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Health Transition Fund Final Report

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**Telecentres for Education and Community Health
(TEACH)
Final Report
(Code #NA366)**

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1.0 Executive Summary

The primary purpose of the Telecentres for Education and Community Health (TEACH) project was to develop, implement, and validate a distance-based service delivery model for primary healthcare and health education services. The project built upon the basic service and technology model created in Newfoundland and Labrador for the Remote Community Services Telecentre (RCST) project to create a custom telecentre model focused on healthcare and health education services. The facilities and services created through this project provided vital information technology infrastructure to the Government of Newfoundland and Labrador's multi-year Primary Healthcare Enhancement Project (PHEP). The objectives of the TEACH project were:

1. To design, develop and implement an effective information technology platform to support the Newfoundland provincial governments three PHEP pilot sites.
2. To create a flexible model for the TEACH centres that can be quickly adapted to the needs of the PHEP pilot communities in light of the needs assessments that will be conducted.
3. To develop new telehealth services and health educational content, in conjunction with the adaptation of existing services and content, to meet the service requirements of the PHEP sites.
4. To evaluate and refine the TEACH service and technology model to ensure its wider scale applicability on a provincial and national basis.
5. To develop a technology model that can be adapted to a range of differing network and technology infrastructures, in line with the differing environments across Canada.
6. To develop a technology and service model that is cost-effective and sustainable at the community level on an ongoing basis.

The TEACH project concentrated on the development of a focused primary healthcare delivery model for rural and remote communities, with the creation of a new project site at in Port aux Basques and the enhancement of two existing RCST sites (Goose Bay – Labrador and Twillingate) to create a network infrastructure for the PHEP sites. Within Newfoundland and Labrador the target audience for the project was the Department of Health and Community Services, and the regional health boards, with the intent of developing and validating a viable service delivery model that could be extended on a province-wide basis. Nationally, the project has focused on bodies with funding and/or policy-making authority (Health Canada, provincial health departments) and the regional health boards who could serve to facilitate the expansion of the concept on a national basis.

Building upon the initial work done within the RCST project, the TEACH project has gone through the following primary phases:

- 1) **Requirements Analysis:** Documentation of the functional requirements of the user community, service providers, and the PHEP project.
- 2) **Design:** The design of the facilities and network infrastructure at the project sites, as well as the design of the initial healthcare and health education services to be implemented.

- 3) **Implementation:** This phase of the project saw the installation and commissioning of the project facilities, as well as the training and orientation of the user groups at the project sites.
- 4) **Application Development:** This addressed the creation of a general teleconsultation model to be used for primary healthcare delivery as well as the creation of new services and educational content. This activity was ongoing throughout the project.
- 5) **Operations:** This represents the day-to-day operations of the project sites and the delivery of services. Over 7000 hours of satellite-based applications were delivered to the TEACH project sites between August 1999 and April 2000 (Section 3.2 details the application history).
- 6) **Evaluation:** The final phase of the project was the conduct of a formal end of project evaluation.

The evaluation process indicated the following regarding the TEACH concept and its applicability to primary healthcare for rural communities:

- Growth in usage was rapid, growing from 224 hours of use in August 1999 to over 1000 hours by December 1999;
- Access to the Internet for health education and health-related information was the core application, but there was steady growth in the use of video conferencing technology for clinical and education applications;
- 98% of telecentre clients said they would use the facility again, and 97% would recommend it to a colleague;
- 88% of telecentre clients rated the facilities either Excellent or Very Good;
- Of the patients surveyed (primarily for cardiology and autism consultations) all indicated that the service had saved them travel-related costs, ranging from \$1,200 - \$3,000 per session.
- 70% of the persons interviewed connected with the PHEP project indicated that the project was effective in supporting PHEP, while 90% felt that TEACH had positively impacted access to health services in the community.
- 70% also felt that TEACH had been beneficial in assisting with staff recruitment and retention.

Overall the TEACH project had a positive impact on the delivery and support of primary healthcare services in the pilot communities and the basic technology and applications model is suitable for expansion to other jurisdictions. A number of revisions and enhancements were identified through the project that are being applied to the current and planned sites, including multi-point video bridging to support larger multi-community educational sessions, improved and expanded training and orientation programs, and an expansion of the technical and operational support facilities. A key recommendation arising from the project is the need to provide a dedicated site coordinator position in each community to support the service instead of relying on volunteers. Key barriers to the adoption of the TEACH model on a long-term sustainable basis were focused primarily on communications costs (the operating costs of the satellite facilities) and the problems caused by physician payment schemes that do not provide for payment for consultation services delivered through distance technologies. The operating cost issue will depend on the final pricing model that is developed by the service provider for the

bandwidth on demand technology used in the TEACH project, but it is important to recognize that the TEACH model can also be implemented using terrestrial communications facilities, giving a community the ability to implement a solution that best suits their technology and budgetary environment.

The issue of physician reimbursement and the relationship to telemedicine activities is a policy issue that has impacted a number of telehealth research projects, and is an issue that must be resolved before distance-based service delivery can truly become a component of the national healthcare system. The other key policy issue raised by the TEACH project is that of budget allocations. Projects, such as TEACH, that offer alternative service delivery options for rural and remote communities should not be viewed solely in terms of cost savings opportunities for the healthcare system. Instead, they should be viewed as options for getting better service delivery and outcomes within existing budgetary frameworks through the refocusing of budget allocations. TEACH provides a new service delivery model for rural and remote communities that could be quickly implemented in a number of jurisdictions within Canada, based on a proven model for development, implementation and support.

2.0 Goal and Objectives

2.1 Project Goal

The overall goal of this project is to develop, prove and refine the TEACH concept in conjunction with Newfoundland and Labrador's Primary Healthcare Enhancement Project (PHEP) while quantifying the operational and service benefits of the approach, as well as its wide-scale applicability on a provincial and national basis.

2.2 Project Objectives

1. To design, develop and implement an effective information technology platform to support the Newfoundland provincial governments three PHEP pilot sites.
2. To create a flexible model for the TEACH centres that can be quickly adapted to the needs of the PHEP pilot communities in light of the needs assessments that will be conducted.
3. To develop new telehealth services and health educational content, in conjunction with the adaptation of existing services and content, to meet the service requirements of the PHEP sites.
4. To evaluate and refine the TEACH service and technology model to ensure its wider scale applicability on a provincial and national basis.
5. To develop a technology model that can be adapted to a range of differing network and technology infrastructures, in line with the differing environments across Canada.
6. To develop a technology and service model that is cost-effective and sustainable at the community level on an ongoing basis.

