



Comparison of Efficacy of Defibrillation Education with Lecture and Simulation Techniques for Interns of Emergency Department of Hazrat-E- Rasoul Hospital in 2015

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ABSTRACT

Objective: Recently, practical training of skills in medical education centers based on educational curriculums has become significantly important. The objective of the present study was to investigate the level of learning to work with defibrillator by interns of the emergency ward with two methods of educational simulator and lecture. **Method:** In this cross-sectional analytical study, all interns working in the emergency unit of Mohammad Rasool Allah hospital during the 6 months of the study in 2015 entered the study. The subjects were randomly assigned into two groups consisting of 76 participants (training to use defibrillator by educational simulator and lecture). The level of training for each person was determined by a questionnaire designed by the researcher in the periods of pre-test, post-test after a month. In addition, the practical skills were investigated using a synthetic model. **Results:** There was no significant difference between the pre-test scores in two groups ($P = 0.199$). The scores for post-test were higher in simulator training group compared to the group trained in the classroom ($P < 0.001$). In order to assess the interns more efficiently, the practical skills of them were studied, in which, the simulator-trained group showed a higher score compared to the group trained in the classroom. ($P < 0.001$). About a month later, the scores from the interns' evaluation showed that the simulator-trained group had a clearly higher score, compared to the group trained in the classroom ($P < 0.001$). **Conclusion:** Based on the results of this study, training with the simulator led to a more effective theoretical and practical learning of interns. It is recommended that the primary training of using defibrillators be considered as a part of the internship program.

Key Words: Defibrillator, intern, simulator, lecture.

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INTRODUCTION

Recently, medical education centers and their educational curriculums have been based on simulation training tools [1, 2]. The emergency medicine has been also using simulators like many majors in order to train and evaluate students, both in general practitioner and residency programs.

Medical students are expected to learn different

procedures and tools of emergency medicine during the one-month rotational course of emergency medicine to deal with patients with cardiac arrest.

Defibrillator is a helpful tool for evaluating patients with cardiac arrest. It can help the progress of these patients' treatment. As its name implies, the defibrillator is a device used to treat fibrillation.

Automatic external defibrillator (AED) is a lightweight portable device which induces an electric shock to the

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heart through the chest. Using AED makes many individuals able to try to defibrillate in the emergency medicine unit. Due to the portability of the AED device, it can be used by individuals other than doctors, so it could be used as a part of emergency response program which includes contacting 911 and cardiopulmonary resuscitation. All these measures are effective in increasing the survival rate in cardiac arrest patients.

Considering that the health care system expects medicine graduates to be able to treat patients with cardiac arrest in an appropriate manner, and regarding the fact that emergency medicine course is an optimal and effective context in educating interns with primary resuscitation measures, one of the main concerns of the education system and clinical education decision-makers is reforming the educational methods and using educational aiding tools to provide the best education to achieve higher efficiency of them.

Using educational programs helps students to be qualified in their profession and learn new skills. The aim of the medical education community is to promote the knowledge and practice of the healthcare community, which ultimately leads to improving the health of the society.

The training can be provided through lectures, pamphlets, and visual, audible and electronic programs including simulators [3].

Two generalized teaching methods have been developed in the recent curriculums of medical training: A teacher-based approach in which the teacher is the inclusive point of the reference, and in this model, which is often provided using lecture method, students learn the subject and often forget it quickly; another approach is the student-based model which concerns mainly on inclusivity, needs, and abilities of the students [4].

Lecture method is a simple traditional and rapid content providing method. Despite the fact that lectures are good means for providing basic information and transferring experimental sciences, the method of communication between the speaker and the audience has advantages and disadvantages.

Thus, it is necessary to make an effort to revise traditional teaching methods such as lectures, and seriously considering the use of active and student-based teaching methods by educational systems, as well as the practical use of these methods in medical sciences.

Training with a simulator aid is one of the student-based methods. By using this method, students will be able to participate actively in education and take on the responsibility of learning by themselves [5].

During a study on the effectiveness of training with the aid of simulations in educational curriculum of physicians, Weller concluded that training with the aid of

simulators can be very beneficial for medical students and provides an opportunity for students to experience the provided knowledge in an environment close to the actual situation [6].

In another study, Chakravarthy reviewed the effectiveness of simulation in medical education in the emergency unit environment. He stated that considering the fact that medical education is constantly evolving, there has been more emphasis on more optimal training sessions based on scenarios closer to clinical events. He concluded that simulation is an asset in providing medical education in the 21st century. He studied different methods of training using simulation aid, and by reviewing the previous studies in the emergency unit, he concluded that simulation aid can be very useful in teaching basic science, clinical course, different skills, teamwork, and communication techniques. In addition, he stated that the widespread education system with the aid of simulation can ultimately improve clinical outcomes associated with the patients [7].

