

Distance Learning Can Be as Effective as Traditional Learning for Medical Students in the Initial Assessment of Trauma Patients

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Abstract- Distance learning is expanding and replacing the traditional academic medical settings. Managing trauma patients seems to be a prerequisite skill for medical students. This study has been done to evaluate the efficiency of distance learning on performing the initial assessment and management in trauma patients, compared with the traditional learning among senior medical students. One hundred and twenty senior medical students enrolled in this single-blind quasi-experimental study and were equally divided into the experimental (distance learning) and control group (traditional learning). All participants did a written MCQ before the study. The control group attended a workshop with a 50-minute lecture on initial management of trauma patients and a case simulation scenario followed by a hands-on session. On the other hand, the experimental group was given a DVD with a similar 50-minute lecture and a case simulation scenario, and they also attended a hands-on session to practice the skills. Both groups were evaluated by a trauma station in an objective structured clinical examination (OSCE) after a month. The performance in the experimental group was statistically better ($P=0.001$) in OSCE. Distance learning seems to be an appropriate adjunct to traditional learning.

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Introduction

Community-based medical education is expanding and replacing the traditional academic medical settings (1). Distance learning is an example of community-based medical education. With the help of technology, higher levels of scientific knowledge and medical skills could be delivered to students in a finite time period (2). This type of learning has its own benefits compared to the traditional methods. The students have the opportunity to learn without being physically present in classrooms and could study at their own pace, thus individualizing the learning process. Moreover, they could have access to the available resources without any time limits. However, lack of discussion and interaction and also not having the ability to question the presenter could be some of the disadvantages of distance learning (3,4).

Among emergency medicine topics, managing trauma patients seem to be a prerequisite skill for medical students. Trauma is a major cause of morbidity and mortality and is responsible for 10% of global deaths (5). In young population, 40% of deaths are due to trauma and injury (6). According to the global burden of disease (GBD) 2010, trauma has been the cause of 11.2% of all disability-adjusted life years (DALYs) (7). An Australian study estimated that 6.09 errors per fatal case occurred in trauma management in the emergency department with 3.47 errors leading to patients' death (8).

Since 1977, advanced trauma life support (ATLS) has been used worldwide as the initial management and control of trauma patients (9). There has been evidence that ATLS improves the standard of care in these patients and could be applied as an organized approach in these situations (10,11,12). Basic medical knowledge

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is not adequate alone for trauma emergencies. As a result, educating medical students and doctors on ATLS is inevitable.

Objectives

We conducted this study to evaluate the efficiency of distance learning on enhancing the required basic skills and knowledge for performing the initial assessment and management in trauma patients, compared with the traditional learning among medical students.

Materials and Methods

Trial design

This was a blinded quasi-experimental study

Participants

We conducted the study at the Emergency Medicine Department of Tehran University of Medical Sciences in Iran. All senior medical students (interns) who were assigned to do the emergency medicine rotation between September to December 2013 were eligible to take part in this study. Exclusion criteria were interns who had done an emergency medicine rotation before that date or who had previously attended a workshop on ATLS.

All senior medical students who were assigned to do their emergency medicine rotation in September to October and November to December interval enrolled in this study, according to the quasi-random allocation. We thoroughly explained the study to the participants of each group separately and also collected a written informed consent. In order to conceal the allocation, the first group who started their emergency medicine rotation in September to October 2013 entered the control group and the nature of the future intervention was not revealed to them, and we did not inform them about the existence of the educational DVD. The other group who started their rotation in November to December 2013 was considered as the experimental group, and they were aware of the nature of their intervention but not informed about the content of the control group's educational package.

To evaluate the level of trauma knowledge in each group, all participants did a test on the first day of their emergency medicine rotation. The test was designed based on the multiple choice question (MCQ) format, consisted of 25 questions evaluating the basic knowledge of participants on the primary survey section of ATLS and initial assessment and management of patients with multiple traumas.

Blinding

Both groups and raters who scored the students during the OSCE were blinded to the content of the educational package and the intervention of each group. The scores of both groups were kept sealed until the analysis was complete.

Intervention

The panel of ATLS instructors designed two individual educational packages. The scientific content of both packages was identical and mainly based on the guidelines of ACS (American College of Surgeons) committee on trauma and ATLS 2010 guide book. The same panel also designed a single trauma station in the objective structured clinical examination (OSCE) for the final evaluation of both groups. The trauma station consisted of standard manned OSCE stations for addressing and evaluating the basic knowledge and skills of participants in the fields of the initial assessment and management of trauma patients especially focusing on the primary survey.

In order to block any possible contamination between both groups, the study began with the control group in September. They were informed that at the end of the month they had to participate in a one-day trauma workshop in the skill lab and at the end of October, there would be an OSCE. The trauma workshop consisted of a 50-minute lecture and 50-minute hands on. The first part of the lecture started with a 35-minute lecture using a Power Point presentation on initial assessment of trauma patients, particularly focusing on the primary survey, and the same ATLS instructor delivered the lecture, exactly equal in content and quality to the experimental group's distance learning materials. The second part was a 15-minute case simulation scenario. Then, the control group took part in the hands-on session in which they practiced basic primary survey's skills on a mannequin for another 50 minutes. By the end of October, we assessed all control participants in the OSCE exam for their knowledge and basic skills.

