Teleconferencing in Medical Education: A Useful Tool

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OPINION

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Abstract

Education and healthcare are basic needs for human development. Technological innovation has broadened the access to higher quality healthcare and education without regard to time, distance or geopolitical boundaries. Distance learning has gained popularity as a means of learning in recent years due to widely distributed learners, busy schedules and rising travel costs. Teleconferencing is also a very useful tool as a distance learning method.

Teleconferencing is a real-time and live interactive programme in which one set of participants are at one or more locations and the other set of participants are at another. The teleconference allows for interaction, including audio and/or video, and possibly other modalities, between at least two sites. Various methods are available for setting up a teleconferencing unit. A detailed review of the trend in the use of teleconferencing in medical education was conducted using Medline and a literature search.

Teleconferencing was found to be a very useful tool in continuing medical education (CME), postgraduate medical education, undergraduate medical education, telementoring and many other situations. The use of teleconferencing in medical education has many advantages including savings in terms of travel costs and time. It gives access to the best educational resources and experience without any limitations of boundaries of distance and time. It encourages two-way interactions and facilitates learning in adults. Despite having some pitfalls in its implementation it is now being seen as an important tool in facilitating learning in medicine and many medical schools and institutions are adapting this novel tool.

Key Words
Telemedicine, Distance medicine, Teleconferencing, Videoconferencing, Continuing medical education, Undergraduate medical education, Postgraduate medical education

Introduction

Education and healthcare are basic needs for human development. Technological innovation has broadened access to higher quality healthcare and education without regard to time, distance or geopolitical boundaries.

Distance learning has gained popularity as a means of learning in recent years due to widely distributed students, busy schedules and rising travel costs. Tele-consultation, tele-proctoring robotic surgery, and even tele-presence surgery are only part of the promise of new technology.

Teleconferencing, made more personal and acceptable by interactive videoconferencing, has been used for years by many businesses to decrease travel associated costs and is now being used increasingly in medical education. It is a very useful tool in distance learning.

The Society of American Gastrointestinal and Endoscopic Surgeons has defined teleconferencing as a real-time and live interactive programme in which one set of participants are at one or more locations and the other set of participants are at another. The teleconference allows for interaction, including audio and/or video, and possibly other modalities, between at least two sites. It can be used for teaching (e.g. didactic lectures, demonstration of surgical or other medical procedures, and demonstration of uses of equipment), consultation, diagnosis, or deliberation.[1]

There are four types of teleconferencing based on the nature and content of interactivity and sophistication of the technology.

- Audio conferencing
- Audio graphic conferencing
- Video teleconferencing
- Web-based conferencing

Three essential features of teleconferencing are:
1. Students/participants are present at a particular time and in dispersed places.
2. Resource persons are present at the same time at the teaching end or different teaching ends.
3. There are interactions between:
   (a) Student – resource persons/AV materials at the teaching end(s)
   (b) Student – student at the education centre
   (c) Student – facilitator/materials/activities at the education centre
   (d) Student – student at/between other education centres
   (e) Resource person – resource person

This article is an opinion on the use of teleconferencing in medical education.

This opinion is based on a Pub Med and literature search for relevant publications in the subject. The search terms were the words "Teleconferencing in medical education", "Videoconferencing", "Video teleconferencing", "Telemedicine" and "Distance education". A reference list of "Journal of Telemedicine and Telecare" was also searched. A total of 146 articles were reviewed. The search included original research articles, review articles, case reports, and chapters in books, letters to the editor and conference proceedings.

Distance learning in medicine has gained popularity nowadays. 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 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 practices long enough to take advantage of CME offered in distant cities.[2]

There has been a technology explosion over the last few years, characterised by smaller, faster, cheaper computer systems and improvements in software. Telecommunications advances have taken us from the old-fashioned telephone/telegraph/radio options to dedicated phone lines (T1, etc.) and the Internet. As these technologies have advanced, it is not surprising that they have penetrated virtually all areas of our lives – including medical education. Medical tele-education has also grown with the growth of telemedicine.

