



Research Article

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Effect of cardiopulmonary resuscitation education based on team debriefing on knowledge and practice of staff nurses: A one-group before-after study

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Abstract

Background: Nurses are the first to attend at the bedside when the patient involves in cardiopulmonary arrest and able to start cardiopulmonary resuscitation (CPR) as long as the CPR team arrives and conduct advanced interventions. Low level of nurses' cardiopulmonary resuscitation knowledge and skills and priorities is frequently reported in the studies. Regarding the challenge of the knowledge retention on the CPR, the method of education in this area requires more attention. **Aim and objectives:** The aim of this study was to examine the effect of CPR education based on team debriefing on knowledge and practice of staff nurses. **Study design:** This was a one-group before-after study. Setting: This study was carried out at three social security hospitals located in Tehran Province, Iran. **Materials and methods:** 50 staff nurses of the CPR teams were recruited to the study by convenience sampling method from Feb-Aug 2017. The intervention was implemented in the form of debriefing sessions (at least three sessions for each participant). Prior to intervention and one week after the last session of the intervention, the knowledge of the participants was measured and their performance was evaluated. A 30-item knowledge questionnaire on principles of basic and advanced cardiopulmonary resuscitation, and a checklist to evaluate cardiopulmonary resuscitation practice of staff nurses were used to collect the data. **Statistics:** Data were analyzed by SPSS software version 16 using descriptive statistics and statistical test. P value less than 0.05 was considered significant. **Results:** The mean score of knowledge after intervention was significantly higher than the mean score before intervention (25.98±4.05; 95% CI 24.83 to 27.13 against 23.54±4.90; 95% CI 22.15 to 24.93) (P≤ 0.0001). The mean score of performance after intervention was significantly higher than the mean score before intervention (22.93±2.66; 95% CI 22.17 to 23.69 against 19.75±4.12; 95% CI 18.58 to 20.92.13) (P≤ 0.0001). The mean change score of knowledge was 2.44±3.24 (95% CI 1.52 to 3.36), with a large effect size d=0.75. Also, the mean change score of performance was 3.18±2.58 (95% CI 2.37 to 3.99), with a large effect size d=1.11. **Conclusion:** CPR education based on team debriefing delivered significant improvements in knowledge and practice of staff nurses.

Keywords: Cardiopulmonary resuscitation, Knowledge, Nurse, Practice, Team debriefing

INTRODUCTION

Despite progress in disease prevention, cardiac arrest is still considered as one of the most important causes of death in most societies [1]. In the United States and Canada, about 350,000 people experience cardiac arrest each year, requiring cardiopulmonary resuscitation (CPR), with half of them occur in hospital [2].

While CPR education is one of the important topics in the nursing education programs, and studies have shown that the success of CPR is closely related to education, low level of cardiopulmonary resuscitation knowledge and skills and priorities is frequently reported in the studies. Several studies have reported that in the field of CPR, nurses have little information, not only in terms of performance, but also in knowledge [3-6].

Resuscitation measures are carried out in accordance with specific guidelines, the implementation of which requires the acquisition of the basic knowledge, skill and experience; so step-by-step teaching of the CPR procedure by well-trained nurse instructors is essential [7]. Nurses are the first to attend at the bedside when the patient involves in cardiopulmonary arrest and able to start CPR as long as the CPR team arrives and conduct advanced interventions, therefore, the training of the nursing staff seems to be very important [3].

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The teaching method plays an important role in the quality of education, and effective learning, is much more the result of effective teaching provided in a proper environment through creative and instructive methods. The influence of the well-trained and skilled people in optimization of the process and the outcome of CPR has been identified, and those with sufficient knowledge and skill are able to save the patients' lives [7]. To improve the quality of CPR, there are many educational methods and tools, such as workshop, lecture, simulation, video, pamphlet, booklet, e-learning, and multimedia software. One of the educational methods that may increase knowledge and performance is team debriefing.

Cheng *et al.* (2018) on behalf of the American Heart Association (AHA) recommend debriefing as a fundamental element of resuscitation education and clinical guideline introduced by the European Resuscitation Council (ERC) to improve the performance of the CPR team recommend team members to debrief after CPR [8]. Debriefing is defined as the simple descriptions that, after an event, integrates and unifies the information, as well as the exchange of knowledge, performance, ideas and thoughts for use in the next exposure to the event. The objectives of the team debriefing include but not limited to clinical performance improvement, training, and team spirit improvement.

