

► Experience with a low-cost telemedicine system in three developing countries

D J Vassallo*, P Swinfen[†], R Swinfen[†] and R Wootton[‡]

*Royal Hospital, Haslar, UK; [†]Swinfen Charitable Trust, Canterbury, UK; [‡]Centre for Online Health, University of Queensland, Australia

Summary

The Swinfen Charitable Trust was established in 1998 with the aim of helping the poor, sick and disabled in the developing world. It does this by setting up simple telemedicine links based on email to support doctors in isolated hospitals. The first telemedicine link was established to support the lone orthopaedic surgeon at the Centre for the Rehabilitation of the Paralysed (CRP) in Savar, near Dhaka in Bangladesh, in July 1999. An evaluation of the 27 referrals made during the first year of operation showed that the telemedical advice had been useful and cost-effective. Based on the success of the Bangladesh project, the Swinfen Charitable Trust supplied digital cameras and tripods to more hospitals in other developing countries. These are Patan Hospital in Nepal (March 2000), Gizo Hospital in the Solomon Islands (March 2000), Helena Goldie Hospital on New Georgia in the Solomon Islands (September 2000) and LAMB Hospital in Bangladesh (September 2000).

Introduction

The Swinfen Charitable Trust was established in 1998 with the aim of helping the poor, sick and disabled in the developing world. It does this by setting up simple telemedicine links based on email to support doctors in isolated hospitals in the poorest countries of the developing world. The Trust then puts these doctors in touch with specialists in tertiary hospitals in the industrialized world, who donate their time and expertise by providing free advice by email on the diagnosis and management of patients. This store-and-forward still-image telemedicine system is based on the British Defence Medical Services' telemedicine system, which has been used worldwide in both military and civilian settings over the last three years¹. It uses straightforward email protocols to preserve patient confidentiality and to facilitate the archiving of referrals.

Bangladesh

The Swinfen Charitable Trust started operating its first telemedicine link in support of the lone orthopaedic surgeon at the Centre for the Rehabilitation of the Paralysed (CRP) in Savar, near Dhaka in Bangladesh, in July 1999. The CRP is the only such hospital in Bangladesh (a country of 120 million people), as well as being the main centre for the care of patients suffering from spinal injuries in the whole of south

Asia². It had previously been limited in the care it could provide by its lack of specialists. After obtaining permission from the Bangladesh Ministry of Health, the Trust delivered two digital cameras (C1400XL, Olympus) and tripods to the CRP in July 1999 and trained staff in the use of the cameras and in the use of simple email protocols. The Trust then coordinated contact between the referring doctor at the CRP and relevant specialists in the UK and Australia, as well as a UK rheumatologist temporarily working in Nepal. Two follow-up visits were made in the first year to carry out further training and evaluation, as well as to help establish new telemedicine links in other hospitals in Bangladesh and in Nepal.

This telemedicine link was carefully evaluated to assess its effectiveness³. In its first year of operation, the Bangladesh hospital generated 27 referrals (there were 43 by 1 December 2000). The information was transmitted over ordinary telephone lines using a 19.2 kbit/s modem. The referrals were dealt with by specialists in neurology, orthopaedics, rheumatology, renal medicine and paediatrics, working mainly at the Royal Hospital Haslar in England, at the Royal Victoria Hospital in Belfast, Northern Ireland, and at Patan Hospital in Nepal.

Referrals were text-based enquiries, supplemented by still images where appropriate. There were no significant delays in obtaining a response from an appropriate specialist (the time from initial query to reply was within 24 h in 70% of cases and within 72 h in all). The advice was judged by the referring doctor to have been beneficial to the patient in 89% of cases. The benefits included establishing the diagnosis, providing reassurance to the patient and referring doctor, and significant changes of management. Interestingly, store-and-forward teleneurology in particular proved to be both feasible and of considerable benefit⁴. Four patients (15% of the total) and their families were spared the considerable expense

Correspondence: David Vassallo, Defence Medical Services Telemedicine Unit, Royal Hospital Haslar, Gosport, Hants PO12 2AA, UK (Fax: +44 2392 762 960; Email: DJVassallo@aol.com)

and unnecessary stress of having to travel abroad for a second opinion, and the savings from this alone outweighed the set-up and maintenance costs of the project.

