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Setting up a telepsychiatry service

Telepsychiatry is the delivery of healthcare and the exchange of healthcare information for purposes of providing psychiatric services across distances (Yellowlees *et al*, 2003). In practice, this most often means an interaction between a patient and clinician who are in different sites, through the use of transmitted live sound and video images. The term telepsychiatry was first used by Dwyer in 1973 who described the use of closed-circuit television at Massachusetts General Hospital for consultations between psychiatrists and patients. However, telemedicine was pioneered at the Nebraska Psychiatric Institute nearly 20 years earlier (Wittson & Dutton, 1956).

Recently there has been a rapid growth in the global use of telepsychiatry (Monnier *et al*, 2003). This is partly a result of improvement in technology, falling running costs and an increase in confidence following publication of research showing that it is acceptable to both clinicians and patients (Zarate *et al*, 1997; Brodey *et al*, 2000), and in some cases costs less (Brunicardi, 1998).

The majority of studies have demonstrated that patients find telepsychiatry acceptable, but it is often healthcare professionals that need more convincing (Hu & Chau, 1999). Resistance to change, lack of experience or training, fear of technology, concerns about the effect on communication, the building of relationships and confidentiality are barriers that need to be overcome. These concerns can lead to a rejection of a system completely or marked underuse. Problems can occur if the equipment has been poorly set up or is difficult to use or access. Advanced planning of the choice, location and positioning of equipment is therefore very important.

Setting up a telepsychiatry suite

Teleconferencing can serve several different functions in healthcare, including clinical consultations, education, supervision of peers and administrative work. The intended use of the technology will need to be defined in advance, as the location and capabilities of the system required will depend on whether it is intended to have a single or multiple function.

Equipment

The main requirements are for a room equipped with a computer processor, camera, screen, microphone and speakers, and a method of conveying the information between the rooms. It is also useful to have a telephone in each room so that contact can be made in the event of failure of the video equipment. There are a number of considerations when choosing equipment, but cost is likely to be a limiting factor for many services. We describe the range of options available and outline the minimum that will be acceptable to both patient and clinician for an effective consultation.

Computer processor

Purpose-built videoconferencing equipment consists of a computer processor and camera built into a compact box that is plugged into a television screen, with an external microphone. This is the simplest to use and requires little knowledge of technology to set up. The alternative is to use a personal computer with videoconferencing software and a separate microphone, speaker and camera. The main advantage of this is a lower cost, but the disadvantages are that a greater technical expertise is needed to set it up, and it may be less reliable because of incompatibility between existing software and the new hardware. Acceptable results can nevertheless be achieved with a desktop computer. There is no absolute minimum requirement for the speed of the microprocessor, but better performance will be achieved with faster computers. At present, a computer with at least a 2-GHz microprocessor is likely to be sufficient for most needs.

A laptop computer with an external camera and microphone can also be used in situations where mobility and flexibility are required. For example, a healthcare professional may wish to use a laptop on a home visit when consultation is required with a senior colleague. There have been no studies to date that have evaluated either the acceptability or validity of using laptop computers for psychiatric interviews, and the potential limitations in quality should be considered by the clinician.

Cameras

The main consideration is whether a fixed or moveable lens is required. A fixed lens will capture a single view

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which is set manually. A moveable lens allows the view to be changed by zooming and panning. There is little difference in the quality of the picture between different cameras, although it may be useful for the clinician to be able to change the view remotely. A fixed-lens camera is predictably much cheaper.

Screen

The screen can be either a computer monitor or a conventional television, depending on the output of the computer processor. The size of the monitor needs to be a minimum of 15 inches, although some services aim for a 'life-size' image of the clinician on the patient's screen and require a screen measuring at least 28 inches. Larger screens are needed if several people will be viewing the picture in the same room.

Speakers and microphones

If a personal computer is to be used, a separate speaker system is recommended to improve the overall quality of the sound. Speakers and microphone systems are available that contain echo cancellation features, which prevent the individual's voice being echoed back a fraction of a second later.

