Telemedicine Ophthalmology consultation in remote Queensland

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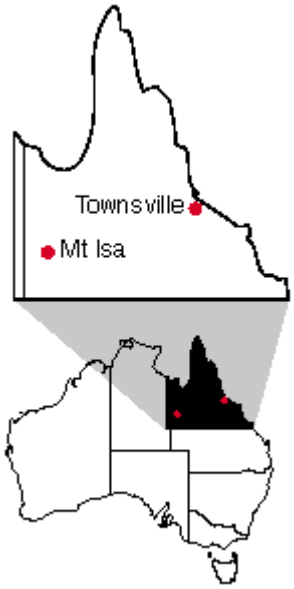
Abstract

Objective: To assess the use of remote telemedicine ophthalmology in patients presenting to an emergency department with acute eye problems.
Design: A prospective review from 1 December 1996 to 28 February 1997 of referral patterns and telemedicine consultations, comparing referral patterns with the same period one year before.
Participants and setting: 24 patients presenting to the emergency department of a remote base hospital in Queensland with an acute ophthalmological problem requiring a specialist opinion.
Main outcome measures: Clinical outcomes; use of the Patient Transit Scheme for isolated patients; acceptability to patients and doctors; and ophthalmologists' opinions of the system.



Results: No adverse outcomes were identified. Patients transferred for urgent assessment fell from 17 for the corresponding period in the previous year to four during the study period, while respective numbers of patients requiring non-urgent transfers (for surgery or postoperative review) during the same periods were 41 and 30. Both patients and staff (including the ophthalmologists) found the telemedicine facility very acceptable.
Conclusion: Ophthalmology is well suited to telemedicine for the diagnosis and management of acute conditions and postoperative

assessment of patients in remote areas. It offers considerable potential benefits to patients, and enhances the skills of local practitioners.

Introduction

Telemedicine is "the use of transmitted images, voice and other data to permit consultation, education and integration in medicine over a distance".[1] This technology is increasingly viewed as a means of improving specialist services to rural and remote parts of Australia,[2] but there are few published studies about the clinical outcomes of telemedicine services.[3,4] Critics often cite inability to examine the patient as a reason why telemedicine does not substitute for face-to-face specialist consultation.[5] However, in medical specialties that depend heavily on visual observation, such as dermatology or radiology,[3,4,6] telemedicine has been shown to be an effective means of providing accurate specialist opinion.

Ophthalmology is another specialty which lends itself well to televised con sultation, and acute problems in ophthal mology are an area where telemedicine may augment existing specialist services.

Many ocular conditions present acutely and require immediate specialist referral. While the remote town of Mt Isa, in central Queensland, has a visiting specialist ophthalmology service, the clinics are too infrequent to be useful for acute problems. Consequently, patients with acute ocular disease often require transfer to Townsville, 900 km away, for specialist consultation. In 1996, Mt Isa Base Hospital transferred 196 ophthalmology patients, representing almost 25% of the total patients transported under the Patient Transit Scheme in that year. Based on the cost of a return flight to Townsville of $500, and not allowing for the costs of patient escorts or accommodation, the cost to the hospital was approximately $100 000.

Following the generous donation to Mt Isa Base Hospital of a slit lamp with a camera facility by OPSM (Optical Prescription Spectacle Makers Industries Limited) in October 1996, we conducted a three-month evaluation of remote consultation for ocular conditions. Our aim was to examine clinical outcome, the effect on Patient Transit Scheme use and expenditure, acceptability to both patients and doctors, the ophthalmologist's evaluation of the transmitted slit-lamp images, and any problems encountered with the system.

Methods

All patients presenting to Mt Isa Base Hospital (i.e., a non-metropolitan hospital serving a number of smaller health care facilities) with acute eye conditions from 1 December 1996 to 28 February 1997 were assessed by the Emergency Department Director. Patients with a clear indication for immediate referral (e.g., penetrating eye injury) were transferred to Townsville as usual.

For those requiring specialist ophthalmological opinion, a telemedicine consultation was arranged during normal working hours within 24 hours of presentation. Each patient was examined by slit lamp at Mt Isa Base Hospital, while a high resolution televised image was assessed

simultaneously by the specialist in Townsville, in voice and visual contact with the patient and local practitioner (see Figure). After the consultation, the recommended treatment was initiated and local follow-up was arranged as necessary. Patients could be discharged, referred to the visiting ophthalmology clinic, or transferred to Townsville if necessary.

In addition, the ophthalmologists arranged for patients who required routine postoperative review during the study period to be assessed on the telemedicine link rather than having to travel to Townsville for an outpatient consultation.

The telelink slit lamp in use. The image on the monitor behind the doctor is viewed simultaneously by a specialist in Townsville.

To gauge the impact of the telemedicine system on use of the Patient Transit Scheme by ophthalmology patients presenting to the emergency department, the study period was compared with the corresponding three-month period in the previous year.

Acceptability of the telemedicine system to patients and doctors was assessed informally by staff in discussion with patients.

Results

During the three months of the study, 264 patients presented to the emergency department with an acute eye condition, of whom 24 (or 9%) were considered to require specialist ophthalmology referral, which was then carried out by telemedicine. By comparison, 315 patients had presented in the corresponding period in the previous year, with 17 (or 5.4%) having been transferred urgently to Townsville, and a further 5%-10% being managed after a telephone consultation with an ophthalmologist, without the use of telemedicine.

