

Original Research



Effects of Near-Peer CPR Workshop on Medical Students' Knowledge and Satisfaction

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Article info

Article History:

Received: 26 Nov. 2020
Accepted: 21 Apr. 2020
published: 7 June 2021

Keywords:

Peer Group
Near-Peer
Workshop
CPR
Learning

Abstract

Background: The acquisition of competencies in cardiopulmonary resuscitation (CPR) among medical students requires specific and up-to-date training. In this study, a near-peer workshop group was used to assess the effects of cardiopulmonary resuscitation training on students' satisfaction, acquisition, and retention of CPR knowledge.

Methods: This quasi-experimental study using repeated measure analysis design was conducted with 120 medical students at the Birjand University of Medical Sciences, Iran. The educational content was presented in six workshop sessions under the supervision of a near-peer group. A questionnaire was used to assess demographics, knowledge, and satisfaction. Data analysis was conducted using SPSS 14.

Results: The mean knowledge scores of participants 6.8 ± 2.7 , 16.1 ± 2.6 , and 13.5 ± 4.0 before, immediately, and two months after the workshop, respectively. These results showed that the mean knowledge score significantly increased immediately after the training. Although the mean scores fell slightly by two months after the intervention, they remained significantly higher than before the workshop. The satisfaction level of all the students of this method was reported as good.

Conclusion: In accordance with the positive effects of collaborative learning methods in the teaching-learning process, we used a novel and efficient collaborative method to improve the quality of cardiopulmonary resuscitation (CPR) training. CPR training with a near-peer group had a positive impact on student knowledge acquisition, knowledge retention, and learning satisfaction. Therefore, this method may be a useful way to conduct such training workshops.

Introduction

Cardiopulmonary resuscitation (CPR) is one of the greatest inventions in the history of medicine as an immediate intervention in preventing or delaying death in individuals experiencing sudden cardiac arrest.¹ The ideal outcome of a resuscitation operation is to fully return the patient to life.² Since 1960, when Kouwenhoven performed CPR with cardiac massage for the first time, there have been many improvements in the method, drugs used, and skill training of the medical staff; however, the mortality rate following cardiac arrest remains high compared with other events.¹

Rescuing a patient from a cardiac arrest requires three principal components: medical knowledge, effective education, and correct execution, all of which demonstrate

the importance of training in rescuing the patient.³ When a patient is hovering between life and death, efficient and knowledgeable staff must be present at his/her bedside.⁴ Various studies have noted the importance of resuscitation in a patient with cardiac arrest by the first individuals to arrive at the scene.^{5,6} The important point is that their information must always be up-to-date, meaning that the resuscitator must learn and then hone their skills continually.⁷ Although proficiency in resuscitation is essential for health care professionals, some studies have found that physicians, medical staff, and students lack the required knowledge and skills in this area.⁵⁻⁹

It is worth noting that an important goal is improving the quality of CPR training. Appropriate teaching methods should be adopted to enhance the quality of CPR training.

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Traditional methods are accompanied by numerous shortcomings, including inconsistency of training programs with the needs of participants, lack of allocation of sufficient time to put skills learned into practice, poor supervision of training, and ignorance of the views of the trainees.^{5,10} Therefore, novel teaching methods may be employed to enhance the knowledge and skills of medical students in learning CPR to achieve better, deeper, and durable learning. By adopting a suitable learning strategy, students can rescue lives in the face of real cases.⁴

Peer education is a modern and popular technique derived from Bandura's social learning theory, in which individuals learn from each other through observation, imitation, and modeling.⁹ A peer group consists of educational units similar to one another in terms of age, social status, behavior, and interests, and enhances social behaviors, personal relationships, and sense of belonging. This can make group education more effective, because the equality of the group of peers and learners and the close relationships among them will contribute to better understanding.¹¹

Peer learning is divided into two main types: near-peers and tutor-peers. Tutor-peers are academically at the same level, and therefore, relatively inexperienced; however, near-peers are students who are one or two years senior. In other words, academically, near peers have more clinical experience than the students with whom they are grouped.¹²⁻¹⁴ The difference between near-peers and tutor-peers is their educational level.^{9,15} It is believed that since near peers have experience being at the same level as the current students, they are more familiar with their educational needs and thus can better understand the students' learning processes and possible areas of confusion.¹⁶ One advantage of this approach includes participation on the part of the individuals themselves in their education, which leads to increased accountability, easier information transfer, and even cost savings.¹⁷

