Original Research

The Effect of Training on Learning Cardiopulmonary Resuscitation Skills in Emergency Nurses

Saeed Golfiroozi [1], Fateme Sheikhnejad [2], Malihe Kabusi [3], Hosein esmaelpour[4], Niku Latifi[5*], Fatmeh Ranjbar Noei [6]

1. Department of Emergency Medicine, School of Medicine, Golestan University of Medical Sciences, Gorgan, Iran.
2. Master of Psychiatry Nursing, Golestan Clinical Research Development Unit (CRDU), 5azar Hospital, Golestan University of Medical Sciences, Gorgan, Iran.
3. Ph.D Student in nursing, Faculty of Nursing and Midwifery, Golestan University of Medical Sciences, Gorgan, Iran.
4. Master of Critical Care Nursing, Clinical Research Development Unit (CRDU), 5 azar Hospital, Golestan University of Medical Sciences, Gorgan, Iran.
5. Master of Geriatric Nursing, Clinical Research Development Unit (CRDU), 5 azar Hospital, Golestan University of Medical Sciences, Gorgan, Iran.
6. Master of surgical nursing, Clinical Research Development Unit (CRDU), 5 azar Hospital, Golestan University of Medical Sciences, Gorgan, Iran.

***Corresponding Author: Niku Latifi**, Master of Geriatric Nursing, Clinical Research Development Unit (CRDU), 5 azar Hospital, Golestan University of Medical Sciences, Gorgan, Iran. Email:n.latifi@gmail.com, Orcid: 0000-0003-0283-7966

Abstract:

Background:

Cardiopulmonary arrest is one of the most important medical emergencies in the emergency department. The knowledge and skills of nurses play an important role in the success of cardiopulmonary resuscitation and chance of survival in patients having cardiopulmonary arrest. It is necessary to improve the skills of nurses in relation to cardiopulmonary resuscitation by holding training courses. Therefore, this study was conducted with the aim of investigating the effect of training on learning cardiopulmonary resuscitation skills in emergency nurses.

Methodology: This semi-experimental single-group study was conducted on 50 nurses working at emergency department of 5th Azar Hospital in Gorgan during 2022. The training process was carried out on 25 nurses over two consecutive days in a workshop according to the latest cardiopulmonary resuscitation guidelines 2020. Data were collected using a standard questionnaire prepared by the North American Heart Association before and after the intervention. Then, using SPSS statistical software version 21, the collected data were analyzed by descriptive statistics (table, mean and standard deviation) and inferential tests (paired t-test and ANOVA test).

Result: The mean score of cardiopulmonary resuscitation skill before the intervention was 11.56±2.28 and after the intervention was 14.26±2.21. The paired t-test showed a significant difference in the level of learning cardiopulmonary resuscitation skills before and after the intervention ($P<0.01$). The covariance test showed a significant difference in the level of learning cardiopulmonary resuscitation skills by removing the effect of pre-test ($P<0.01$, Eta=0.56). So it can be assumed that 56% of the changes in learning cardiopulmonary resuscitation skills have been due to the training.

Conclusion: Considering the effect of training on the learning of cardiopulmonary resuscitation skills in emergency nurses, it is necessary for hospital officials and nursing managers to hold in-service training courses and check the effectiveness of these courses in order to improve the survival of patients and increase the quality of health care workers' performance.

Keywords: Training, Skill Learning, Cardiopulmonary Resuscitation, Nurses, Emergency

Submitted: 7 November 2022, Revised: 24 November 2022 , Accepted: 29 Decenber 2022

[Downloaded from intjmi.com on 2026-11-17]

[Downloaded from intjmi.com on 2026-11-17]

Introduction

Emergency is an important part in the treatment of acute and critical diseases (1). Cardiopulmonary arrest is one of the most important medical emergencies in the emergency department (2). Cardiopulmonary resuscitation is a practical skill (2), which is used to restore the vital function of two important organs; “heart” and “brain” (3). With every minute of cardiopulmonary resuscitation time, the patient's chance of survival decreases by 7-10%. So that after 10 minutes, the patient's chance of survival is zero (4). According to the American Heart Association, starting cardiopulmonary resuscitation in the first 3-5 minutes of cardiopulmonary arrest, in addition to increasing the chance of survival, reduces the future complications (5, 6).

