

BEYOND THE BUSH TELEGRAPH: TELEHEALTH FOR REMOTE CANCER CONTROL AND SUPPORT

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Abstract

Telehealth includes diagnoses, consultations and treatment. The ability to practise telehealth is constantly being simplified by new technology. The analogue telephone system had some useful applications, however the addition of vision with videophones increased the social dimension of the interaction. Linking centres with digital lines enhanced the transfer of data, but carried the expense of installation and limited accessibility, especially in remote areas. Now with fast broadband technology individuals can videoconference using the internet or mobile phones. This should hasten the application of videoconferencing to telehealth. One response to the increasing complexity of multimodality cancer management is the formation of multidisciplinary teams. In rural areas teams can be formed by supplementing existing rural practitioners with experts from larger centres, using telehealth. Psychological support for patients and support for rural practitioners can also be delivered by videoconferencing. Other applications of telemedicine to oncology occur with transmission of pathology images and teleradiology. Remote radiotherapy planning can be achieved by transmitting a remote CT planning image to a planning computer in a tertiary centre. Robotic cancer surgery can be supervised from a distance. A challenge for telehealth is how to evaluate its effectiveness. Patient preferences will ultimately be important.

Telehealth is defined by the World Health Organization as "the practice of healthcare using interactive audio, visual and data communications. This includes healthcare delivery, diagnoses, consultation and treatment, as well as education and transfer of medical data". The ability to practise telemedicine is constantly being simplified by new technology.

The analogue telephone system had some useful applications, however the addition of vision with videophones increased the social dimension of the interaction. Transmitting images clearly stressed the analogue system, as occurred when the internet was accessed using phone lines. Linking centres with digital lines enhances the transfer of data, but carries the expense of installation and there are limits to the accessibility to digital lines, especially in remote areas. Now, fast broadband technology is being used for telemedicine, providing widespread access. There are fewer problems with compatibility of equipment; cheap webcams and free provision of videoconferencing software enable individuals to videoconference cheaply over the net using their computers or small mobile phones. This should hasten the application of videoconferencing to telehealth.

Cancer management is becoming increasingly complex with multimodality treatment and supportive care. One response to this is the formation of multidisciplinary teams. They can include practitioners from each treatment modality, palliative care and allied healthcare. Team meetings are also excellent continuing education opportunities. The challenge in rural and remote areas is to assemble such teams so that there is access to specialist information where there are no specialists in

residence. There is also the need to try to achieve equity of outcomes by facilitating access for diagnosis and treatment and providing supportive care for the greater than a third of Australians who live outside major cities, with 3% living in remote or very remote areas.^{1,2} Some of this can be achieved using telehealth systems.

Analogue telephone system

The analogue telephone system has some useful applications. It has long been used for counselling and is particularly useful for patients who are confined to home. The Cancer Councils in each state and territory provide telephone helplines for patients, their carers and the general public and reviews of these have found that they are widely used for emotional support, however the benefits of helplines have not been fully evaluated.^{4,5}

Studies overseas have shown that although patients have reported benefit from telephone counselling, it has not been easy to show statistically, significant benefits between telephone counselling and control groups.⁶ This is because centres offering such counselling, usually have well developed support programs which make it difficult to evaluate the impact of new technology for delivering them.^{6,7} Other trials have detected only small differences because all patients were counselled rather than those with significant levels of stress or depression.⁸ It is certainly feasible to conduct psychotherapy for patients with cancer by phone.⁹ Group interventions in oncology via the telephone have been less frequently reported, but one study has shown improvements in quality of life and mood, but only during the intervention.¹⁰

Videoconferencing

The addition of a video image improves the social interaction, as we found in a study of the use of videophones to enhance palliative care outreach nursing in remote South Australia.¹¹ In this trial we provided analogue videophones to palliative care nurses in Port Pirie (229km from Adelaide, population 15,200) to enable them to communicate with palliative care patients when general nurses from the more remote Peterborough (95km) and Booleroo Centre (65km) visited them in their homes and plugged a video phone into their analogue phone lines. The advantage was more contact between visits, without increased travel for the palliative care nurses and better communication for the patients, who reported better rapport when they could see who they were talking to. Some disadvantages were long set-up times if the remote nurse was technophobic and freezing or calls dropping out because of the addition of video over a standard busy phone line.