The first step in meeting today's students' needs is to adapt multiple curriculum delivery methods into the educational environment. Traditional large-group lectures may satisfy the learning and lifestyles of some students, while others may need diverse methods. Offering multiple learning modalities to students like teleconferencing can meet students' individual needs.

An increased emphasis on research and clinical practice has resulted in less faculty time for teaching, with new demands on administrators in the delivery of medical school curriculum. This has led teachers to look out for other modalities of imparting education.

With the enhancement of technology, e-learning is becoming an educational tool to deliver many aspects of curriculum. E-learning uses the Internet to deliver curriculum content and allows students to control content delivery, including the sequence, pace, and time. E-learning modalities include distance learning and computer-based delivery models. Internet protocols are now currently robust enough for two-way point-to-point and multipoint videoconferencing, especially over advanced research and education networks such as Internet-2.[3]

CME has become increasingly important for doctors during the past decade. This has favoured development of innovative learning methods including teleconferencing.

Nature of the trend of use of teleconferencing in medical education

1. Continuing Medical Education (CME): The most widespread use of teleconferencing in medical education is in the field of CME. Due to the rapid evolution in the medical sciences, lifelong learning is required for everybody involved in the medical field. CME has become increasingly important for doctors during the past decade and with the growing requirement for continuous improvement of quality in medical practice, it is now virtually mandatory in well-organised systems of medicine.[4] Due to busy time schedules and high costs of travelling, videoconferencing provides a good option for medical professionals to save on time and costs to update their knowledge. Busy health professionals desire access to learning anytime and anywhere, including at home in the middle of the night. There have been constant efforts to evaluate which is the best format for CME and it has been realised that small group teaching fulfils the format most effectively. This fits in well with the concept of making use of telemedicine or videoconferencing in this area since relatively simple equipment can be used to receive teaching materials from a centre even in the doctor's office. Such classes are usually

quite small and it is possible by means of a bridge to speak to several sites at the same time and remain interactive.[4]

A project was started in Belgium called "Pentalfa" in which the authors took the option of teleconferencing to offer a part of the CME in the form of long-distance education and CME for the postgraduates. This was highly successful and the participants appreciated this CME project using teleconferencing.[5]

In Nova Scotia, a tele-health network has been developed which has used videoconferencing for CME since 2000[6] and has been reported as a success. At the Mayo Clinic USA, a satellite system network is used for educational programming and activity and has been an integral part since 1986.[7]

The University of Alberta uses videoconferencing to link physicians in interactive continuing health education. In a study conducted about the programme, results showed that the audience were very satisfied with the programme and felt that the sessions were relevant to their practice. The interactive discussion component was rated very highly. Most respondents stated that they would change their practice based on the information discussed.[8] Morganti et al suggested that videoconferencing networks are appropriate for CME and for distance education, in particular in the discipline of radiotherapy.[9]

Other CME initiatives include videoconference journal clubs and small group learning. In a study involving videoconferenced journal clubs in dermatology the participants' satisfaction with the videoconferencing journal club was high. The adoption of videoconferencing produced promising results, increasing the efficiency of house officer training.[10,11]

2. Use of teleconferencing in medical conferences: Interactive live videoconferencing is being used for the transmission of live surgeries from the operation theatre complex to the conference venue many miles away or even put as a podcast on the Internet. This helps the audience to learn, interact with operating surgeons sitting many miles away from the operation theatre. In an international video-teleconference for orthopaedic trauma education, interactive video teleconferencing successfully met the expectations as an educational tool and the remote participation did not adversely affect the ability to engage in discussion.[12]

3. Use of teleconferencing in undergraduate medical education: Teleconferencing has also been used in undergraduate medical education. Several medical schools have used teleconferencing technology to "extend the walls of the campus". The state of Georgia has implemented the Georgia State-wide Academic and Medical System, a distance learning teleconferencing network that allows the transmission of educational courses to remote campuses.[13] 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.

