** assessment of integration of ICTs in health as clinically and financially integral components of the health care system	Key informant interviews: F/P/T stakeholders, relevant NGO's, CHIPP managers; patient/consumer representatives, providers Case studies
6.3 In what manner and to what extent has CHIPP influenced the integration of service delivery? (integration from a patient/service delivery perspective)	**Perceived impacts on service delivery integration** Evidence of improved linkages across the continuum of care	Stakeholder surveys: project evaluations Key informant interviews: F/P/T stakeholders, relevant NGO's, CHIPP managers; patient/consumer representatives, providers

	Integration of ICT use into clients' ongoing service utilization Change in policies and procedures Change in information flows	Patient trajectory data: project evaluations Case studies Records of changes in policies and procedures: project evaluations Records of changes in information flow: project evaluations
6.4 How have the CHIPP-supported projects affected the communities and regions apart from health care? What importance do these developments hold for the future of ICTs in health care?	Usage levels for economic, social, other uses of equipment **Perceived impacts on communities and regions** **Perceived enhancement of communications infrastructure** **Accounts of development of strategic partnerships and cost-sharing** **Perceived implications for future of ICTs in health care**	Usage levels: project evaluations Key informant interviews: F/P/T stakeholders, relevant NGO's, CHIPP managers; patient/consumer representatives Case studies
6.5 To what extent did CHIPP contribute to effective and sustained partnerships/collaborations within and between jurisdictions? What difference did these partnerships/collaborations make to realization of CHIPP's goals?	**Perceived contribution to effective and sustained partnerships/collaborations within and between jurisdictions**[5] **Perceived impacts of partnerships/collaborations on CHIPP goal attainment**	Key informant interviews: all stakeholders Case studies
6.6 To what extent have the CHIPP contributions been augmented by financial and resource contributions from other sources, beyond the 50/50 contribution ratio agreement?	**Recipient and partner contributions** (total and per cent of CHIPP contributions)	Project final reports
6.7 What impact did CHIPP have upon ICT initiatives and their sponsors that were not selected for CHIPP funding?	**Incidence of ICT projects outside of CHIPP, including applicants (indirect effect) and non-applicants (secular trend/denominator)** Incidence of sustained partnerships	Key informant interviews: F/P/T stakeholders, relevant NGO's, CHIPP managers
6.8 To what extent and in what manner did CHIPP's policies and implementation affect realization of the program's goals?	**Perceived impacts of policies and implementation on CHIPP goal attainment**	Key informant interviews: all stakeholders Case studies
7.0 CONTRIBUTION OF PROGRAM DESIGN TO OBJECTIVES ACHIEVEMENT		
7.1 What difference did each of the following elements of the program's design make to	**Perceived impacts of program design features on participation, size and nature of projects, and objective**	Key informant interviews: all stakeholders

[5] In the broadest sense: including federal-provincial, inter-provincial, inter-Regional Health Authority (and inter-RHA across provinces); inter-professional, inter-institutional, and inter-regulatory jurisdictions.

participation in the program, the size and nature of projects, and the attainment of the program's objectives?: - matching funding requirement - cross jurisdictional partnership requirement - eligibility criteria - selection process - Program Advisory Board - mid-term and final evaluation requirements - others	**attainment**	

7.2 How effective were each of the following administrative features of the program in contributing to the attainment of program objectives?
- project leads
- regional program coordinators
- horizontal activities in:
  - project evaluation
  - privacy and security
  - intellectual property
  - sustainability
  - standards and interoperability
  - communications
	Perceived effectiveness of administrative features contributing to attainment of program objectives	Key informant interviews: all stakeholders
		Case studies

8.0 LESSONS LEARNED		
8.1 What contributions has CHIPP made to knowledge of best practices for: - project management - risk assessment and mitigation - change management - protection of privacy - performance measurement and evaluation - sustainability?	List of best practices identified for each of: project management, risk assessment and mitigation, change management, protection of privacy, performance measurement and evaluation and sustainability; assessment of their number, importance and generalizability	Project final reports Key informant interviews: all stakeholders Case studies
8.2 What are the key factors that explain the relative success or failure of the projects to be implemented and sustained? In particular, what change management strategies proved particularly successful?	List of key factors identified explaining success or failure; assessment of their number, importance and generalizability Examples of more and less successful change management strategies	Project final reports Key informant interviews: all stakeholders Case studies