In this study, it was tried to compare the effectiveness of training to work with defibrillator device in medical students with the aid of simulation and its traditional method, which has been based on classroom sessions and lectures.

RESEARCH METHOD:

During this cross-sectional analytical study, 152 interns working in the emergency unit of Mohammad Rasool Allah hospital during the 6 months of the study in 2015 were divided into two groups of 76 person and entered the study.

In this study, a factual and content validity method was utilized. Therefore, after showing the hypotheses and the designed questionnaire to a number of professors and experts in the field, they all acknowledged that the tool for measuring the questionnaire precisely had the characteristics of measuring the hypotheses.

Based on the scores obtained in the pre-test stage (test before the training course) and the average score, half subjects above the mean and half below that were randomly categorized into two groups.

The including criteria were willingness to participate, having at least a medical internship (participating in the internship exam), and not attending to similar defibrillator training courses.

In order to evaluate the theoretical knowledge, the researcher designed a questionnaire containing 15 questions concerning the use of defibrillator device which was distributed among the participants before the training course, after the course, and one month later. Questions in the knowledge section included awareness about working

with the defibrillator and the proper time for using the defibrillator device. The scores for knowledge level of using defibrillator were compared before and after the training in both groups.

A questionnaire based on the variables and the objectives of this study was used.

In order to confirm the questionnaire, the body of literature on this subject was reviewed. The domestic researches were very limited, and there was no comprehensive questionnaire which evaluated all factors involved. Foreign researches were limited as well. By accessing the questionnaire of some studies, it was found that they contained limited questions which could not answer all the questions in the statistical population.

In the way of designing the questionnaire, the authors consulted with two honorable professors in this regard, and according to their guidance and obtaining similar researches on the desired questionnaire that could meet the objectives and answer the questions, the questionnaire was designed.

The researcher-designed questionnaire was evaluated in terms of validity and reliability before the execution.

After evaluating the designed questions by two other professors, as well as other experts, and removing some improper phrases and reforming some others, the final questionnaire was obtained including 15 questions.

In addition, working with defibrillator device was practically evaluated using a 20-part checklist. A clinical scenario (ventricular tachycardia without pulse) was designed for the practical test, and the practical performance of interns was evaluated using the checklist.

The validity and reliability of the questionnaire were determined using a pilot study before the beginning of the project. Therefore, 15 interns participated in the pilot test in a month, and the Cronbach alpha was determined.

Considering the evaluation of scores in both groups during the pre-test stage and validating the questionnaire, 5 questions with scores outside the usual range of response to the questionnaire were removed, and the 10 remaining questions were used for the evaluation.

In order to evaluate the lasting of the learned item, one month after the end of the course in the emergency unit, the interns were called, and a theoretical test was repeated on them by the same evaluators. The interns were not informed about this test at the beginning of the project.

One group was subjected to training by simulation for one hour, and the other group received one hour of lecture using slides. The training included teaching the physics of the device and the way of application in different critical situations, as well as answering the questions of the interns. A number of question sheets were distributed among students before and after the training in order to perform an evaluation. A month after the evaluation, a

questionnaire was sent to the interns by email. Furthermore, a test was taken from all interns on a synthetic model.

The recorded data from the checklists were collected and analyzed using SPSS software. Central indices (such as mean and average) and dispersion indices (such as standard deviation and variance) were used for analyzing descriptive information, and t-test (t-test and paired t-test) was used to analyze the analytic information. The scores for each group were compared before and after the test. The significance level was considered $p < 0.05$.

FINDINGS:

Out of 152 interns participating in this study, 74 (48.7%) were males and 78 (51.3%) were females. It could be assumed that this form of interns' distribution completely represented the statistical population.

76 interns were trained using the simulator, and 76 were trained using face-to-face and in a class approach to learn using a defibrillator.

In this study, the range of interns' age was 23-27 years with an average of 24.90 ± 1.35 years, and this was in a full agreement with the age of interns' population.

In this study, the range of internship duration was 0-16 months with an average of 7.37 ± 4.56 months. The average duration of internship for the current study was completely acceptable. In fact, the participants had significant experience in learning to work with defibrillators, and they were much more likely to have at least one major section in their internship course.

This study included 74 males and 78 females. Based on the results, there was no significant relationship between gender and the method of training to work with defibrillator. It meant that the gender of the participants did not affect the learning of the method.

In order to consider the possible effect of age and length of internship in the two educational groups, the age and internship duration of participants were compared which resulted in no significant difference between the two groups. Therefore, with more confidence, it could be stated that the age and duration of internship did not have any effects on the training of the two groups.