Information transport

The mode of conveying the sound and pictures between the sites is one of the most important considerations. The main issues are bandwidth, cost and security. The bandwidth is the rate at which data can be conveyed, measured in kilobytes per second (Kbps). Within a certain range, a higher bandwidth results in a sharper, clearer picture with smooth movements and clear sound. Conventional telephone lines convey data at a rate of 56 Kbps, but picture quality at this speed is poor. The Integrated Service Digital Network (ISDN) provides fixed lines that have two channels which each carry data at 64 Kbps. For teleconferencing, both channels are used to give 128 Kbps. It is also possible to have multiple ISDN lines installed and used on the same connection, giving rates that are multiples of 128 Kbps. Two or three ISDN lines used in parallel are common in teleconferencing, giving transmission rates of 256 Kbps or 384 Kbps. An alternative is to use 'T1' lines. These are high-speed fibre-optic or copper lines that are capable of carrying data at approximately 1500 Kbps, roughly fifty times faster than a conventional phone line. T1 lines are expensive and are only recommended if there will be a large number of users on the network simultaneously transmitting data. The cost of data transmission increases with bandwidth.

The alternative to using a 'dedicated' line is to use an internet service provider with a 'broadband' connection. This has the advantage of being less expensive. Data can be downloaded at up to 2000 Kbps and sent at a maximum of 256 Kbps, but some servers now provide even faster rates. Factors that can affect the rate of data transfer are distance from the telephone exchange, quality of lines and the number of other users on the network. To achieve the faster rates, the users need to be within approximately 3 km of the exchange, which may exclude potential users in remote areas – a key indication for telepsychiatry. The contention ratio is the predetermined maximum number of users that can share the bandwidth. For example, service providers regularly offer ratios of 20:1 or 50:1. If a 50:1 contention ratio is chosen, then you potentially share the service with 49 other users, thus speed will depend on the number of users currently online. Unlike fixed lines, the quality of the service can therefore vary with the time of day.

There are potential concerns that the data transmitted by internet service providers is not as secure as that transmitted by fixed lines. These include the concern that other internet users may be able to 'hack in' and eavesdrop on the consultation. A 'firewall' (hardware or software to prevent unauthorised access to the network) and encryption software can be used to reduce this risk. Another solution is to set up a virtual private network. Such a network uses powerful authentication and encryption protocols to ensure security. The disadvantage is that it may be necessary to conference with others outside the network and there may be incompatibility in the protocols used by different networks. Although internet service providers are not yet widely used for medical consultations, the future would appear to favour these given the lower cost.

The rate of data transfer has important implications for the validity and reliability of psychiatric examinations. A study by Zarate *et al* (1997) showed that recognition of negative symptoms of schizophrenia was less reliable at 128 Kbps than at 384 Kbps, although reliability of other clinical measures was similar at the different bandwidths. Systems that use a bandwidth of 128 Kbps have a 0.3 second delay between the sound and picture, and they are noticeably asynchronous. This can be distracting, whereas transmission at 384–512 Kbps appears to be simultaneous. Although some clinicians insist on speeds of 512 Kbps, 128 Kbps is adequate for most clinical applications (Baer *et al*, 1995; Bear *et al*, 1997).

Positioning of camera relative to the screen

The user will be naturally looking at the image of the person they are communicating with on the screen rather than directly into the camera. This can give the impression to the remote viewer that the individual is not making eye contact. A camera placed below the screen gives the remote viewer the sense that they are being 'looked down on'. It is common practice for the camera to be placed on top of the screen and for users to sit as far away from the camera as is practical (approximately 2–4 m) to reduce the angle between eye, camera and screen. This improves the impression of eye contact. The camera should be set up to capture a head and shoulders view for most interactions. A camera that can be controlled remotely by the clinician will allow the clinician to zoom in to examine fine movements or to focus on others present in the room.

A small version of the outgoing video picture in the corner of the clinician's screen ('picture-in-picture') is useful for the clinician to check their own position relative to the camera to make sure that the patient's view of the

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clinician is good. The picture-in-picture should be turned off on the patient's screen as this may be distracting and can make the patient self-conscious.

The room

The size and layout of the room is very important and influences the user's perception of the system. The room should look as far as possible like a normal consulting room. It should preferably have windows and natural light, be quiet and have adequate heating or air conditioning. Above all it should be pleasant to use, as negative attitudes towards telepsychiatry can develop based on experience of the working environment rather than on the quality of the interaction.