Installing digital lines enhances the transfer of data, but carries the expense of installation in fixed centres and limits the accessibility, especially in remote areas. Between fixed centres however, such as two hospitals, it can be quite effective for exporting multidisciplinary care, as we demonstrated in a project linking Darwin Hospital with the Royal Adelaide Hospital Cancer Centre, for the purpose of making the expertise of a multidisciplinary team available to the medical oncologist and surgeons in Darwin.¹² Darwin lacked radiation oncologists who were able to contribute to planning the patients' multidisciplinary care. The regular multidisciplinary meeting by videoconference better supported the isolated clinicians, decreased travel and enhanced the opportunity for education and peer review. Patients in Darwin were able to access the opinion of a full cancer treatment multidisciplinary team.

Fast broadband technology is now being used for telehealth providing wider access. There are fewer problems with compatibility of equipment, with cheap webcams and free provision of videoconferencing software, individuals can videoconference cheaply over the net using their computers or small mobile phones, making support more accessible. In cancer, for example, the internet has enabled the development of online support groups for patients. These can have advantages over face-to-face groups of anonymity when discussing sensitive issues and may allow people with rarer cancers to contact each other without the constraints of geographic location.¹³

While videoconferencing has been available for several years and has been applied to cancer treatment, few studies have yet evaluated its efficacy or cost effectiveness.¹⁴

Videoconferencing and counselling

Videoconferencing is well established in psychiatry.¹⁵ Small studies have examined psychological counselling for remote patients with cancer. Certainly the technique was found to be acceptable in one study of terminally ill patients with cancer who received alternating cognitive therapy face-to-face or by videoconferencing.¹⁶ A clinical

psychologist provided cognitive behavioural therapy to 25 cancer patients in rural Australia and reported that the service was acceptable.¹⁷ More than half of the patients involved had metastatic or advanced disease and there were improvements in terms of quality of life, particularly emotional and functional well-being. It was a very brief intervention with 80% of participants receiving only four sessions of approximately 45 minutes duration each. All but one participant agreed that they would recommend the service to other patients.

Xavier et al have investigated the use of telehealth for mentoring of remote psycho-oncology psychologists and social workers. Twenty-two of 26 staff who had been newly appointed to deliver psycho-oncological support in rural NSW participated in a trial of being professionally mentored and educated. They participated in group education and clinical discussion in groups of three to five on topics voted for by the participants, supplemented by individual phone supervision. There was a significant difference in pre and post-testing in self-reported confidence in dealing with areas such as assessing and treating pain, body image issues and talking about death and dying, which were covered by the educational component of the course. Eighty-two per cent of the participants were "very" or "extremely" satisfied with their involvement and 77% were interested in ongoing participation, if offered.¹⁸

A further use for videoconferencing has been demonstrated in women with breast cancer in rural areas, who in most situations do not have access to professionally led support groups. Twenty-seven such women in the Intermountain region of north-eastern California participated in an eight session support group under the leadership of an oncology social worker, who joined them by teleconference.¹⁹ As with the other examples, this proved feasible and was acceptable to the participants. Comparing tests prior to and after the group sessions, showed significant decreases in depression ($p < 0.02$) and post-traumatic stress disorder symptoms ($p < 0.05$) as a result of the group support. Teleconferencing allowed these women to avail themselves of a useful service despite the leadership expertise not being available in their community.

Telemedicine in diagnosis and treatment

When we first conducted multidisciplinary meetings by telemedicine between Adelaide and Darwin, they incorporated a demonstration of the pathology and radiology to the team.¹² This provided a second opinion to the remote team who had provided the information. One lesson learned was that videoconferencing would be more easily embraced if it did not try to alter the practices of the participants. If pathologists, for example, did not wish to give instant opinions then the pathological information could be sent in advance of the consultation. Initially we had the slides mailed down, but with improved technology the image was considered sufficient to be able to provide an opinion and the slides could be transferred electronically. Telecytology and teledermatopathology trials have been reported as successful^{20,21} and telepathology has been used between major specialists hospitals and rural hospitals.²²

Sending pathology images by the internet is being used for diagnosis, expert consultation and education at Cornell University.²³ This can be done in real time with remote control of the microscope stage. Likewise, radiology images can be transmitted digitally and used in a multidisciplinary conference.²⁴ There is also the potential for remote reporting of scans and X-rays such as has been trialled with screening mammography.²⁵ An extension of this in treatment is remote radiotherapy planning, which can be achieved by transmitting a remote CT planning image to a planning computer in a tertiary centre, thereby making the best use of the planning expertise.

