Tele-education in medicine: why and how

A.R. Graham
Professor of Pathology, Department of Clinical Pathology, College of Medicine, University of Arizona, Tucson, Arizona, USA

General information

Distance learning is defined as a learning setting in which teacher and student are separated from each other in location and/or time. Taken literally, this can occur when a student writes or telephones an instructor to clarify a point of information and the instructor communicates the response back to the student. In current usage, however, distance learning frequently implies the use of modern telecommunications, computer systems, or both.

To understand the evolution of tele-education, it is worthwhile to consider a few quotes from Albert Einstein. The first of these is "We don't need to think MORE; we need to think differently". The second is "If at first the idea is not absurd, then there is no hope for it". It is this combination of thinking differently, and envisioning a method to teach which – when first conceived – appeared unlikely, that has made distance learning possible.

There are some factors which have influenced the growth of distance learning. Some of these are readily apparent. There has been a technology explosion over the last 20 years, characterized by smaller, faster, cheaper computer systems and improvements in the diversity and efficiency of software. Telecommunications advances have taken us from the old-fashioned telephone/telegraph/radio options to dedicated phone lines (T1, etc) and the Internet. Particularly important for a visual specialty such as Pathology has been the improved video image quality now available. As these technologies have advanced, it is not surprising that they have penetrated virtually all areas of our lives – banking, purchasing, record-keeping, airline travel, and purchasing, just to name a few.

The emergence of tele-education combined the appeal of these new capabilities with fundamental changes in our understanding of human learning. Imaging studies of the brain provide real-time insight into how new information is received, processed and retained. Increasingly, it was recognized that people have individual styles of learning and that different teaching and learning formats are required to meet those needs. One clear message from these studies has been that the lecture as a teaching method has certain limitations, although it is still an efficient way to deliver a volume of focused content to a large group of people at the same time. Other information was focused on the differences in childhood and adult learning, particularly within the context of the newly-available technologies. It was known for some time that adults desire to put their new knowledge into use as soon as possible, particularly in the workplace. The newer educational formats enabled them to do this immediately. Increasingly, adults demonstrated their preference for learning which allowed them to practice (and potentially fail) in a "safe" environment. Finally, the concept of learning *while using* became extremely popular.

Adult professionals in a variety of fields – not just medicine - require continuing education for licensing, certification, or career advancement, and many satisfy this need through their professional organizations. As an example of the tele-education penetration into this area, it is worthwhile to consider several statistics. In 1999, only 7% of professional associations were providing continuing education through distance learning, and 17% were expecting to use it. By 2002, 54% of associations used distance learning and 14% used it in a major way to provide continuing education to their members.

Tele-education in medicine

The story of distance learning in medical education is not new. In the 1980's, the American Society for Clinical Pathology initiated its series of audio teleconferences, which have grown in popularity and usage ever since. This year, the ASCP will produce over 100 audio teleconferences on various topics in anatomic and clinical pathology. These entail an audio connection through a telephone bridge, linking the presenter and the remote audience and allowing

for questions and answers heard by all the participants. Visuals are provided by transparency slides mailed to participants ahead of the conference.
The reasons given by medical professionals for using medical tele-education reflect – in large part - reasons for participating in continuing education in general. These include the need to obtain continuing medical education (CME) credits, the satisfaction of gaining new knowledge, and the potential to practice medicine better. The preference for distance education for those choosing this format has several contributing factors. The cost of travel, financially and in human resources, has decreased the potential for attending meetings far away from home. Downsizing of practices – with fewer health professionals available to do the work – has limited the ability of these individuals to get away from practice long enough to take advantage of CME offered in distant cities. Busy health professionals desire access to learning anytime and anywhere, including at home in the middle of the night. These circumstances favored development of innovative distance learning methods.
More sophisticated medical tele-education emerged in parallel with the growth of telemedicine. Telemedicine is medicine practiced at a distance, where physician and patient are separated in space and/or time from each other. Although most patients (and their doctors) would prefer to be in closer proximity than a remote connection, there are a variety of compelling circumstances which are uniquely handled by telemedicine.
Some of these include patients located in a rural or inaccessible location far away from a doctor, the need for subspecialty expertise not readily available in a smaller or distant site from the nearest large medical center, and with certain special patient groups such as those in a prison population.
My home state of Arizona in the United States had all the needs described above, so it was a good test site to demonstrate the feasibility of telemedicine. And with the development of telemedicine came the need and opportunity for medical tele-education. Now, we are certainly not the only group exploring this potential, but I would like to report our observations.

