

STRENGTHS AND WEAKNESSES OF TELEONCOLOGY

The experience of Thunder Bay Regional Cancer Centre

Malcolm Brigden, MD, FRCPC, FACP;
Alana Minty BSc; Susan Pilatzke, RN, BScN, MPH;
Lori Della Vedova, BA, MA; Laurie Sherrington, RN;
Karen McPhail, RN

Top-line summary

Teleoncology is increasingly being used to provide specialized consultation services for remote cancer populations. This article outlines typical requirements for such systems and describes one that has been organized in northwestern Ontario. The article reviews potential pros and cons of teleoncology and presents the results of a survey of user physician satisfaction. Possible solutions to a number of perceived problems with teleoncology services are explored. Additional training for physicians using teleoncology may help them improve skills for communicating in this medium. Many opportunities exist for better research in this rapidly expanding area.

Malcolm Brigden, MD, FRCPC, FACP is Provincial Practice Leader in Medical Oncology at the Saskatchewan Cancer Agency, and formerly was a Medical Oncologist at the Thunder Bay Regional Health Sciences Centre (TBRHSC); **A. Minty, BSc** is a pharmacy student at the University of Toronto School of Pharmacy; **Susan Pilatzke, RN, BScN, MPH** is director of Oncology Clinical Systems at the TBRHSC; **Lori Della Vedova, BA, MA** is Cancer Education Coordinator at the TBRHSC; **Laurie Sherrington, RN** is a Regional Program Manager at the Ontario Telemedicine Network; **Karen McPhail, RN** is a Telehealth Coordinator at the Ontario Telemedicine Network. Address for correspondence: Malcolm Brigden, MD, FRCPC, Department of Medical Oncology, Saskatoon Cancer Clinic, 20 Campus Drive, Saskatoon, SK S7N 4H4; Tel: (306) 655-2710; Fax: (306) 655-2639; Email: Malcolm.Brigden@saskcancer.ca



While the challenge of providing standardized oncology services to residents of geographically distant areas is not confined to Canada, only Australia and certain remote areas in Asia have populations as physically dispersed as ours.

Within Canada, northwestern Ontario comprises a land-mass larger than France and has few oncologists. Cancer patients must travel long distances to seek expert oncologic opinion and treatment. Even if more clinical oncologists were available, smaller communities lack the patient and financial base for providing such a service. Many of the rural and remote communities are First Nation reserves, and a number of these northern aboriginal communities have only seasonal road access in winter or none at all. The challenges include long winters, bad weather and the high financial cost for travel and accommodation. As part of the overall Telehealth program in Ontario, teleoncology service was introduced at the Thunder Bay Regional Health Science Centre (TBRHSC) in 2001. Logarithmic growth in use of this service has made teleoncology the second largest component of the entire telehealth program.

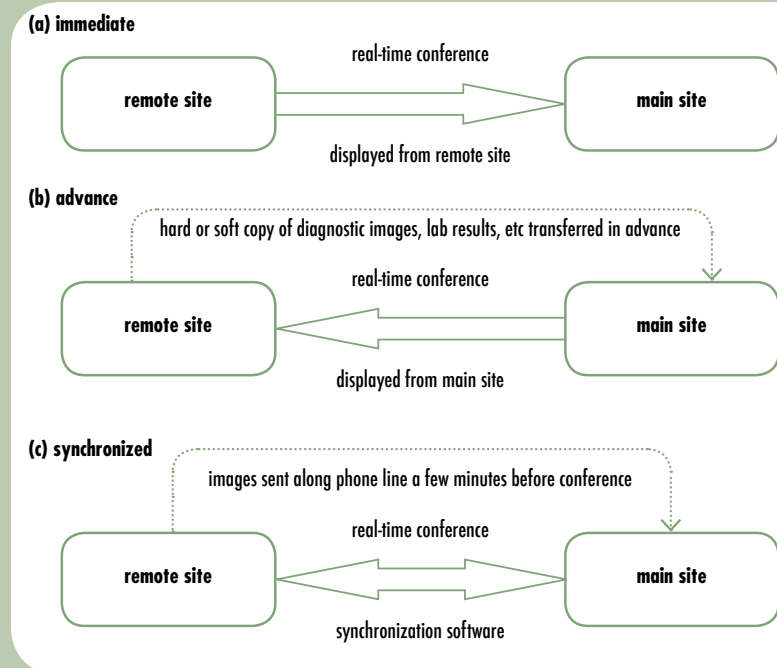
TECHNOLOGY

Teleoncology has generally been defined as the use of a variety of telecommunication technologies to provide oncologic services.^{1,2} Data may be sent in a dynamic 1-way or 2-way interactive process in real time or via a static “store and forward” technology that can be synchronized with other services. **Figure 1** illustrates several data flow models. For security, data may be supplied in either Integrated Service Digital Network (ISDN) format using an advanced encrypted national standard, or via other formats that may be accessible from any location and also may supply high levels of encryption.³ The telehealth equipment used by the TBRHSC network was provided by Tandberg and Adcom and specifically designed for ease of use by the NORTH Network (now a component of the Ontario Telemedicine Network). Smart