Medical students can also be offered lecture content covering clinical objectives via interactive videoconferencing and a study shows that the students learn content focused on clinical learning objectives as well as using videoconferencing as they do in the traditional classroom setting.[14] Videoconferencing of a live pelvic surgery was used to teach first year medical students about pelvic anatomy. In this study, students having recently completed their cadaver dissection and a practical on pelvic anatomy attended a live pelvic surgery through a videoconference that provided two-way pictures and voice conversation.[15]

A study was done to evaluate the concept of a telemedicine-orientated educational application by exposing junior medical students to surgical teaching via videoconferencing from the operating theatre and comparing this to the traditional method currently employed, which requires the presence of students in the operating room. Their experience with telemedicine assisted surgical teaching indicated high acceptance and satisfaction rates by clinical students.[16]

4. Videoconferenced grand rounds: Videoconferencing connects sites for grand rounds and other sessions traditionally hosted by a medical centre/teaching institution, and allow peripheral sites, maybe in different countries, to present clinical material during these rounds. The Long Island Jewish Medical Centre and five other hospitals hold paediatric grand rounds via videoconferencing.[17]

5. Videoconferencing in postgraduate medical education: Video-conferencing is widely used for educational purposes throughout the world. The use of videoconferencing for post-graduate medical education is not new and has been shown to be effective.

Videoconferencing is being extensively used by the National Board of Examinations in India for the training of post-graduate and doctoral students in medical specialities including super specialities. The programme is live with two-

way audio and video interaction of students and the teachers. The students can have one-way video and two-way audio interactions as the programme is beamed via a satellite. A toll free number is given to the students to interact with the experts during the videoconference.[18] Audio conferencing sessions have been used by the National Board of Examinations, a premier post-graduate examination body in India for interactive radio counselling for training of post-graduate students.[18]

An Australian centre provided synchronous tutorials in paediatric surgery using videoconferencing at two rural sites with the tutor located at a metropolitan paediatric clinical school. Videoconferenced surgical tutorials were highly valued by post-graduate medical students as an educational method.[19]

6. Mentoring via videoconference: Telementoring — defined by the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) as real-time interactive teaching of techniques by an expert surgeon to a student not at the same site was first performed in 1962 by De Bakey.[20]

Telementoring has been developed to allow a surgeon at a remote site to offer guidance and assistance to a less experienced surgeon and to reduce the complications associated with surgeon inexperience.

Several studies of surgical telementoring over large distances have been conducted in various parts of the world. K.M Augestad quotes Cubano in his article that long-distance telementoring was an invaluable tool for providing instantly available expertise during laparoscopic procedures.[21]

7. Use of videoconferencing in teaching practical skills: Videoconferencing also facilitates skills instruction and assessment at a distance. Examples include teaching surgical procedures through off-site observation, teaching hand assessment techniques for physical therapists, improving paediatric resuscitation skills through observation and participation, assessing neonatal resuscitation skills and assessing surgeons' informed decision-making skills using a video conferenced standardised patient.

8. Blended education strategy: A multi-continental, multilingual educational service can be offered through videoconferencing, multimedia information superhighways and tele-broadcasting networks. Attractive programmes can be made combining conventional lectures, workshops, talk-shows, teleconferencing and tele-proctoring methods.[22]

Consequently, many institutions have adopted blended learning approaches combining face to face and distance learning. Videoconferencing is becoming part of the mix of technologies to provide distance education and blended learning in varied areas of health science.[23]

9. Development of educational satellite: More educational satellites are now planned to enhance penetration of telemedicine and teleconferencing in our lives.

Advantages of using teleconferencing in medical education
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, travel limitations, economics or personal choice, to avail them of medical knowledge personalised for them.

