

Virtual Cardiopulmonary Resuscitation Training During the COVID-19 Crisis?

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Abstract:

Objective: This study was conducted to determine the effect of cardiopulmonary resuscitation training using the combined training method and the traditional method on knowledge and check the skills of medical interns.

Methods: This semi-experimental before and after the study was conducted on 50 interns of the emergency medicine course at Mazandaran University of Medical Sciences (Ramsar Campus). Thirty individuals received traditional training (4-hour theory class, live demonstration, and practice on mannequins) and a group of 20 individuals received combined training with virtual training (theoretical training in the form of a video).

Results: The findings showed that the average knowledge score after training was 16.2 in the traditional group and 17 in the combined group, which did not show any statistically significant difference ($P=0.529$). The average skill level of these individuals in the traditional group was equal to 11 and in the combined group was equal to 11.5 and there was no significant difference ($P=0.895$). But the findings indicate an increase in the knowledge and skills of the individual in the two groups after the training ($P<0.001$).

Conclusion: The findings of the present study showed that virtual education has not caused a disturbance in the improvement of students' acquired knowledge and skills in traditional education, and this can be used as a less expensive and more suitable method than the traditional method in the conditions of lack of resources and time or COVID-19 related quarantines.

Keywords: Virtual education, Traditional education, Medical Intern, Cardiopulmonary resuscitation

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Introduction

Education is any pre-planned activity whose purpose is to create learning in learners. Educational evaluation is one of the most important programs of any organization, which gives us good information on the design and revision of any system (1). Every year, 400,000 adult patients suffer from

cardiorespiratory arrest in the hospital, in which cardiopulmonary resuscitation is often unsuccessful. Studies have shown that hospitals that have trained teams increase the success rate of resuscitation operations and discharge from the hospital (2). The quality of cardiopulmonary resuscitation affects its

success rate and the patient's survival after performing cardiopulmonary resuscitation, and one of the effective factors in the quality of cardiopulmonary resuscitation is the level of training of the personnel involved in this operation (3). Heart diseases are the most common cause of death worldwide and cardiac arrest is the first sign of cardiovascular disease in victims in 40% of cases (4-5). Factors affecting the prognosis of rehabilitation, such as lack of access to experienced and trained individuals, delay in starting the massage, and massage techniques are important and constant discussions (6). In clinical environments, interns and doctors play a key role in patients' cardiopulmonary arrest; Therefore, their ability to perform cardiopulmonary resuscitation is a vital factor in the success of patient resuscitation (7-10). In situations like the COVID-19 crisis and its effects, which necessitated the need for social distancing in every field, the use of electronic technologies such as virtual education has been very effective for education (11,12). Although traditional education has advantages and has been used for many years, traditional teaching in the lecture method may be the most appropriate teaching method in some circumstances, but this method, allows the student to think, which is necessary for the learning process (12). In traditional methods, students are in a passive state, they do not find the skill to solve the problem and as a result, in real situations, they face problems in using their information to solve problems (13). Therefore, in recent decades, the need to reconsider traditional teaching methods and use new and active, and student-centered teaching methods has been felt (12). According to the current epidemic conditions, virtual education is one of the new methods that has become more developed and popular during the COVID-19 pandemic. So, this study aimed to investigate the effect of cardiopulmonary resuscitation training using combined and traditional methods on the knowledge and skills of Ramsar International University medical interns during the Covid-19 crisis.

Methods

Study design:

This was a semi-experimental pre-post-test interventional study with a control group conducted on all interns of Ramsar International Unit of Mazandaran University of Medical Sciences who were getting trained in cardiopulmonary resuscitation during the emergency medicine training course, in May and June 2022. July and August 2022 students of the emergency medicine training course were considered as the intervention group.

Study population:

The sampling method in this study was simply available. In this way, the first two groups, i.e. the students introduced for the internship, were selected as the control group, and the next month's groups were selected as the experimental group. Inclusion criteria were medical interns who were studying in the emergency medicine course. Exclusion criteria were the previous experience of participating in cardiopulmonary resuscitation training classes, previous experience in real cardiopulmonary resuscitation training, and complete non-participation in training classes during the intervention.

Data collection:

The tools used to collect information include a knowledge assessment questionnaire and a cardiopulmonary resuscitation skill test checklist.