The workshop method has been commonly used for training CPR skills since 1941.¹ The results of various studies have shown the positive effect of this method on enhancing knowledge and skills of participants in learning CPR.¹⁷ Therefore, taking into account the benefits of the near-peer method, the researchers in the present study examined the effect of conducting CPR workshops using the near-peer method on learning, knowledge retention, and satisfaction of students in various medical fields.

Materials and Methods

This quasi-experimental study was conducted with a group of medical, nursing, midwifery, and paramedical students at the Birjand University of Medical Sciences in Iran. Assessments were conducted before, immediately after, and two months following the workshop series. The sample size was determined using the sample size formula for estimating an average in a population based on the pilot study and probable attrition (135 students). In all, 120 students who enrolled in the CPR training workshops

completed the questionnaire.

The near peers were five undergraduate students in their last semester of medical emergency training who were experienced in pre-hospital emergency care. They had experience working in an emergency medical center for at least two years and their ability to perform CPR was attested and approved by three faculty members. Students were divided into six groups and a basic CPR workshop was conducted separately for each group. This baseline CPR workshop lasted eight hours (two and six hours of theoretical and practical content, respectively). Initially, the theoretical content included basic CPR skills for adults, for specific age groups, and for those in special circumstances and was presented through lectures and group discussions. For the practical part of the workshop, students were divided into four groups of five students each. Each group was supervised by one member of the near-peer group. One near-peer student was responsible for coordinating the groups and managing the workshop. All items presented in the theoretical part were practiced first on a CPR mannequin by the near peer, and then by students under the supervision of their near peer. At the end of the workshop, the near peer in charge of each group provided separate feedback on the performance of each student.

Data collection tools in this study included a researcher-created questionnaire consisted of three parts, including demographic information, assessment of CPR knowledge (25 MCQs), and satisfaction rating (15 items on a five-point Likert scale from very much to very little). Using comments of 10 faculty members at the Birjand University of Medical Sciences, content validity index (CVI) and face validity were used to assess the validity of the questionnaires. The internal reliability of the questionnaire was confirmed with Cronbach's alpha = 0.85.

Questionnaires were distributed among the participants before the baseline workshop. It was noted in the questionnaire guide that filling out the questionnaire indicated consent to participate in the study. Immediately following the workshop and again two months later, the participants filled out the questionnaires for a total of three collection points. The completed questionnaires were collected and analyzed with SPSS 14, using descriptive statistical tests (mean, standard deviation, percentage) and inferential tests (Tukey's analysis of variance).

Results

Of the 120 students in the study, 34 (28.3%) were men and 86 (71.7%) were women. The majority of students were nursing students (45.8%), with a mean grade point average (GPA) of 16.01-17 (30%), and, the majority were undergraduate students (61.7%). Most of the subjects (72.5%) had no previous CPR training (Table 1).

To examine the effect of time, repeated-measures ANOVA was used. First, the spherical hypothesis was examined by the Mauchly's Sphericity test. Since the sphericity hypothesis was not established at $P < 0.001$, the

Greenhouse-Geisser test was used to evaluate the effect trend. The results of the repeated-measures ANOVA showed that, over time, increasing the level of students was significant ($P < 0.001$; Tables 2 and 3).

The results of this study showed that the amount of students' knowledge changed significantly over time and was different based on gender, marital status, and educational level; however, there were no significant differences between men and women, married and single people, or different educational programs. On the other hand, results have shown that within different programs, the effect of time, time-group, and group were significant. In other words, there was a significant difference between different fields of study in the amount of knowledge over time, and nursing students reported the highest amount of knowledge (Table 4).

An independent t-test showed a significant difference in mean knowledge scores at baseline and immediately after the intervention and at baseline and at the follow-up. In addition, the mean difference scores of knowledge at baseline and immediately after the intervention, and mean difference scores after the intervention and the follow-up were significant between the students in terms of educational level (Table 5).