The principle of the debriefing is based on the analysis of the events and focuses on strategies needed to improve the knowledge and practice; it also considers strategies and the ethical and psychological components of the event to be discussed [9]. According to Roxane (2013), debriefing can be seen as the heart and soul of a simulation experience [10]. Debriefing may be used for a wide range of areas, particularly in the field of simulation-based medical education. In some studies, it has been reported that debriefing after CPR can be effective in improving the performance of the resuscitation team [11].

Regarding the challenge of the knowledge retention on the CPR, the method of education in this area requires more attention. Some studies have reported that the amount of nurses' learning in the field of CPR (both knowledge and performance) is significantly reduced by time [12-13]. The purpose of this study was to evaluate the effect of CPR education based on team debriefing on knowledge and practice of staff nurses.

MATERIAL AND METHODS

• Study aims and design

The one-group before-after design was used to conduct the study. The main hypotheses were that staff nurses would achieve higher scores of knowledge and practice of cardiopulmonary resuscitation after being educated based on team debriefing. The primary outcome time-point was one week after the last team debriefing session.

• Ethics and funding

The study was carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans. To conduct the project, the ethical approval was acquired from the ethics committee of Iran University of Medical Sciences (IUMS) Institutional Board. This work was supported by the Deputy for Research and Technology, Iran University of Medical Sciences. All potential participants were informed about the study aim and thereafter, on a voluntary basis, signed an informed consent to take part in the study were not remunerated for their participation.

• Intervention

The intervention was organized to be implemented after every real cardiopulmonary resuscitation as a debriefing session and the performance of those nurses participated in the cardiopulmonary resuscitation practice was analyzed and discussed by the main

researcher as debriefer. In this study, debriefing was meant to nurses' explanation of their performance during cardiopulmonary resuscitation in formal sessions and, then, analysis of and debate on team members' behaviors by the debriefer and participants, as characterized by taking into consideration those actions that needed correction and sharing strategies for performance improvement. The session helped nurses to explore their experiences, to increase their knowledge, and to integrate information of the cardiopulmonary resuscitation event. In debriefing sessions, all members were given an opportunity to review and give comment on what was happening during the cardiopulmonary resuscitation process, in order to detect and analyze those behaviors needing change and improvement, and helping the members to identify the gap between what was done and what must be done.

Creating an open and sincere environment, focusing on key learning goals, appreciating participants' views and reflections on the topic, assuring participants of the confidentiality of the debriefing sessions and time management were considered as basic elements of the intervention. The number of debriefing sessions for each participant was at least three.

• Measures

We examined the effect of intervention by measures of knowledge and practice. To collect the data, we used a demographic information form, a 30-item knowledge questionnaire on principles of basic and advanced cardiopulmonary resuscitation, and a checklist to evaluate cardiopulmonary resuscitation practice of staff nurses. The demographic form consisted of information about gender, age, education, working experience as a general and/ or critical care nurse, work schedule, employment status, history of being a member of CPR team and history of participation in training programs on cardiopulmonary resuscitation. The Knowledge questionnaire included 30 multiple-choice questions regarding the principles of basic and advanced cardiopulmonary resuscitation. The knowledge score ranged from 0 as the lowest score to 30 as the highest score. The questions were designed based on the latest references and clinical guidelines of the American Heart Association and the European Resuscitation Council (2015). The questions were focused on diagnosis of cardiopulmonary arrest, assessment of unconscious patient (assessment of the responsiveness and vital signs), positioning the patient, requesting help, basic airway management, ventilation, cardiac massage, advanced airway management, identification and management of dangerous arrhythmias, the use of DC shock machine, medications, and post resuscitation care. Based on the scores obtained by the participants, there were classified as having weak (scores 0 to 15), moderate (scores 16 to 22), or good (scores 23 to 30) knowledge of cardiopulmonary resuscitation.

Performance checklist was used by the researcher/ co-researcher as a tool for evaluating the practice of the nurses in CPR team during cardiopulmonary resuscitation process. The checklist were developed based on the latest references and clinical guidelines of the American Heart Association and the European Resuscitation Council (2015). The performance checklist included 25 items measuring the skills of doing cardiopulmonary resuscitation. The performance score range was 0-25; if doing an item on checklist was not necessary or not related to the task of the participant when resuscitating in an especial situation, it was not scored and not calculated in practice score. Based on the scores obtained by the participants, there were classified as having weak (less than 50 percent of the total score), moderate (51-75 percent of the total score), or good (76-100 percent of the total score) practice of cardiopulmonary resuscitation.