	Examples of operation of key success and failure mechanisms (explanatory)	
8.3 What solutions to policy issues, such as reimbursement, licensure, and liability, did CHIPP-funded projects develop?	List of solutions developed to policy issues including reimbursement, licensure, and liability; assessment of their number, importance and generalizability	Key informant interviews: all stakeholders Case studies
8.4 What contributions have CHIPP-funded projects made to the emerging standards and guidelines for telehealth and EHR? What has been learned from CHIPP's experience about the state of standards development and their implementation?	List of contributions and potential contributions to standards and guidelines; assessment of their number, importance and generalizability List and synthesis of learnings about standards development and implementation; assessment of their number, importance and generalizability	Key informant interviews: project managers, experts, F/P/T stakeholders, CHIPP program managers Case studies
8.5 To what extent has the knowledge generated within CHIPP been shared with ICT stakeholders? What action needs to be taken to ensure that the knowledge gained is effectively disseminated to target audiences?	List of knowledge sharing activities and stakeholders participating in them; assessment of their number, importance and generalizability List of prioritized actions to ensure effective dissemination; assessment of their number, importance and generalizability	Key informant interviews: all stakeholders Case studies

APPENDIX 3
Project Documents Reviewed

Appendix 3 - CHIPP Projects and Documents Jan 26 2004

Title and sponsor	Project/file no.	Technology - Populations	Main reports and other documents *(exact file names unless in italics)*
Alberta First Nations Project to Screen for Limb, I-Sight, Cardiovascular and Kidney (SLICK) Complications using Mobile Diabetes Clinics University of Alberta, Edmonton, Alberta	Project 0114 G36FDY0114	Two vans outfitted with lab equipment and information and telecommunications technologies: rural and remote First Nations	FINAL SLICK REPORT Dec1 2003 Qualitative report Diane Moir Sept 03 Review and comments on final evaluation report
Application en milieu rural de la télémmédecine de première ligne au Témiscamingue Centre de santé de Sainte-Famille, Québec	Project 084 G36FDY0084	Interactive videoconferencing network: senior, remote communities, First Nations	Comments on draft evaluation report
BC Telehealth Program Health Association of British Columbia	Project 099 G36FDY0099	Real-time videoconferencing and store and forward imaging, for specialized infant and child health services	BC Telehealth Final Report + 9 folders of appendices; *appendix J contains* BCTelehealth Program ped v1 *(an evaluation report)* BC Telehealth 2nd Eval review Table 031212CA BC Telehealth Eval Review Table 031117CA BC Telehealth - REV
Bridges to Better Health Children's & Women's Health Centre of British Columbia, Vancouver, British Columbia	Project 0153 G36FDY0153	Electronic health record – pediatric cancer	Bridges Final Report Final Bridges Evaluation Report Zipped file called "Process models" Bridges to Better Health Eval Review Table 040110CA
Central BC-Yukon Telemedicine Initiative Thompson Health Region, Kamloops, British Columbia	Project 095 G36FDY0095	Teleradiology – remote communities	#95 Final Project Report Final Project Report

CLSC of the Future: Telehealth and Tele-home Care Centre local de services communautaires (CLSC) Orléans		Electronic health record for traveling home care workers; tele-surveillance	
COMPETE Centre for Evaluation of Medicines, McMaster University, Hamilton, Ontario	Project 0035B G36FDY30035B	Electronic records and health information, physicians and patients with diabetes	CHIPP Final Project Report dec 24 03 G36FDY035B Complete Final Project Report Dec 24 04 Evaluation Project Report for CHIPP dec 22 03
Development and Implementation of an Integrated Community Mental Health Information System The Capital Health Region and the Victoria Cool Aid Society	Project 002 G36FDY002	Electronic health records: community living mental health patients	ICHMIS Evaluation Report ICMHIS (VIHA) Evaluation Review Table 031229CA
Eastern Ontario Health Network Pembroke General Hospital, Ontario	Project 0023 G36FDY0023	Interactive videoconferencing; rural patients	FINAL PROJECT REPORT + 13 appendices and numerous other documents Final EOTN March 2003 + 19 other documents Easter Ontario telehealth Network Eval review Table 040104CA
Health Infostructure Atlantic Departments of Health, New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador	Project 0015 G36FDY0015	Integrated case management electronic health records Teleradiology	HIA Project Evaluation Report V2.0 HIA Project Evaluation Report V2.0 Final Project Report August 2003 HIA Final report Sept 2003 + 13 presentations Health Info Atlantic Eval Review Table 040102CA
Healthlink Okanagan Similkameen Health Region, British Columbia	Project 0046 G36FDY0046	Health information system for community-living seniors	HealthLink Final Report HealthLink Evaluation Report – working version HealthLink (Interior Health) Eval Rev Table 031222CA
HealthNet/BC Provider Registry Western Health Information Collaborative)	Project 0021 G36DFY30021	Provider information system to allow entry to patient electronic health records	WHIC Provider Registry Final report v1 + *4 folders with numerous other documents (*Design documents, operations documents; Project Management documents; User Documents) Part A CHIPP Evaluation v1

