▶ # Low-cost telemedicine in the developing world

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Summary

The Swinfen Charitable Trust uses digital cameras and email to provide specialist advice to doctors in developing countries. The first telemedicine link was set up in July 1999. By the end of a year there were three links to hospitals in Bangladesh, Nepal and the Solomon Islands. Initially the consultants, all of whom give their advice free of charge, were from the UK, but now are worldwide. At present there are 12 links in operation, including one on Tristan da Cunha, and two links approved and awaiting equipment. The advice given by the consultants has been found to be helpful to the referring doctors and to benefit their patients. Failures have been due to the use of obsolescent equipment, computer viruses, lack of communication with the referring hospital before setting up a link, and referring doctors not chasing up their own referrals. Problems yet to be solved include the unreliability of the Internet, certain medicolegal issues and assessing the quality of medical consultants. In future there will be the problem of managing a rapidly growing telemedicine network.

Introduction

For the last few years the Swinfen Charitable Trust (SCT) has used low-cost telemedicine to provide specialist advice to doctors in developing countries. This work first began in Bangladesh. From 1992 onwards, we had been making regular visits to Bangladesh, to help the Centre for Rehabilitation of the Paralysed (CRP). Lord Swinfen was working for a charity in the UK for people with physical disabilities, with a particular emphasis on encouraging them to become as independent as possible. The CRP had the same approach and did not discharge any patients until they had been trained in some activity that would enable them to generate an income. There is no state welfare in Bangladesh.

In Bangladesh, as in many other countries, there is a shortage of doctors in many areas at consultant level. To provide a partial solution, we founded the SCT in 1997, with the idea of providing telemedical links to the developing world.

SCT telemedicine

We examined a number of forms of telemedicine, including realtime videoconferencing. None was practicable, or affordable, in the context of a developing country. We therefore settled on the use of email, supplemented by clinical pictures where appropriate, taken with a digital camera. The link to the

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CRP was set up in 1999, following a training visit we made there.

At about the same time we were asked to supply telemedicine equipment to a doctor taking up a post at the Patan Hospital in Kathmandu, Nepal. The doctor had previous experience of realtime telemedicine in Northern Ireland. A final-year medical student, doing an elective in the Solomon Islands, was also trained. Thus by the end of the first year we had three telemedicine links in operation.

The SCT is run from home, by the two authors. New referrals are allocated to a panel of medical consultants, who give their advice free of charge. We have consultants in 23 specialties, who are located in Europe, Australia and the USA. Referrals are coordinated, and records kept of each referral and reply. Email messages are checked three to four times daily, seven days a week. Should a referral not receive a reply, we are able to intervene and seek another specialist's advice.

At the time of writing, the SCT has 12 telemedicine links in operation: three in Bangladesh, five in Nepal, two in the Solomon Islands, one on Tristan da Cunha and one in Sierra Leone. Another hospital in western Nepal will be linked up shortly.

A telemedicine link for Tashkent will begin as a pilot study, with up to 12 subsequent links planned to follow.

Successes

The SCT operation is a voluntary scheme. It must be counted as a success that no consultant, once approached, has ever refused to provide advice. But does the advice do any good? Evaluation of the pilot link to the CRP[1] showed that the advice

was helpful for the referring doctor and of benefit to the patients. It was cost-effective and of educational value to the referring doctor. Moreover, the benefit in terms of medical education was not all one way.

On leaving to take up a post in Tasmania, the Director of Gizo Hospital in the Solomons said, 'I can leave knowing that help is only an email away'.

When the Gujarat earthquake occurred in India in January 2001 we came up with the 'SCT emergency pack'. This has a high-resolution digital camera, a laptop computer and a satellite telephone. All are powered by portable solar panels (Fig 1). In May 2001 we took a prototype of this pack to Tansen Hospital in the western hills of Nepal, an area mainly controlled by Maoist terrorists. The Medical Director said, 'The satellite link provides us with a mantle of safety'.

Failures

The last three years of telemedicine work in several developing countries have been very rewarding. However, there have, inevitably, been failures as well as successes.

Equipment

For our first link we installed an obsolescent satellite telephone, as a backup means of communication. However, it quickly failed.