The background should be plain and uncluttered. It is unwise to set up a camera facing either a window or a door. Too much backlight from a window will silhouette the appearance of the individual on camera, and background movement seen through a window or glass pane in a door will be distracting. The colour of the background should be neutral. Some organisations insist on a mid-range blue-coloured background, which is considered to allow better viewing of individuals with different skin tones (Martin, 2004). The name and place of the organisation can be displayed behind the user so that remote viewers are reminded where they are 'connected' to. Lighting in the room should be diffuse, as cameras cannot cope with a wide range in contrast.

Development of a protocol

The aim of the technology is to provide an 'invisible interface' for the clinical interaction to take place. However, some adaptation is required to this form of communication and additional training is required (May *et al*, 2000).

What to tell the patient

The patient should be told the name and location of the clinician. They should be introduced to everyone that is in the room and should be given a view of the entire room to reassure them that no one else is observing the interaction. They should be told that the interaction is not being recorded and that the system is at least as secure as using the telephone. They should be told that the microphone is sensitive and they do not need to shout. They should also be asked not to make loud noises next to the microphone.

What to tell the clinician

Clinicians should receive preliminary training in the operation of the equipment. They should be aware of local policy regarding the actions that should be taken in the event of equipment failure. For example, faults should be reported to the nominated internal support person or team for investigation. Meanwhile, the clinician should make contact with the patient by telephone and, if appropriate, the consultation can be completed by phone or arrangements can be made for an alternative appointment.

At the beginning of the consultation, it is advisable to have the microphone muted. Some centres recommend having the camera pointing away from the clinician, either fixed on a name plate of the organisation or even pointing through an outside window. Some clinicians have found it to be a useful 'ice-breaker' to show the patient the view from their outside window. Arrangements should be made to ensure that the clinician is not interrupted during a consultation. This can be done by placing a notice on the outside of the door and by ensuring that only very urgent telephone calls are connected to the room. In a service that rigorously maintains this practice, patients have commented that telepsychiatry sessions are often preferable to face-to-face interviews because there are fewer interruptions.

Clinicians should be told that they should look at the individual on screen as they are talking to them. In systems that use lower bandwidths such as 128 Kbps, sound is often not conveyed in both directions simultaneously. Therefore if individuals at both locations are talking at the same time, the incoming sound will cut out. The clinician must consciously adapt their style of interviewing to accommodate this by avoiding verbal gestures (such as 'mm' and 'uh-hu') when the patient is talking and instead use non-verbal gestures such as nodding of the head. This is not a problem at higher bandwidths.

Clinicians should be reminded not to make loud noises near the microphone, particularly rustling of papers. The clinician should be reminded to turn off the microphone during breaks in the interview and, at the end, to avoid inadvertent breaches of confidentiality.

Exchange of clinical information

It is often necessary to keep a duplicate clinical file at both locations. Information can be posted, faxed, or transmitted electronically between the different sites. Posting and faxing increases the overall cost of the service, especially when large volumes of information are transferred. Administrative support will be necessary to undertake this task. Electronic medical records significantly reduce the amount of paper transferred between sites, although the start up costs can be considerable and all information required by the clinician may not be available electronically.

Ethical considerations

This paper has focused on the practical aspects of setting up a telepsychiatry service, however there are also some ethical considerations. The psychiatrist may wish to consider the potential limitations of telepsychiatric consultations, particularly when there may be far-reaching implications for the patient, for example in forensic psychiatry. The issue of consent also needs consideration. Many services require users to give written consent to participate in telepsychiatry, but this is not

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universal. Opinion is divided as to whether a consultation which takes place via videoconferencing is fundamentally different from a face-to-face consultation in which consent to participate is generally not sought. Neither is consent usually requested before a telephone conversation with a patient. There are also aspects of malpractice and professional liability to consider. In many states in the USA (including California, Arizona and Texas) a clinical interaction by teleconferencing has the same legal standing as a face-to-face consultation. In England and Wales, the courts have not considered standards of care using videoconferencing, or the extent of liability.

Conclusion

The ability to perform clinical interactions using teleconferencing technology is becoming well established and has the potential to improve healthcare delivery. Research is accumulating to show that psychiatric assessments performed using this technology are both effective and acceptable to both patient and clinician.

Careful consideration of the choice of equipment and planning of the infrastructure to support the service are essential when establishing a new service. Attention to the practical aspects of setting up the telepsychiatry suite, such as the choice of room and positioning of equipment, can greatly enhance the quality of the clinical interaction and thus increase the willingness of individuals to use the system.

Declaration of interest

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