			CHIPP Evaluation Aggregates WHIC Provider Registry Eval Review Table 031224CA
IIU Network Department of Health and Social Services, Government of Nunavut	Project 055 G36DFY0055	Interactive videoconferencing: remote communities	Nunavut Telehealth Implementation Report Appendices implementation Technical Survey –Report Final IIU Nunavut final project evaluation report v1.4 IIU Report Appendices 1.31 IIU Nunavut Telehealth Eval Review Table 031224CA
MBTelHealth Network Winnipeg Regional Health Authority	Project 0027 G36DFY0055	Interactive videoconferencing: rural and remote communities	Manitoba Final report MBTelehealth Ev Final draft MBTelehealth Ev Final_Appendices MBTelehealth Eval Review Table 031206CA
MOXXI McGill University, Quebec		Electronic prescribing system	
NORad North Eastern Health Services Alliance	Project 0038 G36DFY0038	Teleradiology: remote communities	CHIPP NORad Final Report NORad Project Evaluation report – Final Northern Radiology Eval review Table 031128CA
Northern Ontario Remote Telecommunications Health (NORTH) Network Sunnybrook and Women's Health Centre	Project 083 G36FDY0083	Interactive videoconferencing: rural and remote communities Teleradiology	Final CHIPP Project Report + *16 appendices* NORTH Network Program Phase II Evaluation Report June 2003 + *23 appendices* North Network Eval Review Table 031117CA
Project Outreach St. Joseph's Health Care, London, Ontario	Project 149 G36FDY30149	Interactive videoconferencing: psychiatric patients, rural, remote and Aboriginal communities	Master report –Final copy + *12 appendices and 7 responses to HC questions* Outreach Draft Evaluation Report
Regional Clinical Oncology Information Highway Project Centre hospitalier régional de Trois-Rivières,		Electronic health information system: cancer patients	

Québec			
Regionally Accessible Secure Cardiac health Records University of Ottawa Heart Institute	Project 0014 G36FDY0014	Electronic health records: cardiac patients	RASCHR Final Project Report6 Final report Final Appendix A Final Appendix B Comment on the RASCHR Final Evaluation Reports RASHHR Reponse to the CHIPP comments on the Final Evaluation Report Supplementary Report to the Final Evaluation Report Project0014RASCHR
Southwestern Ontario Telehealth Network (SWOT-N) London, Ontario	Project 0070 G36DFY0070	Interactive videoconferencing: rural patients Teleradiology	Videocare Final Prj Prt Videocare Evaluation Rpt SWOntario Telehealth (SWOT-N) Eval Review Table 031215CA SWOT-NREV
Surgical Services Network St. Joseph's Hospital, Hamilton, Ontario		Telementoring in remote surgery Telerobotic surgery	
SYNAPSE Multi-Jurisdictional Mental health Information System North Shore Health Region of British Columbia	Project 0089 G36DFY0089	Electronic health records: mental health patients	SYNAPSE_#89_Final Report SYNAPSE Final Evaluation Report SYNPASE Eval review Table 031201CA
Système d'information du réseau intégré de Laval –SI-RIL Laval, Québec		Information system linking medical clinics and services: urban population	
Tele-Mental Health Project Department of Psychiatry, University of British Columbia		Interactive videoconferencing: psychiatric patients, rural, remote and Aboriginal	

		communities	
Tele-oncology: Model for a Comprehensive Cervical Cancer Screening Program using ICTs Beauséjour Regional Health Authority, Moncton, New Brunswick	Project 0017 G36FDY0117	Information delivery and patient tracking system: rural and First Nations women	RAPPORT FINAL RAPPORT CLINIQUE FINAL Éval. Rapport final Éval. écon final2
Telehealth Saskatchewan Saskatchewan Health		Interactive videoconferencing: rural patients Teleradiology	
WestNet Tele-Ophthalmology Project Department of Health and Social Services, Government of Northwest Territories	Project 0167 G36FDY0167	Remote screening: diabetic patients in remote communities	NWT Evaluation Final WestNet Teleopthamology – Eval review Table 021206CA
Yukon Telehealth Government of Yukon, Health and Social Services	Project 0155 G36DY0155	Interactive videoconferencing: rural and remote patients	CHIPP_Final_Report_July_2003 CHIPP_Eval_Report_FIN BC-Yukon Telehalth Eval review Table 040110CA

APPENDIX 4
List of Technical Reports

Technical Report #1 – *Key Informant Interviews Report*
Prepared by: Howard Research and Instructional Systems Inc
Consultants
September 2004

Technical Report #2 – *Case Studies Report – Best Practices and Critical Success Factors*
Prepared by: University of British Colombia
Division of Continuing Medical Education
September 2004

Technical Report #3 – *Literature Review*
Prepared by: Natalie Kishchuk
Research and Evaluation Inc
April 2003