A t-test was used to compare the pre-test and post-training evaluation scores; and the difference between these two scores showed that the pre-test scores were not significantly different in the two groups.

In addition, according to the post-training evaluation, the group trained with the aid of simulation had statistically significant higher scores compared to the group trained in the classroom. In fact, it can be stated that training with the aid of a simulator was more effective than lectures.

In the next stage, in order to better assess the two educational methods for the participating interns, the practical skills of the interns were investigated. The results showed that the scores of the group trained with the simulation method were higher than the scores of the group trained in the class, and this difference was statistically significant. It could be stated that training with simulator had more effect on learning compared to the lecturing in the class.

Furthermore, one month after the training, the adequacy of training and the stability of the education in minds of the interns were evaluated by sending an e-mail. The results showed that the scores for the simulation method were higher than the group trained in the classroom, and this difference was statistically significant. It could be concluded that training by the simulator was more effective than lecturing in the class.

In addition, comparing the scores of the pre-test and post-test stages showed that the increase in the score of the group trained by simulation was clearly higher than the group trained in the classroom, and this difference was statistically significant.

Comparing the scores of interns after one month, with the scores in the pre-test stage showed that the increase in the score of the group trained by simulation was clearly higher than the group trained in the classroom, and this difference was statistically significant.

As well, evaluating the difference between the scores one month after the test showed that the average score for both groups has decreased, and this decrease was higher in the group trained by simulation compared to the group trained in the classroom, and this difference was statistically meaningful.

DISCUSSION AND CONCLUSION:

In the recent era, the advancement of technology has enabled us to use simulators for medical education. By using simulators, a low-cost approach has been made for teaching medical techniques and running the educational programs that are difficult to repeat in actual cases. Due to the virtual environment, lower costs and medical errors using simulators may lead to the increased productivity of medical training by improving the level of education in medical students.

Considering the fact that the health system expects medical graduates to be able to deal with cardio-respiratory arrest patients and the most proper approach, and regarding the emergency medicine course of internship as an optimal and effective context for training interns to deal with primary resuscitation measures, a major concern of the education system and clinical education decision-makers has been reforming the

educational methods and using educational aids to provide the best education with higher effectiveness.

Using educational programs helps students to be qualified in their working field and learn new skills. The objective of the medical education community has been promoting the knowledge and practice of the healthcare community, and ultimately improving the health of the society.

These trainings can be provided using lectures, pamphlets, and visual, audible, and electronic programs including the use of simulators [8].

Two generalized teaching methods have been developed in the recent curriculums of medical training. The first one is the teacher-based approach in which the teacher is the inclusive point of reference. In this model, which is often provided using lecture method, students learn the subject and often forget it quickly. The other approach is the student-based model which concerns mainly on inclusivity, needs, and abilities of the students [9].

The lecture method is a simple, traditional, and rapid content providing method. Despite the fact that lectures are good means for providing basic information and transferring experimental sciences, the method of communicating between the speaker and the audience has advantages and disadvantages. The lecture method has been far more effective in the mature group compared to the immature group [9].

Thus, it is necessary to reform traditional teaching methods such as lectures, and seriously consider the use of active and student-based teaching methods by educational systems, as well as the practical use of these methods in medical sciences.

This study was conducted to investigate the adequacy of training to work with defibrillator device in medical students. In this study, training with the methods of lecturing (traditional method) and simulation was compared. Based on the assumption, training with each of the two methods did not have any significant difference, and utilizing both methods could be useful in advancing educational objectives among medical students.

Reviewing relevant studies in previous years which have been discussed in authoritative conferences and published in related journals showed that training to work with defibrillator can be very important to medical students [10-13]. Therefore, based on the need to promote the teaching of this medical treatment method among medical students, this study was conducted. Medical students of Iran University of Medical Sciences took at least a one-month course in the emergency unit of the affiliative hospitals. According to comments, the students found this course very useful in spite of the heavy workload and long shift hours, as well as facing sleep deprivation and the disruption of normal sleep-wake rhythm (which was often due to non-compliance with this condition).

Therefore, it could be effective in improving the quality of services provided in health care section, especially for those who would be working in emergency units during their military service or compulsory medical service program after graduation.

The results of the present study showed that training to work with defibrillator device using the simulator aid had better results compared to the traditional method. It should be noted that both groups had a significant upgrade in learning performance compared to the pre-test stage. This was consistent with the hypothesis of the neutral study.

According to different studies, it can be concluded that the training to work with the defibrillator device is considered during the internship course in developed European countries and the United States [12]. However, considering the medical students who participated in this study, almost none of them were familiar with the working instructions of the defibrillator device before entering the emergency unit.