2.3 Project Relevance

The TEACH (Telecentres for Education and Community Health) project successfully provided an information technology base (in terms of both communications and information access/delivery) to support the implementation of the PHEP project in three rural communities (Port aux Basques, Twillingate and Goose Bay), delivering a range of video conferencing, telehealth applications, and health education content and services. In its support of the PHEP concept the TEACH project was consistent with two of the four priority areas for the Health Transition Fund, specifically Primary Care Reform and Integrated Service Delivery. Its applicability to Primary Care Reform arose from its province-wide integration in the provincial government's core primary healthcare project and the effective application of technology in that area. In terms of Integrated Service Delivery, the TEACH

project developed and validated a scalable and effective platform for the delivery of a wide range of medical services into a community.

3.0 Project Activities

3.1 Activities

The following were the primary activities undertaken within the project:

Requirements Analysis: The TEACH project was initiated with the conduct of a requirements analysis with the primary user groups at the project sites and the representatives of the PHEP project. The intent of this activity was to document the service requirements at the PHEP sites as well as any supporting services (i.e. communications, training) required by the PHEP project team. This defined the basic service set the project would have to support, serving as the primary input to the Design Phase.

Design: The Design Phase address two specific areas, infrastructure design and applications design. The infrastructure design dealt with the specific facilities to be implemented at the Port aux Basques as well as enhancements to the existing RCST hospital sites in Goose Bay and Twillingate. The application design process focused on the specification and design of the initial communications, education, and formation applications, working with service providers such as the Centre for Nursing Studies and the MUN Faculty of Medicine.

Implementation: The Implementation Phase of the project saw the installation, configuration and testing of the new infrastructure at the project site in Port aux Basques, consisting of the following primary activities:

- Installation of the satellite communications facilities (in conjunction with Telesat Canada);
- Installation of local area network facilities in multiple education and clinical locations within the hospital;
- Installation and testing of two video conferencing systems (one optimized for teleconsultation activities) as well as Internet access terminals).

In addition to the technical implementation of the site facilities, a series of training and in service sessions were conducted with medical staff at the site to support the implementation of the initial video conferencing application services.

Application Development: Once the project sites were operational the focus of the project team was on the development of the end user applications and services to be delivered to the TEACH sites. See the following section (Applications and Services) for details on these activities.

Ongoing Operations: With the project sites operational (completed by August 1999) services were delivered to the project sites on an ongoing basis, along with technical and user support. This activity was coordinated through the RCST project's Application Team.

Evaluation: To develop an evaluation framework for the TEACH project ongoing contact was maintained with the PHEP project team to share common elements within the evaluations of the two projects and to ensure that the results of the TEACH evaluation would be useful to the PHEP team. A number of end user data collection instruments were developed and implemented over the period September 1999 – April 2000. The results and assessment of these evaluations are reflected in Section 4.0 (Evaluation).

3.2 Applications and Services

The following is a chronological description of the development and implementation of services within the TEACH sites (the Nursing Centre in Nain is included given its relationship to the TEACH site in Goose Bay).

May 1999

Health Education: Health Education sessions started with Twillingate and Goose Bay focused on community and family practice medicine. This led to the project team working with a number of healthcare and allied health groups to determine potential applications and enhance the establishment of multi disciplinary teams in the community. Assisted in moderating sessions, providing literature relevant and guiding sessions in an effort to move forward. The Family Practice Faculty quickly moved from a trial and information gathering session to regularly scheduled weekly meetings for administration and curriculum development purposes with audio add-ons where necessary. These activities continued throughout the project on a weekly basis.

Pilot of Nurse Practitioner Course during May '99 with participants from Nain and Goose Bay was successful. One component of this course was developed by faculty from the Centre for Nursing Studies (CNS) for web delivery. Participants were given an orientation via video and "walked" through the web site with real "hands on" participation at the remote site. The entire course developed for web-based delivery and full-scale implementation was planned for the fall of 1999. However, due to staffing issues implementation has been postponed until later in 2000.

June 1999

Capacity Building: June month saw the first steps in establishing contact with a number of societies and professional groups (i.e. pharmacy, psychology, social work, ARNN, Arthritis Society of Newfoundland, the Chrons and Colitis Foundation of Canada). Hands-on sessions followed, discussing the potential within the RCST model and a live demonstration citing current activities and suggested applications and needs identification. This was followed up over the next few weeks/months as groups moved beyond the conceptualization phase. Absence

of multipoint capabilities was a limiting factor to some groups and even though they could see the potential it would not be feasible for them to move forward and develop material etc. for point-to-point applications. Although many professional bodies had mandates to their memberships to meet educational needs/requirements, most were restricted financially when it came to developing content that could only be utilized by a limited number of members or required personnel offering info in repeated sessions from site-to-site. Result: When it is feasible, presentations and meetings etc. using a point-to-point connection proceed. When multi point conferencing becomes available many users will proceed at that time.

Health Information: Training and support for healthcare providers at RCST sites and surrounding areas, identified by various site coordinators, coordinated through the Telemedicine /TETRA centre. Site meetings took place with the representatives from the site, Colabnet and Telemedicine/TETRA to further define needs and establish methods to meet needs. As a result, various health groups have come together for information and training sessions on an as-need basis and need specific basis, relationships and collaboration with the Health Sciences Centre (HSC) Library was initiated as Internet use and web browsing were needs identified. The HSC library worked with users to plan and implement training specific to their needs. The HSC Library, committed their support to assist in meeting the needs of health professionals at RCST sites. Their initiatives included following up with communities and other librarians and the Libraries Board to discuss other opportunities and supports that the sites could avail of. Internet use, web browsing and document delivery training sessions have occurred or are planned with sites. In an effort to meet the needs of all health professionals the HSC Library in March announced the Newfoundland and Labrador Health Knowledge Network available on line at <<http://www.med.mun.ca/nlhkn>>.

Health Education: After meeting with the Dental Hygienist Association their education committee offered members of their association the opportunity to participate in their annual continuing education conference via video from Goose Bay. To maintain license eligibility, members have to earn a required number of credits over a two-year period. This gave these members the opportunity to attend from their own community. Feedback was very positive. As a result, this year (April 2000) members may attend the conference from either the Port aux Basques site or Goose Bay site. Professionals (i.e. dentists) and members from surrounding communities have registered to attend. The Dental Association has approved attendees for CE credits for those of their association who attend this conference.