In this study, most students (85.0%) were satisfied with the near-peer teaching method. The results showed no significant difference in mean satisfaction scores among students in terms of gender ($P = 0.150$); however, differences in the field of study was significant ($P = 0.030$). The result of Tukey's post-hoc test showed that the mean satisfaction score among the medical students was significantly higher than in the nursing students, and it was higher in postgraduate students and general practitioners in comparison with undergraduate students ($P = 0.007$).

Spearman's correlation test showed no correlation between students' total GPA and mean scores of learning ($P = 0.570$), retention ($P = 0.510$), and satisfaction ($P = 0.480$).

Discussion

Based on the results of this study, mean knowledge scores of students were unsatisfactory prior to training. Abdollahi et al. also found that students lacked suitable performance before encountering training.⁴ Madden found that 94% of students did not receive an acceptable score in the pre-test phase due to the way CPR has been taught in universities.¹⁸ Although CPR skills are an important component of intensive and emergency care in the medical sciences curriculum, these skills have unfortunately not been highly regarded and are often

mainly taught theoretically in various subjects, and thus students do not receive suitable practical training.¹⁹

The significant difference between pre- and post-test scores of students is indicative of the efficacy of this teaching method in improving their knowledge. Perkins also confirmed a positive effect of peer education on CPR performed successfully by medical students.¹⁹

Although the mean scores of students in the follow-up phase decreased compared with the post-intervention phase, their scores were still significantly higher than at baseline. These results support the findings of a study by Madden.¹⁸ This study demonstrates the importance and necessity of repetitive and continuous training of CPR skills for students, as stated in the American Heart Association (AHA) guidelines that all hospital staff in contact with patients should be continuously trained for CPR.²⁰

Despite the effect of various factors on CPR qualification,

Table 1. Frequency distribution of the study subjects in terms of demographic characteristics

Variable	Number	percentage
Gender	Male	34 / 28/3
	Female	86 / 71/7
Field of study	Medicine	45 / 37/5
	Nursing	55 / 45/8
	Anesthesiology and Health	20 / 16/7
Grade point average (GPA)	15 and less	30 / 25
	15-16.01	29 / 24/2
	16.01-17	36 / 30
Education level	More than 17	25 / 20/8
	BS	74 / 61/7
Prior training experience	MSc & PhD	46 / 38/3
	Yes	33 / 27/5
Familiarity with CPR	No	87 / 72/5
	Very low	60 / 50
	Primary	41 / 34/2
	Moderate	19 / 15/8

Table 2. Comparison of mean (SD) knowledge scores of students before, immediately after the education and follow-up phase

	Mean± SD	Max	Min
Before the education	6/48±2/76	15	1
Immediately after the education	16/14± 2/65	21	9
follow-up	13/56±4/02	21	3

Table 3. Investigating the effect of peer education (repeated analysis of variance)

Factor	Sum of squares	d	Mean of squares	F	P
Time	5531/089	1/74	3167/72	315/59	<0,001
Error	2085/57	207/78	10/037		

Table 4. Investigating the effect of peer education based on gender, field of study and educational level

Groups			Sum of squares	d	Mean of Squares	F	P
Gender	Within groups effects	Time	4357.48	1.75	2490.34	248.12	<0.001
		Time-Group	13.26	1.75	7.58	0.75	0.45
	Between groups effects	Group	0.401	1	0.401	0.03	0.86
Field of study	Within groups effects	Time	1968.33	1.66	1186.06	130.84	<0.001
		Time-Group	355.64	6.638	53.576	5.911	<0.001
	Between groups effects	Group	481.81	4	120.45	12.33	<0.001
Education level	Within groups effects	Time	361.112	2	180.55	22.45	<0.001
		Time-Group	203.73	3.24	62.82	6.33	<0.001
	Between groups effects	Group	56.47	2	28.23	2.13	0.12

Table 5. Comparison of mean knowledge scores of students before, immediately after the education and follow-up phase