The survival rate of patients after cardiopulmonary resuscitation is reported to be 20-30% (7). In Iran, post cardiac arrest death rate is more than 90%, and the chance of patients being discharged alive from the hospital is less than 7% (8). This problem has caused negative consequences for patients and society (9). The correct and timely implementation of cardiopulmonary resuscitation can save the lives of many patients from death (10). The number of successful cases of cardiopulmonary resuscitation is one of the important indicators of hospital emergencies. The high success rate of cardiopulmonary resuscitation indicates the success of emergency department (2). Nurses are the first members of treatment team who are present at the patient's bedside during cardiopulmonary arrest (3). Therefore, it is necessary for them to have many skills in cardiopulmonary resuscitation (9). The level of nursing skills plays an important role in the success of cardiopulmonary resuscitation and survival of patient (11). The lack of skill or knowledge of nurses is an effective factors in the failure of cardiopulmonary resuscitation (12). For this reason, the existence of science, efficient training and correct implementation of resuscitation process are among requirements for the success of cardiopulmonary resuscitation (13). Education plays an important role in increasing the clinical efficiency of nurses and physicians in the resuscitation process (3). Training and in-service courses increase the quality of cardiopulmonary resuscitation (14, 15). Staff training is a strategic and important issue in the development of human resources, because in-service training increases the level of awareness, knowledge and occupational/professional skills of employees (16, 17).

Also, the existence of a gap between theory and knowledge acquired by clinical nurses is one of the important factors in the failure of cardiopulmonary resuscitation (18, 19). For this reason, it is necessary to provide in-service cardiopulmonary resuscitation training based on the latest standards (20, 21). Holding training/retraining courses is one of the important programs of continues nursing education in hospitals (22). Thus, this study was conducted with the aim of investigating the effect of training on learning cardiopulmonary resuscitation skills in emergency department nurses.

Method

This semi-experimental study was conducted on 50 nurses working in the emergency department of 5th Azar Hospital in Gorgan, Iran in 2022. The criteria for entering this study were; having a history of cardiopulmonary resuscitation, and having at least one year of work experience in the hospital and emergency department. The nurses who were about to be retired or nurses who were about to finish their supernumerary contract in the next 6 months were excluded from the study. The non-random convenience sampling method was used for sampling in this study. To conduct this study, after approving the project by the research

[Downloaded from intjmi.com on 2026-11-17]

council and obtaining the code of ethics, the researchers were introduced to the authorities of 5th Azar Hospital in Gorgan, which is a trauma center. The researchers then, after explaining the study objectives, asked the emergency nurses to participate in this study. The training course was conducted in the training hall of the 5th Azar Hospital in Gorgan. The training course was held on 2 consecutive days, from 8:00 AM to 2:00 PM, and a group of 25 nurses were trained each day. The main instructor of this course was a senior specialist in intensive care nursing and a hospital educational supervisor with 23 years of work experience, who had more than 15 years of experience working in ICU departments. Also, a part of the training course was taught by an emergency medicine specialist as teaching assistant. The educational content of this course was compiled based on the reference books of emergency medicine, cardiopulmonary resuscitation guidelines of the American Heart Association and the latest guidelines for adult cardiopulmonary resuscitation (23-25). These instructions were also approved by the Vice-Chancellor of Education and Treatment of Golestan University of Medical Sciences. The main topics coved by this training course included familiarization with basic resuscitation skills, advanced resuscitation skills, working with electroshock device and post-resuscitation care.

In order to measure the learning of cardiopulmonary resuscitation skills in nurses, a questionnaire with 20 questions was used based on the latest guidelines of American Heart Association 2020 (24, 25). This questionnaire is used to evaluate the knowledge of cardiopulmonary resuscitation. The questions of this tool include items such as; recognition of symptoms, cardio-respiratory arrest, examination of the injured, examination of the unconscious person, examination of the level of consciousness, vital signs, medications, positioning of the patient, request for help, breathing rate and depth of chest compressions, airway management, and use of AED. The questions are scored from 0 to 20 with higher score indicating greater knowledge of cardiopulmonary resuscitation. Each correct answer is given a score of 1 and each wrong answer is given a score of 0. Negative marks are not considered for wrong answers.

To check the validity of this questionnaire, after translating the questions, they were given to 10 experts of cardiac training courses with a master's degree in critical care and medical/surgical nursing, as well as cardiologist and emergency medicine specialist. After checking the validity of its content, some questions were changed according to the experts' opinion. Then, the questionnaire was given to 10 people (3 nurses, 2 nurses with a master's degree in nursing, 2 doc nursing PhDs, 1 cardiologist, 1 emergency medicine specialist, and 1 senior health education) to determine its face validity. The questions of this tool were evaluated in terms of appearance and level of understanding. All 20 questions of this questionnaire had an item score of above 1.5. Therefore, the questions were kept in the questionnaire. Then, the researcher gave the questionnaire to 10 faculty members and instructors of cardiovascular resuscitation in order to check its content validity and determine its content validity ratio (CVR). They were asked to choose one of the 3 options; "necessary", "useful but not necessary" and "not necessary" for each item and then, those items that had a score of above 0.62 (based on the Lawshe, 26) were kept in the questionnaire. At the end, 20 questions with score of above 0.62 were kept in the questionnaire.