July 1999

Clinical Services: Allied Health professionals at one site met with the Department of Health representatives at St. John's and RCST application members to assist and further develop a multi-disciplinary model of patient/client service. Bi-weekly meetings took place over the summer months and plans developed to facilitate sharing of experiences with other sites. Due to staff change-overs and staff shortages at this site, as well as other sites efforts to share their lessons learned have been put on hold. They continue to develop the multi-disciplinary team within their own community with plans to extend to others as indicated.

Representatives from the Department of Cardiology, Diagnostic Imaging and Neuromotor at the Janeway Child Health Centre were linked with Goose Bay for an initial meeting to view the technology, discuss potential applications and uses, and identify needs. Personal shortages and limitations pose challenges to moving forward. However, the number of connections via ISDN have increased to agencies and specialists outside the Newfoundland area.

Health Education: Representatives from the MUN Counseling Centre and health professionals at Twillingate were brought together to discuss the feasibility of supporting Twillingate through video conferencing. In September bi-weekly meetings took place to determine needs and a plan of action. Due to the time commitments and established need for counseling support and services the group applied for funding through the Strategic Social Plan initiatives. A site visit and full needs assessment was felt to be required and funding was necessary for this to continue. Thus in November the activities were put on hold until a decision re funding was made. In February of 2000 their proposal was funded. Site visits have been completed and activities are being made to resume meetings and support via video conferencing. * **Note:** Presentations of funds and project approval by Twillingate MHA made at Telemedicine site with representatives from Twillingate participating via video.

August 1999

Health Education: An applications working group was established to supplement the RCST education and health committees. The aim was to identify applications that have the most potential in remote areas for viability and utilization and combine efforts to support the development, implementation and delivery of key applications. Patient consultation was the initial focus.

September 1999

Clinical Services: Remote cardiology patient consults with consultant at St. John's site pilot started. Over a four week period six patients were seen (two from each at Twillingate, Port aux Basques, and Goose Bay). Feedback was very positive. Physician reimbursement remains a barrier to patient consultation. From these sessions we were able to identify and develop guidelines and protocols for future consultations and refine the consent form and evaluation tools that could be adaptable to many disciplines.

Emergency pediatric consult from Nain clinic to specialist in St. John's. The young patient presented with a rash and after consulting a GP in Goose Bay via store and forward a pediatrician in St. John's was consulted. Arrangements were made for the images to be forwarded to St. John's where the pediatrician viewed them. The pediatrician reported that he needed to see the patient and a video conference was quickly established. The child was treated at the clinic with follow-up in his own community.

November 1999

Clinical Services: VisiTran (store and forward) transmission via satellite configuration and tests completed successfully with the Nain sites. Configuration and integration of Goose Bay site completed in December. However, staff at Goose Bay unavailable for training until early February. Transmission via telephone became a possibility with the implementation of RCST and until satellite transmission issues were rectified the Nain to Goose Bay sites utilized the service via the telephone link. Twenty six cases were transmitted with diagnosis confirmed for 16 via store and forward technology. Two cases have been transmitted via satellite with positive results. Future transmissions will be via satellite.

Health Education: Following a demonstration of technologies and suggested applications the Department of Health and Community Services are utilizing RCST (Goose Bay and St. John's) monthly to interact with colleagues in remote site for administrative and educational purposes.

Nain and Goose Bay have established a regular weekly meeting time for a combination of administration, staff development, and patient rounds. These sessions were traditionally audio conferences but with the addition of video they are much more interactive.

Multi disciplinary conference "Age of Herbal Medicine" attended by health professionals from Corner Brook, Stephenville and Port aux Basques through the Port aux Basques RCST site. Approximately, 200 participants were present at the St. John's site. This was a full day conference and both sites were able to fully participate and interact. Power Point presentations, overheads, and slides were utilized and shared.

December 1999 - Ongoing

Clinical Services: Health activities established in the previous months continue particularly in the Labrador sites. Cardiology consults will continue on a demand basis, pending the availability of a cardiologist in St. John's. During times of holidays and community crisis the satellite link Nain-Goose Bay will be maintained to allow access to health professionals at Melville Hospital as needed.

Health Education: School of Social Work have been and continue to offer continuing education sessions on a site-to-site basis utilizing ISDN and satellite where available. Awaiting the ability to multipoint and therefore reduce redundancy.

3.3 Deviations/Problems

There were several significant deviations from the original plan. There were:

Scope: The original project plan had focused primarily on the new site in Port aux Basques, but to effectively support the PHEP project it was necessary to extend the TEACH model to the sites on Goose Bay and Twillingate. This was accomplished without an increase in the overall project budget.

Communications Infrastructure: The original project plan called for the use of terrestrial communications facilities in the Port aux Basques, in part to compare their relative effectiveness to the satellite facilities installed in the RCST project sites. During the design phase it became apparent that the terrestrial facilities available would not be able to provide an equivalent bandwidth to the satellite option (within the project budget), with the implication that Port aux Basques would not have capabilities equivalent to the other project sites. On this basis it was decided to switch to satellite for the Port aux Basques site.

Applications Focus: As per the original plan for TEACH it was intended that the user community's requirements for applications would be defined primarily by the community assessments, augmented by advisory committees. In actual implementation, this model was impacted by two realities that shaped the actual implementation process:

1. In most cases communities and user groups were able to express their requirements in general rather than specific terms (i.e. "we need better access to the Internet", or "we need faster access to specialists").
2. Most of the user groups had limited exposure to network-based applications, and fewer still to broadband applications. This tended to limit their ability to shape and define their requirements into a form that clearly defined an application. Most groups did not have a frame of reference into which they could define their application requirements relative to the RCST technology.

The impact of these realities has been that the application definition process has become a much more intensive process that has required the project staff to do extensive orientation and familiarization of the user community with the technology before the actual application definition process can begin. In most cases defining and implementing an application has been a highly interactive process between the application team and the project sites wherein the team has helped the user group understand and appreciate the technology and its potential application, as well as shaping this appreciation into a specific application for the community or user group. This approach, which embodies a considerable amount of user education in the initial phases, is more time consuming than originally envisaged, but is essential in effectively introducing new technology-based applications. Rather than just defining the user requirements the project team has had to play an active and proactive role in working with the user groups to build the understanding needed to shape these requirements. One assumption that did not hold up within the project was that there would be a great demand and utilization of web-based

educational materials. In reality (due in part with the limited supply of relevant course materials in a distance-ready format) there was a much heavier use of videoconferencing-based training and in-servicing, either from the provincial site in St. John's or taught directly from the TEACH sites.