Variable		Before the education	Immediately after the education	follow-up	Mean difference score before and immediately after the education	Mean difference score before and follow-up	Mean difference score immediately after the education and follow-up
Gender	Male	7.2±15.68	16.2±12.29	13.3±12.57	8.3±97.68	5.4±97.09	-3.3±00.95
	Female	6.2±72.80	16.2±15.79	13.4±73.22	9.3±43.26	7.5±01.03	-2.4±42.40
P		0.45	0.95	0.46	0.50	0.29	0.50
Field of study	Medicine	5.2±89.78	17.2±02.17	12.3±40.53	11.2±13.93	6.4±51.69	-4.4±62.18
	Nursing	7.2±96.43	16.2±24.76	15.3±62.81	8.2±27.99	7.4±65.77	-0/3±62.99
	Anesthesiology and Health	5.2±90.53	13.2±90.10	10.2±50.67	8.3±00.66	4.4±60.55	-3.2±40.62
P		<0.001	<0.001	<0.001	<0.001	<0.05	<0.001
Education level	BS	7.2±35.57	15.2±55.76	14.4±27.22	8.3±20.18	6.4±92.86	-1.3±28.83
	MSc & PhD	6.2±02.89	17.2±09.19	12.3±41.49	11.2±07.93	6.4±39.71	-4.4±67.15
P		0.01	0.002	0/01	<0.001	0.56	<0.001

an important factor affecting it is the teaching method used.¹⁸ Peer tutoring is an approach in which students are encouraged to take charge of their learning. Learning is improved and is more sustainable in this method because students are more actively involved and participate more in their learning.¹⁹ Parcheh Bafieh et al. investigated the effect of the near-peer teaching method on clinical self-efficacy of nursing students and found that this educational method could increase the sense of clinical self-efficacy in students, thus improving the patients' care dimensions.¹⁴ A systematic review at the University of Lathrup, Australia (2016) showed that the use of near peers in the education process can be effective in the learning and performance of both students and near peers.²¹ Improved learning and performance and increased self-confidence of medical students and near peers are other advantages of using the near-peer approach.¹⁶

In the present study, a large number of students (120 students) were effectively trained for the important topic of CPR in a workshop that required a great deal of time and energy by using the near-peer education technique. Wik et al. found that the baseline CPR was able to be taught to 1303 employees of a factory within three weeks using the peer teaching method. Therefore, in addition

to the above-mentioned advantages, the peer teaching method is also be a potential solution to compensate for the amount of human resources required for correct CPR training. Since effective training of this practical skill requires adequate time in both theory and practice, one of the major problems for educational institutions is a shortage of trainers.²²

The findings of our study suggest that medical and postgraduate students were more satisfied with the near-peer workshop method compared with undergraduate students. Given the higher exposure of medical and postgraduate students to patients in need of clinical resuscitation, and consequently, their higher need to learn the resuscitation process, this group may have been more interested in learning skills they saw as immediately applicable in their training, which may transfer to their higher satisfaction ratings as well. Various studies have shown that peer education can contribute to increased self-esteem, improved presentation skills, increased responsibility-taking, development of critical thinking skills, improved test scores, and increased opportunity for questions and answers. This teaching method has also been reported to increase intergroup collaboration in the transmission of health information.²³

All of the abovementioned factors can contribute to increased interest in learning and increased satisfaction among students.

Conclusion

According to the positive effects of collaborative learning methods in the teaching-learning process, we used a novel and efficient collaborative method to improve the quality of CPR training. The results of this study indicate positive effects in using near peers as educational elements, and integrating near-peer training into workshop education in the teaching-learning process could be considered as a strategy to facilitate this process.

Ethical approval

This article is the result of the research project, which is approved by the code of IR.bums.REC.1394.461 at the Ethics Committee of the Birjand University of Medical Sciences.

Competing interests

The authors have no conflicts of interest.

Authors' contributions

All authors designed the study and collected the data. HS and EAM analyzed the data and prepared the manuscript draft. All authors participated in the edition of the manuscript based on editor and reviewer comments. HS edited and approved the final manuscript. All the authors had full access to all data in the study.

Acknowledgments

The authors appreciate Jalil Ahmadian Moghadam, Javad Dehaki Toroghi, Mahdi Razavi, Alireza Ghohiyani Aval, and Jaafar Mehraban who cooperated in near-peer group.

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