Other countries

Based on the success of the Bangladesh project, the Swinfen Charitable Trust supplied digital cameras (either the Olympus C1400XL or the Olympus C2500) and tripods to more hospitals in other developing countries. These are Patan Hospital in Nepal (March 2000), Gizo Hospital in the Solomon Islands (March 2000), Helena Goldie Hospital on New Georgia in the Solomon Islands (September 2000), and LAMB Hospital in Bangladesh (September 2000). In addition, the Trust has recently helped provide another charity with a digital camera to establish a similar telemedicine link to Sarajevo State Hospital in Bosnia. A network of specialists in the UK, USA and Australia assists each hospital with free telemedicine advice.

The telemedicine link for Gizo Hospital is interesting because it was established through the generous assistance of a final-year medical student from Manchester going on his elective, after preliminary email contact with the hospital to confirm that the doctor there would welcome such a link. Specialists at Emory University in Atlanta, Georgia, USA, had already indicated that they would be willing to provide advice if a camera could be delivered. The medical student delivered the digital camera to Gizo in early March 2000, and during his elective he trained local staff and supervised the sending of some 10 referrals, all of which received prompt replies and benefited the patients.

The telemedicine link has been maintained since his departure from Gizo. It has also resulted in another camera being provided to the Helena Goldie Hospital on neighbouring New Georgia to establish a new link, and in additional telemedicine advice being obtained from the main hospital in Honiara, the capital of the Solomon Islands. It is not often that a final-year medical student can leave such a useful legacy behind, or can take on responsibility for training others during an elective. The way that this particular link was established could, in principle, be emulated by other medical students going on elective, setting up simple telemedicine links with their parent medical schools, delivering cameras donated through the Swinfen Charitable Trust or procured through their medical schools. They would thereby help spread specialist expertise to the developing world. Such a project should appeal to far-sighted deans of medical schools.

The Patan Hospital generated 25 referrals in nine months (mainly in dermatology, neurology, respiratory medicine and cardiology), these referrals being sent to the UK and Australia. Gizo Hospital generated 20 referrals in the same period (primarily for radiological opinion, but also for oncology, general surgery, dermatology and paediatrics), mainly sent to Emory University, USA. LAMB Hospital generated three referrals, and Helena Goldie Hospital has established email contact but has not yet needed to make any referrals. The results are encouragingly similar to those for the CRP.



Fig 1 HRH Princess Anne visiting the Telemedicine Centre at the Centre for the Rehabilitation of the Paralysed, Savar, Bangladesh, 21 November 2000.

This low-cost telemedicine network—each donated camera would normally cost about £700 (£1 is \$1.4, EU1.6)—has provided much help to isolated doctors practising under difficult circumstances, and has provided willing specialists in the industrialized world with an effective way to share their expertise where it is most needed. It has elicited considerable interest in the relevant countries, and resulted in a recent visit by HRH Princess Anne to the CRP to see the telemedicine link for herself, and to assess its potential for elsewhere (Fig 1):

The Princess Royal was delighted to visit the Telemedicine Centre at the Centre for the Rehabilitation of the Paralysed in Savar on Tuesday and sends you her congratulations for establishing such a worthwhile link between Bangladesh and the UK. . . . Her Royal Highness . . . sends you every good wish for equal success with your telemedicine system in Nepal.⁵

Discussion

Having demonstrated its feasibility, there is now significant demand on the Swinfen Charitable Trust⁶ from other hospitals in the developing world to expand the service. The limiting factors are likely to be the funding of cameras for donation to needy hospitals in the developing world, their transport, and the provision of training for local staff in the use of the cameras and in the use of simple email protocols. Particularly important will be the recruitment and active participation of groups of specialists willing to help individual hospitals. The involvement of elective medical students and their respective medical schools may provide an answer to at least some of these challenges. The research question is how best to scale up this project.

