

CANARIE E-health Program

Final Report

East York Telehomecare Project

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1.0 Description of the Project

In Ontario, home care budgets have not kept pace with the increased demands for community care over the last 10 years. Hospital restructuring and a trend towards shortened hospital stays have placed enormous demands on the Community Care Access Centres (CCACs) to provide acute home care services. As the demand for acute care services has increased, the ability to fund home care for individuals who are living with chronic illnesses and disabilities has decreased. This has led to a gap between needed services, especially for the elderly, and available government funded services. Romanow (2002) called for full home care to become “the next essential service” under the Canadian Health Care Act (CHA).

Individuals living with a chronic illness require ongoing monitoring, education, support, and interventions to improve disease management. Adequate attention to disease management of chronic illnesses prevents disease exacerbations, disease complications, and premature institutionalization of the elderly. People with diabetes, congestive heart failure (CHF), and chronic obstructive lung disease (COPD) have been identified as populations that would benefit from in-home monitoring and education to support disease management (The Change Foundation, 2002). However, the focus of the current health care system remains the diagnosis and cure of acute, episodic health events rather than the provision of integrated, ongoing services. Individuals with chronic illnesses are often expected to travel to doctors’ offices and ambulatory care centres for monitoring and care despite limitations in mobility, sensory perception, and cognitive acuity. Often the burden for transportation and accompaniment to appointments falls on family members, who must take time off paid work for this task. Most individuals who are living with chronic illnesses are elderly individuals living on fixed incomes. In these environments, the volume of patients requiring services often precludes time for individualization of care, integration of services from the health care team, and teaching of self-management strategies.

The use of new technologies to provide remote health care is a growing trend in Canada. Telehomecare (THC) is one emerging option for the delivery of community care where telecommunications technology is used to provide video-based face-to-face communication, observation, and the remote monitoring of heart and lung sounds, blood pressure, temperature, pulse, and blood glucose levels in the home. THC offers a potential strategy for bridging the gaps between patients, health professionals, and needed services (Britton, Keehner, Engelke, Rains, & Mahmud, 2000). Early studies suggest that telehome care has considerable potential to reduce the demand gap through better management of chronic illnesses (Bowles & Dansky, 2002; Short & Saindon, 1998). While THC is one potential option, it is vital that home care agencies evaluate patient and provider experiences and ascertain whether THC is a cost-effective delivery method (Kinsella, 2001).

The East York Telehomecare Project

The potential for telehealth is increasingly recognized among health care communities (Salvatore, 2002). The current project, funded by CANARIE and the Ontario Innovation Trust commenced April 1 2003. The first phase that coincided with the end of CANARIE funding, was completed March 31, 2004. The larger project will continue until 200 THC participants have been enrolled. The project was innovative in that it brought together a team of clinicians, administrators, educators, and researchers situated in the East York region of Toronto, that implemented *video-based* telehomecare for patients, accessing an *integrated* health system. Patients in the project had access to a team of health care providers connected to a wide network of health services: Community Care Access Centre coordinators and case managers, community nurses, family practice physicians, and nurses from the Toronto East General Hospital ambulatory care and diabetic clinics.

Project strategic objectives

- Carry out a large scale THC project with individuals with CHF, COPD, diabetes across health sectors and providers
- Explicate the process and concerns of users and providers by developing a midrange theory of THC experience over its duration
- Evaluate costs, accessibility, health outcomes, and satisfaction for users and providers with traditional community care
- Establish best practice guidelines, policies and standards for THC

Literature review

While telemedicine has been utilized in various forms for many years, telehomecare (THC) is a relatively recent innovation. A major driving force for THC in Canada is the need to improve access to health care while controlling costs (National Initiative for Telehealth Guidelines, 2003). An aging population, resulting in increased hospital admissions, and a shift in care from hospital to the community is leading health care providers to consider the use of technology to meet the need for care delivery (Branko, Celler, Lovell & Chan, 1999). The consumer movement in health care, with individuals becoming increasingly interested in self-managing their health, and a preference for aging at home rather than in an institution, is another driving force (Landers, 2000; Romanow, 2002).

Running parallel to these societal changes is the tremendous growth in communications technology (National Initiative for Telehealth Guidelines, 2003). Increased bandwidth has improved access to a range of technologies including high resolution videoconferencing consultations between patients and providers and, data store and forward systems that are fast and more affordable. The development of these technologies makes a quality THC visit increasingly possible.

Impact on patients

Telehomecare (THC) is currently being used to manage a wide variety of health problems from acute wound care and gestational diabetes to chronic illnesses such as diabetes and congestive heart failure. Clinical outcomes are promising. Typically, THC patients report that the care they received met their needs, enhanced control over, and improved their health (Bratton & Cody, 2000; Jenkins & McSweeney, 2001; Bowles & Dansky, 2002). Findings from empirical studies suggest that patients have a positive patient experience (Demiris, Speedie & Finkelstein, 2001) and report a high degree of satisfaction (Scott, 2002; Ryan, Kobb & Hilsen, 2003). Several researchers suggest that ongoing patient education, monitoring and support results in better self-management and improved outcomes (Short & Saindon, 1998; Borchers & Kee, 1999; Dansky, Bowles & Britt, 1999; Frantz, 2000). Patients who are involved in health monitoring have better access to information, which increases their decision-making powers and may improve quality and satisfaction with care (Hutcherson & Williamson, 1999). Improved patient compliance with medications has also been documented (Ryan et al., 2003).

While the literature suggests that patients may benefit from THC, supports and systems need to be in place to support the patient. The equipment needs to be easy to learn and operate (Jennett, Yeo, Pauls & Graham, 2003). It needs to be integrated into the home; inadequate space can pose risks to the patient (Fisk, 1997). Patient privacy and confidentiality with electronic health care records must be protected (Romanow, 2002). Further, while the studies conducted to date contribute to an understanding of patients' experiences, there is a gap in the literature regarding an in-depth exploration of patients' experiences with THC.

Impact on providers

Much of the THC literature regarding providers' experiences has been conducted with nurses. Some of the benefits reported by THC providers include the more efficient use of time and less "windshield time," resulting in the ability to give more rewarding, regular care (Kinsella, 2001). Staff satisfaction regarding communication and assessment has been documented as "high" (Scott, 2002; Ryan et al., 2003) with increased patient rapport and bonding (Dansky, Bowles & Britt, 1999). Staff members report that observing their patients' health improving from THC, increased their work satisfaction (Ryan et al., 2003). Further, providers working in rural areas linked by technology to other providers reported reduced feelings of isolation which had a positive impact on their morale (Armer, 2003).

The Canadian Health Services Research Foundation (2001) report entitled: *Commitment and Care* noted that there are declining numbers of nurses graduating in Canada, the nursing workforce is aging, and most nurses retire in their mid-fifties. If these trends continue, the current nursing shortage will present a serious threat to the quality of health care in Canada within 10 years. THC, where care requires communication skills rather than physical strength, provides an attractive alternative for experienced nurses who wish

to continue working later in life or for nurses with workplace injuries that require modified job assignments.

Some negative effects of THC related to the quality of work-life have also been identified. Nurses reported that managers did not appreciate the amount of time it took to implement THC and did not give sufficient recognition for project work. Feelings of frustration with the patient recruitment process and a decline in productivity during project implementation have been documented. Frustration with technical problems has also been reported (Dansky, Bowles & Britt, 1999).

Impact on the health care system

Traditional home care patients who receive in-home professional services are usually seen during two or three scheduled visits per week. THC offers more flexibility. While regular visits are scheduled in THC, it is easier to conduct a timely visit in response to a change in the patient's health status using THC. These "urgent" visits often result in an intervention that averts a trip to the Emergency Department (ED). Program evaluations that have been conducted suggest that through improved monitoring ongoing patient education, and timely interventions, THC can reduce the numbers of visits to EDs and inpatient hospital readmissions (Bondmass, Bolger, Castro & Avitall, 2000; Britton, Engelke, Rains & Mahmud, 2000; Dansky, Palmer, Shea and Bowles, 2001; Jerant, Azari & Nesbitt, 2001)

A further system benefit of THC is workplace efficiencies with respect to nurses' schedules and travel time. Estimates of the number of traditional home care visits that could be enhanced or replaced with THC range from 12% (Black, Anderson, Loane, & Wootten, 2001) to 86% (Scott, 2002). The number of visits made by a nurse in a given day may rise from six in-home visits (IHV) to 15 THC visits (Britton, et al., 2000) or nine IHV-18 THC (Scott, 2002). Frantz (2000) suggests that disease management through THC may improve outcomes and decrease costs, allowing nurses to manage a larger caseload, thus enhancing care across the hospital-community continuum. Despite these claims, the majority of research conducted to date has focused on short-term projects with relatively small patient samples and has yet to provide sufficient evidence to make a business case for THC (Cellar, Lovell & Basilakis, 2003; Hailey, Roine & Ohinmaa, 2003). This statement is particularly true in the Canadian health care system where reimbursement practices differ substantially from the American health care system where many of the THC studies have been done.

Challenges

Telehomecare has the potential to improve care and reduce costs however, as with any large technological change, full scale adoption will require major changes in the health care system (Celler, Lovell & Chan, 1999). Provider reimbursement, inter-agency document sharing, and recruitment are among the challenges consistently identified in the THC literature. Another concern is the potential impact that technology implementation may have on the provider-patient relationship and the quality of nursing care (Ozbolt,

1996). Patient and provider training is another consideration that requires attention particularly as mature staff and older patients may experience technology anxiety (Roback & Herzog, 2003).

While the body of theoretical and evaluation literature is growing, to date there have been relatively few large scale, long term empirical studies conducted in this field. While THC success stories are frequently reported, there are relatively few full and frank discussions of the challenges that arise during the THC implementation process. In the Romanow (2002) report it was noted that new health care technologies need to be carefully evaluated in terms of not only cost but in relation to health outcomes as well. Based on a stakeholder needs assessment and a review of the literature, the decision was made to implement an *integrated* THC project, conduct a descriptive study of patient and providers' experiences using quantitative and qualitative methods, and to fully document the implementation process.

2.0 Overview of Project Results

In the first year of a 3 year THC project 27 individuals, aged 60-93 living in the community diagnosed with chronic illnesses, such as CHF, COPD, and diabetes were admitted to the EYTHC Project. Collectively, across health sectors and providers they received 285 remote and 59 in-home visits. While recruitment was lower than the projected 50 patients, it must be acknowledged that the implementation did not commence until the end of September, so the 27 participants were enrolled over a six month period.

The process of integrating THC and the concerns of patients were made explicit in a preliminary four-phase middle range theory entitled: *Living in a Comfort Zone*. A content analysis of interviews with care providers revealed four major themes: nurses' experiences with THC, the impact of THC on patients' health, challenges with work processes and experiences with technology.

A preliminary evaluation of costs, accessibility, and satisfaction revealed that while no savings are realized to either the provider organization or CCAC during the initial period of THC implementation due to equipment and training costs, there is significant potential savings to the health care system from decreased hospital in-patient and ED admissions. No patients enrolled in THC required in-patient hospitalisation and there was only 1 ED visit during the initial 6 months of the implementation project. Additionally, it was established that there is good accessibility and both providers and patients report high degrees of satisfaction with THC.

Best practice guidelines, policies and standards for THC were established for the period prior to beginning and implementation project, for the period of the project implementation, and for the evaluation phase of a project. Before beginning THC implementation it is important to apply change theory principles and to set clear objectives, determine available cost and resources, and, identify project partners, project

leaders and a project manager. Contacts need to be developed, policies and procedures are established and, service is integrated with usual delivery practices. During the implementation phase of a project it is of paramount importance that key members of the project meet regularly to enhance communication and resolve problems, especially in relation to recruitment and reimbursement. Excellent technical support is required to support use of the THC equipment. It is also important to evaluate the implementation periodically in relation to technology, satisfaction and to do a cost/benefit analysis.

2.1 Overview of THC technology

The THC equipment used in this project was a video-based system that transmits images and data over ordinary telephone lines. Patients and providers could see and hear each other during a remote visit. The clinician station consisted of a video camera, headphones and software loaded on a PC. Patient information could also be viewed by clinicians who had system access with personal identification and passwords, from any Web-enabled PC. The patient station consisted of a unit about the size of a breadbox and a small video camera. Peripheral devices such as blood pressure cuff, stethoscope, heart rate monitor, oxygen saturation monitor and weigh scale were also included. Data could be captured by the patient at any time, stored, and then forwarded to the clinician. Nurses typically installed units in the patient homes on their second in-home visit after explaining THC processes and research and obtaining patient consent for project participation.

2.2 Project Deliverables

Phase	Deliverable	Actual Achievement
1	Detailed research plan for disease impact (Objective #2)	Achieved; comments by objective
2	Detailed research plan for use and costs (Objective #3)	Achieved; comments by objective
3	Disease management strategy (Objectives #3 and 4)	Achieved; comments by objective
4	Preliminary Rollout (Objective #1)	Achieved; comments by objective
5	Full scale rollout (Objective #1)	Achieved; comments by objective
6	Final report	Achieved

2.3 Overall Objectives

Project objective # 1: Implement a THC program

Objective status: achieved

One partner commented, *“To be innovative and integrated is important. We were excited to bring these diverse groups together and learn so much”*.