4.0 Evaluation of Project Outcomes

4.1 Evaluation Objectives

- To provide data on the accessibility, quality and effectiveness of the multipurpose telehealth technology.
- To provide data on how, when and why the multipurpose telehealth system is used on an ongoing basis.
- To evaluate patient and health professionals' satisfaction with the telehealth facility.
- To determine if the telehealth facility provides a cost-effective way to deliver health information in the chosen sites.

4.2 Evaluation Methodology

Analysis of scheduling documents and reports: Ongoing information on all telehealth events were obtained from scheduling documents kept in the Telemedicine Centre and include information on: participating sites, date and time of session, contact person or organization, telehealth service request, as well as, analysis of monthly and annual reports from the RCST and TEACH projects.

Patient/Client Satisfaction: Any patient for whom telehealth interaction was used was asked for their consent to complete a satisfaction questionnaire. Any individuals who have used the system for continuing medical/health information or meetings were asked to complete an evaluation form. (See Data Collection Tools, Appendix 1).

Key informant interviews: Semi-structured interviews were conducted with the Primary Healthcare Enhancement Project staff and physicians from each of the pilot sites. Health professionals involved in conducting patient consultations via videoconferencing were contacted for an interview. As well, health professionals who were involved in coordinating Health/Medical education sessions using the telecentres. The interviews assessed the satisfaction with the services provided by the TEACH project, and specifically if it supported the PHEP goal and objectives. (See Data Collection Tools, Appendix 1; TB Clinic Evaluation Summary, Appendix 2; Mental Health Assessment Evaluation, Appendix 3;)

Technical support staff questionnaire: All site contacts and Telemedicine/TETRA technical staff were contacted to assess their satisfaction with the system in general and specifically with the telemedicine training, equipment and communications protocol. (See Data Collection Tools, Appendix 1)

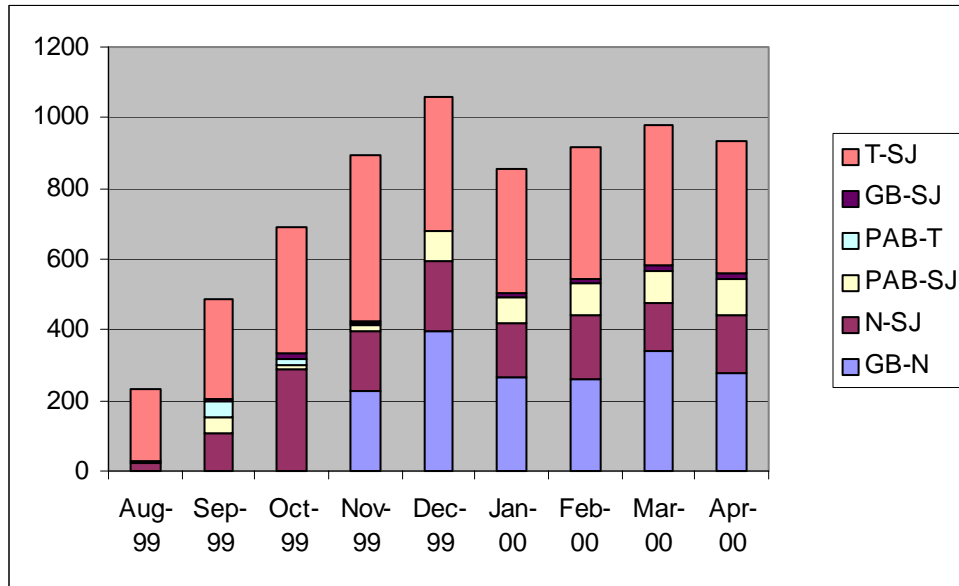
4.3 System Utilization Data

All use of project facilities was coordinated and logged through a centralized scheduling system. The following sections summarize the reports from that system in terms of usage on a site and application basis.

Site Connections:

The following Table and Graphic detail the communications patterns between the TEACH sites and the project site in St. John's (all figures expressed as hours of satellite time).

	Aug-99	Sep-99	Oct-99	Nov-99	Dec-99	Jan-00	Feb-00	Mar-00	Apr-00
GB-N	1	2	1	228.5	397.7	264.5	262.5	342	276.5
N-SJ	24	104.5	286.5	168.6	198.4	157	180.5	132	165.5
PAB-SJ	1.5	44.4	13.5	16.8	82	72	88	90.5	103
PAB-T	1.5	44.4	13.5	5					
GB-SJ		5.7	21	7	2	7.5	12	18.5	15.5
T-SJ	203	284.2	355.7	470.3	378	353	373.5	398.5	375.5
	231	485.2	691.2	896.2	1058.1	854	916.5	981.5	936



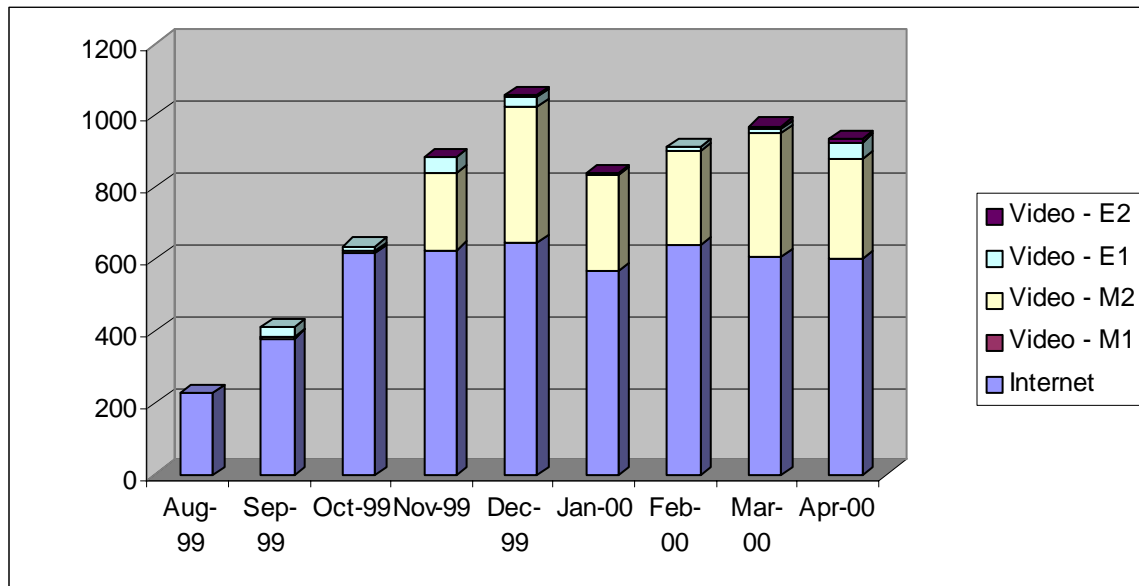
GB- Goose Bay	SJ – St. John's
ST – St. John's (Testing)	F – Forteau
T – Twillingate	N – Nain
PAB – Port aux Basques	