We have employed remote planning as part of the interaction between Adelaide and Darwin (which does not have a radiotherapy unit) and although patients are still required to travel to receive radiotherapy, the time and expense of being away from home is reduced if planning can be done in advance. In a further extension of the concept, a Norwegian study linking two remote planning systems, explored the feasibility of remote planning supervision and second opinions. Remote simulation was limited by software capabilities, although remote supervision was possible and the investigators were able to calculate the patient load per annum which would make such a system economically viable.²⁶

Furthermore, even in cancer surgery, robotic surgical equipment such as the Da Vinci equipment for prostate surgery, linked by telemedicine, could feasibly make remote surgery possible. A project exploring telerobotics of remote surgeons in neurosurgery for brain tumours in Canada has been reported between a large academic center (Halifax, Nova Scotia) and a community-based centre (Saint John, New Brunswick) located 400km away.²⁷ The initial experience found it feasible, reliable and safe, with the potential to extend neurosurgical expertise to more rural and remote centres. Also in Canada in 2003, the world's first telerobotic surgical service was established between St Joseph's Healthcare Hamilton, a teaching hospital affiliated with McMaster University and North Bay community Hospital 400km away.²⁸ Procedures included laparoscopic colonic resections, again demonstrating the potential that exists for exporting surgical expertise from major centres.

Medicolegal issues

The medicolegal issues are not unique, but shared by other medical consultations and distant communications.²⁹ Studies have reported, however, that the increase in technological developments has led to community concerns about the security of health information.^{30,31} There are issues of patients needing to be informed about their case being discussed in a multidisciplinary meeting and the need for privacy. Telemedicine adds the difficulty that there may be individuals off camera unknown to the patient at one end of the link. The consultation should be secure and any record kept of it should be private. The whole of the multidisciplinary team may be held responsible for the opinion of the team. There may also be additional jurisdictional issues if a telemedicine consultation

crosses state or national boundaries.

In the Adelaide to Darwin link, these considerations were minimised by the consultation occurring between doctors who were registered in both states and the patient's own remote doctor, who passed the information from the clinic to the patient. In our evaluation, several patients would like to have seen a recording of the videoconference.¹² A further potential issue is that if there is a link available to remote experts to improve patient care, could the local practitioner be liable for not using it?

Evaluation

There is no standard evaluation of teleoncology or globally agreed parameters for evaluation. Often patient numbers are relatively small because of the small populations in remote centres which preclude randomised comparisons. Most studies have focused on patient and clinician satisfaction with the consultation. As recorded above, where interventions have measurable health outcomes, these have been measured. There has been little prospective evaluation of the economic impact of a telemedicine consultation.³² Most retrospective evaluations compare the costs of the telemedicine, with the costs of travel for a face-to-face consultation and offset the cost of the equipment and its operation against that. Health outcomes should be evaluated unless it is assumed they will be the same for telemedicine as for a face-to-face consultation. Certainly the equipment is becoming much cheaper as the technology evolves. Patient preferences will be important since remote patients may be prepared to pay more for the convenience of telemedicine, despite equal health outcomes.

Conclusions

Telehealth is one of the solutions to the problems of equity of access to specialist cancer consultations for rural and remote patients. With rapid advances in communication technology, which has seen us progress from analogue telephone lines to broadband internet, videoconferencing is now more accessible to the whole population.

Increasingly, cancer treatment is multimodal and requires management decisions to be made by multidisciplinary teams. These can be created for rural and remote patients by supplementing the clinicians who are geographically available, with experts from distant urban centres using videoconferencing. Moreover, counselling and psychological support can be provided using this technology. In turn, remote psycho-oncology staff can be supported by their urban peers.

Extrapolating from what is already possible, remote diagnosis, treatment planning for radiotherapy and even surgery will extend the reach of expert specialty care to include rural areas.

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