Systems for Health (an Ontario Ministry of Health and Long-Term Care agency) and Bell Canada provide the actual connectivity. The carrier class is Polycom MGC-100 Video Conferencing Bridge. The NORTH Network uses Internet Protocol (IP) videoconferencing to deliver services. Smart Systems for Health provides this secure, private bandwidth (signals do not travel over the public internet) to all hospital sites and to K-Net. K-Net is the information technology arm of the Keewaytinook Okimakanak tribal council, and supplies broadband connectivity, information technology services and community development services to First Nations communities across Northern Ontario and beyond. The NORTH network also offers point-to-point IP videoconferencing (live audio and video connection between 2 sites) as well as multipoint bridging (e.g. connecting numerous sites for educational purposes and meetings). An ISDN gateway permits sites using dial-up systems to participate in videoconferencing. Several specialized medical devices are available for individual videoconferencing sessions, including a digital stethoscope and fiberoptic scopes for examining eyes, ears, nose and throat. A hand-held high-resolution camera has many uses such as examining postoperative wounds, skin rashes and cutaneous tumour deposits, studying a patient's gait and other close-up views. X-rays and other diagnostic images of the patient can be scanned and transmitted to the host site for examination by the specialist either before or during the actual teleoncology session.

Certified medical and radiation oncologists, trained oncology nurses and telemedicine service providers comprise the local teleoncology team, and the telemedicine service staff includes schedulers and technologists. The remote team at the local site consists of a trained oncology nurse or nurse practitioner, the patient and sometimes family members or others in their support system. The local primary care practitioner is a vital member of the local team but frequently is unable to attend the actual teleoncology session due to time constraints. Appointments are scheduled in advance and pertinent patient data are gathered at the host site and reviewed by the consultant prior to the teleoncology visit. The patient at the recipient site is oriented to the interactive process in advance of the actual session. The TBRHSC practice in northwestern Ontario serves over 27 outreach sites. Currently approximately 93% of sessions are for followup and 7% are new patient consults. Growth has been exponential from a modest beginning with 1 teleoncology visit in 2001 to over 1154 in 2006, and several TBRHSC oncologists have started to perform the majority of their followup visits exclusively via the teleoncology service.

FIGURE 1. Data flow models for the teleoncology process



Internet resources for telehealth and teleoncology

- **Telehealth Assessment Tool**
Checklist by Dr. Rod Elford (Digital Telehealth Inc.) helps determine whether an organization should consider telehealth.
www.telehealth.ca > Documents
- **The Telemedicine Information Exchange**
Website of the Association of Telehealth Service Providers offers comprehensive information on telemedicine and telehealth.
<http://tie.telemed.org>
- **Telemedicine and e-Health (journal)**
www.liebertpub.com/tmj
- **Journal of Telemedicine and Telecare**
www.rsmppress.co.uk/jtt.htm
- **Canadian Society of Telehealth/ Société Canadienne de télésanté**
www.cst-sct.org
- **International Society for Telemedicine and eHealth**
www.isft.net

POTENTIAL PROS AND CONS OF TELEONCOLOGY

Table 1 summarizes findings of prior reviews in the literature pertaining to the feedback of various participants, including patients, physicians and nurses on the teleoncology team and other healthcare stakeholders or providers.^{4,5} Despite rapid and widespread introduction of telemedicine and teleoncology, very little definitive research has been performed. Major areas for teleoncology research have focused on overall efficacy, cost-benefit, and patient and client physician satisfaction. *The Canadian Medical Association Journal* published a review of articles relating to telemedicine in 2001.⁶ Of 1124 studies examined, only 50 were judged satisfactory in terms of overall design and followup. Most were pilot studies that documented only short-term outcomes. This review concluded that there is little evidence for the efficacy of telehealth, and that only teleradiology, specifically CT examinations, had been shown to be cost-effective. A similar systematic review in relation to cost-effectiveness published in the *British Medical Journal* in 2002 concluded that of all articles reviewed, only 9% incorporated appropriate cost-benefit data⁷ and only 4% utilized appropriate analytical tools. Thus, no firm conclusions regarding the cost-effectiveness of telehealth could be justified based on the literature available at that time.