Of the TEACH sites the highest traffic volumes were from the sites in Twillingate and Port aux Basques (with PAB showing growing use once its facilities had been broken in). The remote nursing center in Nain also showed high traffic volumes to its regional site in Goose Bay (for weekend emergency standby) and to St. John’s for Internet and educational services. The site in Goose Bay did not show the same level of growth in usage primarily to problems with access to facilities (the PHEP Coordinator being located at another site). In April 2000 the network in Goose Bay was extended to the PHEP offices in the Rural Academic Center to resolve this problem.

Applications Usage:

The following Table and Graphic detail the Applications Usage pattern over the life of the project (all figures in hours).

	Aug-99	Sep-99	Oct-99	Nov-99	Dec-99	Jan-00	Feb-00	Mar-00	Apr-00
Internet	227	380.5	617	625.4	642.4	567.5	637	605	602
Video - M1									
Video - M2		4	4	212.5	381	264.5	262.5	346	277
Video - E1		25	15	44.5	28.3	5.5	10.5	9.5	46.5
Video - E2				2	5	4		10	7.5
	227	409.5	636	884.4	1056.7	841.5	910	970.5	933



M1	Medical Data Transfer	M2	Consultations
M3	Store and Forward Consultations	E1	Medical Professional Development
E2	Nursing Education		

Video Applications

The primary use of the video conferencing systems has been for remote patient consultations and access to specialists, but there has been steady growth in the use of the technology for medical education as the specific training programs become available. Video has been supported by a number of in-service and training sessions as well as ongoing skills and technology upgrading.

Internet Access

Internet access has been available in the project since March 1999. As this was new to some sites many were unsure of the possibilities. Training sessions for health professionals were offered by librarians at the Health Sciences Centre in St. John's. To assist in promoting use a list of commonly accessed health sites and journals was compiled and distributed to sites. As communities expanded the list, they shared with each other their information. Some communities were able to utilize students during the summer months to bookmark web sites and to train and offer assistance to users as well as develop a guide to Internet access for new users.

In an effort to determine users and to track time and purpose of use a sign in/out book was put in place, however, most users were noncompliant in completing information. A on-line log-on form was developed, unfortunately, there were some problems that terminated this avenue of data collection.

4.4 Client/ Patient Response

Client Questionnaire

The RCST evaluation form was designed to collect feedback from those individuals who have used the Remote Community Satellite Telecentres. One hundred and eighty forms were completed and returned from September 1999 – June 2000. The following is a summary of the responses.

Fifty-six percent of the respondents used the system in St. John's, 22% in Goose Bay, 13% in Twillingate, the remaining were from Port aux Basques and Nain. Fifty-four percent of the respondents were first time users and 29% second or third time users. Fifty-six percent of respondents used the system for education applications and 26% for health applications (*please note: the terms health and education were not defined; therefore, were often confused*). Ninety-two percent used the system for videoconferencing.

The majority of respondents stated that the telecentre did not save them a trip; however, 42% stated it did allow them to participate in an activity that cost or distance would not have allowed them to participate. An overwhelming 98% of respondents stated they would use the telecentre again and 97% would recommend the telecentre to a colleague or friend.

When asked what they liked most about the centre a variety of responses were given. The most common responses were “very interactive” (17%), “the ability to network with individuals in other communities” (14%), as well as, “easy to use and quality of connection”, “knowledgeable and approachable staff”. When asked what they liked least about the telecentre the most common response was the slight audio delay. Other comments related to small technical problems both with audio and video, the equipment being threatening, not being able to hear participants (especially with a large group) and limited space.

When asked to rate the facilities on a scale from “Excellent” to “Poor”, 88% of respondents rated the facilities between “Excellent” and “Very Good”. Similarly, on a scale from 1 – 10, with 10 being the highest, 84% rated the facilities between 8 and 10.

The most common responses given, when respondents were asked for suggestions on possible additional services, included “multi-site linkage”, “larger TV screen” and “more services and training (beginner’s package and practice sessions) in rural areas”.

Patient Questionnaire

A short questionnaire was distributed to patients or their families involved in consultations using the videoconferencing system. Of the ten consultations (cardiology and autism) conducted, five questionnaires were completed and returned. The following is a summary of the responses.

All five of the respondents had never before used the videoconferencing system. All reported feeling comfortable with the use of the system and all reported that the equipment did not inconvenience them in any way. All 5 respondents reported that they were able to communicate with the healthcare professional in a satisfactory way and they were satisfied with the quality of care they received by videoconference. One of the five respondents stated that “my care was better” by using the videoconferencing systems instead of face-to-face. The other four respondents stated that their consult was the “same as in-person”.

The videoconferencing equipment saved all participants a long distance trip which would include travel to and from their hometown, travel to and from the hospital, accommodations, meals, babysitting and time off from work. The cost savings ranged from \$1280.00 to \$3000.00. When asked if they would be interested in using the telemedicine system again all 5 respondents stated “yes”.

Conclusion

Overall, all clients/patients were very satisfied with their telemedicine experience. Eighty-eight percent (88%) rated the facilities between “Excellent” and “Good”. Almost half of the respondents stated the telecentre allowed them to participate in an activity that cost or distance would not allow. Ninety-eight percent (98%) of respondents stated they would use the system again. Clients liked most that they system was “very interactive”, “increased accessibility to individuals in other communities” and “the equipment was easy to use and of good quality”. What clients/patients liked least was “the slight audio delay”. Suggestions for additional services included: multi-linkage, larger TV screen, availability of a beginners package and more microphones for larger groups.

