Telemedicine: a cautious welcome

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Telemedicine is a major new development. Having become technically and economically feasible, it deserves proper investigation. Rushing into equipment purchase, however, is almost certain to prove counterproductive. Face to face contact is fundamental to health care and enthusiasts of telemedicine should recognise that it is not as good as the real thing (and unlikely ever to be). However, constraints on time and resources will make face to face consultation increasingly expensive, and telemedicine has the potential to produce major efficiencies in the diagnostic process. The goal of current research is therefore to marry medicine with technology, capitalising on the advantages of telemedicine and producing a robust system that delivers an acceptable service at an appropriate price.

Telemedicine will do for health care what the personal computer has done for the office. Or so its proponents believe. Its opponents believe that it represents a threat to the doctor-patient relationship and is an intrinsically unsafe way of practising medicine. What is more, they suspect that its costs vastly exceed its benefits and that it is yet another example of "toys for the boys." Like many new developments in health care, telemedicine seems to have a polarising effect on the medical profession, producing either evangelists or Luddites. Perhaps the real challenge, therefore, is to try and preserve a disinterested position and ensure that it will be the health-care profession that influences the introduction of telemedicine, rather than it being driven by interested parties such as equipment manufacturers.

What is telemedicine?

There are various definitions of telemedicine. The most general one ("medicine at a distance") covers the whole range of medical activities, including treatment and education.¹ There are many successful examples of distance education in medicine, including the continuing medical education programme run by the Mayo clinic and delivered by satellite² and the teaching of surgery to undergraduates by means of Britain's Super-JANET network.³ On the other hand, there has been little work on distance treatment, and it is difficult to envisage anything other than a minority role for it in future.

It is the area of telemedicine where the professional is remote from the patient or specimen in which there has been, and will continue to be, major activity. Well known examples include:

- **Teleradiology**—Radiographic images are transmitted to a radiologist for interpretation
- **Telepathology**—A pathologist can look down, and in some cases control, a microscope located several hundred miles away
- **Teleconsulting**—The doctor and patient are in different places, joined by some sort of communications link, such as medical videoconferencing. In its simplest form

this kind of telemedicine uses the telephone; more recently, full colour, two way, video and audio links have been used.

It is important to understand that telemedicine is a process not a technology. The process of telemedicine has become much more feasible in the past few years as a result of technological advances and continuing cost reductions. Because it is feasible, people are beginning to try it out (there is nothing wrong with this—indeed, it may be unethical not to try out a new technique if there is a reasonable suspicion that it may be advantageous). As is well known, there is at present little

Teleradiology workstation in Cork. The system connects six major referring hospitals to both neurosurgical departments in the Republic of Ireland. (Supplied by Dr W P Gray, Wessex Neurological Centre)

Telepathology workstation at University Hospital of Tromsø. Three departments of pathology and five peripheral hospitals without surgical pathologists use the system, mainly for remote diagnosis of frozen sections. (Supplied by Dr R Elford, Memorial University of Newfoundland)

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Teleconsulting room at Kansas University Medical Center. The Kansas Telemedicine Project consists of 12 rural and two urban sites. (Supplied by Dr G Doolittle, University of Kansas)

scientific evidence that telemedicine works. However, it is equally true that many other healthcare innovations have not been properly evaluated either.⁴

Why is telemedicine being used?

There is much telemedicine activity around the world. Why is it being used? There are basically two reasons: (a) because there is no alternative or (b) because it is in some sense "better" than traditional medicine.

NO ALTERNATIVE TO TELEMEDICINE

Telemedicine has a valuable role in the case of emergencies in remote environments such as the Antarctic, on ships, in aeroplanes, and possibly on the battlefield. In all these situations it may be difficult or impossible to get a doctor to the patient in time. For example, telemedicine support for seafarers has a long and successful history dating back to the early days of radio.⁵ More recently, the airline industry has woken up to the possibilities because of the high cost of diverting long haul aircraft in cases of medical emergencies.⁶ In the United States the Department of Defence is spending large sums of money on developing emergency telemedicine support systems for dealing with casualties on the battlefield.⁷ In terms of providing overall health care for the population, however, these examples are, and will remain, "niche markets."

TELEMEDICINE IS BETTER.

Telemedicine has obvious advantages in remote or rural areas where there are relatively few doctors. In this situation it improves access to health care, reducing the need for patients or doctors to travel.⁸ Even in urban areas, however, the introduction of telemedicine has been shown to speed up the referral process, to reduce unnecessary referrals, and to improve the consistency and quality of health care.⁹ Improved contact between the professional staff involved has been shown to produce educational benefits (continuing medical education) for them and to reduce professional isolation.¹⁰

By improving communication between the periphery and the tertiary hospitals, telemedicine facilitates higher quality medicine. Early advice from a neurosurgical centre, based on teleradiology from the peripheral hospital, improved the care of head injured patients.¹¹ Advice and counselling from a national centre for fetal medicine, via a telemedicine link with a peripheral hospital, improved the hospital's interpretation of antenatal ultrasound scans.¹²

Telemedicine also offers advantages in cases where moving the patient may be undesirable. In the American prison service, telemedicine is cheaper than transporting prisoners to hospital and reduces the risk of escape.¹³

Telemedicine allows the possibility of changing the mix of skills at the periphery, such as by means of nurse practitioners.^{9, 14} For example, the minor injuries clinic at South Westminster in London was able to avoid employing medical staff to cover a tiny proportion of the workload by installing a low cost telemedicine link. This had considerable economic advantages for the NHS Trust concerned. There is also the possibility of using telemedicine to provide medical cover in cases where, with the reduction in junior doctors' hours, it might be difficult to do so by traditional means.