The subjects of this study showed a considerable interest in education, which made it easy to conduct the training, and reach the goals of the study.

Both groups had the same level of access to the defibrillator device and performing it on the patients. The same questions were distributed between the two groups, and the practical test was similar for both groups. They were allowed to exchange the educated knowledge between themselves immediately after the training, and one month later. It was believed that implementing this method could enhance the scientific level if it is supervised. The implemented method was in contrast to the study in which participants were subjected to different tests during the study [14].

Learning by lectures involves a number of complications such as failure to meet the minimum similar conditions to actual events. Furthermore, the results of this study showed that this method failed to be able to cover the simulation training method.

Recently, the need for software engagements for advancing medical objectives and even international cooperation in emergency medicine has become a concern [3, 4, 9]. Accordingly, in order to make this method inclusive, the necessary context should be established for interns and assistants during the study period.

In summary, it can be concluded that training to work with the defibrillator device with the aid of simulator had a better effect compared to the lecture-based methods including videos and slides. In addition, based on the results of this study, the barriers in the way of reaching the development of the modern educational methods should be addressed.

Based on the findings of this study, it could be suggested that future studies should focus on the following subjects: Other teaching methods including pamphlets and continuing education methods.

Different groups of physicians.

Larger study populations.

Considering the study subjects and the method of conducting the research which was a part of the educational curriculum of emergency medicine interns, there were no specific problems during this project.

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Table 1: Intersection table for comparing the method of education among females and males

			Sex		Total
			Male	Female	
Study method	Simulation	Number Percent in method	32 1.42	44 9.57	76 0.100
	Class	Number Percent in method	42 3.55	34 7.44	76 0.100
Total		Number Percent in method	74 7.48	78 3.51	152 100

Table 2: Comparison of quantitative variables in the two groups of study

	Standard deviation ± average		P Value
	Using simulator	Participating in class	
Age	24.88±0.15	0.15±24.92	0.858
Internship duration	6.79±0.50	0.53±7.95	0.118
Pre-test score	0.25±1.35	0.14±1.68	0.199
Post-test score	0.10±7.10	0.19±5.70	0.000
Score after one month	0.14±7.38	0.14±5.06	0.000
Pre-test score for practical training	0.11±2.79	0.17±2.54	0.209
Post-test score for practical training	0.08±14.49	0.23±10.17	0.000
Difference in post-test score with pre-test score	0.21±5.75	0.25±4.01	0.000
Difference in score one month after the test and pre-test score	0.28±6.03	0.19±3.38	0.000
Difference in score one month after the test and post-test score	0.17±0.28	0.21±0.63-	0.001

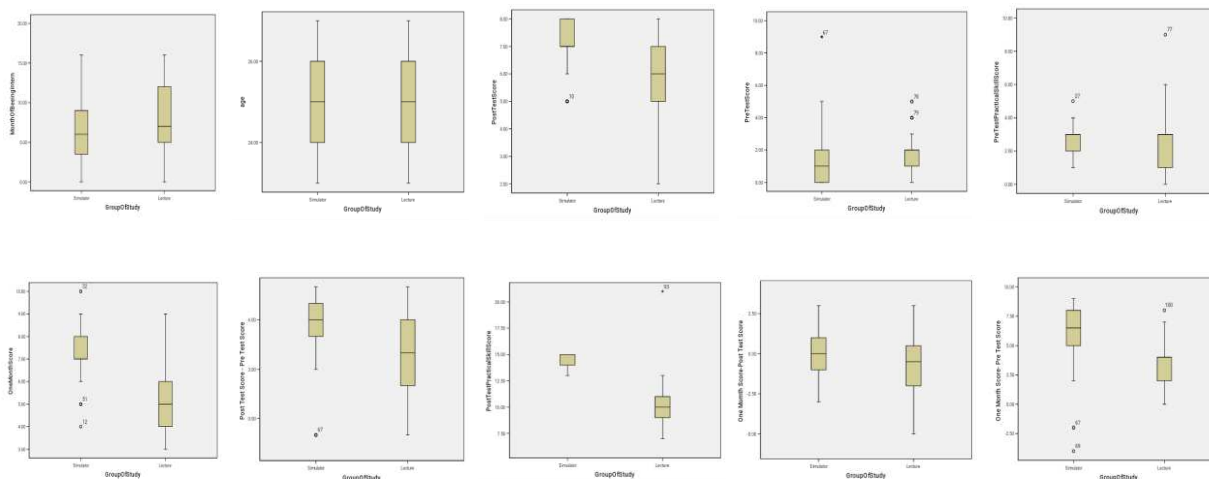


Figure 1: Comparison chart of quantitative variables in the two groups of study