In November, the experimental group entered the study. We informed them that by the end of the month, they had to participate in a one-day trauma workshop and by the end of November, there would be an OSCE. At the same day, we gave them a DVD and informed them that on the workshop day there would not be a lecture about a primary survey of trauma patients. The DVD consisted of 35-minute lecture and 15-minute simulated multiple trauma case scenarios. The same ATLS instructor in the control group workshop delivered the lecture. During the videotaped lecture, the

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exact Power Point presentation was shown on the screen, synchronizing with the content of the spoken topics of primary survey. Then, the panel and the same instructor with four emergency medicine residents demonstrating the practical skills required for managing patients with multiple trauma showed a simulated case scenario. The panel of experts in medical education and ATLS instructors approved the whole content of the DVD after they compared it with the control group's lecture. At the workshop day, the experimental group took part in the hands-on session in which they practiced basic primary survey's skills on a mannequin for 50 minutes. By the end of December, we assessed all experimental participants in the OSCE for their knowledge and basic skills. Since we did not know the efficiency of distance learning, all participants in the experimental group attended the ATLS lecture and workshop after the OSCE.

Objectives

Comparing the efficacy of distance and traditional learning among senior medical students.

Outcome

The primary outcome is comparing the absolute score of the trauma station in the OSCE among two groups of senior medical students.

Analysis

We calculated the sample size as approximately 49 participants in both the experimental and control group.

We gathered all the data in the individual data sheet for each participant and analyzed them by SPSS 11 using T-test. We considered $P < 0.05$ as statistically significant.

Results

One hundred and twenty fully cooperative senior medical students enrolled in the study. We placed 60 students in the experimental group (distance learning) and 60 students in the control group (traditional training). The baseline characteristics of participants including gender and age were similar in both groups ($P < 0.05$) (Table 1).

Table 1. Baseline characteristics in the experimental and control group

	Experimental group (N=60)	Control group (N=60)	P.value
Gender (F)	30	30	0.86
Age (years±SD)	25.06±0.58	25.05±0.53	0.87

Considering background knowledge of participants, we used the MCQ score for evaluation. The possible minimum score was 0, and the possible maximum score was 20. There was not a significant difference in both groups ($P = 0.68$) (Table 2).

Table 2. Comparison between MCQ scores in the experimental and control group

	Experimental group	Control group
Mean	12.5	12.6
Median	12.8	12.8
Mode	12.8	13.6
Minimum	8	5.6
Maximum	16	16.8
Variance	3.9	3.8
Standard deviation (SD)	1.98	1.94

The experimental group watched the 50-minute lecture and the scenario on DVDs, and the control group attended a 50-minute workshop, and both had a hands-on session at the end. By the end of their emergency

medicine rotation, each group took part in a standard separate OSCE with similar content. We considered the trauma case station score for comparison among two groups. The possible minimum OSCE score was 0, and

the maximum score was 20. Comparing both groups, the overall performance in the experimental group (distance

learning) was statistically better than the control group ($P=0.001$) (Table 3).

Table 3. Comparison between the OSCE scores in the experimental and control group

	Experimental group	Control group
Mean	16.5	12.3
Median	17	12.7
Mode	18	14
Minimum	13	6
Maximum	20	16
Variance	3.8	4.9
Standard Deviation (SD)	1.96	2.22

Discussion

We designed this study as a quasi-experimental blinded study and equally divided 120 interns into two groups. Both groups attended an MCQ exam to show how similar are the two groups and after that, the experimental group watched a 50-minute lecture on an initial assessment of trauma patients especially focusing on a primary survey on DVDs, and the control group attended a 50-minute live lecture in the classroom on the same subject. One month after each workshop, both groups participated in an OSCE. The overall outcome of this study was that the experimental group (distance learning) performed better in the trauma station of the OSCE compared to the control group. In a study done by Ali *et al.*, two groups of first year family medicine residents attended either an on-site ATLS course or one delivered by telemedicine. The study showed that telemedicine course could be as successful as an on-site course in ATLS training (13).

In another study, 24 interns attended 2-day ATLS training and their performance improved significantly in the OSCE done after the workshop. This study showed that ATLS training could improve interns' performance (5).

The advantages of distance learning for third-year medical students doing a clerkship in the United States were avoiding the need to travel to the campus for lectures, the convenience of viewing the lectures whenever the students wish to and easy access to the lectures in the future. Inability to ask questions from the presenters and lack of group discussion were among the

main disadvantages. All students agreed that this type of learning could be an appropriate substitute for live lectures, and there was not a significant difference in the performance of students in both groups (4). Another study done among students doing their surgery clerkship showed that computer assisted learning significantly improved students' ranking in their class (2).

Considering the above studies, distance learning seems to be an appropriate adjunct to traditional learning with its own advantages. Our study indicated that distance learning in combination with hands-on could even be superior to traditional workshops. Compared to above studies, in our study, the medical students did not require an internet access to complete the course and can repeat watching the DVD as many times as they want. The period of the course was shorter compared to similar studies, and both groups of students had the opportunity to practice the skills during the hands-on session.

Limitations

In this study, a one-month period was between the MCQ exam and the OSCE and the experimental group had access to educational DVDs and they were able to review the material before the workshop and OSCE as many times as they want. This was the most important limiting factor. Attending in the emergency department for one month rotation before the OSCE and their different personal preferences to participate in trauma team could be a confounding factor. As a result, we suggest having a trauma station case scenario evaluation similar to the final OSCE right after the workshop could

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be helpful. Moreover, knowledge of the participants about the primary survey of the trauma patients was the main focus of this study, and the participants' skills were not fully evaluated in just one station of the OSCE. Finally, this study was a quasi-experimental study, and we did not completely randomize participants to each group. We highly suggest conducting a randomized trial.

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