4.5 Key Informant Response

PHEP Key Informants:

A semi-structured interview was conducted with the following individuals involved in both the PHEP and TEACH project: PHEP Provincial Manager, PHEP Coordinators, PHEP Assistants and Physicians. Ten individuals were interviewed and asked questions pertaining to their involvement with both the TEACH and PHEP projects, how the TEACH and PHEP worked together, successes and challenges and satisfaction with the telecentre. All comments were taped and recorded by the interviewer.

The telecentre had been used by the pilot sites for various applications and uses. One commonly stated application was for continuing education for a variety of health professionals (social workers, nurse practitioners, department of family medicine, speech language pathologists etc.). The telecentre was also used for various multi-disciplinary meetings, for example, South Western Health Committee, By-Laws Committee, Dieticians meetings, to name a few. In addition, the telecentre was used for trials of patient consultations between sites.

One of the objectives of the TEACH project was to provide an information and communication infrastructure for the PHEP. Key informants were asked if the TEACH project was effective in supporting the PHEP. Seventy percent (70%) of the respondents stated “Yes”. Ninety percent (90%) of respondents stated that the TEACH project has positively effected the access to health services in the communities. It has improved access mostly for health professionals by providing Internet access and enabling them to attend continuing medical education sessions. It has increased access for the general public by allowing some consultations to occur via videoconferencing; however, due to the reimbursement barrier for physicians the number of consultations have been few.

Ninety percent (90%) of respondents believe that the quality of care for people in the community has been positively effected because of the TEACH facility. Enabling health professionals to access various educations sessions and to interact with colleagues in other sites indirectly enhances the quality of care given to the communities. When respondents were asked if this model was a cost-effective way to support health related activities, 80% of respondents believed it was cost effective by decreasing time away from work and travel and accommodation costs.

Recruitment of health professionals to rural areas is an important issue in Newfoundland and Labrador. Seventy percent of respondents (70%) stated “yes” when asked if the TEACH facility provided a way to help address this issue,. The majority of respondents felt it would enhance the retention of professionals to the rural areas by offering continuing medical education, contact with family members, and correspondence with other professionals in more urban sites.

When thinking about the telecentre for health applications some of the most commonly stated challenges faced included: MCP reimbursement for physicians, not having a telemedicine coordinator or technical person on site, not having someone in Ottawa on call 24/7 to deal with satellite problems. When asked about barriers the most common responses were: unable to give the telecentre the attention needed because of lack of a telemedicine coordinators or technical person, MCP reimbursement for physicians and unreasonable timelines.

When respondents were asked for the positive results of the TEACH telecentre the following responses were stated: allows health professionals to access information that they would not normally be able to access, saves costs due to travel, acts as a communication link, it has “put us [community] on the map both regionally and provincially”. The TEACH model has been used not only for health related issues but also for Human Resources and Employment, Department of Education, MUN Extension Services, Judicial court proceedings, clergy and various community groups, to name a few.

Patient Consultations

A semi-structured interview was conducted with four health professionals (3 physicians and 1 Project Coordinator) involved in patient consultations via videoconferencing or store and forward. These individuals were asked various questions related to their experience and satisfaction with the system.

Three of the health professionals used videoconferencing and 2 used store and forward for patient consultations. From these consultations 3 of the respondents had experienced some small technical difficulties but all were resolved very quickly. All four participants felt that the videoconferencing system or store and forward are effective methods for conducting patient consultations. When asked how they felt patient care was effected, all respondents said it was “not as good as face-to-face”, however, it is the “next best thing”.

All respondents agreed that the equipment adapted to meeting the needs of the patient and family, as well as, positively affecting the access to health services. In relation to the cost-effectiveness, 3 respondents thought it is a cost-effective way for conducting patient consultations. The store and forward technology “decreases some medivac transports which could be up to \$5000 a transport”. The videoconferencing equipment “saved in potential travel for both the physician and parents”, for example, it would cost “over \$1000.00 for air travel from Nain to St. John’s” One respondent was not convinced that it is a cost-effective system due to the cost of the equipment and potential cost of satellite time.

All respondents agreed that other physicians and health professionals would be interested in using the system for patient consultations. Suggestions for getting others involved would include paying the fee-for-service physicians, allowing observations of sessions, promoting the technology, providing training and teaching the benefits of using this system in practice. All agreed that the reimbursement issue is a definite barrier to physicians using the system for consultations. Suggestions on how to resolve this barrier included involving the provincial government, developing a billing code for videoconferencing and developing a fee protocol.

When thinking about the Telecentre for patient consultations some of the challenges recognized included: scheduling various sites for appointments, making the equipment more accessible in St. John’s, getting the process up and running. With store and forward the challenges included trying to recalling the patient’s face and history and determining body language. The disadvantages included: “the families are conscious that this [Telemedicine department] is part of the hospital that patients are not normally seen are a little bothered by their privacy”. With the store and forward technology a disadvantage is that some physicians may think the technology is not user friendly and inability of this program to create an electronic file for patient information.

The advantages of this system for patient consultations are: “ very convenient for families who can’t fly to see specialist”, “it decreases the amount of time it takes to see a patient”, “It decreases the travel and accommodation cost for family or physician”, “ Allows people to get help in their own environment ... without the trouble of coming to St. John’s”, “saves time and costs and gives a continuum of care”.

Other recommendations included: the possibility of having this equipment accessible from the new Janeway site, to get a discussion organized with all stakeholder and the Department of Health and Community Services, develop a software for the store and forward in which patient files and medical records could be kept and organized.

Health Education/Information Sessions

A semi-structured interview was conducted with key informants involved in coordinating or facilitation a health education or information session. Six key informants were interviewed regarding their satisfaction with the facility, accessibility, effectiveness and successes and challenges.

Three of the six respondents experienced difficulties with the service; however, of the problems stated all were minor and were fixed efficiently. All respondents stated that using the videoconferencing system was an effective method for conducting education/informational sessions. When respondents were asked how they found the videoconferencing as an alternative to meeting face-to-face, the comments were positive and included: “A lot better than using the telephone ... good to see in the room and interact with the participants”, “Seemed to convey most of the things as good as face-to-face”, “... we found after a site visit ... meeting the people in the flesh... helped with future sessions”, “Very effective... you can never replace face-to-face interaction but it is the next best step”.