In an introductory session, after explaining the research to the students, the consent form was given to the students. In order to check the basic knowledge of the students, a pre-test of knowledge was taken from the students according to the knowledge measurement test. The test to measure the knowledge of cardiopulmonary resuscitation was a pre-made questionnaire (Baba Nazari et al.'s questionnaire) containing 15 questions with 4 options, 3 questions related to airway management, 6 questions related to

the necessary actions in cardiopulmonary resuscitation operations, 4 questions related to drug injection, 2 questions related to recognizing the rhythm and using electroshock. The validity and reliability of this questionnaire were measured by Baba Nazari et al.'s study with Cronbach's alpha coefficient of 93% (14). The scoring method is such that a positive score was given to each correct answer and no score was given to each wrong or non-answering answer. In the end, according to the total points obtained, the level of knowledge of a person was determined. The maximum possible score was 15 and the minimum is zero.

The students' skills were also measured by a checklist of cardiopulmonary resuscitation skills, on a mannequin and individually in a separate room. This checklist was prepared by the researcher based on the checklist provided by the American Heart Association in 2020 and includes 8 general sections and 22 partial sections. 8 general parts include: answering, asking for help, checking the carotid pulse, identifying the correct placement of the hands, performing cardiac massage, opening the airway, giving the patient breath, and following the order of resuscitation. If the skill is completed correctly, the score of 1, and if the skill is incomplete or fully not completed, the score of zero belongs to the individual. In the end, according to the total score, the skill level of the individual was determined. The maximum score that can be obtained was 22 and the minimum score was zero. Higher scores indicated a higher level of skill (CVR face validity: 0.99 and CVI: 0.84, checklist reliability determination: score correlation: 0.92 and 0.93) (14). To reduce contact between students during the skill test, each student was isolated in the class after completing the test related to him. The skill test was only performed after the intervention. A follow-up was performed one week later.

Intervention:

Cardiopulmonary resuscitation was taught to the students in a combined and traditional way. In the traditional group, the same educational content (basic and advanced CPR), which was approved by expert professors, was presented in two sessions with the same duration of time by the researcher and with the presence of one of the academic staff members. In the traditional method, the educational content was presented using educational aids such as mannequins, and the student's practical skills were practiced by introducing the disease to them concerning the educational discussion, and their problems were solved.

In the interventional group, a 60-minute video about standard cardiopulmonary resuscitation was dividedly provided into 2 seasons on students' phones.

Data analysis:

After collecting the patients' information was analyzed in SPSS 24.0v software. The statistical method was selected according to the type of variable. Independent t-test and ANOVA were used to compare quantitative variables, and Chi-square and Fischer's tests were used for qualitative variables. Also, Pearson and Spearman analysis methods were used to check the correlation coefficient between quantitative variables with normal and non-normal distribution, respectively. In descriptive statistics, quantitative data were expressed as mean and standard deviation, and qualitative data were expressed as percentages, and a difference of more than $P < 0.05$ was considered significant.

Results

In the study conducted, 30 students were under traditional education and 20 students from the population had virtual education.

Table 1. Correlation results of study variables

Type of training			Knowledge score before training,	knowledge score after training	skill score after training
Traditional	Knowledge score before training	r	1	.476**	-.173
		P		.008	.360
		n	30	30	30
	knowledge score after training	r	.476**	1	-.022
		P	.008		.909
		n	30	30	30
	skill score after training	r	-.173	-.022	1
		P	.360	.909	
		n	30	30	30
Integrated	Knowledge score before training	r	1	.719**	.129
		P		.000	.586
		n	20	20	20
	knowledge score after training	r	.719**	1	.308
		P	.000		.187
		n	20	20	20
	skill score after training	r	.129	.308	1
		P	.586	.187	
		n	20	20	20

In the group that received a traditional education, the average score of their knowledge before starting the training was 9.4 ± 2.9 and in the combined training group, the average score of their knowledge before the training was 9.7 ± 3.7 . The results of the t-test showed that there was no statistically significant relationship between these two groups ($P = 0.767$). (Fig 1). This average in the traditional education group after training was equal to 16.2 ± 2.8 and in the combined group the average knowledge score after training was equal to 17 ± 0.8 . The results of the t-test showed that there is no statistically significant relationship between these two groups ($P=0.529$).

The results of measuring the skills acquired after the training are as follows: In the group that received a traditional education, their average skill score was 11.3 ± 1.2 , and in the combined education group, it was 11.5 ± 1.3 . The results of the t-test showed that there was no statistically significant relationship between these two groups ($P=0.895$). The paired-T-test statistical test showed that in both traditional education and combined groups, there was a significant increase in the knowledge score ($P<0.001$).