References

- 1 Vassallo DJ. Telemedicine kept simple. *Images in Paediatric Cardiology* 2000;**3**:1-14. Available online at <http://www.coh.uq.edu.au/swinfen>. Last checked 13 July 2001
- 2 http://www.emergency-medical.com/case06_01.htm. Last checked 13 July 2001
- 3 Vassallo DJ, Hoque F, Farquharson Roberts M, Patterson V, Swinfen P, Swinfen R. An evaluation of the initial year's experience with a low-cost telemedicine link in Bangladesh. *Journal of Telemedicine and Telecare* 2001;**7**:125-38
- 4 Patterson V, Hoque F, Vassallo D, Farquharson Roberts M, Swinfen P, Swinfen R. Store-and-forward teleneurology in developing countries. *Journal of Telemedicine and Telecare* 2001;**7** (suppl. 1): 52-3
- 5 Quote taken from a letter addressed to Lord Swinfen (Administrator of the Swinfen Charitable Trust) from Lady in Waiting to HRH The Princess Royal, 22 November 2000
- 6 Swinfen Charitable Trust, Dene House, Wingham, Canterbury, CT3 1NU, UK. Website: <http://www.coh.uq.edu.au/swinfen>. Last checked 13 July 2001

► The development of a telemedicine system for a centralized maxillofacial unit serving four towns

John Lowry

Department of Surgery, Royal Bolton Hospital, Blackburn Royal Infirmary, Bolton, UK

Summary

Following the amalgamation on one site of inpatient oral and maxillofacial surgical (OMFS) services serving four towns, patients attending accident and emergency (A&E) departments in Bolton, Burnley and Bury who required specialist OMFS care were transferred to Blackburn. This sometimes led to inappropriate transfer, with inconvenience for patients, substandard care and wasted resources. To reduce these problems, a videoconferencing system was established, linking the A&E departments of three peripheral hospitals to the central site. This allowed realtime visualization of patients and their radiographs, discussion between clinicians and transfer of a summary data-sheet. The aim was to improve remote diagnosis and to deliver a cost-effective, high-quality specialist service. In the first 12 months, there were an average of 25 remote consultations per month, with favourable feedback from both patients and clinicians.

Introduction

As a result of the amalgamation of specialist inpatient and out-of-hours emergency services for four towns, patients initially attending accident and emergency (A&E) departments at three peripheral hospitals and who required specialist oral and maxillofacial surgical (OMFS) care were transferred to the central unit. Occasionally, inappropriate transfers occurred, with inconvenience for patients and their families, substandard care and wasted resources. Formerly, patients presenting with maxillofacial injuries were assessed by casualty officers who decided whether or not specialist maxillofacial treatment was required and, if so, whether this should be immediate or delayed. A patient's injuries would be discussed with the on-call maxillofacial surgeon at the inpatient centre to determine whether appropriate management would be:

- (1) early transfer to the central hospital;
- (2) review at the next outpatient clinic at a peripheral hospital;
- (3) immediate treatment at a peripheral A&E unit following specialist guidance;
- (4) review by a senior specialist, who would have to travel to the peripheral hospital.

Assessment permitted during telephone contact alone often led to inappropriate transfer or delayed definitive care. To reduce these problems, a videoconferencing system was established, linking the A&E departments to the inpatient centre. This aimed to enhance decision making and to allow the delivery of a cost-effective, high-quality specialist service.

The target population served by the four hospitals was approximately 1.5 million. In a typical week, approximately 35-40 patients with facial injuries (excluding pure ophthalmic injury) attended each of the four A&E departments in the study area¹.

Correspondence: John Lowry, 50 Ravens Wood, Bolton BL1 5TL, UK
(Fax: +44 1204 390 937, Email: John.lowry@boltonh-tr.nwest.nhs.uk)