All 6 respondents stated that this facility positively effect the access to their program. Three of the respondents stated that if it were not for this service all participants in rural sites would not be able to attend the session. Five respondents stated their was a cost savings, to either the participants or group, by using the videoconferencing equipment. The cost savings ranged from approximately \$200.00 up to \$5500.00.

Some of the challenges stated for using this system for health education/information sessions included the following: details of x-ray were difficult to see from a slide, having multiple learners at multiple sites, those presenting have to be made aware of the technology and capabilities, hard to assess how people feel, some people fear the technology. When asked if there were any disadvantages to using this system three (3) of the respondents did not think there were any disadvantages. Other comments included “we have to go to the university [St. John’s site] and “making the links to more urban centres may weaken the links or relationships in the [rural] community’. Two of the respondents stated the potential cost in the future may be a disadvantage to using videoconferencing.

The comments given for advantages for using videoconferencing for health and information services were very similar. The two most common responses were: “the ability to reach out to rural areas” and “increase access to programs for rural areas”. Other advantages stated were: “avoid travel”, “interactive process”, “decreases costs”, “allow wider audience to attend”. “helps to develop more peer and professionals relationships”.

When asked if they plan to use the system in the future, 5 of the 6 respondents said “yes”. One (1) respondent stated it would depend on the cost and the grants their program received. The respondents plan to use the system for conferences, meetings, education and possibly for client assessments.

Conclusion

For the above key informant interviews it is evident that the TEACH facility is used for a variety of applications - continued education, multi-disciplinary meetings, patient consultations, to name a few . According to the respondents the facility was very effective in supporting the PHEP and increasing access to health services in the project sites. Respondents also stated the TEACH facility indirectly effected the quality of care of people in the communities by allowing health professionals access to continued education and correspondence with other health

professionals. The majority of respondents believed the TEACH model is cost-effective because it saves on cost of travel and accommodations and time away from work, however, some people are still sceptical due to the cost of the equipment and eventual cost of satellite time.

The common challenges identified included: lack of MCP reimbursement for physicians, lack of a telemedicine coordinator in the sites and the potential cost in the future. Common barriers that were identified include the before mentioned and “unreasonable timelines”, “fear of the equipment” and “lack of portability of equipment”. The lack of MCP reimbursement for physicians was also a barrier for the project in recruiting physicians to pilot the technology for consultations. The most frequently stated advantages of the equipment included: “increase accessibility to information and programs”, “decrease time and cost of travel” and “communication link”. The majority of respondents felt that videoconferencing was “the next best thing” to a face-to-face interaction.

4.6 Technical Support Questionnaire

Nineteen (19) key informant questionnaires were distributed to individuals involved in the delivery of TEACH/RCST telehealth applications in Newfoundland and Labrador. At this time, 11 of the 19 questionnaires have been returned and completed for a 58% response rate. Five of the eleven respondents were from outside the St. John’s site. The following is a summary of the responses.

Seventy-three percent of respondents had previous telecommunications experience before involved with RCST. Fifty-five percent of the respondents had attended a telemedicine training session, of which 50% rated this training as excellent and the other 50% rating the training as fair to good.

Sixty-four percent of respondents felt they received sufficient training to work with telemedicine, however, 82% felt they could use more training. More training was suggested with regards to trouble-shooting of software and equipment and more “hands-on” practice with an experienced person.

Seventy-three percent of respondents stated they found these applications to be user-friendly. When asked to state the challenges faced on a day-to-day basis related to telehealth applications the responses varied. The most common responses were: lack of time to commit to promoting the applications; lack of support in the remote sites; lack of communication. The majority (73%) of respondents did not know of any protocols/guidelines available at their site related to telehealth communications. Seventy-five percent of these respondents felt there is a need to develop protocols/guidelines for the sites.

When asked what they like most about the telehealth system the responses varied. The most

common responses were: the ability to access education and health services at a distance; the ability to interact face to face with other sites. When asked what they liked least about the telehealth system the feedback varied again. One recurrent response involved the respondents experiencing technical problems and not having the proper training to be confident to trouble-shoot. The feedback varied from not having time to commit to setting up applications to salaries for support staff need to be competitive with industry equipment support.

Ninety-one percent of respondents could see a demand for future telehealth services in their community. Eighty-two percent of respondents felt they get acceptable support from their institution and 73% feel they get acceptable support from the St. John's site.

When asked what they would recommend to improve the telehealth system common recommendations included: better communication, which includes the development of protocols/guidelines for all RCST sites; continued staff education; increased communication to the public and government on the benefits and abilities of telehealth applications.

Conclusion

The majority of the respondents felt they could use more training, specifically in the area of trouble-shooting of software and equipment. This training should include more hands-on practice with the equipment. The majority of staff found the equipment to be user-friendly. When asked to identify challenges "lack of time to commit to promoting applications", "lack of support staff in remote sites" and "lack of communication" were commonly stated. The majority of respondents felt the need for well-established protocols and procedures. What respondents liked least was not having the training to trouble-shoot and the lack of time they have to devote to this technology because of other work related responsibilities. What they liked most was that this equipment allowed the "ability to access education and health services" and the "face to face interaction". An overwhelming majority of respondents could definitely see a future need for this technology in their community.

4.7 Overall Conclusions

- 1) On an overall basis the TEACH model had a positive impact on the delivery of Primary Healthcare services in the pilot communities. This was accomplished through enhanced access to remote consultation and store and forward teleconsultation services, as well as through the enhanced opportunities for medical education and professional development, enhanced access to information, and enhanced communications between sites.
- 2) While the overall model functioned well there are some revisions and enhancements that will have to be made based on operational data and user feedback. These include:
 - i) The capacity for multipoint video conferencing (the current system is point to point, which

has limited the development of wide scale training applications or multi-site conferences). This will be corrected by the Fall of 2000.