Lesson

It is worthwhile obtaining up-to-date and reliable equipment.

Fig 1 The SCT emergency pack in use at the Tansen Hospital in the western hills of Nepal. Solar panels provide the power for a digital camera, a laptop computer and a satellite telephone.

Computer viruses

A great deal of trouble with the central coordination of the telemedicine work occurred when our computer was infected by a computer virus. This has happened more than once.

Lesson

Install a good anti-virus program and keep it up to date.

Poor communication

On 23 December 2000 a hospital sent a referral that was not answered for 11 days. This represents a major failure. (For comparison, the mean delay in answering CRP referrals was 1.6 days during the first year of operation[1]).

We had major problems with our desktop computer caused by a virus and the computer was sent away for repair. The referral in question was made between the time the computer became inactive and before a standby computer could be brought into operation. The first we knew of the referral was when we received a copy of the consultant's reply on 5 January 2001.

Lesson

Referring doctors need to keep an eye on responses to their referrals and to have an expectation about how long to wait before raising the alarm.

Poor communication — continued

In 2000 we lent equipment to a medical school so that students on electives could establish telemedicine links on our behalf. In practice, we found that none of the patients referred were actually treated — they could not pay!

Lesson

As a result of this we now ask all hospitals requesting a SCT link about their policy on treating the very poor. We ask that the very poor are treated free of charge (all the consultants give their advice free of charge).

Unsolved problems

All of the above represent the lessons of hard-earned experience. Nonetheless, they represent problems that we have solved. However, there are some seemingly intractable problems.

The Internet

Email is not a totally reliable means of communication (and, indeed, may never be). The hospital in Sierra Leone, which should have been online in June 2001, took a year to become operational because of problems with its server. In addition, one of the remote hospitals in Bangladesh, which sends its

referrals through Dhaka, has difficulty in receiving replies due to telephone and server difficulties.

These problems should be solved as technology improves.

Medicolegal issues

Patient confidentiality is important and it is a point that we always emphasize. However, names are not always removed from radiographs before they are digitized. There have been cases where the patient's face has been shown on images when it has not been essential for medical reasons. There has been one instance of a patient being identifiable by place of work and job.

This is partly a matter of training. But how does one ensure that the remote hospital fully understands the reasons for strict confidentiality?

Quality assurance

We are not doctors. How do we ensure that the consultants give the best and most appropriate advice? Since they will not always know if a particular treatment or medication is available at the remote hospital, they normally give a list of preferred treatments, thus enabling the referring doctor to use the most appropriate. In practice, this seems to work well.

A more difficult problem is this: how do we ensure that the consultants themselves are up to date? The obvious answer is to employ some kind of medical audit. But where do we find a panel of top consultants in each field prepared to review the referrals and the advice given?

Feedback

Probably the most difficult problem of all concerns the absence of feedback for the consultants and, to a lesser extent, for the referring doctors. Because of the nature of medicine in the developing world, it is usually the case that patients are lost to follow-up once they leave the hospital. This prevents the closure of the 'feedback loop', since neither referring doctor nor specialist can then know whether the recommended treatment was successful.

The future

In three years we have grown from supporting one hospital with telemedicine to supporting more than a dozen, with at least another dozen more if all the potential Uzbekistan hospitals join the scheme. At the same time, the number of volunteer consultants has grown from about eight to over 60. All this is managed from home by the two of us, checking email messages several times every day.

The work of the SCT demonstrates that low-cost telemedicine is feasible and, in the right circumstances, very successful. It is clear that there is a substantial demand for the sort of service we have been offering. But how do we scale it up? Clearly, we need an automatic system that can be operated by people with no technical knowledge or expertise and that is capable of being used by those, very often with only basic English, in remote places. Such a system is under development at present, in collaboration with the Centre for Online Health at the University of Queensland.

Reference

1 Vassallo DJ, Hoque F, Roberts MF, Patterson V, Swinfen P, Swinfen R. An evaluation of the first year's experience with a low-cost telemedicine link in Bangladesh. *Journal of Telemedicine and Telecare* 2001;**7**:125–38