Finally, telemedicine may be cheaper than conventional practice, although relevant studies are only just starting to appear. Recently, teleradiology in Norway was shown to be uneconomic at low volume¹⁵ but cost effective at higher volume.¹⁶ Tele-oncology in Kansas was shown to be cheaper than an outreach clinic.⁸ One problem about the economic analysis of telemedicine is that it often begs the question "cheaper for whom?" From the perspective of those who would have to buy equipment, for example, many of the benefits of telemedicine are intangibles, such as patients not having to take time off work. This is certainly one reason why patients like telemedicine, although surveys have found that many doctors like it too.¹⁷

Drawbacks

Telemedicine is not a panacea and its disadvantages include:

- *Possible legal implications*—Although it has yet to be tested in the courts, telemedicine is not thought to raise any new issues of principle in comparison with use of telephone, fax, mail, or email for consulting. It does not alter either the duty of care owed to patients by healthcare staff or their interprofessional relationships¹⁸
- *Having to rely on an amanuensis during teleconsultation*—However, experience shows that a rapport is quickly established
- *Depersonalisation*
- *Bureaucracy*—Use of telemedicine may require a radical change in the way that services are provided and paid for
- *Overdependence on technology that may be unreliable*
- *Clinical risk*—As with any other activity, the clinical risks associated with telemedicine must be managed.¹⁹

None of these drawbacks is unsurmountable. The real danger is that unbridled curiosity and commercial pressure may drive the widespread introduction of telemedicine before the time is right. Thus, instead of telemedicine being a process to support, enhance, and develop health care, the process itself will become the priority. Preventing this does not require formal regulation. Rather, the introduction of telemedicine should be guided by the principles of:

- Evidence based practice
- Appropriate risk management
- Proved cost effectiveness
- Maintenance of equity in provision of health care
- Partnership between patients and professionals in future developments.

Implementing telemedicine

Successful implementation of telemedicine depends on various factors including:

- *Having a clear idea of why you are doing it*—Is it to raise the standard of service or to reduce its cost?
- *Confirming that purchasers want it and that providers are willing to do it*
- *Evaluating it*—Since there is so little experience in Britain you would do best to regard it as a pilot trial: in other words, accept that it may not work, run it with proper monitoring, and publish the results for the

benefit of others. Wyatt has set out some criteria for evaluating telemedicine as a new health care technique²⁰

• *Understanding that telemedicine is not driven by technology*—Purchasing the equipment will not guarantee success (any more than buying a scalpel will turn you into a surgeon).

It cannot be overemphasised that simply buying the box won't enable you to practise successful telemedicine. In this respect certain commercial companies are doing the medical profession a grave disservice by implying that, say, videoconferencing equipment is all that is required for telemedicine. The NHS has an unfortunate history of introducing information technology, and parts of the country have been littered with the Ozymandian carcasses of past "initiatives" at huge expense to the tax payer. Successful telemedicine requires not only the right equipment but, perhaps more important, a change in the way that medicine is organised and services are contracted for. For example, it may be necessary to develop a mechanism for reimbursement of telemedicine episodes.

The future

Telemedicine is here to stay and is likely to play an increasing role in future health care.¹ Pressure from patients, and an increasingly litigious environment, make it important that in cases of doubt an appropriate professional opinion is sought. Telemedicine offers a method of seeking that opinion quickly and cheaply, thus providing a solution to an increasing problem in the delivery of health care.

If telemedicine were to be adopted widely, it might have a considerable impact on the NHS. In areas where it was shown to be cost effective, which are likely to include particularly the interface between primary and secondary care, it would facilitate the decentralisation of healthcare delivery. This might increase the pressure at district hospital level. However, it should not be viewed as posing a threat to specialist hospitals—rather the reverse, since telemedicine offers a mechanism for

exporting their expertise (for money) further down the healthcare pyramid.

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Can telemedicine be used to improve communication between primary and secondary care?

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Abstract

Objective—To test feasibility and acceptability of teleconferencing routine outpatient consultations.

Design—Exploratory trial of teleconferenced outpatient referrals of general practitioners.

Setting—An inner city teaching hospital and surrounding general practices.

Subjects—Six general practices linked to hospital outpatient clinics.

Main outcome measures—Levels of participants' satisfaction measured with self administered questionnaires.

Results—54 teleconsultations were performed in 10 different specialties. Few serious technical problems were encountered, and high levels of satisfaction with the consultations were reported by patients, hospital specialists, and general practitioners.

Conclusions—Teleconferenced consultations for routine outpatient referrals with joint participation of general practitioner were feasible. These may have an important potential benefit for improving communication between primary and secondary care.

Introduction

Problems in communication between hospital specialists and general practitioners are a well documented feature of the interface between primary and secondary care, especially in inner city areas.¹ Written communications have been shown to be of variable quality^{2,3} and are often of poor educational value.^{2,4} The need for improved communication between hospitals and community care has been recognised by the NHS as a priority for its research and development programme.⁴

There are several ways in which communications between primary and secondary care may be improved, such as the more effective use of telephones, outreach clinics, and greater use of joint domiciliary visits. There is evidence that some general practitioners and specialists make extensive use of the telephone, but in general it is not used a great deal and programmes to increase its use have not proved successful.⁵ There has been a major expansion in the use of outreach clinics, in which consultants see patients in a general practice setting, but current evidence indicates that these do little to improve interaction between general practitioners and specialists.⁶ They are also expensive in consultant time. Domiciliary visits are now uncommon apart from in medicine of old age and psychiatry. They are also costly

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