The team recognized that it was important to have a well-established participatory process to enhance the success of the project. They wanted to ensure that the lines of communication and reporting were clear and that partners had the opportunity to participate equally in the formation of the guidelines that would be implemented (Gaventa, 1993). Four working teams were formed to complete the project work (Fig.1).

The teams were accountable for reporting to the Project Steering Committee. A full-time project manager was hired to manage the CANARIE THC and the e-learning projects.

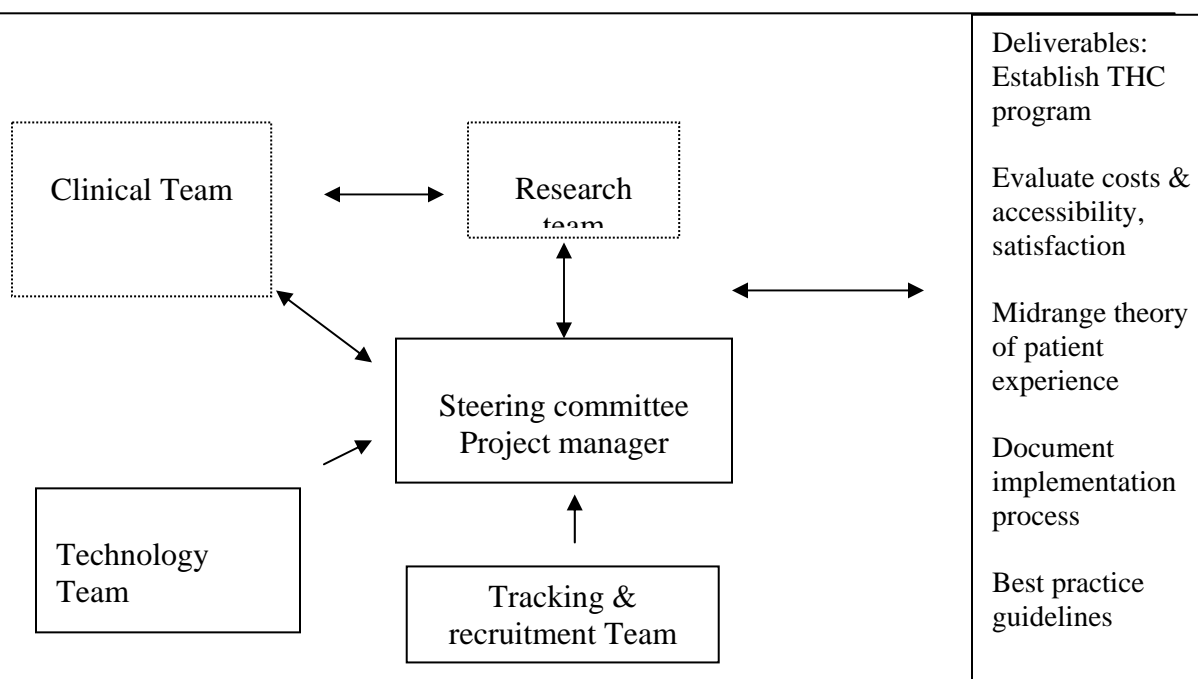


Figure 1. THC Implementation Process

Team membership and roles

Clinical team

The clinical guidelines, screening protocols, standards of practice, recruitment process and THC policies were developed by the Clinical Team composed of community nurses, nurse managers, a Telehomecare educator and expert practitioner, physician, a case manager from the East York Access Centre, the project manager, and the project researchers. The committee's mandate was to "facilitate the appropriate selection, admission process and monitoring of patients with limited mobility and chronic illnesses requiring frequent interactions with health providers". The team met every month early in the project to develop an initial set of guidelines for the identified THC patient populations. Later, a sub-group met every week to provide clinical and technical support to THC nurses as they implemented care.

Technology Team

The team consisted of the project manager and a manager from American Telecare. They liaised with the partner IT teams regarding clinician station hardware, software and telephone line installation.

Tracking and recruitment team

The group investigated the number of patients who would potentially be eligible for THC. Initially a case manager at the East York Access Centre, the Director and Supervisor of Comcare Health, the Director of Emergency and Ambulatory Care Clinics at TEGH, a project researcher, and the project manager all participated in this process. As the processes were refined and staff was trained the recruitment team shifted more directly to the care providers and their direct supervisors.

Research team

Researchers included Diane Duff (York University/Centennial College) and Lynda Atack (Centennial College). Dr. Duff was the project Principal Investigator; she held overall responsibility for project implementation and budget. She and Dr. Atack conducted the literature review, prepared materials for ethics review, developed the research plan, selected and developed data collection methods. The two researchers conducted data analysis and compiled the final report and were responsible for dissemination of findings.

Steering committee

The steering committee was formed to oversee project implementation, track project progress, identify and resolve challenges, and seek funding for sustaining the project. The committee included clinicians and managers from all partner groups and the project researchers. A project manager was hired specifically for the CANARIE-funded projects. The manager chaired the steering committee, was responsible for overseeing project implementation, tracking patient enrolment, team communication, budget tracking, and reporting activities.

Project Objective # 2 Explicate the process and concerns of users and providers by developing a midrange theory of THC experience over its duration
Objective status: Achieved

Target population

Participants included patients, project staff, and managers in the East York region of Toronto. Patients with CHF, COPD and diabetes were targeted for enrolment. These populations were identified by TEGH family physicians as high users of physician office visits, in-patient units and Emergency departments. Patients were referred from the Family Physician's offices and East York Access Centre and had to meet the following criteria:

Patient inclusion criteria:

- Older than 18 years
- Willing to be involved in telehomecare
- Mentally competent or mentally competent caregiver in the home
- Functional spoken English or a caregiver who speaks English who is in the home
- Frail or homebound

- High system users, unstable health condition requiring frequent monitoring, or newly diagnosed
- Doctor's supervision is available.
- Requires a minimum of 10 THC visits as part of the service plan

Patients were excluded from the project if they met the following criteria:

- No electrical or telephone services
- Unsafe home environment
- Requires hands-on care from an RN or physician at each visit
- Lacks one or more of the inclusion criteria

Project participants also included: nurses, physicians, and case managers from community and hospital agencies who reported on the provider's experience in delivering THC.

Ethical consent

The study was reviewed and received ethics approval at Centennial College and the Toronto East General Hospital. Members of the clinical team from the Access Centre and hospital and family physicians' offices assessed patients for THC eligibility based on a standard Home Care referral. Nurses gave patients an information package that explained the study and included a consent form. Health care team providers gave informed consent to the project as well.

Sample

In total, 32 patients were referred to the telehomecare program during the study period. Twenty-seven were admitted to the THC project. Two individuals were excluded upon referral screening and transferred to in-home visits. One had no phone and one was living with mental illness in an unsuitable home situation for THC equipment installation. Additionally, three individuals were transferred to in-home visits following the first in-home assessment visit. One individual had cognitive impairment that precluded learning how to use the patient station. A husband and wife who were referred together for their respective health problems were overwhelmed with their combined health conditions.

Research design

A decision was made to conduct a descriptive study for several reasons. The team believed it was important to have a clear understanding of participants' experiences, the THC implementation process, and costs before conducting a randomized clinical trial. This decision was supported by the literature review which revealed gaps in describing the THC implementation process.

A variety of methods and sources for data collection were selected to provide a full and comprehensive picture of the THC implementation process. By combining methods, the researchers were able to add depth and breadth to understanding the phenomenon under study (Shih, 1998). Combining methods enhanced the opportunity to explicate and validate constructs (Polit & Hungler, 1999) and to begin theory development on THC

adoption. Methods included: surveys, interviews, health care system utilization tracking, chart audit, content analysis of meeting and clinical notes, and field observation.

Data collection

1. Surveys

Patients who consented to participate in the project were asked to complete three surveys at various points in the project. These included (Appendix A):

- A demographic survey at the start of the THC visits
- A Home Telehealth Satisfaction Survey after one month on THC
- The SF36 version 2 survey at the start of THC and monthly thereafter while on THC

The demographic survey, designed by project researchers, consists of eight items that ask patients questions about their health history and demographic information. The SF36 is a multi-attribute survey of health status from the perspective of the patient that assesses eight health concepts related to physical, social, and everyday activities. It has been used with patients living with a wide variety of illnesses. The SF36 has been extensively tested in studies of more than 1500 patients and has an excellent response rate (72-83%); completion rate (95%); and evidence of reliability with a Cronbach's alpha greater than 0.75 (Jenkinson, Wright & Coulter, 1994).

The Home Telehealth Satisfaction Survey was (HTSS) developed for the project based on a thorough review of the telehomecare survey literature. Approximately 75% of the items were culled from existing THC surveys (Scott, 2002; American Telemedicine Association, 2003) to meet the needs of this project. While items from existing surveys were developed by telemedicine experts, no evidence for the reliability of survey items was located. The HTSS was pilot tested with 5 elderly patients who reviewed the survey for clarity, ease of use and length of time for completion. An expert THC nurse also reviewed the survey. Following the pilot test, revisions were made and the survey was finalized. The Cronbach alpha for the HTSS was .94 in this study.

2. Interviews

Patients

Every patient enrolled in the THC program was asked if he/she would like to participate in an interview. To date, 10 patients have consented and participated in one or more interviews. An interview guide, using open-ended questions, developed following a review of the literature, was used (Appendix A). The questions reflected the pattern of questions typically used in a grounded theory study. Participants were asked to tell the researcher about their THC experience, what helped them get started with THC, difficulties or concerns, recommendations, the impact on their relationship with the nursing provider and the impact of THC on their health.

Project team

Interviews were also conducted with members of the project implementation team. The purpose of these interviews was to identify nurses and managers' perspectives at different stages in the THC implementation process.

3. THC system costs and health care system utilization

The cost effectiveness of THC was measured by tracking the number of participants on THC and the duration of time on THC. The number of patient visits to the ED and hospital admissions were also tracked. These data were compared with a similar population of patients identified through a chart audit.

4. Observation and document review

Researchers attended all clinical and steering committee meetings. Additionally, minutes from the meetings and documents produced by the groups were used to conduct a thematic analysis to identify project processes, successes and challenges. Patients and providers were observed during THC visits on 3 three occasions. A review of the nurses' documentation was also made and a content analysis of the activities conducted during THC visits was made.

Results

Results are reported from the following sources: the demographic survey, the Telehomecare Satisfaction Survey, interviews with patients, nurses and managers, and the document review from meetings and patient charts and field observations of THC visits. Results from the SF36 are not included in this report. Data is being collected longitudinally from patients and as yet only baseline data has been collected.

Demographic Survey

At the time this report was compiled, nine patients (33 %) had returned the demographic survey. The majority of patients were, as expected, elderly (Table 1). The number of times patients made a doctor's visit in the past year ranged from two to fifty, with a mean of 14 (SD 14.5) and median of 10. The average number of hospitalisations in the past year reported by patients was 1.25 (SD.44).

Table 1. Patients' demographic profile

<i>Variable</i>	<i>n %</i>
Age	
70-79	7 (77.8%)
80-89	2 (22.2%)
Gender	
Females	6 (66.7%)
Males	3 (33.3%)
Medical diagnosis	
Congestive heart failure	2 (22.2%)
Diabetes	
Chronic lung disease	3(33.3%)
More than 1 of the above	4 (44.4%)
Length of time with illness	
< one year	2 (22%)
1-5 years	2 (22%)
11-15 years	2 (22%)
16-20 years	1 (11%)
> 20 years	2 (22%)
Living arrangements	
Alone	3 (33%)
With spouse/partner	6(66.7%)
Help provided with care	
Yes	5 (62.5%)
No	3 (37.5%)
Missing	1

Home Telehealth Satisfaction Survey

The Home Telehealth Satisfaction Survey (HTSS) is a 25- item survey designed to measure patient's satisfaction after one month on THC in relation to comfort, ease of use with equipment, relationships with staff and the impact on health (Appendix A). Respondents used a Likert-type scale ranging from 1 to 4 to rank their responses to survey items where 1 = strongly disagree and 4 = strongly agree. The higher the score, the more positive the experience. There are 21 items related to overall satisfaction followed by 4 items that relate to specific peripheral devices (blood pressure cuff, weight

scale, oximeter and stethoscope). An overall score on the HTSS is calculated based on the first 21 items; the remaining four items are peripheral-specific; not every item applies to all patients. The maximum score on the HTSS is 84. The response rate was 41% (n = 11). The overall mean score on the HTSS for all patients was 70.8 (SD 10.0). To assist with interpretation, scores were converted to a number out of 100. The mean score was 84.2/100. The range of scores was 58 to 84 (69/100 to 100/100).

Items on the Home Telehealth Satisfaction Survey

The majority of patients (91%, n = 10) reported they were comfortable using the technology. All patients (100%) agreed with the statement “*I found the technology easy to learn and use.*” All patients (100%) reported that the technology helped them monitor their health and 100% agreed with the statement, “*Staff monitoring my health helps me feel more secure.*” Ninety-one percent (n = 10) agreed that they were better able to manage their health with the THC; 100% reported THC helped them learn about their health. All respondents reported that their families were comfortable talking with staff using the equipment.