Table 1 shows the correlation between the variables. In the traditional group, the correlation between the knowledge score before and after the training, there was a positive correlation ($r=0.476$; $P=0.008$). The correlation between the knowledge score before the training and the skill score after the training showed a negative association ($r=-0.173$; $P=0.36$). In the combined training group, the correlation between the knowledge score before and after the training showed a positive correlation with the ($r= 0.719$; $P<0.0001$).

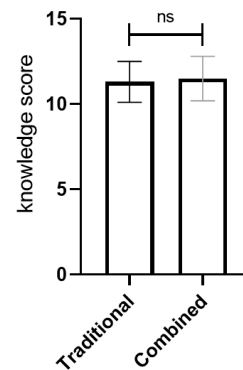


Figure 1. Knowledge scores before and after intervention; ns, not significant.

Discussion

The purpose of this study is to compare performance-based criteria of cardiopulmonary resuscitation skills from two types of traditional and combined cardiopulmonary resuscitation training courses. Also, today, due to the necessity of reducing physical presence in circumstances of quarantines, saving resources, flexibility in time, and easy access to repeatability for learners, the internet and virtual presence can be used to a great extent. In this study, there was no significant difference between the students' knowledge scores before the training between the two groups, which indicates the homogeneity of the groups. Other results of this study indicated a significant difference in the knowledge score after training in both groups. Also, the acquisition of knowledge after training in both groups has a direct relationship, which shows that the effect of both types of training is useful and has a significant difference compared to before. These results at least show that virtual education has not caused a disturbance in the improvement of students' knowledge. In the study of Reder et al., they found that students who had video training along with exercises performed better than the group that was trained traditionally and the group that only had computer training (17). Also, in their study, Todd et al investigated the effect of two methods of teaching cardiopulmonary resuscitation in the classroom and watching videos on medical students. The results of this study showed that the ability of students who received video training was 24% higher than students with classroom training. The results of this study show that video training is more effective than classroom training (18). The results of this study showed that the skill score after the training in the group that was trained in the combined method was higher than in the traditional group, which was still not statistically significant. In the Kardong-Edgren study, the results indicated that the performance of students trained by the computer method in cardiac massages with better depth, proper hand placement,

and ventilation with better volume was better than students trained by the traditional classroom method (19). The results of the study by Sadeghzadeh et al., which was conducted at Urmia University of Medical Sciences, indicated that the group that received computer training showed better functional skills than the control group, but no significant difference was observed between the knowledge of the two groups. In this study, the use of simulation did not affect students' knowledge. Perhaps the reason was that the software was only practical, and the increase in knowledge can be achieved in real and practical situations with explanations and guidance from professors. (20). The present study showed that the score of knowledge and skills after the training was not significant between the two groups, and the adoption of virtual training along with practical training can replace the traditional method of classroom training. The use of virtual training in cardiopulmonary resuscitation and professors' explanations in that environment can be an effective educational method as a complementary method to traditional education by creating a safe and stress-free environment. Also, in this method, students can increase their ability to recognize and learn practical skills by repeating and practicing emergency situations in a simulated way.

Limitations:

In general, the most important limitation that we had in this study was the time limit and the small sample size, with the increase of the studied population and analysis in subgroups, more accurate results can be reached, which will definitely have higher validity.

Suggestions for future studies: In this study, an attempt was made to give a comprehensive answer to the hypotheses and research questions as much as possible in the form of a project. The limitations have caused parts of the work to be examined in the form of other proposals in the future: It is suggested that the study be done in a larger volume of samples. It is suggested to do the same with peer education method. It is suggested to compare the amount of

learning in other practical procedures in combined and traditional education.

Conclusion

The findings of the present study showed that virtual education did not have a lesser effect on the acquired knowledge and skills than traditional education, and this can be a less expensive and more suitable method than the traditional method in the conditions of lack of resources and time.

Declarations:

Funding:

Mazandaran University of Medical Sciences.

Conflicts of interest:

None.

Authors' contributions:

SA and AB wrote the study protocol, collected datasets, SA, AB, FR and RF performed statistical analyses, and wrote the manuscript.

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None.

Ethical considerations

The study was approved by the Institutional Review Board of Ramsar Campus- Mazandaran University of Medical Sciences with the code IR.MAZUMS.RIB.REC.1400.062.

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