Specific to teleoncology, cost-effectiveness studies have tended to focus on the financial burden of establishing and maintaining a teleoncology program compared to a conventional oncology practice.^{8,9} A University of Kansas study found that the cost of a traditional local onsite oncology consultation was about US\$ 149,⁸ while a teleoncology consult would have cost US\$ 812. Flying in the same oncologists to an outreach clinic, however, would have cost US\$ 897. Another study in the United Kingdom concluded that the average additional cost incurred to the National Health Service in providing a teleoncology consult was approximately US\$ 250 per patient. The individual patients, however, incurred net savings in relation to the cost of travel time as well as time taken from work.⁹

TABLE 1. Benefits and disadvantages of the teleoncology process for different users^{4,5}

category of user	potential benefits	potential disadvantages
patients	<ul style="list-style-type: none"> improved access to a physician less travel time with decreased stress decreased costs for meals and accommodation less time lost from work easier system access and improved scheduling more family involvement and social support 	<ul style="list-style-type: none"> depersonalization stresses of technology not hands-on; lack of physical exams substitution of other healthcare providers for physicians
telehealth team including physicians and nurses	<ul style="list-style-type: none"> decreased need for travel; increased safety optimized professional time; potential for increased productivity educational, peer review and collaborative opportunities 	<ul style="list-style-type: none"> scheduling problems depersonalization increased clinical risk legal implications including clinical risk reimbursement issues confidentiality issues
other healthcare providers and stakeholders	<ul style="list-style-type: none"> speed up medical processes and provide more efficient service to patients reduce unnecessary referrals more needed referrals possible reduce unnecessary tests and procedures expanded networking opportunities for all participants 	<ul style="list-style-type: none"> high initial cost outlay other efficiency-related problems

Similar conclusions recur frequently in cost-benefit analyses relating to telehealth and teleoncology services. An investigation of the priority and feasibility of telehealth in Ontario showed that in 1993–1994, C\$ 20 million was paid for provincial air ambulance services in the north,¹⁰ and another C\$ 10.5 million for travel subsidies; 72% of these funds were for followup visits to specialists. Many of these visits as well as the original consultations could have used a telehealth service incorporating teleoncology. It was estimated that 25% of all travel for health purposes in Canada could be avoided via the use of a national telehealth system.¹¹ A recent costing analysis of the NORTH network in Ontario showed that the average cost avoidance per patient was C\$ 433 per eligible northern event (based on an average 1-way distance traveled of 579 km per patient.¹²

PATIENT SATISFACTION

A number of studies have focused on patient satisfaction.¹³⁻¹⁶ A University of

Kansas study compared patient satisfaction with an onsite consultation vs a teleoncology appointment using a 12-item, 2-stage questionnaire.¹³ While only modest differences were seen in the level of satisfaction, patients expressed definite preferences related to the styles of the individual oncologists. No difference in satisfaction related to the technical aspects of consultation were expressed, but 41% of patients indicated concerns about the role of a proxy examiner, and 50% stated that they preferred to see the oncologist in person. Thus this particular investigation found that the patients perceived the teleoncology service as more useful for monitoring than for initial consultations. A Canadian study performed by Weinerman et al on Vancouver Island investigated the delivery of subspecialty cancer consultations for gastrointestinal malignancies to remote communities via teleoncology.¹⁴ Little difference was observed in patient satisfaction according to whether the patients were seen by videoconference or in person, and overall, patients were

very satisfied with the considerable savings in travel costs and time afforded by the teleoncology process.

PARTICIPATING PHYSICIAN SATISFACTION

Weinerman's study also found, however, that participating oncologists (i.e. those at the host centre) felt the video media to be less satisfactory than person-to-person patient interviews. In an Australian study, a majority of oncology clinicians reported finding a telemedicine link between Darwin and Adelaide to be either globally useful or at least useful for some aspect of their practice.¹⁷ The main perceived benefit was improved ability to participate in multidisciplinary cancer conferences; other benefits included better support of isolated clinicians, decreased travel and enhanced education and peer review. Perceived difficulties were technical problems, the impersonal nature of the interaction, inability to examine a remote patient and potential lack of reimbursement for consultations. Some clinicians reported that the telemedicine consultative process actually decreased their workload.

A recent Japanese crossover study comparing face-to-face with telemedicine consultations found that patients were very satisfied but physicians were more likely to feel hampered by communication barriers:¹⁸ they felt they had experienced good communication in only 40% of the telemedicine consultations, vs 90% of the face-to-face conversations. This investigation showed that the physicians expressed significantly fewer utterances of empathy, praise and facilitation in the telemedicine consultations. Ratings on perceived difficulties in asking questions and clearly understanding what was on the patient's mind, however, were nearly the same. The article concluded that additional training programs might be required for physicians to improve their communication skills and their ability to express empathy in telemedicine consultations despite the constraints of the medium.