Patient outcomes

Our experience with the 24 patients who had telemedicine consultations (31 consultations in all) is shown in Box 1. No patient had an adverse clinical outcome as a result of being assessed by telemedicine rather than face-to-face in Townsville. For the first six patients in Box 1, management was altered as a result of the consultation, and transfer was avoided. For the next 12, management was continued locally as planned and transfer was avoided. For the next four patients, treatment was altered and urgent transfer arranged. For the remaining two patients, treatment was unchanged after telemedicine consultation.

Patient transfer

Box 2 shows number of ophthalmology patients transferred urgently and non-urgently (for surgery or postoperative review) during the study period and the corresponding period in the previous year. Overall, four patients were transferred for urgent assessment during the study period,

compared with 17 for the corresponding period in the previous year. Another four patients were referred to the next local visiting ophthalmology clinic as their problems were not urgent. Comparing the numbers of patients requiring urgent transfer for the two periods (4 v. 17), and based on the costings described above, the hospital saved $6,500 over the three months of the study. In addition, five patients were reviewed locally after surgery (the two children with strabismus correction were seen twice) instead of returning to Townsville, representing a total saving to the Patient Transit Scheme budget of approximately $10 000 over the three months.

2: Comparison of Patient Transit Scheme use by ophthalmology patients in the study period and the corresponding period in the previous year

	Study period: 1996–1997 (*n* = 264)		Previous year: 1995–1996 (*n* = 315)	
	Non-urgent transfer	Urgent transfer	Non-urgent transfer	Urgent transfer
December	8	1	10	7
January	15	3	10	6
February	7	0	21	4
Total	30	4	41	17

Acceptability

Frail elderly patients who had undergone cataract extractions were happy to avoid a further trip out of Mt Isa. Similarly, the patients who had strabismus correction were all young children with siblings, and it was very convenient for them to be seen locally. Indeed, as previously documented,[7-9] all patients seemed to respond well to the new technology, with no patient refusing a teleconsultation, and all saying that in the future they would prefer such a consultation over travelling to Townsville for review.

Medical and nursing staff in Mt Isa were enthusiastic about the new facility, often arranging their work so that they could be present at a teleconsultation.

The ophthalmologists in Townsville found that the quality of the transmitted slit-lamp image was of sufficiently high quality to allow definite diagnosis in all cases.

Discussion

Our pilot study indicates that ophthalmology by telemedicine can provide a clinically effective and resource- efficient means of augmenting a specialist service in a rural area. There were no adverse outcomes related to the use of the technology. Indeed, the service for patients seemed to improve, with specialist consultation being provided within 24 hours, allowing appropriate management to be promptly initiated. The ophthalmology telemedicine system, which could be applied across rural Australia, needs local practitioners willing to

acquire basic expertise in eye examination, and use of the slit lamp and tonometer. Successful use of the technology requires skilled practitioners at both ends of the transmission[10] generating and interpreting slit-lamp images.

Yellowlees and Kennedy have identified several key ingredients for successful telemedicine systems.[2] Many of these already existed in Mt Isa: an ISDN (Integrated Services Digital Network) videoconferencing system had been in place for two years; many medical and nursing staff had received training in the use of the system; telemedicine remains an initiative strongly supported by the hospital executive; there was enthusiasm for the project in both Mt Isa and Townsville; and Mt Isa Base Hospital employs an Information Technology Coordinator.

The success of this new service relied heavily on the enthusiasm and commitment of all involved to ensure that the time of specialists (who donated their services) was not wasted, and that busy practitioners could rely on agreed appointments reflecting accurately the timing and duration of consultations.

We found proper notekeeping to be of major importance. Unlike Kavanagh and Yellowlees, who provided case management referral letters after televised psychiatry interviews,[11] we have not yet been able to organise specialist letters after ophthalmology teleconsultation because of time, cost and reimbursement issues. Hence, it was the responsibility of the local practitioner who attended the consultation with the patient to document the diagnosis and management plan.

The fact that telemedicine is not covered by Medicare is likely to act as a barrier to its widespread development. This has been shown to be the case with several telemedicine applications in the United States.[2,11-13] While the ophthalmologists involved in this study donated their time, the question of remuneration must ultimately be addressed.

The great sense of camaraderie generated by the improved contact between health professionals was an unexpected benefit of the telemedicine system. As has been suggested,[2] the use of telemedicine may decrease the professional isolation of rural doctors by providing an interactive medium for medical education focused on immediate clinical management.

The telemedicine facility at Mt Isa Base Hospital will continue to be used for informal ophthalmology teaching, with medical and nursing staff encouraged to attend consultations. In addition, a telemedicine link to a day surgery unit in Townsville is currently being used to train theatre staff for the planned introduction of cataract surgery to Mt Isa.

Finally, all users of telemedicine should be encouraged to evaluate their services to ensure that they are meeting a clinical need and not just being driven by the technology. Users should be mindful of the

lessons from the extraordinary growth of laparoscopic surgery,[14] where practitioners have only recently begun to address clinical outcomes after laparoscopy in appropriately designed studies. Rather than being seduced by the promise of the new, technology must be harnessed to help improve patient care.

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