There were no technical problems noted (100%). All patients reported that they could see the nurse clearly. However, while 73% (n = 8) reported they could hear the provider clearly; 27% (n = 3) could not. Eighteen percent (n = 2) reported that the equipment was in the way in their home. While 73% percent (n = 8) said that “*it was just as easy to communicate with the technology as with a face to face visit*”; 27% (n = 3) disagreed.

Items regarding the peripherals were evaluated separately. All the patients reported that the blood pressure cuff, the oximeter and the stethoscope were easy to use. None of these patients indicated that they had used the weight scale.

Interviews

Results are reported from interviews with patients, nurses and managers.

Patients’ experiences with Telehomecare

Ten patients who received THC during the project participated in interviews with researchers concerning their experience with THC. Interviews were conducted at various stages of the telehomecare experience. Interviews were audiotaped and transcribed or recorded using field notes. Interviews ranged from 15 to 60 minutes. Participants were given a choice concerning the setting and format (face to face or telephone) for the interviews. Three interviews were conducted face-to-face in the participants’ homes and seven were conducted by telephone. Participants were asked to tell the researcher about their health situation, the THC experience, what helped them get started with THC, difficulties or concerns, recommendations, the impact on their relationship with the nursing provider and the impact of THC on their health.

Additionally, data concerning the THC experience and process was collected and transcribed from two patient videos that were filmed as part of the e-learning project.

Data were analyzed using the classical methods described by Glaser and Strauss (1967). Substantive theory derived by grounded theory methods are formulated to have explanatory power that permits the transfer knowledge of common patterns and process from a study such as this to other practice situations that share similar situations and contexts (Glaser, 1978; Morse, 2001). Grounded theory must *fit* the data and be confirmed by participants as accurately explaining their experiences to enhance credibility. Theory must also *work*, meaning that it is capable of explaining and interpreting what is happening with participants over time and predict what will happen in similar circumstances.

Data describing the participants' experiences with telehomecare were analyzed using the grounded theory research method to explicate a preliminary substantive middle range theory that identifies common processes and experience trajectories over time. Conceptual categories and their properties were identified from substantive coding of participant data using the constant comparative method with theoretical memoing. The over-arching process involved in the participants' experience with THC was that they were: *Living in a Comfort Zone* (Figure 2). Four major categories were identified and sequenced into overlapping phases: *Making a connection*, *Focusing on vital signs*, *Understanding illness*, and *Taking control*. Further work on the theory will be done to densify the categories using theoretical sampling to explore the experience of participants with other illness situations and to better understand contrary cases. Contrary cases allow the investigator to identify contexts and circumstances that interfere with the process of effectively benefiting from THC. Prolonged engagement with participants and incremental revisions of the theoretical categories will occur until the theory "closely resembles reality" (Morse, 2001, p.11).

Living in a comfort zone

<i>Making a connection</i>	<i>Focusing on vitals</i>	<i>Understanding illness</i>	<i>Taking control</i>
Health situation	Preoccupied with norms	Exploring signs and symptoms	Stabilizing
Community care	Understanding normal	Connecting with directives	Exploring capacity and limitations
Provider	Identifying potential for change	Integrating medications and self care actions	Becoming proactive
Technology			

Figure 2. Participants' experiences with telehomecare

The core category of the theory, *Living in a Comfort Zone*, encapsulates the recurrent concerns of participants throughout their experience with THC. The transition period following discharge from the hospital as an in-patient or from the Emergency Department, was reported as a very anxious time. Patients expressed the desire to learn to live with chronic illness in a way that allowed them to feel confident in their health and able to participate in social activities and activities of daily living. The goal of living independently with some sense of comfort or reassurance transcended all aspects of the THC experience and impacted on family members as well as the individuals living with illness.

Making a Connection

The first phase of the process of *Living in a Comfort Zone* focuses on *Making a Connection*. Patients begin by connecting to their own health situation upon discharge to home, to community care, community providers, and to the THC equipment and process. For many patients this is a time that is fraught with anxiety and concerns. Often they have restrictions imposed by their illness, by the prescribed disease regimen, and by the very process of needing to receive care and monitoring. If care by remote videoconferencing and monitoring is not successful, it is usually during this initial phase that it becomes apparent because the patient cannot master the technology, the actual hands-on care required is greater than anticipated, or the total situation is so overwhelming that they are not willing or able to engage. In some cases, initial reluctance to adapt to THC can be overcome by increasing the number of initial in-home visits and through intensive coaching. In other cases, *Making a Connection* with THC fails and must be replaced by in-home visits. In two patient situations, both face to face and THC was refused despite a referral and perceived need for intervention by hospital or medical providers.

Most patients adapted very well to THC, one stated: *“The equipment is very straight forward to use...I liked it right from the beginning. The nurse is very good...she has a good personality...I liked when she came [to my home] as well...but it is more convenient with the equipment...I like that I can do it [self-monitoring] myself at other times. I use it to give myself a check-up every morning.”*

Another participant said: *“I was thrilled when asked if I would like to participate in the project...I am certainly glad to have the equipment in my home...Jennie did a good job of explaining how it all works...it is a great source of comfort not only do you have someone at the end of the telephone line but you’ve got that visualization with that person...it is much more intimate [than the phone].”*

One patient noted he wished he had received the equipment earlier. He did not receive the equipment until after he experienced life-threatening complications:

“I didn’t get the equipment when I really needed it [after his cardiac bypass surgery] then I had a heart attack and even then we had to twist their arms to get it [home care]...really would have been great in the first 10 days after the surgery...that was the really rough time...I asked for home care but was told I couldn’t get it.”

Some patients were more ambivalent. One recalled at the beginning of his involvement in the project: *When they came with the equipment I cried. I just didn't want it...it was too much. It was too much ...I am very emotional...and then I felt so bad that I didn't even try it...I was mad at myself...so I phoned them back and said if it wasn't too late that I would take it [the THC equipment and remote visiting]. Because I felt guilty I didn't even try it before I said no...and it was so easy...I don't know why I said no in the first place...but it was just too much after coming home.*

While most patients adapted well to THC, it clearly is not suitable in every situation. A patient, who initially agreed to trial the THC equipment, changed his mind when he received an end-stage diagnosis citing a feeling of being “*overwhelmed*” with his health situation. Another patient could not retain the instructions for answering the telehomecare equipment signal [wait for 2 rings and press the green button] due to cognitive impairment.

Preoccupied with vital signs

Once the patients and providers have surmounted the initial challenges involved in *Making a Connection* there is a tendency on the part of both the patients and the providers to focus on the vital signs. Providers concentrate on establishing a baseline and ensuring that patients are maintaining their health at an adequate level. Most patients took their vital signs at least once a day, even when they were not scheduled for visits with the provider. Some patients took their vital signs more often, sometimes even several times a day.

One patient stated: *“What I like best is that I can monitor myself whenever I feel I need to do it...if I am tired or I am short of breath...I can use the equipment...and it is relaxing to my mind to know that actually I am fine...it lets me know maybe I should rest but that I am fine...I don't need to worry like before that maybe I should phone for the doctor.”*

Another patient said: *“At first I worried that it jumped around so much [the vital sign readings]...I didn't know that it was supposed to...I always thought it would pretty much stay at the same level...but the nurse explained to me that my activity and even the times of day would change things...like my oxygen [saturation] is always the lowest in the morning.”*

One patient was surprised that the researcher knew from the electronic record how often she had checked her vital signs. *“Well, especially at the beginning I checked a lot [she lowered her voice] I didn't know if I was allowed to...but I was interested. It was the first time that I saw for myself what the numbers were...before only the nurse or the doctor knew...so it was interesting to me.”*

However, another patient stated: *“The nurse encourages me to take my vital signs everyday...especially because my blood pressure and oxygen has been low and she would like to see if there is a pattern...but I don't always remember...especially if I am feeling good and I am busy...”*

Understanding illness

Many patients learned to use the THC equipment results and feedback from the health care provider to better understand their illness and its impact on their activities and in return, the impact of activity and health state on their vital signs. THC at this stage becomes part of the daily routine. Participants and providers noted that they realized that the technology itself is simply an enabler to the health care interaction or their daily assessment of their own health, and it was so thoroughly integrated into the fabric of the visit or daily activities that it was no longer even noticed.

“We [participant and caregiver] do this first thing in the morning. If it’s a bit high I can usually hit the nail on the head about what’s come along and triggered it...and I do adjust like my fluid intake or activity...then I can take it the next day or later in the day just to see if it’s up...it gives me a comfort zone.”

Another patient who was interviewed after discharge from the THC project stated: *“I missed it [the THC equipment]. For the first few days I kept going into the room to take my pulse and blood pressure first thing in the morning. I forgot that Irene had picked it up. But I’ve been fine, so she was right. I didn’t need it any more, I was fine...but I had got used to the security of it. Just knowing I could check on myself.”*

Another participant demonstrated to the researcher his mastery of the equipment. The patient said: *“See I told you it would be up...what with the stress today...and it is up...but if I rest this afternoon it will be right back to normal. It should go up and down like this...it is okay...I just use it as a guide so I know myself what it means.”*

However, patients noted the equipment and vital signs were only part of the THC equation. They were looking for knowledge related to their illness as well and did not always feel that the nurses had the specialized information they were looking for. One patient remarked:

“She’s not a cardiac nurse. I told her about the high heart rate and she gave me the knowledge she had, which was limited, not her specialty. She got me to put the stethoscope on and verified the vitals signs...and that I didn’t have water on the lungs...and that was reassuring, I worried a bit less. I pushed her for what I should do and she told me to get hold of my GP or cardiologist and so I did...but I wished she could have offered a bit more [would have really liked a cardiac nurse specialist].”

For some patients however, there is little interest in learning self-monitoring. One patient was surprised that other patients used it outside of the visit time. *“No, I never use it except when the nurse calls. I wouldn’t know what it all meant. It’s just too much numbers...but the nurse always knows and she checks I took my pills...sometimes that’s the problem...Sometimes my son asks me but I don’t remember the numbers...if he’s here he likes to know...he usually comes for the [THC] visits.”*

Taking control

As mentioned in some of the previous examples, many patients use the monitoring results to gauge their own activities. Other patients used it to determine if they needed to contact a health provider.

One patient with congestive heart failure remarked: *“If it was up [my weight] now I know and I can phone into my doctor for a change to my medications like my water pills...or sometimes if it is just a little bit up I will make sure to keep my legs wrapped [with compression bandages] and maybe have less to drink the next day...so maybe it will come down again. Before, I didn’t like the bandages and it was not something I would have thought would have an effect...but now I can be in control and I don’t need to be in touch with the doctor and this is saving a call to the doctor.”*

Another patient stated: *“Well I quit smoking but I wanted to wash the sheers [drapes] so it wouldn’t still smell like cigarettes when I came into the house. So first I took the measurements [vital signs] and everything was normal. Then I got my husband to take them down and I washed them and hung them and when they were dry I ironed them...but not all at once, spread out like. After each step I took the measurements again and I was fine. It gave me confidence to know I was fine and I could do things again. So then I went out to the shops and it was fine and now pretty much I am back to where I was before I went into hospital...maybe better...and I couldn’t have predicted that because I felt so low when I got out [of hospital].”*

The electronic health record indicated if patients had used the THC equipment monitoring capacity to determine if they were in some difficulty, such as shortness of breath. Patients avoided a trip to the ED by requesting an extra home visit during these episodes and learned strategies to manage these kinds of health situations. Patients were then able to use these strategies in similar situations to avoid activation of the EMS with an ED admission.

Finally, one patient noted how vital the equipment was to his sense of well-being, but also to his survival. *“I had a serious problem last week and with this defibrillator thing [defibrillator implant] I got a shock at 1 a.m. And it was very reassuring to go downstairs and do my BP test, take my pulse and oxygen thing. To know that in spite of the shock I was still alive...I noticed my heart rate started to go up about five weeks ago and was watching it warily...I wasn’t that surprised when the defibrillator kicked in. I called my GP the week before the defib went on...just because I was concerned about my heart rate and trouble breathing [I’d had heart failure before which was like] drowning on the inside... and I was concerned I was sliding into that space... [but with the THC equipment] I had enough ammunition to say I’ve got to do something.”*

While few patients identified improving disease management strategies as a goal at the outset of THC, many did acquire sufficient knowledge and strategies to control their illnesses. The goal that they identified was continuing to live independently at home with some comfort and confidence. Some patients with an end-stage diagnosis were often able to live in their own homes, for several months, thus avoiding premature

institutionalization. In one case, THC allowed a couple who had been married for more than half a century, the support they required to live together for a further six months. A final remark from one of the patients who received THC for more than two months following a series of hospitalizations summarized how many of the patients felt: *“It may have kept me from going crazy with not having enough information. This gives you good information.”*

Interviews with nurses

Two nurses who delivered THC to patients in the project participated in interviews with researchers as they began implementing THC, during the project and at the end of the project. Interviews were taped and transcribed. A content analysis was conducted of the transcripts to identify major themes. Both nurses were experienced home care providers working for a private Nursing service. While familiar with email, neither nurse described herself as particularly “techno-savvy” and this was their first experience delivering THC. Interviews ranged from 20 to 60 minutes to accommodate nurses’ work schedules. Nurses were asked to describe their experiences with THC, the impact on their patients’ health, benefits for patients, challenges and recommendations (Appendix A).