To ensure validity, the instruments were reviewed by 10 faculty members who were expert in research, emergency care and intensive care gave their comments on content validity of the questionnaires and their comments were considered in the revised version of the questionnaires. In order to ensure the reliability of the knowledge

questionnaire, test-retest was conducted, based on which a correlation coefficient of 0.95 was calculated indicating acceptable stability of the instrument over time.

• Procedures

Recruitment to the study was from three social security hospitals located in Tehran Province, Iran. After that senior managers of these hospitals were informed about the study aim, 50 staff nurses of the CPR teams were recruited to the study by convenience sampling method from Feb-Aug 2017. The main researcher explained the purpose of the study and details of the procedure to the potential participants. After written informed consents were obtained from the volunteers, their demographic data were recorded. Before the intervention, the knowledge questionnaire was completed by the participants and their practice of CPR was evaluated by the performance checklist during one real cardiopulmonary resuscitation event.

Intervention was implemented in the form of debriefing sessions (at least three sessions for each participant). One week after the last session of the intervention, the knowledge of the participants was measured and their performance was evaluated.

• Statistical analysis:

Data were analyzed by SPSS software version 16 using descriptive and inferential statistics. A P value less than 0.05 was considered statistically significant.

RESULTS

The highest percentage of participants in the study were 30 to 39 years old (60%), male (60%), on rotation shiftwork (74%), and had bachelor degree (94%), and working experience of 10-19 years (68%). Also, the highest percentage of participants had a history of being member of the cardiopulmonary resuscitation team for less than 10 years (72%), and participation in more than two training courses of cardiopulmonary resuscitation (88%) (Table 1).

Table 1: Frequency distribution of demographic characteristics of the study population

Variable	n (%)
Gender	
Male	30 (60)
Female	20 (40)
Age (year)	
20-29	4 (8)
30-39	30 (60)
≥40	16 (32)
Shiftwork Pattern	
Fixed	13 (26)
Rotation	37 (74)
Academic Degree	
BSc	47 (94)
MSc	3 (6)
Working Experience (year)	
<10	11 (22)
10-19	34 (68)
≥20	5 (10)
Hx of CPR Team Member (year)	
<10	36 (72)
≥10	14 (28)
The Number of Training Course on CPR	
≤2	6 (12)
>2	44 (88)

The knowledge of most participants about CPR was good, before and after the intervention (66% and 86% of participants, respectively). The mean score of knowledge after intervention was significantly higher

than the mean score before intervention (25.98±4.05; 95% CI 24.83 to 27.13 against 23.54±4.90; 95% CI 22.15 to 24.93) (P≤ 0.0001) (Table 2). Before intervention, 32% of participants were evaluated as weak or moderate performer in CPR procedure; this was reduced to 6% after intervention. The mean score of performance after intervention was significantly higher than the mean score before intervention (22.93±2.66; 95% CI 22.17 to 23.69 against 19.75±4.12; 95% CI 18.58 to 20.92.13) (P≤ 0.0001) (Table 2).

Table 2: Comparison of the mean scores of knowledge about and performance in cardiopulmonary resuscitation, before and after intervention

Time	Before	After	Test Results
Knowledge: mean (SD)	23.54 (4.90)	25.98 (4.05)	df=49, t=5.325, P≤0.0001
Performance [mean(SD)]	19.75 (4.12)	22.93 (2.66)	df=49, t=7.881, P≤0.0001

The mean change score of knowledge was 2.44±3.24 (95% CI 1.52 to 3.36), with a large effect size d=0.75. Also, the mean change score of performance was 3.18±2.58 (95% CI 2.37 to 3.99), with a large effect size d=1.11.

DISCUSSION

The knowledge and performance of most nurses in the CPR team about cardiopulmonary resuscitation was acceptable before and after the intervention. Saghizadeh *et al.* (2006) reported that the knowledge and performance of nurses working in the cardiac care unit in Urmia City, Iran, were weak in the field of cardiopulmonary resuscitation [14]. This finding is opposed to the finding of the present study that states nurses' knowledge and performance about CPR was acceptable even before the intervention. The reason for this can be the development of knowledge and performance of nurses in the resuscitation team in the last ten years. However, both studies recommend training as a way to increase the level of knowledge and practice of nurses about CPR. The amount of the effect can be determined by selecting the appropriate educational method based on educational goals, and the nature of the learning situation and the content that must be transferred.