1. Videoconferencing has many advantages that enable distance and, to some extent, time problems to be overcome. Time required for travel is an important barrier to attendance, and videoconferencing overcomes this problem and eliminates the associated travelling costs. In addition, it improves the efficiency of training programmes generally by enabling sessions to be held more frequently.
2. It overcomes time or scheduling problems for students who can assemble at an education centre for a limited period only because of their full time or part time work, and family and community commitments.
3. It allows the best of educational programmes and learning opportunities to be delivered from anywhere in a country or overseas and delivers them directly to the receiver whilst allowing simultaneous interactive teaching at many sites. Distance is now not a barrier for good quality learning and education.[4]
4. Providing a curriculum to students scattered over a broad geographical area is a challenging problem. Videoconferencing is a potential method of providing educational programmes to virtually all residency programmes with considerable cost and more effective use of the resources. Videoconferencing has the potential for providing timely, high quality educational programs to viewers who may be scattered over a wide geographical area.[24]
5. It is a practical and cost-effective method of sharing educational resources between two or more institutions. Results show that videoconferencing has the potential to become a practical, cost-effective

method of sharing educational resources by means of interactive multi-site educational programs.[25]

6. Videoconferencing via satellite makes real-time interaction possible between audience and faculty as well as central production of resource intensive course material which makes it an appealing educational tool.
7. The videoconferencing sessions can also facilitate collaborated learning even when students are located far apart.

Disadvantages

Although teleconferencing is a very useful tool, it has some disadvantages in some settings.

1. The initial cost of the equipment and leasing the lines to transmit conferences may be prohibitive.
2. Companies which produce codec's have each developed unique methods of compression which may be incompatible with the equipment at different sites, the desired method of communication or software, although protocols have been established to allow communication among brand names.
3. If the bandwidth that carries the transmission among sites is not large enough, the students may observe ghost images when rapid movement occurs in real-time. If the system is not properly configured, class members may observe an audio echo effect. The result is audio interference that detracts from the learning environment.
4. Technical problems can lead to the failure or interruption of the teleconferencing sessions. Sometimes these problems need a long time to be resolved which may lead to cancellation of the session. Technical problems include power failure at the remote end and disconnection of the satellite link.
5. There is no direct self-directed learning through teleconferencing. However the student may choose teleconferencing through a self-directed approach as the preferred modality of learning.
6. It is difficult to teach psychomotor skills using teleconferencing.
7. Videoconferencing technology can constrain dialogue, and students at distant sites often feel more disconnected than those on site. Unless a strong effort is made by the instructor, students not located with the instructor may remain uninvolved in the course. Students may appreciate hearing answers to questions others ask even though they do not ask questions themselves.

Conclusion

Teleconferencing is an exciting and useful tool available for learning and teaching in medical education. With advances in Internet technology it is now possible to have the best of learning and teaching opportunities available to wide and scattered students without time and distance constraints. Teleconferencing will play an important part in medical education in the future.