Eight interviews were conducted. In addition, anecdotal information from clinical meetings that nurses had with a THC nurse expert and observations were made of nurses taking their THC training and conducting THC visits on three occasions.

Results

Four major themes were identified based on the content analysis. These included: nurses’ experiences with THC, the impact of THC on patients’ health, challenges with work processes and experiences with technology.

Nurses’ experiences with telehomecare

Overall, nurses’ reported positive experiences delivering THC. One nurse remarked, *“This is the future, it feels good to be doing it.”* Both nurses reported that their training, which had consisted of a one-day workshop with orientation to the clinician and patient stations and peripheral devices, and discussions regarding patient assessment, communication and troubleshooting, had been effective. One nurse reported that the software was easy to learn *“you can learn that in 30 seconds; you don’t need anyone to teach you that.”* One nurse met by telephone with a THC nurse expert from the technology provider group after the training; that was also reported as helpful. Nurses also had access to an online course in THC, the product of a concurrent CANARIE project, which they reported as useful.

As expected, both nurses conducted a mix of in-home and THC visits. Nurses identified a number of clinical benefits arising from THC. They found it easy to see patterns in patients’ vital signs because of the software graphing capabilities. They noted that THC had a positive impact on patients’ health, and one nurse remarked, *“for some patients it’s*

even better” [than in-home care]; a theme which is discussed separately later in this section.

One nurse noted however, that she found her conversations with patients “*less meaningful*”. She noted, “*There have been times, when to thoroughly assess, I go into the home to make a visit so I can sit down and really talk to them, find out what’s going on and advise them*” The nurse attributed the need for the in-home visit partly due to her elderly patients’ hearing problems. She questioned her patients’ ability to understand her well when they did not have the opportunity to read her lips. Accordingly, this nurse made a mix of face to face and THC visits with her patients and felt that as a result, she had very good relationships with her patients. The second nurse found her relationships with patients unchanged: “*I always start with a home visit, then I do some THC visits. Then, when I see them again in the home, it’s like there is no gap. We’ve seen each other along the way just in a different form. It’s just the same, there’s no difference.*”

Nurses also identified a number of benefits to THC they expected to realize when the program was fully operational: less driving time and the ability to conduct more visits in a day. They also noted that prior to THC they followed a fairly rigid schedule of patient visiting, for example two or three visits per week, scheduled for certain days, regardless of the patient’s needs on those particular days. They felt that the THC nurse could be more flexible and responsive to patient needs throughout the week. “*People with respiratory problems. We saw them twice a week in the home, checked vital signs and then we were out. Now, we have some clients like, R.T and others like him, the unit is there. When they are short of breath, they go to their pulse ox, check sats (Oxygen level in the blood) and they have access to the technology right there.*”

Nurses also discussed those patients who were not successful with THC. One individual was reluctant to take an active self-management role and “*just wanted to be taken care of.*” One elderly woman, acting as caregiver to her husband, with her own health problems, felt that the THC was more than she could manage. One other client had more advanced cognitive impairment than initially recognized and was unable to learn THC. Another patient, with alcohol abuse problems, was unreliable regarding his THC visits and the equipment was withdrawn.

Impact on patients’ health

The second major theme identified by both nurses was the positive effect that THC had on patients’ health. Nurses noted that access to the THC equipment and staff impacted on patient behaviour in three ways: reduced utilization of physician and hospital resources, as a tool for decision-making regarding daily activities and improving compliance and accountability with medications. One nurse described teaching her patients about the acceptable range for pulse, blood pressure and oxygen saturation. Patients were advised that if they didn’t feel well to check their vital signs and compare results to the acceptable range of values and then call if there was a problem. The ability to self-monitor had a definite impact on patients’ use of the ED and their physician’s

time. In the 27 patients they had nursed on THC, only one patient had gone to the ED and no patient had been admitted to hospital. One nurse remarked,

“I’ve seen a lot of people be empowered to care for themselves more, with the equipment in their home. And to make more informed decisions for themselves about when to go to the hospital, when to go to the doctor, when to call and ask for advice. For those who are ‘frequent flyers’, running in and out of hospital for whatever reason, maybe for attention or they feel something because they’re aging and getting worried. Those people, if they use the equipment comfortably on their own, then there’s a much greater chance of keeping them out of the hospital or ER for little or no reason.”

The second nurse commented, *“That’s why Mr R. wants to keep the unit until summer when the weather is better when he is out and about and has increased activity to see how much he can improve, how far he can go. Just testing out his activity tolerance so...He is only able to do that, push himself, because he has the unit, he knows he is not going to go too far.”*

Experiences with technology

Nurses noted that their experiences with the technology had been positive with few technical problems. When they encountered problems, nurses called a 1-800 number that connected them with staff at the technology provider site. Nurses reported that with that support and experience, their own technical problem-solving skills developed in a very short time. One nurse found the audio and video quality completely satisfactory. The second nurse, as noted earlier, found that the sound quality was not sufficient for some of her older, hard of hearing patients. She speculated that this might be because these patients were using lip reading to support their understanding and were missing that visual cue when communicating with THC. When these patients had trouble hearing her, the nurse reverted to a simple telephone call which she said was effective.

Nurses were occasionally frustrated with data retrieval and data entry problems and found the system slow at times. They had reported these problems to the technology provider and felt confident these would be addressed. Both nurses identified the issue of lighting. Nurses visited patients living in older homes or apartments where there was often only one three-pronged plug required for the installation. *“So the equipment goes in a location convenient for equipment, not for the nurses”* This often resulted in inadequate lighting to complete a thorough assessment, particularly wound care.

Documenting patient care was described as “easy”. While there was no nursing care plan on the system, nurses said this was not an issue if one nurse consistently covered her own group of patients. Problems arose when another nurse had to step in and “cover” and did not have access to a care plan.

3. Problems with work processes

While nurses reported positive experiences for their patients, they were much less positive regarding the impact of THC on the quality of their work life. At the start of the

project nurses carried a full caseload of community patients and were paid on a per visit basis. As they prepared to take on THC patients, they reduced their community caseload. Recruitment to the THC project was slow however, and during the transition to THC, with a low volume of visits, nurses actually experienced a drop in income.

The second problem nurses reported was one of “juggling time.” Again, because the volume of THC patients was never large enough to make up a complete caseload, nurses retained community clients. Normally these nurses would make their visits in a particular sector of the city, to reduce driving time and would rarely come in to the Nursing agency office. When THC patients were added to their caseload, they had to drive to their patient’s home to install equipment and make an initial assessment. Patients were situated in one geographic area for the purpose of the project. Unfortunately, that area was across the Greater Toronto Area from the Nursing office. The nurses then had to return to the Nursing office in order to conduct the THC visits and to another geographic sector to see their in-home patients. This meant nurses were driving more than before. They were also obliged to go into the office; an unusual event in community practice. One nurse commented, “*I feel like I’m spread all over the city*”. Nurses recommended boosting recruitment to the project to enable full office THC days. Another strategy they suggested was to place a clinician unit in the nurses’ home until such time that there were sufficient patient numbers to enable full- time office work.

Interviews with managers

Interviews were held with managers from partner organizations at the start and the completion of the THC project. Researchers, as part of the project team, attended all the monthly partner meetings. Notes and minutes from these meetings were reviewed and a content analysis was conducted. Five major themes were identified during THC implementation. These included:

1. Organizational readiness
2. Recruitment
3. Funding/reimbursement
4. Clinical care, support and training
5. Cost savings/ROI and sustainability

Organizational readiness

Project partners came to the project in different states of organizational readiness. There was variance in knowledge about THC, lead time, interest, project resources and reasons for joining the project. Partners faced a steep learning curve regarding THC. With the exception of the technology partner, none of the partner organizations had prior THC experience. A summary of comments from each partner group appears in Table 2.

Table 2. Managers’ perspectives: Project start

<p>“We were looking at options of service and when this came to our attention we thought this would be a great learning experience for us. This would be completely new for our staff.”</p>
<p>“I feel telehomecare is the next generation of what we will be doing. Disease management will be a huge component. Strategically, that is where we are looking as a company.”</p>
<p>“I’ve had a long standing interest in telehomecare and I have been tracking the development in the rural and remote areas for the past 10 years, so when the opportunity came about I was very interested in trying it out in the Ontario context where there are clearly defined mandates and roles in agencies. And to see how would we work through developing a concept or application in Ontario in an urban setting.”</p>
<p>“While physicians are obligated and inclined to be early adopters of technology, most have little or no knowledge about THC. A major issue for us will be how to integrate THC into existing workflow.</p>

Technology demonstrations were conducted for the partners in the months prior to formal project start. By the time the project formally commenced however, there had been two partner changes, including the technology partner. While senior staff had been present for initial technology demonstrations, clinicians, senior representatives from new partners and IT staff from the different organizations had not. Those groups that had been present from the onset of project discussions found the transition process easier and reported more “buy-in” compared to those who joined the project later.

Key concerns at this time for managers included: benefits of THC to patients regarding quality of life and health experiences, cost savings to the hospital and CCAC providers. They were interested in knowing how the patient record would be integrated and accessible to providers. There were some concerns related to technology adoption as well. *“It has to be user friendly not only for the clients but us too.”* The need to market the project within their organizations, to support patient recruitment, was identified as a major task.

All partners experienced the challenge of implementing a major change in health care delivery during the one-year project timeline. One manager commented, *“Particularly with the change in technology partner just before we started, we had a short planning time before moving on to rapid implementation.”* Another commented, *“Initially we didn’t realize the volume of work this would involve; we had to go in and change our work processes.”* Telehomecare was perceived as an “add-on” to already full portfolios. *“We had other major initiatives underway that were dictated by the Ministry, things we had to do, versus nice to do - like telehomecare.”*

Considerable time was initially spent clarifying partners' roles regarding patient referral, reimbursement and after hours care, patient eligibility, infection control, equipment tracking and cleaning. Other issues identified at this time included concerns for patient safety and a fear of growing too fast. Shortly after the project began, managers from three partner sites visited a THC program at the Atlantic Health Sciences Centre in New Brunswick. Staff there spent considerable time demonstrating telehomecare with patients and families and discussing issues regarding operationalization. The opportunity to observe patients using the equipment and to observe the day-to-day workings of THC was very helpful.

An IT team composed of the project manager and a manager from AmericanTelecare was formed. They worked with IT teams in the partner institutions to install clinician stations and problem-solve regarding technical issues. Regrettably, due to the rapid project start, IT department representatives were not involved in the beginning stages of the project. THC equipment was owned by the lead institution on the project and loaned out to partners. The team quickly learned that some IT departments were already overloaded with internal demands on their time leaving little time to support the THC project, nor would they assume responsibility for equipment that did not belong to their organization. Other technical challenges included institutional firewalls and the need for dedicated phone lines in institutions to ensure good video quality. Partners were anxious about implementing the technology. 24/7 support was provided by the technology provider by telephone and numerous on-site support visits were made by the technology partner to support implementation. This support was viewed as a valuable resource.

Other factors that influenced partners during the project included staffing shortages, and home care budget reductions. The THC project began just as SARS was brought under control in the Greater Toronto Area. SARS management had a tremendous impact on managers' time and home care budgets. One manager noted, *"At the moment we have four hours a day scheduled teleconferences and 100 emails a day just about SARS on top of regular workload, so it is not business as usual."* Further, the majority of participants in the CANARIE East York Telehomecare project were simultaneously participating in a second, CANARIE e-learning project. Despite these demands, the partners contributed time and resources to the project and demonstrated steady commitment.