In order to measure the content validity index (CVI) of the questionnaire, the same 10 experts specified the relevance of each item by giving it a score of 1 to 4 (1=not relevant, 2=relatively relevant, 3=relevant, and 4=completely

[Downloaded from intjmi.com on 2026-11-17]

relevant (26). All items obtained the score of above 0.79, indicating an appropriate content validity index of the questionnaire. To measure its reliability, the questionnaire was completed and confirmed by 10 hospital nurses, using the retest method with a correlation coefficient of 0.86.

This questionnaire was completed in two occasions; before the implementation of the in-service training course (at the beginning of the intervention) and also at the end of the training course (after the intervention). On average, it took 15-20 minutes at any time to complete the questionnaire. The researcher and the training course instructors were present at the time of completing the questionnaire and answered any doubts and questions that the participants had. During the study, the participants were assured that their evaluation scores would remain confidential in in the nursing office. They were also informed that their grades do not have a negative effect on their work. The researcher prepared and designed educational programs with the help of hospital officials to strengthen the skills of those participants who obtained low scores. The collected data were entered into the SPSS statistical software version 21 for analysis, using descriptive statistics (table, mean and standard deviation) and inferential tests (t-pair) at a significance level of 0.05.

Results

The mean and standard deviation of nurses' age was 26.78 ± 5.17 years and their work experience was 3.9 ± 3.02 years. In terms of gender, 26% (13 people) of the nurses were male and 74% (37 people) were female. The mean score of learning cardiopulmonary resuscitation skills before the intervention was 11.56±2.28 and after the intervention was 14.26±2.21. The paired t-test showed a significant difference in the mean score of learning cardiopulmonary resuscitation skills before and after the intervention (P< 0.01).

The covariance test showed a significant difference in the mean score of learning cardiopulmonary resuscitation skills after removing the effect of pre-test (P<0.01, Eta=0.56). So, it can be assumed that 56% of the changes in learning cardiopulmonary resuscitation skills have been due to the training (Table 1).

Discussion

The results of present study showed that cardiopulmonary resuscitation training increased learning in emergency nurses. The results of this study are consistent with other studies.

Xu (2022) stated that cardiopulmonary resuscitation training increases the quality of resuscitation in nurses (14). Ireland (2020) argued that cardiopulmonary resuscitation training increases the skills of emergency personnel (11). Kuckaki (2022) in a study showed that training cardiopulmonary resuscitation skills, in addition to improving the efficiency of nurses, increases the chances of survival in patients after CPR (3). Akbari (1400) in a study revealed that the basic and advanced cardiopulmonary resuscitation knowledge and skills of nurses increased greatly after the training course (13).

Rajeswaran (2018) in a study showed that low knowledge of cardiopulmonary resuscitation skills in nurses leads to a decreased chance of patient survival and unsuccessful resuscitation (17). Cardiopulmonary resuscitation is considered as a life-saving skill and technique, and the correct performance of this technique increases the patient's chance of survival (27). The best time for resuscitation is in the first 5 minutes of cardiopulmonary arrest, and the knowledge and skills of nurses and the healthcare team play an important role in the success of cardiopulmonary resuscitation (2). Therefore, training and providing feedback increase the quality of skills and learning (16). For this reason, the training method plays a

[Downloaded from intjmi.com on 2026-11-17]

major role in increasing the knowledge, ability and skills of nurses performing cardiopulmonary resuscitation (28). Any type of education can increase learning, but the use of new and up-to-date knowledge has a prominent role in increasing the quality of nursing education (13).

In general, by reviewing related texts and studies, we can see the importance of education on improving the scientific knowledge of nurses and physicians regarding the correct implementation of cardiopulmonary resuscitation to save patients' lives and reduce post CPR complications CPR (13). Also, increasing resuscitation skills in emergency nurses plays an important role in the successful leadership of nurses in the resuscitation team, because the nurses' experience and skills play an important role in successful resuscitation (29). One of the limitations of this research was the lack of a control group for comparison. Investigating the new educational methods in learning cardiopulmonary skills is recommended in future studies.