The Arizona experience

The Arizona Telemedicine Program (ATP) was developed over ten years ago by our Pathology Department Chairman Ronald S Weinstein, M.D. at the University of Arizona Health Sciences Center in Tucson, Arizona. As described above, the principal purpose of this program was to enable patients in small, rural communities to have the benefit of the specialized and high-quality medical services as practiced at the University Medical Center Hospital in Tucson. There are currently 69 sites connected through the ATP by high-speed telephone lines for telemedicine practice.
Since 1998, the ATP has broadcast over 500 continuing education presentations through its network. The types of programming as are follows. Real-time seminars are conducted simultaneously among the faculty of the Tucson and Phoenix campuses of the University of Arizona College of Medicine. Clinicopathologic conferences are held monthly at the University Medical Center, with linkages throughout the state, utilizing the classic format of clinical presentation, discussion by specialty experts, and correlation with pathologic findings; the real-time format enables visualization of colleagues participating at distant rural sites, including medical students doing rotations in these outpatient settings. Medical personnel (particularly nurses and other health care professionals) are trained in how to operate a remote site for the practice of telemedicine.
Over 790 people have attended these various CME activities, with over 4600 CME hours awarded. Some participants have used the network only a small number of times, but they were very pleased with the topic, format, and the savings. For a given physician, the cost of conventional CME to obtain 20 credit hours would be $1700. The cost of medical tele-education was only $156, for a savings of over $1500 per year. Some of those surveyed indicated that they preferred a more traditional CME experience (e.g., at a national meeting) because of the opportunity for networking with colleagues. However – and very importantly – over 90% indicated that they would not have been able to attend such a presentation without ATP.

On the national scene – The ASCP experience

Although ASCP's audio teleconferences have been around since the 1980's, much of ASCP's programming in the distance education realm is much more recent. For the last two years, ASCP has offered computer-facilitated teleconferences (called the Town Hall Teleconferences). These are carried out by an audio connection through a telephone bridge. The hand-out materials are provided through a password-protected Internet connection in two formats, for downloading prior to the conference. A number of these have been oriented about governmental and public health topics, with the most recent subject being West Nile virus.
Also about two years ago, Lectures Online was initiated, with content from ASCP's workshops, seminars, etc., videotaped and provided online (free to ASCP members as a member benefit). This recognized the desire of some CME learners that the ASCP's high-quality programming offered at national meetings be available to those who may not have been able to attend the meeting. Just within the last year, the ASCP co-sponsored with the American

Association of Clinical Chemists in producing labtestsonline, providing information on laboratory tests to the public.
Another recent innovation from the ASCP was "preview" materials available online to those registered for a subsequent live educational event provided through ASCP's regularly scheduled programs. This enables the participant to look at materials ahead of time which will be part of the content for the formal program. This enriches the learning experience for several reasons. One is the reinforcement of learning which takes place from repetitive exposure over a period of time. Another is that learning is better retained when it is approached from more than one perspective.

What does the future hold?

There are vast new potentials for medical tele-education. Just a few of these follow. There is the potential for residents learning specialized areas of Pathology to interact with recognized experts in the subject who are located at a distant medical center, for the residents to ask questions, and even to go over a challenging case by robotic microscopy in real-time. There is the possibility of medical students studying their basic sciences to learn - at least in part - from home, in a way which better suits their learning style than conventional didactic lectures. For health care professions which have shortages, such as medical technologists, some students would be enabled to do part of their studies from a remote site, with subsequent practical training in a small community hospital, thereby enabling them to contribute to the workforce potential without the necessity of distant travel and expense imposed by training at a large urban medical center. For the public, a patient could have access to a pathologist or other laboratory professional to explain the results of a laboratory test in person and allow for some of the questions these patients may have.
There is tremendous excitement about the future of medical tele-education. Perhaps one of the main reasons is that it affords opportunities which were previously unavailable for the health professional student, practitioner, or individual patient because of circumstances of geographic location, limitations for travel, economics or personal choice, to avail themselves of medical knowledge personalized for them.