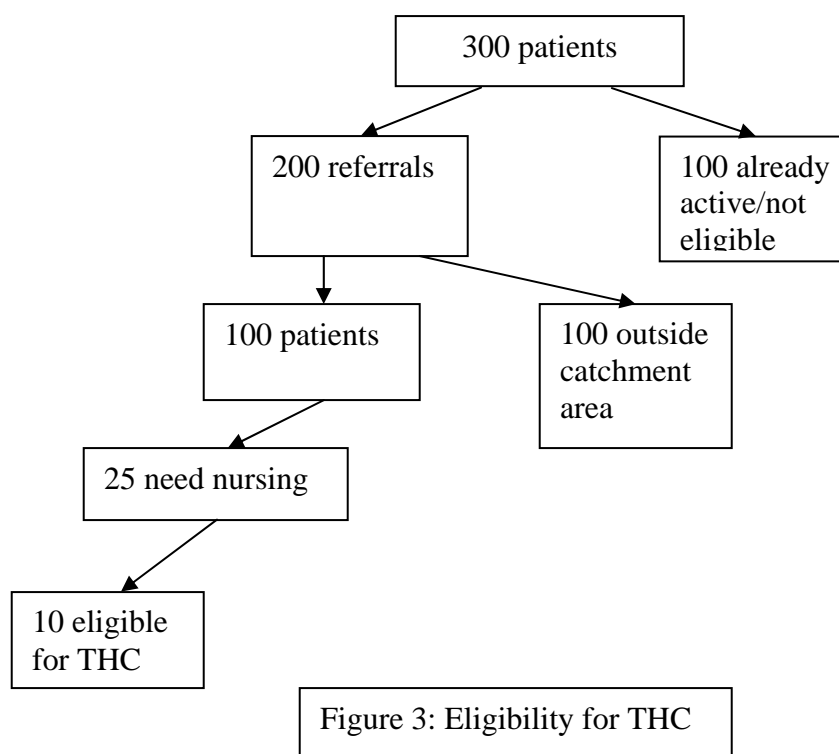
Recruitment

The issue that appears most frequently in the minutes from partners' meetings and absorbed significant partner time and energy was patient recruitment. The original recruitment plan called for patients from three populations to be referred to the project by a project physician and the Community Care Access Centre(CCAC). Nurses completed their THC training September 24th. The first patients started on THC the week of October 1st. and by October 14 five patients were on THC. Considerable project marketing was conducted including information sessions at doctor's rounds at the hospital and CCAC's . A chart review was conducted to identify "frequent flyers" to the ED who would benefit from THC. By the end of October, there were just three patients on THC. Partners

recognized they were not meeting project goals and identified a number of barriers. These included:

1. Lack of information to assist in decision-making for patient recruitment. The CCAC could not retrieve patient information according to diagnostic category.
2. Once identified, the primary diagnosis did not give enough information to make a judgement if the patient was suitable for THC
3. Confining recruitment to the three identified diagnostic categories rather than using the criteria of patient need to determine eligibility for visit did not always result in identifying patients who would most benefit from THC.
4. The THC project was not well understood by hospital discharge coordinators reducing the number of patients referred to THC.
5. The decline in the number of patients referred to THC as the project progressed was influenced by post-SARS budget constraints on home care funding. The SARS outbreak strained home care budgets, re-directing funding away from chronic care patients to priority palliative and acute care patients, Less funding for chronic care patients on home care meant fewer patients referred to THC.

The declining number of patients being referred to THC resulted in a re-examination of patient eligibility. The following information was compiled (Figure 3). Out of a potential pool of 300 patients, approximately just 10 were eligible for THC visits. One important finding was that patients already receiving home care and expected to come on THC were already assigned to a nursing care provider who was not participating in the project. This rendered them ineligible for project participation.



Further, five patients (16%) declined THC or were discharged by clinicians for reasons that have been documented elsewhere in this report.

Action taken to boost recruitment

To address the recruitment challenge, a team of senior people from each partner organization was formed. The following recommendations were made:

1. *Expand the project geographic catchment area.*

This option was explored and a number of CCAC's were identified as interested in participating however, various factors worked against inter-agency cooperation. The CCAC's in Ontario operate as independent service brokers. Each CCAC has its own pool of care providers for nursing, social work, physiotherapy and other support services. Referring established patients from one CCAC to another is complex in that once patients are enrolled with a CCAC they are assigned to a nurse from a particular community agency. Transferring patients to the project CCAC meant disturbing an established nurse-patient relationship and would result in a drop in the original nurses' caseload and salary. Additionally, including patients from other CCAC's would mean that THC nurses would need to travel outside their catchment area for home visits, thereby increasing travel time and costs.

2. *Change eligibility criteria to focus on patient need rather than diagnostic category.*

This was done and it did increase the number of patients eligible for THC.

3. *Recruit patients from ambulatory clinics at the partner hospital.*

This decision was made, and two units were deployed. Hospital clinic nurses and a diabetes nurse educator were trained in THC by the community nurses. Despite assigning nurses to the THC project at 50% time for the final quarter, recruitment from the hospital remained problematic.

4. *Mentor the hospital providers.*

It became apparent that one obstacle to THC was that hospital providers, although very experienced clinicians, understandably lacked the experience of delivering community health care to patients in their homes. Nurses from the community provider agency made THC visits with the clinic nurses from both the community nursing office as well as from the hospital. To get them started with THC, three patients who were due to be discharged from the home care funded program were transitioned to the hospital nurses. These patients were all experienced recipients of THC and were enthusiastic supporters of the technology.

5. *Increase efforts to promote telehomecare in the hospital environment and facilitate community outreach.*

THC was presented at medical rounds and on posters on each unit at the hospital. An open house was held at one of the hospital clinics where the equipment was demonstrated and patients were able to interact with a nurse in another part of the hospital to get an impression of how the equipment worked. Information about the THC equipment and hospital capacity to deliver THC was also presented to a group of outreach agencies in the community that provide support for survivors of mental health illness and an agency that conducts senior's day care and programs for frail elders. Two clinics will be set up

beginning in May 2004 that will use THC to link hospital clinic nurses to clients in these community organizations.

6. *Refer private clients for THC and provide salary support to nurses for this group.* Two private patients who were identified as potentially benefiting from THC but who were not eligible for nursing funded by the CCAC were referred to the project. This action boosted the number of patients who were initially admitted to THC and provided a salary cushion for the nurses who experienced a loss of income while in transition to THC.

In retrospect the team identified three groups of providers who, while initially trained and oriented to the THC project, required further training and support if recruitment to the THC program was to be successful: These were the physicians, the hospital discharge planners and Access Centre case managers. More active involvement from these groups would have likely boosted patient referrals to the project. The THC project manager suggested the team work to develop a profile of the eligible THC candidate to make it easier for THC gatekeepers to identify clients. Another suggestion was made to work more directly with patients regarding THC. One manager proposed a model whereby patients admitted to a cardiac unit at the hospital would be informed about THC, trained during their hospital stay and discharged home with the equipment. This would raise awareness of THC and provide a tool that would potentially reduce the anxiety that many patients experience on discharge back into the community.

Funding and reimbursement

The team also acknowledged that overall lack of funding to community services for individuals living with chronic illness was problematic on an ongoing basis. The needs of patients discharged from the community following acute care illnesses after short hospital stays or day surgeries has meant that services to chronically ill and frail elderly people has been significantly reduced over the last several years. This problem was compounded during the post-SARS period as community care dollars had been used to provide extra services for patients who were unable to visit clinics and doctors offices because of SARS restrictions. The expenditure of money early in the fiscal year resulted in a scarcity of community resources for individuals in need of services post-SARS.

The rate of funding per visit and the number of visits per week by the Access Centre to the nursing provider also had to be negotiated. This was done and a contract for THC was developed between the Access Centre and the nursing service provider. The Access Centre adopted a flexible rate structure for the duration of the project to facilitate THC.

Another major issue identified was the impact of THC on nurses' salaries. Nurses in the project were employed by a private nursing provider and were typically paid by the number of visits they made. In order to prepare for THC, the community nurses reduced the number of community patients in their caseload. Unfortunately, because of recruitment challenges, this meant nurses saw fewer patients than usual and experienced a corresponding drop in salary at various times during the project. To remedy this, nurses were put on salary one day per week for the project.

The same issue applied to the physicians who participated in the THC project. Currently there is no reimbursement mechanism for THC visits for physicians. The physicians' time was covered by project funding.

Clinical care, support and training

Early in the project, providers recognized that the standard of care for THC would resemble that used for traditional community visits. Protocols for the different patient populations were reviewed and approved by the clinical team. Additional individual orders included in the home care referral were to be carried out in the same manner as were standard referrals.

Training consisted of a full day demonstration and practice with the clinician and patient stations, including file management, patient assessment using peripherals, documentation, troubleshooting, home assessment and installation. Testing for THC implementation, referred to as competency validation, was provided by the technology partner on the second day of training. Training took place at all four clinical partner sites and included nurses, supervisors, the project physician, hospital discharge planners, a case manager and Access Centre managers. Project participants also had access to the online THC course being developed as a second CANARIE project running concurrent to the implementation project. As the implementation project and e-learning project were running concurrently there was no opportunity for the THC providers to take the whole course. However, they did access the information from the course and provided invaluable data concerning the needs of providers. Training videos in particular were a helpful resource.

Later in the project, community nurses trained hospital clinic nurses and these nurses were oriented to the online THC course as well. These nurses grasped the technology quickly. However, as no patients were immediately referred to them, they developed a "subtle resistance" to THC. Unless training is quickly followed with application, anxiety regarding the process builds.

The community nurses had few problems with the technology. They did note however, that they found the patient units heavy when installing them in the patients' homes and rollers were purchased to make handling equipment easier. Nurses had technical problems in two homes at the start of the project. However, they called the 1-800 technical support line to American TeleCare and were walked through problem-solving steps. Two limitations of the technology were identified. The system used is a "point-to-point system"; at times it would have been helpful to include a third party, such as a case manager in a patient-nurse meeting. The second limitation was quality of the image provided by the camera was reported as insufficient for wound care without installation of a more specialized, high resolution camera.

In response to recruitment challenges, and the small number of nurses who were working independently, the need for ongoing clinical support was identified. Accordingly, a sub-group of the clinical team consisting of the project manager, an expert THC nurse from

the Technology team and a community nurse, met every two weeks by teleconference. The purpose of these meetings was to identify eligible patients, support clinicians in the THC learning curve, assist in technology trouble-shooting and share clinical expertise. One issue identified by the project team was the tendency for nurses to focus on vital signs during patient visits. Currently, the THC software does not include a nursing care plan or case manager planning tool and the team felt this would “*encourage a look at the whole client.*” While both nurses were making a mix of face-to-face visits and THC visits, the case manager felt some clinical observations had been missed and that home visits were integral to the success of THC. The team emphasized the need for sound, ongoing THC education for clinical staff. The suggestion was made to develop online resources that would enhance patient assessment, care planning, and patient education that could be accessed by the team through the clinician software.

Despite repeated calls and information sessions at the community nursing agency, just two nurses came forward to work on the THC project. Other nurses were not interested: they preferred conducting face to face visits with their patients, they were not interested in making a change from their routine, and were anxious that implementing THC will complicate their work-life. “*Community nurses are very accustomed to being out and around, having a different environment, that’s part of the appeal. Just remaining stationary in front of the equipment will be an adjustment.*” One suggestion from the partners was to market THC to nurses who are close to retirement or on disability as the physical demands of THC are very low. This would be a way of enhancing recruitment and retention of experienced clinicians during the current nursing shortage.

Cost savings/ROI and sustainability

The final theme identified focused on issues related to the future of THC. Partners felt encouraged that the project had recruited 30 patients and reached a steady state. Partners were interested in continuing to enrol patients to build sufficient numbers to measure health outcomes and identify system and agency costs to determine if health outcomes and cost savings could be gained through THC. Another issue that absorbed the team considerably, almost from the onset of the project, was sustainability. There was a general sense that having come so far, it would be disappointing to see the project fold for lack of further funding. Partners recommended separate resource allocation to the CCAC’s in Ontario for THC to support implementation.

Project objective # 3: Evaluate costs, accessibility, health outcomes, and satisfaction for users and providers with traditional community care

Objective status: achieved

A hospital chart audit was conducted to estimate existing system costs and resource utilization and to identify “frequent flyers” that would benefit from telehomecare. A database search for all patients admitted to the Emergency Department (ED) at TEGH from April 1, 2002 to March 31, 2003 was conducted. This timeframe was chosen as the most recent period in which complete data was available without historical factors such as SARS affecting hospital and ER admissions.

Table 3. Patients classified by disease categories: initial chart audit

<i>Disease category</i>	<i>Number of patients</i>	<i>Number of visits</i>
Congestive heart failure	366	437
Chronic lung disease	340	469
Diabetes	224	257
Total	930	1163

The chart audit revealed that the majority of patients (52%) within the sample group of the targeted populations of CHF, COPD, and diabetes, had complex health problems often presenting with multiple interrelated problems. The second largest group of patients in the audit was the group with CHF (19%). The third largest group was patients presenting with problems related to COPD. Patients with diabetes were the most often seen to have multiple health-related problems at the time of admission (Table 3).

Two hundred and thirty-three patients included in the initial chart audit were patients who had made multiple visits to the ED. Of this number, 27 (12 %) patient charts were randomly audited to determine eligibility for telehomecare and to estimate mean costs associated with ED and in-patient admissions. It should be noted that these estimates may significantly underestimate health care utilization if patients visited more than one hospital for ED and in-patient care.

Men and women were almost equally represented in the patients identified in the random audit who presented to the ED; 48% were men and 52% were women. They ranged in age from 51 to 92 with a mean age of 72.5 years. Many patients (37%, n = 10) lived alone. The remainder lived with a spouse or family member (44 %, n = 15); the two remaining patients were admitted from a retirement home and a nursing home.

The majority (52%, n = 14) had multiple chronic illnesses affecting multiple body systems and presented with complex health situations. The second highest group was patients with congestive heart failure (18.5%, n = 5). A further 18.5% (n = 5) presented with a variety of lung problems with either an exacerbation of a chronic illness or an acute episode (Figure 4).

