Original Article

Is Tele-Education a Proper Substitute for Regular Method to Train Anesthesiology Residents?

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Abstract

Background: Communication technology development has provided easier and quicker services in various medical fields. One of the main applications of tele-communication is tele-education, which helps in remote education of students. This study was designed to compare impact of tele-education and regular education methods on anesthesiology residents.

Methods and Materials: Anesthesiology residents participated in both tele-education and regular courses during a one-year period. Various related subjects were taught in tele conference and regular sessions. In each course, residents were assessed by pretest and posttest exams. Finally, satisfaction was evaluated regarding quality of sessions using questionnaires especially prepared for the purpose.

Results: Mann-Whitney U test showed no statistically significant difference in pretest (p=0.15) and posttest (p=0.07) results of both courses, although this difference was notably in favor of tele- posttest results. The highest rate of satisfaction among residents was dedicated to "saving time" to get to tele conference classes. Moreover, 92.59% of residents preferred to take part in tele conference classes.

Conclusion: The study showed that tele-education and regular methods could be equally effective in the education of residents. Some advantages of tele-education for anesthesiology residents were high satisfaction of residents, time saving, and overcoming long distance. Tele-education could be regarded as an effective substitute for regular education of anesthesiology residents.

Keywords: Anesthesiology, Tele-education, Telemedicine, Medical education, Residency

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Introduction

Improvement in technology and communication has provided a great opportunity for anesthesiologists to exchange information across the world. Using technologies such as tele-medicine can be a perfect solution to reduce the expenses while providing access to high quality health care. Tele-medicine has a wide range of applications in anesthesiology including preoperative tele-assessment, international collaboration for intraoperative management, tele-

consultation (1) and tele-education for residents (2). Tele education requires a suitable communication system and plays a key role in acceptance of tele health as a whole (3).

Uneven distribution of anesthesiology educational facilities throughout the country and the need for anesthesiologists in remote locations to discuss and consult problem cases with experts in tertiary centers indicate that tele-education can be helpful for the improvement of learning in this field. This study was conducted to evaluate the role of tele-education in anesthesiology for finding an alternative solution for training, especially regarding problem cases and in remote locations, compared to regular educational programs.

Methods

This cohort study was performed during a one-year period. Initially the Ethics Committee of Shahid Beheshti University of Medical Sciences (SBMU) expressed their approval of performing the project. Anesthesiology residents, who were willing to participate in this study, took part in training courses. To compare the mean of test results in two independent populations, sample size was considered 40 according to the following formula

$$n = \frac{(1.96 + 0.84)^2 \times (\sigma)^2}{(0.5 \times \sigma)^2} = 40$$

All participants took part in tele-education and regular courses, equally. Participants were all residents from nine training hospitals affiliated to Shahid Beheshti University of Medical Sciences. Tele-education courses were held weekly in classrooms of each hospital and all the residents simultaneously participated in the course via tele-conference. Microsoft Lync software was used for communication via intra-network of SBMU.

Regular education courses were held for the same residents in a selected hospital every week. All the required educational topics were selected according to the curriculum and were randomly allocated to tele –conference or regular sessions. The main goal of both classes was to discuss difficult cases and their anesthesiology management. The topics mainly included CPR (cardiopulmonary resuscitation), airway management, anesthetic management of patients with cardiac disorders, mechanical ventilation management, nerve blocks (interscalene block, popliteal block), and anesthesia management in the fields of obstetrics and gynecology surgeries, transplantation.

All tele-education sessions were run live through the web conference system during which residents and professors could ask questions and make discussions. In tele-education sessions, in addition to the use of slide shows and images, professors practically performed live procedures on patients while the residents were watching remotely. In each session, six related multiple choice questions were designed by the instructor and were given to residents as pretest and posttest (the answers to the questions were mentioned during the sessions.)

Finally, the scores of exams were separately evaluated for each method and eventually compared. The statistical analysis was performed by Mann-Whitney U test, using SPSS statistical software, version 16.0 (SPSS Inc., Chicago, IL, USA)..

In order to assess the courses, residents filled out a Likert scale five-point satisfaction questionnaire (Please attach the questionnaire used or the original form of it). The questionnaire was made up of five sections (learning improvement in tele-education course, saving time, quality of sound and image, learning improvement in tele-education course compared to regular course). In addition, there was also a question about their preference to take part in regular course or tele-education course.

Results

This study was performed on 40 anesthesiology residents taking part in both tele-education and regular course. To provide the same conditions in both groups and to have a better comparison between the methods, all residents took a pretest exam. The pretest results (p=0.15) demonstrated that there was no significant difference in the basic knowledge of residents.

After each session of both methods (tele-education and regular), participants went through a posttest exam. The results of Mann-Whitney U test (p=0.07) showed that no statistically significant difference was seen between tele-education and regular method; although a significant rise was detected in tele-education posttest compared to regular method (p=0.00).

To evaluate the satisfaction of participants, the frequency of each item was calculated. The result of satisfaction evaluation is illustrated in graph 1. The highest rate of satisfaction was for saving time in attending tele-education course while the lowest rate of satisfaction was seen in the quality of sound and image.

Moreover, the preference of participants to take part in courses was 92.59% of participants who preferred to attend tele-education course and 7.41% of participants preferred to take part in regular sessions (graph1). It is noteworthy that two regular sessions were cancelled due to severe air pollution and traffic restrictions.

Discussion

This study indicates that tele-education and regular method can be equally effective in anesthesiology residency education programs.