Conclusion

Considering the positive effect of training on learning cardiopulmonary resuscitation skills in nurses, we can point to the importance of regular and in-service cardiopulmonary resuscitation training. In addition to training and improving the knowledge of learners, the nursing managers and hospital officials can evaluate the nurses' level of learning and solve their learning problems by using appropriate training methods. Increasing the learning and skills of cardiopulmonary resuscitation increases the chances of survival in patients.

Acknowledgments

The researchers consider it necessary to express their gratitude to all the nurses who participated in this study. We also would like to thank the officials of 5th Azar Hospital in Gorgan. This study was approved by Nursing Research Center of 5th Azar Hospital in Gorgan with code of et IR. GOUMS. REC. 1401.465

Conflict of interest

No conflict of interest was observed in this study

Reference

1.Zhang YR, Hu RF, Liang TY, Chen JB, Wei Y, Xing YH, et al. Applying formative evaluation in the mentoring of student intern nurses in an emergency department. Front Public Health. ۲۰۲۲;.۱۰:۹۷۴۲۸۱

2.Nazri Panjaki A, Salari N, Khoshfetrat M. The relationship between working shifts and the success rate of cardio-pulmonary resuscitation in emergencies and wards. medical journal of mashhad university of medical sciences. ۲۰۱۷;۶۰(۴):.۶۱۰-۷

2.Kuchaki Z, Taheri M, Esfahani H, Erfanifam T. The effect of CPR educational package on knowledge and performance of nurses working in intensive care units: A review study. J Family Med Prim Care. ۲۰۲۲;۱۱(۵):.۱۶۷۷-۸۲

4.Shabannia A, Pirasteh A, jouhari z. The effectiveness of cardiopulmonary resuscitation training by mannequin training method and educational video on the awareness of Shahed University staff. Daneshvar Medicine. ۲۰۲۱;۲۹(۴):.۳۳-۴۱

5.Ojaghi Haghighi SH, Shams Vahdati S, Mahmoudie T, Sepehri Majd P, Mirza-Aghazadeh-Attari M. Outcomes of cardiopulmonary resuscitation in the emergency department. Journal of Emergency Practice and Trauma. ۲۰۱۷;۳(۲):.۴۹-۵۲

6.Panchal AR, Bartos JA, Cabañas JG, Donnino MW, Drennan IR, Hirsch KG, et al. Part ۳: Adult Basic and Advanced Life Support: ۲۰۲۰American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency

[Downloaded from intjmi.com on 2026-11-17]