Also, there was a statistical significant difference between the mean scores of knowledge and also, practice of participants before and after the intervention. These findings are in line with the results reported by Dine *et al.* (2008) on improvement of nurses' performance in cardiopulmonary resuscitation after debriefing [15], and Van Heukelom *et al.* (2010) about increase in nurses' knowledge of resuscitation skills after debriefing [16]. Most studies conducted on CPR training emphasize that education can increase the knowledge and performance, but it is obvious that a more effective, available, low-cost, and easy-to-use method of education encourages and motivates participants to attend training sessions. This can be achieved by post CPR debriefing sessions. Debriefing after CPR is a method that is conducted in a real environment, while most educational interventions evaluated in the studies have been in the form of lecture, workshop or simulation. Debriefing after CPR is a cost-effective method that can even be held with a low number of participants and without any monetary cost. One limitation in conducting workshops on CPR is that holding these workshops requires some coordination, providing simulation facilities, and also, the money; but holding debriefing sessions doesn't have these challenges and can be considered as an easy and accessible method, which can be done even in a short time. Another positive aspect of CPR training by debriefing method is that it is possible in these sessions to address all the issues and challenges associated with CPR, especially in the field of CPR management and teamwork. A main characteristic of debriefing after CPR is that the team members are mentally and psychologically better prepared for learning, because after an event, the individual is more eager to address the mistakes and challenges associated with that event. In

some of the traditional methods of CPR training, the focus may only be on the knowledge, attitude or psychomotor domain of learning, which is usually the knowledge domain. However, in debriefing after CPR, all domains of learning are considered at the same time.

The findings of the present study showed the effect of the debriefing on improving the knowledge and performance of the nurses about CPR, and that the intervention was more effective on performance than the knowledge. The results of a study conducted by Zebuhr *et al.* (2012) also showed that the effect of post CPR debriefing program was greater on psychomotor than cognitive skills [17]. The study conducted by Wolfe *et al.* (2014), showed that the use of a comprehensive and systematic debriefing program improved the quality of in-hospital CPR as reflected improving survival outcomes in pediatric intensive care units [18]. Dine *et al.* (2008) hypothesized that a multimodal training method (audiovisual feedback and immediate debriefing) would improve CPR performance among care providers [15]. They reported that healthcare providers had a significant cardiopulmonary resuscitation quality deficit and that debriefing or feedback alone improved cardiopulmonary resuscitation quality. They concluded that CPR feedback and debriefing improve rescuer training. Gamboa *et al.* (2018) in a simple blind randomized clinical trial examined the effect of two debriefing strategies on neonatal resuscitation skills among health professionals [19]. In their study, one group received oral debriefing and the other, oral debriefing assisted by video and a checklist was used for the evaluation. The findings showed that both debriefing strategies improved the technical and behavioral neonatal resuscitation skills of the health professionals and the difference between the groups was non-significant.

In the current study we examined the effect of the debriefing on nurses' knowledge and performance. It would be ideal to consider patient outcome as dependent variable. In a study conducted by Couper *et al.* (2016), three methods of educational debriefing (monthly group debriefing, individual verbal debrief, and written feedback sheets) was shown to be feasible, but did not have a large effect on patient outcome, which can be attributed to the high-quality of CPR being delivered [20].

One approach to improving performance of health professionals in CPR may be debriefing in an interdisciplinary manner. Wolfe *et al.* (2014) reported that implementing an interdisciplinary, post event debriefing program was effective on CPR quality and survival with favorable neurologic outcome [18].

CONCLUSION

Nurses as one of the CPR team members must have optimal knowledge and skills to play their role suitably in cardiac arrest events. The challenge of knowledge retention in the field of CPR and the emergency nature of the cardiac arrest requires evaluation of various educational methods to better understand which one is superior to transfer the knowledge and skill of CPR to healthcare providers in best manner. Team debriefing can be recommended as a practical method to do so. This method can be applied with the minimum cost and time in the context that staff nurses don't have enough time to refresh themselves through attendance in formal educational sessions.

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Conflict of interests:

The authors declare no conflict of interest in this study.

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