Telemedicine is a new technology that is set to expand (Rayman 1992, Lindberg 1995, Llewellyn 1995, Brismar 1995), and like any new technology, the people who use it will need considerable training (Flannery et al 1995, Phillips et al 1995, Lindberg and Humphreys 1995, Beard et al 1993, Voges 1996). Generalists and specialists, doctors and nurses all need to learn how to use it and, more importantly, understand how it functions.

At Central Middlesex Hospital, we were able to set up the telemedical equipment between two rooms in our A&E department, prior to installing it for remote trauma management at a minor accident treatment service four miles from the main A&E.

Making mistakes is part of the learning process and users must have an understanding of some of the pitfalls that can occur (Phillips et al 1995). Following a six month practice period, and a further year for live teleconsultations, we have come to the conclusion that the training need for users is:

- A one day course in small groups
- Two weeks’ practice with the equipment preferably with seniors present
- Learning on the job
- Continual improvements.

THE ONE DAY COURSE - The basic knowledge and skills required can be imparted in a one day learning course in which an instructor uses half the time for formal instruction and half the time for questions. The following topics are covered:

- WHAT IS TELEMEDICINE? The instructor gives a brief historical account of telemedicine, its course of development and current uses, such as remote trauma management, protocols that we have for the management of various clinical conditions. We also have a protocol to take nurse practitioners through the steps of a teleconsultation. All staff need to know where their authority comes from and who will cover them in the event of an untoward incident.

- RESPONSIBILITY AND AUTHORITY

Staff at the transmitting and receiving ends of a telemedical consultation have the responsibility of learning how to use the technology and keeping abreast of developments. They need to know the indications for the limitations of telemedicine.

We included the indications for a telemedical consultation in each of the 38 protocols that we have for the management of various clinical conditions. We also have a protocol to take nurse practitioners through the steps of a teleconsultation. All staff need to know where their authority comes from and who will cover them in the event of an untoward incident.

Medico-legally there is relatively little problem if the paymaster for both the transmitting and receiving ends is the same, but as telemedicine expands, these are likely to be different and squabbles can ensue particularly when it comes to accepting blame. Good record keeping is essential from the outset to ensure that arbitration can occur at a later stage.

QUICK OVERVIEW

The students are provided with an initial demonstration of the system’s capability and given ample time to assimilate the technical terms of each of its

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Clinical telemedicine

**References**


**Teleme dicne**

Telemedicine is the use of medical information technologies to support clinical health care at a distance. It enables healthcare providers to share information electronically and remotely to improve patient care and outcomes. Telemedicine can be used for a variety of purposes, including patient consultation, diagnosis, and treatment. It allows healthcare providers to connect with patients in different locations, improving access to care and reducing travel time.

**Optics**

Charts are drawn to demonstrate the behaviour of light and how we see things. These charts are particularly useful in explaining the concept of image transfer. They help to illustrate the principles and concepts of optics in obtaining images.

**Video Cameras**

The students are shown how the video cameras work with some 'hands on' experience, such as manual focus and auto-focus, manual iris and auto iris. All the cameras are equipped with telephoto and wide angle facilities, and at least two have a macro facility. The students are taught how to use the white-boarding facility to mark a particular suspect area with one colour of the white-boarding facility and have the consultant respond in another colour. The consultant can use a fair bit about the optics in obtaining images. When an image is blurred, overexposed or lacking trueness of colour, it requires a little more explanation. They also need to understand the basics of how the digitised information is compressed and transferred along either ISDN line or the satellite or whatever means is being used for the transmission. At this stage, the students have been through this process.

**Digitising Information**

Most students have used a camera or a video camera and understand a fair bit about the optics in obtaining images. They have all watched television so they know when an image is blurred, underexposed, overexposed or lacking trueness of colour. When it comes to the question of digitisation of the image, a little more explanation is required. They also need to understand the basics of how the digitised information is compressed and transferred along either ISDN line or the satellite or whatever means is being used for the transmission.

**Practical Demonstration**

Each student demonstrates transmission of images of different parts of the body, X-rays, ECGs, etc. After the students have been through this process.
most students have used a camera or a video camera and understand a fair bit about the optics in obtaining images.

They are then left to practice with the cameras, the sound equipment and the software.

As instructors, we also found it useful to outline some of the mistakes we have made in our own learning process.

**Practical test** At the end of the course we have a practical test to satisfy ourselves that the students have learnt how to use the equipment competently.

**Two weeks practice** A two week practice period is sufficient to become reasonably proficient provided the students try some consultations each day. To be able to achieve this, they must transmit information on patients who do not need a teleconsultation, but whose permission has been obtained for use in these practices. We have a protocol for telemedical consultation which the nurses need to follow. Short cuts are to be deprecated and at the end of the two week period there is a practical test for each of the students.

**Learning on the job** Many of the early telemedicine pioneers learnt on the job. Students find that much of what was taught is reinforced and gradually become confident. They learn that it is alright to experiment with the equipment. Some of them come up with new ideas and tips which they put down in a book. They are encouraged to discuss telemedicine, among themselves and with their seniors.

**Continual improvement** One or two of the clinicians should take a special interest in the telemedicine so that interest is maintained. Both students and seniors are encouraged to visit video shops and exhibitions to help foster new ideas about projection images. We are gratified that some of our students then undertake to read and study about telemedicine to see what other groups are doing.

**Discussion** Telemedicine is becoming popular and users accept that the technology works but that ‘an ongoing training environment is recommended (Beard et al 1993). Laproscopists recognise the drawbacks of their technology which are similar to those of telemedicine, such as, the limited spatial view, monoscopic vision, the missing sense of touch and reduced mobility in the operating area. They envisage the development of a telepresence and telemanipulation system which will ease the training of surgeons (Voges 1996).

Some researchers encountered initial difficulties but concluded that with careful training of personnel in cell selection, remote DNA ploidy analysis would be an effective tool for standardisation and quality control (Phillips et al 1995).

In the United States, a survey of residency program directors regarding telephone management training in internal medicine showed only 6 per cent of the programs offered formal training. The training consisted of a single lecture or reading material. Sixty per cent of the respondents felt that formal training in telephone management was very important and should be a part of every inter- nal medicine curriculum (Flannery et al 1995). We feel that the greater technical demands of telemedicine mean training needs are even greater.

We found no literature about training in transmission of images with sound, in the medical environment. Conventional training needs were identified for the training of deck officers by Saarni et al (1995). Laproscopists recognised the drawbacks of their technology which are similar to those of telemedicine, such as, the limited spatial view, monoscopic vision, the missing sense of touch and reduced mobility in the operating area. They envisage the development of a telepresence and telemanipulation system which will ease the training of surgeons (Voges 1996). Students then undertake to read and study about telemedicine to see what other groups are doing.

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