Tele-education for medical students has been studied in different fields. A study conducted in 2008 (4) in the field of pathology showed the efficacy and satisfaction of students in tele-education method. In another study a virtual university was established for surgeons with three following objectives showed that all the aforementioned helped improve different aspects of surgical procedures (5):

1. performing consultation via video conference all around the world

2- holding surgery continuing education programs via tele-education for the specialists worldwide and

3- conducting MASTER program that was surgeries with minimum access via robotic and tele communication.

Another study in 2011 compared regular and online educational courses in health research. Results of the study showed that knowledge progress was the same in both methods. Besides, considering the cost effectiveness of online education, this method was suitable for regions with limited facilities (6). A study of tele-education efficacy in anesthesiology in 2012, reviewed the efficacy of e-learning for the interns willing to go through anesthesiology residency. It was an online education course during ten months. The control group consisted of interns who did not take part in the online course. Interns were self-assessed by comparing pretest and posttest results. The results of these assessments showed positive results in favor of teleconference classes (7). In 2015, another study was carried out on anesthesiology residents in which knowledge transfer was compared between tele-education and regular course. Score progress was seen in both courses, which indicated that tele-education method was as effective as regular course and it could bring knowledge development and close collaboration among universities in order to promote global health (2). Another systematic study assessing tele-education method for specialists in health domain showed that using this method not only enabled distance learning opportunities, but also the learning outcomes of tele-education could be compared to traditional face-to-face learning, but further studies are needed (8). A study done in 2016 reviewed the attitude of medical students towards tele-education through smartphone apps. The students conveyed that using the app was more helpful than using textbooks (9).

There are also other surveys on medical students' satisfaction from tele-education courses; for example, a study was done on teaching pulmonary pathology to medical students by using virtual pathology. During this study, attendance of students increased from 30-40% to 100% and satisfaction over four consequent years showed an increasing trend (10). Another study, which assessed diagnostic accuracy in surgery and satisfaction of participants in tele-conference, demonstrated a diagnostic accuracy rate of 95% and a high satisfaction rate (83-88%). These results demonstrated high efficacy of tele-education and tele-consultation in the field of surgery (11). In 2014, development of a tele-anesthesia preoperative clinic to support distant military services was studied. Anesthesia preoperative diagnosis/work was performed via tele-communication, which was significantly cost saving and enhanced patient-service was accomplished (12).

In our study, to ensure the reliability of using tele-education for anesthesiology residents, all the aspects of this method were assessed. The results of this assessment are as follows:

Comparison of educational yield between regular and tele-education method: the study revealed that tele-education via video conference system and regular education method brought the same outcomes in the learning of residents.

Assessing the acceptance and satisfaction of

residents: the satisfaction questionnaire of residents demonstrated their positive attitude towards two following questions; how much tele conference sessions improved your learning and how much learning progress did you experience-using tele-education compared to regular method (55.56% of participants chose "very much" among the answers of both questions).

Moreover, pretest and posttest results in both methods showed that the educational yield was same in both methods (Mann-Whitney test showed no statistically significant difference between pretest (p=0.15) and posttest (p=0.07) results of tele-education and regular method).

Therefore, it can be concluded that tele-education was as effective as regular education and that the scores of residents showed the equal efficacy of both methods. However, half of the residents (55.56%) believed that tele-education was more helpful for their learning progress, which could be due to other advantages of tele-education such as saving time.

Presenting various topics in anesthesiology: several studies in anesthesiology tele-education worked on special topics, for example in 2015 Canadian researchers studied on tele-education of airway management via web-based learning. Even though the study supports the potential feasibility of this education program, it suggests to do further studies on other courses in anesthesiology (13). In our study various subjects in anesthesiology such as mechanical ventilation, nerve blocks (interscalene block, popliteal block, etc.) and CXR interpretation training were taught in both education methods and the results were similar.

Stable communication network with suitable bandwidth: in order to have live conversation between residents and professors, tele-education course was held via video conference, therefore a suitable bandwidth and a secure network was provided for all participants.

Full engagement of informatics experts for possible trouble shooting: one of the possible problems in holding tele-education courses is inability of operators (instructors and residents) in trouble shooting. Hence, in this study there was an IT expert in each hospital taking care of communication issues therefore no session was technically canceled and technical problems were properly handled during the course.

Cost effectiveness: as mentioned in different studies, during the economic crisis with pressure on health care systems using a technology like telemedicine can be the perfect solution to reduce the costs while providing access to excellent health care (9).

Tele-education is one aspect of telemedicine and it is considered highly cost saving since the already existing intra-network of university and the available devices in hospitals are used. Moreover, the expenses of transportation for participants are also omitted. It is worthy to mention that if telemedicine courses are held for faraway cities and countries, decrease in transportation expenses will be more pronounced and taking part in tele-education courses will be much more cost effective than traveling.

Saving time: in this study, tele-education reduced the time of transportation of participants. Time is a key factor for accepting to teach and sometimes long distance makes professors decline participation. This happens especially for more experienced professors who can remarkably promote the education of residents and on the other hand have loads of tasks, which hinder their physical presence in remote locations.

Overcoming bad weather: during the course, two sessions of regular method were canceled due to air pollution and transportation restrictions but for tele-education course, there were no limitations.

Conclusion

According to results of this study tele-education in anesthesiology was as effective as regular classroom participation, both residents and instructors had high satisfaction, and it was both time and cost saving. Therefore, tele-education can be a proper substitute for regular education for training anesthesiology residents.

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Conflicts of Interest

The authors declare that they have no conflict of interest.

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