Telemedicine: The Indian Perspective

Telemedicine is the transfer of medical data from one site to another for consultation, diagnosis, provision of and support for clinical care, continuing medical education and research. Medical data such as high resolution photographs, radiological images, sounds and patient records can be transferred in the form of electronic signals via the Internet, intranet, personal computers (PCs), satellite, video conferencing equipment and telephone lines.\(^1\)

In India, a large segment of the population resides in rural and semi-urban areas which lack adequate health infrastructure. Skilled medical personnel are concentrated in metropolitan areas and are scarce in these areas, and the doctor-population ratio is 1:15,000 compared to 1:500 in developed countries.\(^2,3\) In such a situation, providing medical care to the underserved and reducing the patient workload of the few referral centres in large cities calls for cost-effective utilization of meagre resources. Teleconsultation can help achieve this.

Real-time teleradiology (RTT) and telepathology are a step in this direction. Instant transmission of digital images enables the physician and imaging expert, both at different locations, to reach a diagnosis, saving on time and X-ray films. Thus, RTT overcomes the difficulties posed by traditional radiology—those of lost films and lack of storage space. In a similar manner, an intraoperative frozen section service with a dynamic pathology system would allow a pathologist at a remote location to provide a tissue diagnosis to a surgeon or physician at the other end.

Apart from long distance consultation and diagnosis, telemedicine can assist in the maintenance of databases of different diseases and exchange of data linking physicians doing collaborative research. Indianet (Inet) already provides online access to the database of the Johns Hopkins Hospital in Baltimore, Maryland, USA.

Major medical institutions in India, selectively connected through high-end systems with dedicated workstations, are exploiting telemedicine for other uses as well. High resolution video transmission with wide band width (such as T1 line, ISDN and microwave) can link ambulances to emergency rooms and enable RTT, telepathology, tele-endoscopy and telerobotic surgery\(^4\) to become a reality in India. The cost of linking two locations with such systems would be Rs 4–6 million.

On the other hand, low-end systems, based on multimedia PCs connected through modems and regular telephone lines or the Internet, can be set up for Rs 2–5 million. These enable store-and-forward teleradiology, static telepathology, web-based medical records, tele-electrocardiographic or electroencephalographic monitoring, telenursing, physician–physician collaboration, continuing medical education and remote consultation. With such systems, conventional X-ray films can be digitized, scanned and video-recorded with a frame grabber card, compressed by desktop PCs and transferred through modems and regular telephone lines or the Internet. Because of the lower costs, low-end systems seem a more viable option for general use in India.

All major medical centres in India need to establish a medical image repository (MIR), RTT and picture archiving and communication systems (PACS). These would result in cost and space saving in the long run, though a high initial cost would be a deterrent especially in public hospitals. Web-based systems for imaging computerized patient records would also be advantageous.\(^3\) However, these pose problems of data security, piracy and unauthorized access, and hence make intranets for hospitals and security on the Internet necessary.\(^5\)

Technologies such as telepresence surgery and telerobotics are expensive and need to be applied judiciously. Reducing the hardware and recurring transmission costs would be a major challenge before these technologies can be considered for application in India.

The Indian telecommunication infrastructure is gearing up to tackle the increased traffic imposed by the wider implementation of telemedicine systems. The Videsh Sanchar Nigam Limited (VSNL) is increasing the capacity of its international routes from 2.2 MB to 2.5 GB which is expected to decrease traffic congestion and make
access faster. The government also plans to provide teleconnectivity to 630,000 village clusters through small automatic exchanges. All these measures would make it feasible to use low-end systems in India. However, the government should also make appropriate allocations in the health budget for telemedicine.

With a plethora of options available, the difficulties in choosing the right technology for telemedicine are overwhelming. Medical professionals, computer scientists, the telecommunication industry and the government need to work together to make full use of this potentially exciting and useful technology.

REFERENCES
2 Background paper on the proposed Telemedicine Program of the Department of Electronics, Government of India, New Delhi.
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—Editor