Cardiovascular Care. Circulation. ۲۰۲۰;۱۴۲(۱۶_suppl_۲):S۳۶۶-s.۴۶۸
7.Fuchs A, Käser D, Theiler L, Greif R, Knapp J, Berger-Estilita J. Survival and long-term outcomes following in-hospital cardiac arrest in a Swiss university hospital: a prospective observational study. Scand J Trauma Resusc Emerg Med. ۲۰۲۱;۲۹(۱):.۱۱۵
8.Abdollahi H, Tayebeh P, Mazlum R, Malekzadeh J, Farsi M, Janati F. effect of capnography feedback during cpr on return of spontaneous circulation. medical journal of mashhad university of medical sciences. ۲۰۱۸;۶۱(۱):.۸۱۶-۲۴
9.Kavosi A. Effect of continuing education competency-based program for emergency nurses on rate CPR successful. IJNV. ۲۰۱۵;۴(۲):.-۰
10.hashemy s, valiei s, Ariaie Nejhad mk, Ariaenezhad b. Effect of training cardiopulmonary cerebral resuscitation management on nurses' knowledge. IJCN. ۲۰۱۴;۳(۱):.۴۲-۹
11.Ireland S, Marquez M, Hatherley C, Farmer N, Luu B, Stevens C, et al. Emergency nurses' experience of adult basic and advanced life support workstations as a support strategy for clinical practice in the emergency department. Australas Emerg Care. ۲۰۲۰;۲۳(۲):.۷۷-۸۳
12.sadeghi e, bahmani h, khorshidi s. Evaluation of cardiopulmonary resuscitation status and its related factors in Shahid Motahhari hospital of Marvdasht: a descriptive cross-sectional study. jumsjmj. ۲۰۲۰;۱۸(۱):.۲۳-۸
13.Akbari Farmad s, Khoshnoodi far M, Rezaee M, Farajpour A. The effect of simulation-based cardiopulmonary resuscitation training on knowledge and clinical skills of nurses in Baharloo Hospital. Educational Development of Judishapur. ۲۰۲۱;۱۲(۲):.۵۱۱-۲۰
14.Xu J, Dong X, Yin H, Guan Z, Li Z, Qu F, et al. Improve Cardiac Emergency Preparedness by Building a Team-Based Cardiopulmonary Resuscitation Educational Plan. Front Public Health. ۲۰۲۲;.۱۰:۸۹۵۳۶۷
15.Araujo NR, Araújo RA, Moretti MA, Chagas ACP. Nursing training and retraining on cardiopulmonary resuscitation: a theoretical-practical intervention. Rev Esc Enferm USP. :۵۶;۲۰۲۲e.۲۰۲۱۰۵۲۱
16.Hojjati H, Mehralizadeh Yl, Farhadirad H, Alostany S, Aghamolaei M. Assessing the effectiveness of training outcome based on Kirkpatrick model: case study. IJNV. ۲۰۱۳;۲(۳):.۳۵-۴۲
17.Rajeswaran L, Cox M, Moeng S, Tsima BM. Assessment of nurses' cardiopulmonary resuscitation knowledge and skills within three district hospitals in Botswana. Afr J Prim Health Care Fam Med. ۲۰۱۸;۱۰(۱):e۱-e.۶
18.Hojjati H, Sharifinia H, Nazari R. The effect of blended clinical teaching on nursing students' attitude toward psychiatric patients. IJME. ۲۰۱۱;۱۱(۳):.۲۳۸-۴۴
19.Mortell M. A resuscitation "dilemma" theory-practice-ethics. Is there a theory-practice-ethics gap? J Saudi Heart Assoc. ۲۰۰۹;۲۱(۳):.۱۴۹-۵۲
20.Chalkias A, Antoniou P, Xanthos T. Education in resuscitation: The need for a new teaching method. Am J Emerg Med. ۲۰۱۷;۳۵(۲):.۳۷۰-۱
21.Horriar L, Rott N, Böttiger BW. [The new ۲۰۲۱resuscitation guidelines and the importance of lay resuscitation]. Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz. ۲۰۲۲;۶۵(۱۰):.۹۷۲-۸
22.Kol E, İlaslan E, Turkay M. Training needs of clinical nurses at an university hospital in Turkey. Nurse Educ Pract. ۲۰۱۷;.۲۲:۱۵-۲۰

[Downloaded from intjmi.com on 2026-11-17]

23.Kain V, Mannix T. Neonatal Care for Nurses and Midwives: Principles for Practice ۲nd Edition: Elsevier Health Sciences; .۲۰۲۲
24.Surgeons AAO, Hunt RJ. AEMT: Advanced Emergency Care and Transportation of the Sick and Injured Advantage Package: Jones & Bartlett Learning; .۲۰۲۱
25.Olympia RP, Lubin JS. Prehospital Emergency Medicine Secrets E-Book: Elsevier Health Sciences; .۲۰۲۱
26.Sharifnia SH, Zareian A. THE development process in health sciences ,۳editor. Tehran: Jamengar; .۲۰۲۱
27.Yazdani M, Farsi Z, Nezamzadeh M. Cardiopulmonary Resuscitation Education with Serious Game on Base Smart Phone And Simulation on the Attitude of Nursing Students in Aja University of Medical Sciences. ajaums-mcs. ۲۰۱۸;۵(۲):.۹۵-۱۰۳
28.Navalpotro-Pascual S, Blanco-Blanco Á, Torre-Puente JC. Experience of emergency healthcare professionals in cardiopulmonary resuscitation and its relationship with self-efficacy: A qualitative approach. Enferm Clin (Engl Ed). ۲۰۱۹;۲۹(۳):.۱۵۵-۶۹
29.Armstrong P, Peckler B, Pilkinton-Ching J, McQuade D, Rogan A. Effect of simulation training on nurse leadership in a shared leadership model for cardiopulmonary resuscitation in the emergency department. Emerg Med Australas. ۲۰۲۱;۳۳(۲):.۲۵۵-۶۱

Table

Table 1: The effect of training on learning cardiopulmonary resuscitation skills in emergency department nurses

Source of variance	Sum of squares	Degree of freedom	Mean of squares	f-value	Level of significance	Eta
Modified model	136.01	1	126.01	63.02	P<0.01	0.56
Post-test separator	62.97	1	62.97	29.17	P<0.01	0.37
Group	136.01	1	136.01	63.02	P<0.01	0.56
Error	103.01	1	2.15			
Sum	10407	50				
Total	239.62	49				

[Downloaded from intjmi.com on 2026-11-17]