- ii) Enhanced training and skills development for the user community, as well as, additional application-specific training.
 - iii) The provision of dedicated full-time support staff at each site (for this project volunteers or PHEP staff were used), to promote and support the service and dedicated site coordinators, will be required. This is considered one of the most critical factors for the long-term success of a site.
 - iv) While the system had a good record of reliability there are still improvements that could be made in terms of technical support and problem response time. The project partners are now working to implement a 7*24 technical support service as well as planning a series of maintenance visits and technical upgrades to the site facilities.
 - v) A formal pricing model must be developed for the satellite airtime. Under the current project model this is an R&D activity and the final satellite cost for production services has not been determined. Institutional user groups will require this to be able to make long-term budgetary commitments to the TEACH model. This issue is now being dealt with as part of the formal business planning process by the RCST group.
- 3) Physician reimbursement schemes will continue to be a barrier in moving these services from a research mode to becoming part of the standard healthcare delivery model. In a fee-for-service environment most physicians will provide some services without compensation as part of proof-of-concept exercises, but will expect to be paid for their services on an ongoing basis regardless of the delivery systems and technology used. This is at odds with many of the physician payment schemes in the country, which do not recognize telemedicine or distance-based services as being eligible for payment. This may represent the single biggest barrier (and major policy issue) to be addressed in using distance technologies to enhance health service delivery to rural and remote communities.
- 4) The basic technology and service delivery model created within the TEACH project has been validated as an effective mechanism for improved primary healthcare and health education services to rural and remote communities. In addition to the technology model and telemedicine and health education applications that were developed and validated, the project team developed a number of supporting tools including training manuals and protocols for the implementation and support of network-based health services. The TEACH project has created a package of technologies, services, processes, and supporting materials that can be directly applied to other areas of the country facing the same challenges as Newfoundland and Labrador, in fact there have been discussions with a number of jurisdictions on extending the models developed in Newfoundland and Labrador. The successful Smart Communities project in Labrador (Smart Labrador) will have a significant healthcare component, including a focus on aboriginal healthcare. The Newfoundland government has signed a Memorandum of Understanding with the government of Nunavut regarding collaboration on distance medicine, and discussions are underway on collaborative projects in the

Atlantic Provinces and the North West Territories. The outcomes of the TEACH project provide a continuum of technologies and services that can be used to implement rural-focused healthcare projects in other parts of the country, ranging from support for project planning and assessment, through to the design, implementation and management of complete projects or services.

- 5) From a program and service development perspective TEACH has shown that distance delivery is a viable approach that will be well received by the healthcare community and the community at large. The implications for service delivery for rural and remote regions is that services that were previously cost prohibitive to deliver (due to travel or resource costs) can now be reconsidered due to the efficiencies of the telecommunications medium relative to staff travel, as well as the ability to share scarce and expensive staff resources among multiple communities on an as-needed basis. The feedback from the PHEP project, in particular Port aux Basques and Twillingate, has indicated that the integrated PHEP/TEACH approach can assist in staff retention as well, offering a better working environment and enhanced access to professional development opportunities.
- 6) The success of the TEACH project in Newfoundland and Labrador has policy implications beyond the issue of physician reimbursement. A core issue deals with the allocation of budget for healthcare delivery for rural and remote communities. The ability to provide more effective healthcare services in a rural community should not be viewed as an issue of cost savings (i.e. how much is saved by not having to transport a patient), but as more effective utilization of budgetary resources (i.e. is some of the money that would be spent on patient transports better spent on technology, application development and staff development to support better service directly within the community). TEACH has shown that the technology and service models are viable and effective, what is needed now are policy decisions to re-allocate resources to allow these systems to be deployed on a much wider scale in the rural and remote regions of Canada. There are a number of similar or compatible projects or services running in various provinces funded as research and development activities (with all the problems this type funding causes in terms of service expansion and continuity), and the point has been reached where policy decisions are required to make these funded elements of the overall healthcare delivery system.

5.0 Dissemination Plan

The target audiences for the dissemination of the project results are those groups and organizations who could promote and/or support the expansion of the TEACH model throughout other jurisdictions on a national basis. This audience can be broken down as follows:

- Funding and policy making bodies (Health Canada, provincial health departments);
- Healthcare delivery organizations (i.e. regional health boards);
- Medical Professional Associations (i.e. Nursing Associations).

The primary delivery mechanisms for information on the TEACH initiative will be the WEB site and presentations at appropriate healthcare events, articles in selected journals, and demonstrations of the concept to interested groups. These will be implemented as follows:

- 1) The WEB site will be implemented as a standalone site and will also be linked to from TETRA's main web site and the sites of related projects such as IEMN and RCST. The site will have two sections, a public section that will contain general information on the project and its outcomes, and a private access controlled area that will contain more detailed information as well as updates on the project and the technology/application base. The intention is to make the private area available as an information and support resource to organizations that are actively working to implement the TEACH model in their jurisdictions. This site will be fully operational in July 2000.
- 2) The project team have been invited to submit abstracts for a number of upcoming regional national, and international/medical conferences and professional development sessions, and will be integrating the TEACH results into those presentations. These conferences include:
 - Canadian Society for Telehealth Conference, Health 2000 (Montreal, October 2000)
 - Bay Bytes Rural Information Technology Conference (Port Blanford, September 2000)
 - Newfoundland and Labrador Hospital Board Association AGM (St. John's, October 2000)
- 3) The team is also preparing to develop articles based upon the TEACH project for submission to a number of healthcare and professional journals starting in the Fall of 2000. Journals under consideration include:
 - Journal of Telemedicine
 - Association of Registered Nurses Access Magazine
 - American Telemedicine Journal
 - RN Magazine
- 4) The project team have the ability to conduct live demonstrations of a model TEACH facility and applications from sites in Ottawa and St. John's, Newfoundland, including a suite of teleconsultation services and peripherals (these sites have done over 100 technology demonstrations in the past year), as well as being able to connect to the current PHEP sites to allow interested parties to communicate directly to user groups. The team will also seek to implement model facilities at several medical conferences to provide live demonstrations to the conference audience (this approach was trialled at the Intermed Conference in Toronto, July 1999). These demonstrations will be ongoing.

No interviews with the media are planned at this time, though opportunities may emerge as the project materials are released publicly (these will be coordinated through the office of the Telemedicine/TETRA Chair – Dr. Carl Robbins). Some local press coverage has occurred in Port aux Basques, copies of which are attached. (See Media Coverage, Appendix 4)

APPENDIX 1

Data Collection Tools

[Not Available Electronically]

APPENDIX 2

TB Clinic Evaluation Summary

[Not Available Electronically]

APPENDIX 3

**Mental Health Assessment
Evaluation Summary**

[Not Available Electronically]

APPENDIX 4

Media Coverage

[Not Available Electronically]