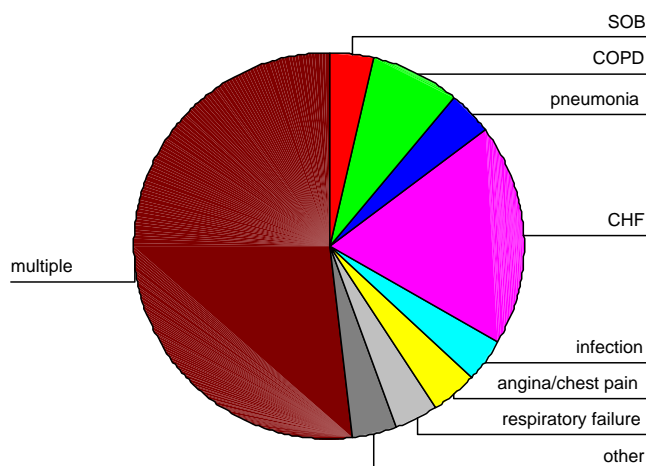


Figure 4. Patient classification according to disease state

Of the 27 patients whose charts were audited, patients had a range of 2 to 10 admissions to the ED visits in a 12-month period, with a mean number of admissions of 4.1 (Table 4). Almost 80% of these visits resulted in an inpatient admission with an average stay of 25 days in the 12-month period examined.

Table 4. Description of hospital admission in a 12-month period (n = 27)

	<i>Number of ER admissions</i>	<i>Number of inpatient admissions</i>	<i>Number of days in ICU</i>	<i>Total length of stay, all admissions</i>
<i>Mean (SD)</i>	4.1 (2.08)	3.1(1.9)	2.3(6.4)	25 (16.7)
Minimum	2	1	0	4
Maximum	10	7	24	60

The provincial per diem rate for public hospitals in Ontario varies considerably from a low of \$478 at Campbellford Memorial Hospital to a high of \$1760 at Children's Hospital of Eastern Ontario. The per diem rate of \$715 at TEGH is an average rate for a community hospital in Ontario.

Total hospital costs were calculated based on the TEGH per diem rate of \$715/day (MOHLTC, 2003) an average intensive care bed cost of \$1387 (daily bed costs in Intensive Care at TEGH range from \$1368 to \$1405/day), and an Emergency Department encounter cost of \$137. There is considerable variation in the hospital costs for the 27 patients in the sample group. The minimum cost was \$2,860 and the maximum cost was \$77, 558. The mean cost was \$17, 875/year. Only hospital costs associated with the Toronto East General Hospital were available for analysis, physician costs were excluded, and data regarding patient assignment to semi-private or private rooms was not collected. None of the patients in the sample had private insurance documented on their admission sheets. As a result, total costs to hospital and the health care system are higher

than those identified in the chart audit. However, this data gives an acceptable working baseline for discussion purposes.

By way of comparison, the THC group collectively had no in-patient hospitalizations and only one ED visit from October 2003 to February 29, 2004 for a total cost of \$137. Collectively, the 27 patients had 276 THC visits and 59 in-home visits for a total cost of \$15,075 (335 visits @ \$40/visit) over a five month period. The mean number of combined THC and in-home visits per patient was 15.1 over two months for an average cost of \$680 per patient. However, when the cost of the equipment is added \$ 555/ two months (\$10,000/patient unit amortized over three years) a total of \$1,235 for two months is determined. However, even if the same rate of visiting was maintained over an entire year that would only yield a total THC cost of \$7,410, well under the average of \$17,875 incurred by the hospital comparison. It also must be noted that 56% of patients in the comparison group did go on to have some form of home care services as well, though this was beyond the scope of the audit and these costs were not calculated.

It is important to note however, that while this data suggests a cost saving trend, the estimates are not based on a randomized control trial with equivalent groups at base-line but on cost comparisons between two different groups that appear to be similar in terms of key demographic variables: age, diagnostic category, geographical setting, and available health care services.

An additional cost factor that has not been evaluated at this point is whether there might be additional cost savings associated with the decreased travel and visit times that have been documented in other studies. This parameter will be evaluated once a steady state of patient recruitment is achieved. However, travel savings were not realized during the early implementation phase of the project as nurses needed to travel between their districts and the central office to make the remote visits.

As with the implementation of any program, it is important to identify the number of patients who would potentially be referred to the project. While over half the patients admitted to the ED or as inpatients were referred for Home care services, most were referred for Personal Support Worker services rather than professional nursing care. As a result, few of the patients in the random audit would have been eligible for telehomecare if the same guidelines for referral were applied. None of the patients in the sample had private health insurance, so third party payment for THC would not have been a funding option.

Table 5 Patient referrals from the ED (audit sample)

<i>Referral status</i>	<i>Number of patients</i>	<i>%</i>
Not referred to community care	11	40.7
Referred to project nursing provider	2	7.4
Referred to other health care agency	13	48.1
Missing data	1	3.7
Total	27	100

The data were also examined to identify patients who would not have been eligible for THC. The majority (78%, n = 21) of patients had no exclusion conditions that would have precluded admission to the telehomecare project. When exclusions were apparent based on data collected during the audit they related to patients with a diagnosis of paranoid psychosis (11%, n = 3) or those who could not speak English and who did not have an in-home caregiver who could speak English (11%, n = 3).

Content analysis of THC charts

A preliminary review of the THC patient charts was conducted to complete a work analysis of the patient visit and to determine the activities required to enable patients to be more independent in disease management. Activities were clustered under the following categories: physical assessment, patient education, psychological support and compliance assessment and supervision (Table 6). A more in-depth analysis of both the work content and time required will be done in the second year of the EYTHC project. It has also become apparent during the project that there needs to be more emphasis on developing assessment and teaching materials for nurses to use with patients to ensure that the potential that THC has in monitoring disease and promoting disease management is realized. By having explicit assessment and teaching protocols and documentation it is also possible to integrate multiple caregivers without duplication of effort or missed opportunities.

Table 6 THC work analysis

<i>Physical assessment</i>	<i>Patient education</i>	<i>Psychological support</i>	<i>Compliance assessment and supervision of care</i>
Vital signs	Medications: actions and side effects	Patient coping	Medications
Chest auscultation	Activity limits	Family/caregiver coping	Wound care
Activity & energy	Deep breathing and coughing, pursed lip breathing	Palliation	Diet and fluid restrictions
Glucose level, oxygen saturation, peripheral circulation, chest tube functioning, abdominal girth, weight	Disease management: diabetes, CHF, shortness of breath		Appointments with clinics and doctors.

Project Objective # 4: Establish best practice guidelines, policies and standards for THC

One of the most significant accomplishments of the first year of the EYTHC project that was conducted with CANARIE funding is the establishment of best practice guidelines, policies and standards for an integrated THC implementation project. It is a complex and difficult task to bring together diverse organizations, health providers, and administrators to engage in a new initiative.

Best practice guidelines, policies, and standards have been developed for the three phases of an implementation project: Prior to THC; During THC Implementation, and Upon Project Completion. The lessons learned during this project and the work required is summarized in Tables 7, 8, and 9. These guidelines provide a model for other organizations and consortiums that are planning a THC implementation project to create an understanding of the scope of the endeavour and a road map to avoid common pitfalls.

Table 7. Best practices prior to THC Implementation**Prior to THC implementation participants should:**

- Gain knowledge of the various forms that programs can take and technology options. Knowledge may be gained through THC literature, online courses (Centennial College, University of Calgary) and field trips to THC program sites. Review the National Initiative for Telehealth Framework of Guidelines (2003)
- Conduct a careful assessment of patient characteristics, needs, care delivery costs, IT and communication infrastructure. This activity should be completed prior to selecting a particular technology option.
- Identify program objectives and conduct a detailed costs and resource analysis to identify services that might be enhanced, or delivered more efficiently, through THC
- Identify a project manager to oversee and champion the project
- Identify partners and appoint a project leader within each organization to facilitate program implementation. Ensure senior and middle management as well as clinician involvement in the project
- Develop contracts to assist partners to clearly identify their roles and responsibilities and to enable them to plan and allocate resources accordingly. Re-visit the contracts regularly to ascertain milestones are being met
- Integrate THC as part of regular service delivery practice
- Orientate clinicians, particularly physicians and nurses to the various THC options and involve them early and often in decision-making re: THC
- Determine clinicians' reimbursement schemes
- Involve partners' IT teams early in the planning stage. Designate an IT manager for the project
- Develop policies regarding project referral, patient eligibility, patient recruitment, infection control, training, confidentiality and privacy, data transfer and sharing
- Train clinicians and managers

Table 8. Best practices during THC Implementation

During THC implementation participants should:

- Meet regularly with all partners
- Provide rapid and effective, onsite technology support to clinicians and by telephone to patients
- Review patient service records to identify patients eligible for THC. Focus on patient need rather diagnostic categories. Identify those who are ineligible or declined THC
- Evaluate the impact of the program on patient health outcomes and satisfaction with care delivery using standardized instruments
- Examine program care objectives, costs and resource utilization
- Evaluate clinicians' support for the project (numbers of referrals, satisfaction)
- Evaluate project team communication
- Review technology support from the users' perspective (clinicians, patients, managers)
- Document reimbursement issues
- Evaluate effectiveness and costs of clinician and manager training
- Conduct a thorough economic impact analysis
- Evaluate the impact of the THC program on staff satisfaction, recruitment and retention
- Continue to conduct in-home visits as needed
- Conduct regular quality assurance checks of care processes and delivery
- Document technology-related problems
- Document clinical problems

Table 9. Best practices following THC Implementation

Upon project completion the team should:

- Evaluate the technology decision-making process
- Evaluate patient and provider satisfaction
- Evaluate cost-benefits
- Determine the actual cost of the monitoring technology

2.4 Project Contribution to Sector/Social Objectives

One of the interesting features of implementing major technological change is that the activity tends to shine a spotlight on existing practices. The “siloization” of health care, with organizations focusing care delivery within their own sectors was visible during the project. Further, partners came to the project in different states of preparedness highlighting the need for “synchronized readiness” (Hebert, 2002). Perhaps the most remarkable lesson learned from the project was that partners from sectors that usually operate in relative isolation from each other can work together, overcome these barriers and implement a major delivery innovation that benefits patients. The enormous efforts made by the partners, individually and collectively, to step outside their usual ways of working, provided the foundation for project success. As with any major change process, a champion is needed at every site. This project was fortunate to have champions at each partner site.

The project revealed the need for a better understanding across sectors and providers about the continuum of care from hospital to community. In particular, hospital staff, educated in traditional acute care training models, would benefit from education regarding community care, which patients should be referred to home care and the role of the Community Access Centre.

Patient numbers during the project were relatively small. The greatest THC caseload carried at any time in the project was 10 patients. These numbers meant that THC tended to be an “add on” rather than an integrated part of practice. With greater patient volumes clinicians can establish a THC routine, managers can establish a THC portfolio and devote sufficient time to build project momentum and success. When numbers are low, the situation becomes one of the technology adding cost but not efficiencies (Ryan et al., 2003). While patient numbers were low, the opportunity to conduct research as the team grappled with implementing THC has led to a rich description of patient, provider and manager experiences at each stage of the implementation process and the identification of agency and system costs.

A positive finding from the interviews conducted with nurses and patients is that THC can help patients learn and manage their health and thereby stay healthier and feel more secure. While the response rate from the Telehealth Satisfaction Survey was low, the mean score of 84.2/100 on the survey supports interview findings. Patients and caregivers

found it was easy to learn to use the THC equipment and did not report any technical problems; an encouraging finding with a largely elderly group of patients. Some patients had trouble hearing their nurse; this problem will be further investigated as the study proceeds. The low survey response rate is a concern. Steps will be taken during the next phase of the EYTHC project to facilitate survey completion and return with this elderly, frail population.

Perhaps the most significant finding was that THC is a major innovation and implementation is more about change management than it is about technology. Clinicians, patients and managers grasped the technology quickly and reported fairly few technical problems, consistent with earlier studies (Demiris et al., 2003). The more difficult task was integrating THC into referral and work processes. The project revealed the need to carefully assess the degree of organizational readiness within organizations well in advance of project start (Jennett, et al., 2003). The need to educate and market the program clearly and demonstrate program benefits to all stakeholders was also identified. Change can be threatening; participants need to quickly identify a benefit that makes it worthwhile. Clinicians may observe benefits for the patients however, if their own work lives are more complicated or incomes affected, there will be resistance to change.

Another key finding was that there was just one ED admission, and no hospital admissions for patients enrolled in THC, resulting in major cost savings. Care needs to be taken in interpreting this finding as patients in the THC project may not have been comparable to patients included in the random chart audit. Additionally, data from the THC patients was only collected for a three month period rather than a full year as with patients identified in the random chart audit. The comparison would be strengthened if data from the preceding year regarding hospital utilization for the THC patient group were available. Still, the initial finding from this finding compares favourably to the comparison group and findings from other studies (Johnson, Wheeler & Deuser, 2000; Maiolo et al., 2003). In this study, the cost savings resulting from reduced admissions were made by the hospital partner. This poses a problem for community agencies that bear the cost for equipment and training when savings are accrued to the hospital. When examining the benefits of THC it is important to look at cost savings across the system rather than from individual organizations. Further, the return on investment needs to be considered more broadly, beyond cost to societal benefits (National Initiative for Telehealth Guidelines).