OUR STUDY OF CLIENT PHYSICIAN SATISFACTION

After a literature search revealed few published studies of client (i.e. local) physician satisfaction, we undertook such a survey in our service area of northwestern Ontario.¹⁹ The study aimed to survey 98 referring physicians from 17 remote communities, and to determine overall client physician satisfaction with our teleoncology process. The survey had 13 response fields, with opportunities to provide additional comments regarding any perceived problems as well as possible solutions. With an overall response rate of 60%, the survey demonstrated a perceived overall patient satisfaction of 91%. Client physician satisfaction with the teleoncology process as a whole was 86%, and no client physician indicated being unsatisfied with the service.

TABLE 2. Client physician satisfaction with components of TBRHSC Teleoncology Services

service parameter	percent satisfied
quality of information provided	96%
comprehensiveness of information provided	96%
timeliness of information provided	70%
potential of information provided to change patient management	70%
potential of service to initiate earlier treatment	61%
ability of service to integrate primary physician into circle of care	74%

As a global indication of client physician satisfaction, 98% of referring physicians stated they would continue to use the teleoncology service. Similarly, 96% would definitely recommend the use of this service to their clinical colleagues. **Table 2** shows the satisfaction ratings for the other survey fields. Fifty percent of surveyed client physicians felt the teleoncology process could be further improved: the major areas felt to warrant attention were delays in the reporting process, problems with continuity of care, absence of a complete assessment process (i.e. lack of physical exams) and degree of patient comfort with technologies involved. **Table 3** details these potential areas for improvement, along with proposed solutions.

As a result of this feedback, our centre is investigating the feasibility of an immediate post-consult dictation

TABLE 3. Areas of concern with possible suggested solutions reported by client physicians

concerns	potential solutions
delay in reporting process	<ul style="list-style-type: none"> • obtain faster dictation and typing, perhaps using voice recognition technology • email or fax reports • use electronic medical records • have onsite nurse prepare executive summary of vital information
problems with continuity of care	<ul style="list-style-type: none"> • avoid referral for services that could be delivered locally • communicate clear followup plan • have direct oncologist-family physician communication by phone, email or fax
patients uncomfortable with technology	<ul style="list-style-type: none"> • improve pre-session orientation for new patients • ensure constant availability of reliable translation service • have telehealth coordinator always present to assist with technical aspects
absence of complete assessment	<ul style="list-style-type: none"> • use for followup visits only • ensure presence of local referring physician

DISCOURSE

service with a fax-back mechanism for almost instantaneous reporting to the referring client physicians. We are also investigating an onsite package to improve orientation to patients who will be using our service. We have initiated a program to assure provision of 100% availability of First Nation translators for all aboriginal clients.


A major question still to be answered is the overall suitability of the teleoncology process for new patient consultations vs followup visits. Other authors have concluded that in certain areas of oncology such as for decision-making in head and neck cancer, lymphoma and cervical cancer — where the physical findings are often critical — telemedicine may not be appropriate.³ Certainly in our practice, the documented ratio of 13 to 1 for followups vs consultations seems to indicate similar potential preferences for both onsite oncologists and referring physicians. On the other hand, a 1975 study published in the *British Medical Journal* by Hampton and associates, investigating the utility of history alone vs the traditional full consultation of medical outpatients, documented an accuracy of 85% for the history, with the physical examination providing additional useful information in only 10% of cases, and the laboratory being helpful in another 7%.²⁰

A CAUTIOUS ENDORSEMENT

Telemedicine in general and teleoncology specifically are both here to stay. Before introducing technology, however, administrators and oncologists need to be knowledgeable about the potential benefits and pitfalls of the

proposed service. For example, as earlier detailed, a number of studies of the initial financial outlay for the technology required for telemedicine have not necessarily shown cost savings to the healthcare system.⁵⁻⁷ Dr. Rod Elford, a top Canadian telehealth expert, has stated that telemedicine and teleoncology do have the ability to deliver the expected results if done for the right reasons.²¹

Dr. Elford has emphasized that providers setting up a teleoncology service must conduct proper needs and utilization studies, and these must provide concrete evidence that any proposed service will satisfy needs earlier identified. He has documented that many Canadian telehealth systems do not have adequate written policies or clear procedures for utilization, and he believes this is one of the chief reasons for ineffectiveness.

Teleoncology has the potential to successfully improve the delivery of oncology services to remote areas. When appropriate needs analyses are performed and written procedures and utilization policies are developed in advance, it can also be cost effective — particularly for patients. If services are properly structured, the potential exists for a high degree of patient and client physician satisfaction. There are exciting opportunities for a great deal of additional research in this rapidly expanding area of medicine, especially in relation to our unique Canadian geography and healthcare system organization. 

Disclosure

The authors report having no potential conflicts of interest related to this article.

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