References

1. SAGES [Internet]. The Society of American Gastrointestinal and Endoscopic Surgeons: Guidelines for the surgical practice of telemedicine; practice/clinical guidelines, 2009 [cited 2010 October 18]. Available from: http://www.sages.org/publication/id/21
2. Graham AR. Tele-education in medicine: why and how. Riv Med Lab JLM 2002;3(2):S1.
3. Locatis C, Vega A, Bhagwat M, Liu WL, Conde J. A virtual computer lab for distance biomedical technology education. BMC Med Educ 2008; 13:8-12.
4. Norman JN, Alsajir MB. Tele-education – Postgraduate education. Med Principles Pract. 2001;10:115-22.
5. Himpens B. Postgraduate Continuing Medical Education via videoconferencing at the Leuven in Belgium: An Evaluation of Pentalfa. In: Kallenberg AJ, Van de Ven MJJM (ed). The new educational benefits of ICT in higher education: Proceedings. Rotterdam: Erasmus Plus BV; 2002;255.
6. Allen M, Sargeant J, MacDougall E. Videoconferenced continuing medical education in Nova Scotia. J Telemed Telecare 2002;8:2-4.
7. Tangalos EG, McGee R, Bigbee AW. Use of the new media for medical education. J Telemed Telecare 1997;3(1):40-7.
8. Klein D, Davis P, Hickey L. Videoconferences for rural physicians' continuing health education. J Telemed Telecare 2005;11:97-9.
9. Morganti AG, Pasquarelli L, Deodato F, Digesù C, Di Falco C, Dinapoli N, Macchia G, Picardi V, Tagliaferri L, Valentini V, Cellini N,. Videoconferencing to enhance the integration between clinical medicine and teaching: a feasibility study. Tumori 2008;94:822-9.
10. Ahn H. Videoconferencing journal club for dermatologesidency training: An attitude study. Acta Derm Venereol 2007;87:397-400.
11. Callas PW, Bertsch TF, Caputo MP, Flynn BS, Doheny-Farina S, Ricci MA. Medical student evaluations of lectures attended in person or from rural sites via interactive videoconferencing. Teach Learn Med 2004;16:46-50.
12. Ho D, Hu P, Carmack D, Hayda R, Pohl A, Dunbar R, Harris R, Frisch H. Design and evaluation of International Video Teleconference (iVTC) for orthopaedic trauma education. AMIA Annu Symp Proc 2006:951.
13.Technology across the curriculum: the state of Georgia: network brings education and medical information to rural residents. Syllabus of Georgia State University. 1995;8(4):20.

14. Bertsch TF, Callas PW, Rubin A, Caputo MP, Ricci MA. Effectiveness of lectures attended via interactive video conferencing versus in-person in preparing third-year internal medicine clerkship students for Clinical Practice Examinations (CPX). Teach Learn Med 2007;19(1):4-8.
15. Metheny WP, Gajewski W. Using videoconferencing of a live surgery to teach about pelvic anatomy. Acad Med 1998;73(5):601b.
16. Gul YA, Wan ACT, Darzi A. Undergraduate surgical teaching utilizing telemedicine. Med Educ. 1999;33:596-9.
17. Rosner F, Gandhi MR, Lanzkowsky P. Teleconferencing for graduate and continuing medical education. Acad Med 1992;6:384.
18. National Board of Examinations [Online]. Teleconferencing schedule for month of august, 2010 [cited 2010 October 1]. Available at http://www.natboard.edu.in/matter.php?notice_id=607.
19. Holland AJ, Soundappan SV, Oldmeadow W. Videoconferencing surgical tutorials: bridging the gap. ANZ J Surg 2008;78(4):297-301.
20. DeBakey ME. Telemedicine has now come of age. Telemed J 1995;1(1):3-4.
21. Augestad KM, Lindsetmo RO. Overcoming distance: video-conferencing as a clinical and educational tool among surgeons. World J Surg 2009;33(7):1356-65.
22. Moreau JF, Le Guern H, Melki P, et al. Teleteaching for medical education: Why and how to do it: 4th International Conference on Image Management and Communication, 1995;214.
23. Ruiz JG, Mintzer MJ, Leipzig RM. The impact of E-learning in medical education. Acad Med 2006;81(3):207-12.
24. Berk RA. The delivery of continuing education: teleconferencing, an alternative mode. Bull Med Libr Assoc 1982;70(1):21-7.
25. Gold RH, Kangarloo H, Yaghmai I, Grant EG, Stewart BK, Mankovich NJ, Sayre JW, Dwyer SJ 3rd. Teleconferencing for cost-effective sharing of radiology educational resources: potential and technical development. AJR Am J Roentgenol 1993;160(6):1309-11.

CONFLICTS OF INTEREST

The author declares that there is no conflict of interest

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