Self- management is a lifelong task for those with chronic illness. Patients in this study reported feeling more confident about managing their health with the support received through THC. Recognition needs to be made that costs may be incurred at one organization and benefits reaped at another; support needs to be allocated accordingly for successful THC. An important finding from this study is that THC is not about adding a piece of equipment, it is about restructuring care and using technology as a tool to accomplish this goal. Senior decision-makers, policy experts and advocates from the senior team from each organization need to be part of THC implementation.

One of the major limitations of the study was the small patient sample resulting in a small number of clinician participants. One nurse reported no difference in her communication with patients and this finding is supported by earlier work (Dansky, Bowles & Britt 1999). The second nurse in this study did however, note differences. Decreased opportunity for “live” sensory information means nurses need to be very skilled at assessment and decision-making (Greenberg, 2000). The issue of how technology impacts on patient-provider communication and clinical processes is an important one and warrants further exploration (Miller, 2002).

Nurses participating in the project appreciated the ongoing training and clinical support they received from an expert THC nurse. This support is key and will help clinicians practice from a holistic perspective of disease management with patients and families and avoid the pitfall of focusing on vital signs. Online “pop-up” tools and care maps would be helpful additions to the software that would enhance clinical practice.

3.0 Schedule

Table 10: Work Schedule

Phase	Objective/Deliverable	Original Completion Date (SOW)	Actual Finishing Date	Final Status of Task/Deliverable
1	Detailed research plan for disease impact (Objective #2)	June 5, 2003	July 3, 2003	Completed
2	Detailed research plan for use and costs (Objective #3)	June 24, 2003	July 21, 2003	Completed
3	Disease management strategy (Objectives #3 and 4)	May 2, 2003	August 28, 2003	Completed
4	Preliminary Rollout (Objective #1)	October 20, 2003	December 31, 2003	Completed
5	Full scale rollout (Objective #1)	November 11, 2003	March 31, 2004	Completed
6	Final report	January 20, 2003	May 10, 2004	Completed

As discussed in Section 2.3, SARS, recruitment, reimbursement issues, and in Section 4, changes to the technology and clinical providers and other commitments by Clinidata delayed some aspects of the project and extensive efforts by all remaining partners were required to ensure the success of the project.

4.0 Profile of Participating Organizations

Representatives from six organizations in the Toronto region met and worked together for 12 months prior to project implementation to discuss strategies to meet the needs of home

care patients and to clarify their vision and goals regarding THC. Decisions were made regarding project objectives, patient populations, and the type of technology that would be used to provide THC, and the East York region of Toronto was chosen as the initial setting for the project.

Just as project funding was announced two key partners, the nursing service provider and the technology provider (March Networks) withdrew from the project as a result of a change in their organizations' strategic plans. These partners were replaced by Comcare Health Services and American TeleCare.

Comcare Health Services is a professional community health care provider with over 30 years of experience in health care. Their services include Nursing, Home Support, Physiotherapy, Occupational Therapy, Social Work, and Speech Language Pathology. Comcare has offices in British Columbia, Alberta, Ontario, New Brunswick, and Nova Scotia. They hold contracts with the CCACs in many areas of Ontario including East York.

American TeleCare was selected as the technology sub-contractor for two reasons. They produce an interactive, video-based system which was important as providers needed to be able to see patients to conduct health teaching for disease management. Secondly, they have developed a stethoscope for remote assessment; a vital feature when assessing patients with COPD and CHF. A further advantage was that this company was highly experienced in THC and equipment and training processes were established and tested. While the patient and provider technology provision changed from broadband to telephone lines the EHR was stored on-line in an identification number and password protected site that allowed all designated health professionals and researchers access to the data from any PC. A third partner, Clinidata was unable to meet project timeline commitments and withdrew from active participation in the rollout of the project implementation. Comcare then took over the after hours coverage of the project. Clinidata maintained a collaborative presence regarding the larger three year project and a review of the current project. An additional research partner, York University was also added.

The active partners in the CANARIE funded phase of the project included Centennial College (lead organization: project management, research), the East York Access Centre (EYAC) (patient referral, clinical guidelines development), Comcare Health Services (community nursing, clinical guidelines), American TeleCare Inc., (technology provider), Toronto East General Hospital (TEGH) (clinic nurses, clinical guidelines and consultation) and two of the family physicians, Dr. Jamie Meuser and Dr. Marcus Law, affiliated with TEGH (patient referral, medical follow-up, review of processes and protocols) and York University (research). It is important to note that during the one-year project time period, participants from these organizations were simultaneously participating in a second CANARIE funded project to develop online training in THC for the provider team.

9.1 Conferences/Workshops

All conferences and workshops at which presentations related to the project were made or for which abstracts have been submitted are listed. The categories are noted to be: (CS – CANARIE sponsored conference, NC – non CANARIE sponsored conference, PS – project sponsored workshop/seminar, OW – other workshop/seminar, OT – other. The number of attendees has been estimated.

Conference/ Workshop/Seminar	Category	Registration Fee (y/n)	Number attending	Audience
East York Telehome care project; <i>13th Annual Canadian Home Care Conference</i> - Toronto Dec 1, 2003	NC	Y	75	Home care providers administrators and policy makers; government
East York Telehome care Project: <i>Models of Telecare Invitational Workshop</i> ; Montreal; February 27-28, 2004	CS	N	75	E-health project groups; CANARIE
EYTHC project: <i>Toronto East General Hospital-Grand Rounds</i> -November, 2003	PS	Y	50	Health care professionals
Toronto East General Open House	PS	N	200	General public, health care professionals, administrators, media
Silos to Solutions: East York Community Coalition	OT- communit y stakeholde rs	N	25	Community care stakeholders
Telehome care: Opportunities and barriers for individuals with neuroscience conditions <i>35th Annual Meeting of the Canadian Association of Neuroscience Nurses</i> ; Calgary, Alberta, June 11, 2004	NC	Y	40	Nurses, administrators, researchers
14 th Annual Canadian Home care conference- Halifax, Nova Scotia- submitted abstract	NC	Y	?75	Home care providers administrators and policy makers; government

9.2 Publications

Article title and location	Audience
Atack, L., & Duff, D. Implementing telehome care: Process and issues from managers' perspectives Submitted to: <i>HealthCare Management Forum</i> May, 2004	Hospital and community care organization administrators
Atack, L., & Duff, D. Telehome care: The perspective of the telehome care nurse. Submitted to <i>The Canadian Nurse</i> , May 2004.	Nurses, administrators
Duff, D., & Atack, L. The East York Telehomecare Project. Planned submission to the <i>Journal of Telemedicine and Telecare</i> , June 2004.	Health care providers
Duff, D. Telephone care: Opportunities and barriers for individuals with neuroscience conditions. Planned submission to <i>AXON</i> , June 2004.	Nurses
Duff, D., & Atack, L. Living in a comfort zone: A substantive grounded theory of individuals with chronic conditions using telehome care technology. Planned submission to <i>Qualitative Health Research</i> , June 2004.	Health care providers

9.3 Print and Electronic Media (Promotion/Communication)

The following print and electronic media presentations and events describe the ways in which the EYTHC project has been promoted or communicated, and the target audience.

Title/event	Audience
East York Telehome care Showcase February 10, 2004	Media, community and hospital health care providers
Telehomecare patient interview of John Langworthy by Lu Zhou: CBC Radio 1 Metro Morning Show: February 17, 2004	General public
Telehomecare interview with CCAC Barb MacFarlane: CBC Metro Morning Show with Andy Barry February 17, 2004	General public
Pilot project uses video, voice to deliver home care, <i>The Toronto Star</i> , Friday Mar 5, 2004, F1; F5. Helen Henderson	General public
Making home care easier, <i>The Toronto Star</i> , Friday March 5, 2004, F5. Helen Henderson	General Public
Centennial fuels growth of telehomecare. <i>The Toronto Sun</i> , Feb. 18, 2004. http://www.canoe.ca/CareerConnectionNews/040218_0ncampus.html	High school and post-secondary students
Health Care just a mouse click away. <i>The Toronto Observer</i> , February 10, 2004	General Public

13.0 Socio-economic Impacts

Beneficiaries

Clearly, on a micro-level the participants of the project are the real beneficiaries. Many credit the use of the telehomecare technology with preventing disease exacerbations and the ongoing connection to providers with furthering their understanding and management of their own health conditions. Family members noted that they too took comfort in having the technology so readily available to monitor the patient's condition and to allow for increased understanding and empowerment of patients through knowledge acquisitions and improved disease self-management. On a more intermediate level, the lessons learned from the project and the integrated model of health care that utilizes and mirrors the current system can be utilized and adapted to similar populations of patients and communities across Ontario. Finally, on a system-wide level, if scalability can be realized and telehomecare becomes sustainable through government reimbursement of services, the health care system, and ultimately the Canadian tax payer will be the real beneficiaries in reducing costs associated with unnecessary hospitalizations and use of expensive medical services for avoidable disease exacerbations caused by inadequate management or lack of compliance related to inability to access care or misunderstanding of treatment regimens.

Intended Impacts

As previously stated, the project was designed to improve access to care for individuals with mobility issues or disease related frailties to improve their quality of life and health outcomes.

Actual Impacts

While there is insufficient data at this stage of the project to analyze the impact on quality of life using the SF36 results, qualitative data support this trend. Additionally, preliminary results in tracking participants' use of the health care system and comparison of data with a similar group of patients support a trend toward lower use of hospital inpatient and medical services. Most participants also noted increased knowledge and a feeling of being empowered to take control of their own health.

The THC implementation project will continue for two more years with a plan to enroll a total of 200 patients. Existing data collection methods will continue. We will also take a more in-depth look at the impact of THC on nurse-patient communication and the work processes followed during a THC visit. We are interested in identifying the compensatory activities that providers implement when adopting technologies and their impact on practice (Mort & May, 2003). The extended opportunity to follow THC patients will enable us to build on the theory and findings developed to date as well as examine the sustained impact of THC on providers and patients. A more in-depth look at physicians' experiences is also planned. Other health providers will also be introduced to THC and their experiences will be documented and explored.

Finally, we will recruit nurses who are currently on disability leave with back injuries to practice THC. Tapping into this pool of experienced clinicians would be a way to

maximize resources during the current nursing shortage. Additionally, patient assessment and teaching protocols and online methods of accessing this information and tracking patient problems and plans of care will be developed and evaluated over the next two years.

An aging population and rising consumer interest in self-managing chronic illness is placing further demands on an already strained health care system. There is keen interest in examining technology as the means to enhance the quality of care and augment existing resources. Findings from this project indicate that quality care can be provided with telehomecare with good patient and provider satisfaction. Assessing organizational readiness and implementing change management strategies are key to project success. A major finding is that THC is not about adding a piece of equipment, it is about restructuring care delivery across health sectors and using technology as a tool to accomplish this goal.

Contribution to Technical Research, Organizational and Pedagogical Innovation

Other research findings from this project have identified gaps in the electronic health record, integration of service and client referrals for community care, and, lack of systematic patient assessment, treatment and collaborative planning, all of which are being rectified by the partner organizations.

References

- Armer, J.M. (2003). A case study of the use of telemedicine by advanced practice nurses in rural Missouri. *The Journal of Continuing Education in Nursing*, 34(5), 226.
- Black, S., Anderson, K., Loane, M., & Wootton, R. (2001). The potential for telemedicine for home nursing in Queensland. *Journal of Telemedicine and Telecare*, 7(4), 199-205.
- Bondmass, M., Bolger, N., Castro, G., & Avital, B. (2000). The effect of physiologic home monitoring and telemanagement on chronic heart failure outcomes. *The Internet Journal of Advanced Nursing Practice*, 3(2). Retrieved March 27, 2000, from <http://www.ispub.com/journals/IJANP/Vol3N2/chf.htm>
- Borchers L. & Kee, C.C. An experience in telenursing. *Clinical Nurse Specialist*, 13(3), 115-8.
- Bowles, K.H., & Dansky, K.H. (2002). Teaching self-management of diabetes via telehomecare. *Home Healthcare Nurse*, 20(1), 36-42.
- Bratton, R.L., & Cody, C. (2002). Telemedicine applications in primary care: A geriatric patient pilot project. *Mayo Clinic Proceedings*, 75(4), 365-368.
- Britton, B.P., Engelke, M.K., Rains, D.B., & Mahmud, K. (2000). Measuring costs and quality of telehomecare. *Home Health Care Management and Practice*, 12(4), 27-32.
- Canadian Health Services Research Foundation (CHSRF). (2001). Commitment and care: The benefits of a healthy workplace for nurses. Ottawa: CHSRF.
- Celler, B.G., Lovell, N.H., & Chan, D. (1999). The potential impact of home telecare on clinical practice. *Medical Journal of Australia*, 171, 518-521.
- Celler, B.G., Lovell, N.H., & Basilakis, J. (2003). Using information technology to improve the management of chronic disease. *Medical Journal of Australia*, 79(5), 242-246.
- Dansky, K.H., Bowles, K.H., & Britt, T. (1999). Nurses' responses to telemedicine in home health care. *Journal of Healthcare Information Management*, 13(4), 27-38.
- Dansky, K.H., Palmer, L., Shea, D., & Bowles, K.H. (2001). Cost analysis of telehomecare. *Telemedicine Journal & E-health*, 7(3), 225-232.
- Demiris, G., Speedie, S.M., Finkelstein, S., & Harris, I. (2003). Communication patterns and technical quality of virtual visits in home care. *Journal of Telemedicine and Telecare*, 9(4), 210-215.

- Demiris, G., Speedie, S.M., Finklestein, S. (2001) Changes of patients' perceptions of telehomecare. *Telemedicine Journal & E-health*, 7(3), 241-248.
- Frantz, A. (2000). Disease management—Carp diem home care! [Home care in the new millennium:Nurse experts discuss homecare and hospice in the new era]. *Home Health care Nurse*, 18(1), 15-17.
- Fisk, M.J. (1997). Telecare equipment in the home: Issues of intrusiveness and control. *Journal of Telemedicine and Telecare*, 3(1), 30-32.
- Gaventa, J. (1993). The powerful, the powerless, and the experts: Knowledge struggles in an information age. In P. Park, M. Brydon-Muller, B. Hall & T. Jackson (Eds.). *Voices of change: Participatory research in the United States and Canada*. Westport, CT: Bergin & Garvey.
- Glaser, B. (1978). *Theoretical sensitivity*. Mill Valley, CA: Sociology Press.
- Greenberg, M.E. (2000). The domain of telenursing: Issues and prospects. *Nursing Economics*, 18(4), 220-224.
- Hailey, D., Roine, R., Ohinmaa, A. (2003). Systematic review of evidence for the benefits of telemedicine. *Journal of Telemedicine and Telecare*, 8(1), 1-30.
- Hebert, M., Paquin, M.J. & Iversen, S. (2002). Predicting success: Stakeholder readiness for home telecare diabetic support. *Journal of Telemedicine and Telecare*, 8(3), 33-36.
- Hutcherson, C., & Williamson, S.H. (1999). Nursing regulation for the new millennium: The mutual recognition model. *Online Journal of Issues in Nursing*. Retrieved March 12, 2004, from www.nursingworld.org/ojin/topic9/topic9_2.htm
- Jenkins, R.L., & McSweeney, M. (2001). Assessing elderly patients with congestive heart failure via in-home telecommunication. *Journal of Gerontological Nursing*, 27(1), 21-27.
- Jennett, P.A., Affleck, H.L., Hailey, D. Ohinmaa, A. Anderson, C., Thomas, R., Young, B., Lorenzetti, D. Scott, R.E. (2003). The socio-economic impact of telehealth: A systematic review. *Journal of Telemedicine and Telecare*, 9(6), 311-320.
- Jennett, P.A., Yeo, M., Pauls, M., & Graham, J. (2003). Organizational readiness for telemedicine: Implications for success and failure. *Journal of Telemedicine and Telecare*, 9(2), 27-30.

- Jerant, A.F., Azari, R., & Nesbitt, T.S.(2001). Reducing the cost of frequent hospital admissions for congestive heart failure: A randomized trial of a home telecare intervention. *Medical Care*, 39(11), 1234-1245.
- Johnston, B., Wheeler, L., & Deuser, J. (2000). Outcomes of the Kaiser Permanente telehome health research project. *Archives of Family Medicine*, 9(1), 40-45.
- Kinsella, A. (2001). Telehealth interventions for PPS. *Home Healthcare Nurse*, 19(5), 315-318.
- Landers, D. (2000). Home care overview. Retrieved April 2, 2004, from [http://iml.jou.ufl.edu/projects/Fall2000/Landers/home care.htm](http://iml.jou.ufl.edu/projects/Fall2000/Landers/home%20care.htm)
- Maiolo, C., Mohamed, E.I., Firoani, C.M. & De Lorenzo, A. (2003). Home telemonitoring for patients with severe respiratory illness: The Italian experience. *Journal of Telemedicine and Telecare*, 9(2), 67-71.
- Miller, E.A. (2002). Telemedicine and doctor-patient communication: A theoretical framework for evaluation. *Journal of Telemedicine and Telecare*, 8(6), 311-318.
- MOHLTC (2003). Revised 2003/04 Ontario Interprovincial hospital inpatient billing rates. Retrieved April 15, 2004, from http://www.health.gov.on.ca/english/providers/program/ohip/bulletins/na_09/NA-09.pdf
- Morse, J. (2001). Situating grounded theory within qualitative inquiry. In R.S. Schrieber & P.N. Stern (Eds.), *Using grounded theory in nursing* (pp. 1-15). New York: Springer.
- Mort, M. & May, C., & Williams, T. (2003). Remote doctors and absent patients: Acting at a distance in telemedicine? *Science, Technology and Human Values*, 28(2), 274-295.
- National Initiative for Telehealth Guidelines. (2003). *National Initiative for Telehealth (NIFTE) Framework of Guidelines*. Ottawa: NIFTE. Retrieved April 3, 2004, from <http://www.nifte.ca/framework/english/index.htm>
- Ozbolt, J.G. (1996). Nursing and technology: A dialectic. *Holistic Nurse Practitioner*, 11(1), 1-5.
- Polit, D.F., & Hungler, B.P. (1999). *Nursing research: Principles and methods*. (6th ed.). Philadelphia: Lippincott.
- Roback, K., & Herzog, A. (2003). Home informatics in health care: Assessment guidelines to keep up quality of care and avoid adverse effects. *Technology and Health Care*, 11(3), 195-206.

Romanow, R. (2002). Building on values: The future of health care in Canada-Final report. Ottawa: Commission of the Future of health Care in Canada. Retrieved April 10, 2004, from http://www.hc-sc.gc.ca/english/pdf/romanow/pdfs/HCC_Final_Report.pdf

Ryan, P., Kobb, R., & Hilsen, P. (2003). Making the right connection: Matching patients to technology. *Telemedicine Journal and E-Health*, 9(1), 81-88.

Salvatore, T. (2002). A telehealth care primer for managers. *Home Healthcare Nurse*, 20(2), 127-130.

Scott, R.E. (2002). Home telehealth pilot project. Independent evaluation conducted for March Networks Corporation. Retrieved March 27, 2000, from <http://www.marchnetworks.com>

Shih, F.J. (1998). Triangulation in nursing research: Issues of conceptual clarity and purpose. *Journal of Advanced Nursing*, 28(3), 631-641.

Short, L.A. & Saindon, E.H. (1998). Telehome care rewards and risks. *Caring*, 17(10), 36-42.

The Change Foundation (2002). *The disease management approach in the province of Ontario*. Retrieved April 3, 2002 from www.changefoundation.com

APPENDIX A

Demographic Survey

Telehealth Satisfaction Survey

Interview guide patients

Interview guide nurses

Interview guide managers



Telehome care Demographic Survey

Participant # _____

(Please circle the most appropriate answer; or provide a brief response at the end of a question.)

1. Which age group do you belong to?

1 Less than 40 2 40-49 3 50-59 4 60-69 5 70-79 6 80-89 7 over 90

2. 1 Male 2 Female

3. Which medical condition(s) do you have? You may select more than one.

1 Congestive heart failure 2 Diabetes 3 Chronic lung disease 4 Other _____

4. How long have you had the medical problems you indicated above?

1 Less than 1 yr. 2 1-5 yrs. 3 6-10 yrs. 4 11-15 yrs. 5 16-20 yrs. 6 More than 20 yrs.

5. Living arrangements:

1 I live alone 2 I live with my spouse/partner 3 I live with my children 4

Other _____

6. Do you have someone who helps you with your care? 1 YES 2 NO

7. How many times have you been to the doctor in the past year? _____

8. How many times have you been a hospital patient in the past year? _____

9. Are you willing to participate in an interview about your telehome care experiences?

YES _____ NO _____



Home Telehealth Satisfaction Survey

Please read each statement below, and then fill in the circle from 1 to 4 that most closely represents your view on the following items.

1 = strongly disagree 2 = disagree 3 = agree 4 = strongly agree

1. I am comfortable using technology at home to receive care 1 2 3 4
2. The staff are comfortable using the equipment 1 2 3 4
3. My family/caregiver is comfortable using the equipment 1 2 3 4
4. I was adequately trained to operate the equipment 1 2 3 4
5. It was difficult to learn to use the equipment 1 2 3 4
6. Home technology helps me monitor my health condition 1 2 3 4
7. Home technology is helping me to stay healthier 1 2 3 4
8. Staff monitoring my health with technology helps me feel more secure. 1 2 3 4
9. Home technology helps me to better manage my health 1 2 3 4
10. The equipment is not in my way at home 1 2 3 4
11. I am comfortable using home technology as part of my daily routine 1 2 3 4
12. I am comfortable talking with staff when I use the home technology equipment 1 2 3 4
13. My caregiver is comfortable talking with staff using the home technology equipment 1 2 3 4

14. The home technology equipment helps me to
 learn about my health 1 2 3 4
15. It is just as easy to communicate with staff using
 the home technology as with a face to face visit 1 2 3 4
16. I feel just as comfortable sharing information with
 staff using home technology as with a face to face visit 1 2 3 4
17. The equipment was easy to learn and use
 1 2 3 4
18. The equipment works when it is supposed to work
 1 2 3 4
19. I had technical problems with the equipment
 1 2 3 4
20. I was able to see my provider clearly using the equipment
 1 2 3 4
21. I was able to hear my provider well using the equipment
 1 2 3 4

Please read each statement below, and then fill in the circle from 1 to 5 that most closely represents your experience

1 = strongly disagree 2 = disagree 3 = agree 4 = strongly agree

5 = not applicable

22. The blood pressure cuff is easy to put on my arm 1 2 3 4 5
23. The weight scale is easy to use 1 2 3 4 5
24. The oximeter that measures oxygen levels is easy to use
 5 1 2 3 4
25. The stethoscope that I use on my chest is easy to use
 5 1 2 3 4

Thank you so much for completing the survey!

Please return it in the envelope provided in 10 days:

Items on this survey were adapted from the Home Telehealth Special Interest Group
Home Telehealth Satisfaction Survey

Interview guide: Managers, end of project

1. What are your thoughts on THC implementation now at the end of the project? (quality of care, recruitment, cost effectiveness?)
2. What were some of the key project successes/accomplishments?
3. What were some of the difficulties or barriers you experienced?
4. What lessons have you learned?
5. What recommendations would you make to other organizations ?
6. What thoughts do you have on your next steps with THC?
7. Is there anything else you'd like to add to what we have discussed today?

Interview guide: Patients, starting on THC

1. Can you tell me what it has been like for you to begin using telehome care?
2. What things worked or were helpful as you were getting started?
3. Did you have any concerns or difficulties at the beginning?
4. What recommendations do you have for us?
5. How has it been for you getting to know your nurse using the technology?
6. Did you think receiving care in your home using technology is making a difference to your health? Can you give me an example of how this has helped?
7. Is there anything more you'd like to add to what we've talked about?

Interview guide: Patients (on THC for one month or longer)

1. How long have you had the video equipment in your home?
2. What has your experience been with receiving home care this way?
3. Reflect on earlier interview and ask if they feel the same or have their feelings changed.
4. Do you think your overall health has stayed the same or improved during this time? (Examples?)
5. Do you feel that your ability to manage your condition has improved or stayed about the same during this time?
6. Have you discussed with your providers as to when your telehome care visits will be ending?
How do you feel about this?
7. What recommendations would you make to the telehome care team to improve this service?
8. What recommendations would you make to patients who will be using this equipment?
9. Is there anything more you'd like to add to what we've talked about?

Interview guide: Nurses (Beginning THC delivery)

- 1.Can you tell me what it has been like for you to begin using telehome care?
- 2.What things worked or were helpful as you were getting started?
- 3.Did you have any concerns or difficulties at the beginning?
4. How has it been for you getting to know your patients using the technology?
- 5.Do you think delivering care to patients in their homes using technology is making a difference to the patients' health? Can you give me an example of how this has helped....
- 6.What recommendations do you have for us?
- 7.Is there anything more you'd like to add to what we've talked about?

Later interview guide

- 1.How many patients have you had on THC?
- 2.What has your experience been with delivering home care this way? (prompts: relationship with patients, impact of equipment on family, home, your own routine, worklife)
- 3.Reflect on earlier interview and ask if they feel the same or have their feelings changed.
- 4.Do you think patients' health status has stayed the same or improved during this time? (Examples?).
- 5.Do you feel that your ability to deliver care to clients using THC has improved, stayed about the same or is less effective than traditional visits?
- 6.What recommendations would you make to improve this service?
- 7.What recommendations would you make to other health care providers who will be using this equipment?
8. Is there anything more you'd like to add to what we've talked about?

