Investigating the Effect of Cardiopulmonary Resuscitation Training on the Cardiopulmonary Resuscitation Awareness Level of Nursing Students in Islamic Azad University, Tehran Medical Branch

Hesam Aldin Varpaei[1], Mohammad Mahdi Miremami[1], Chiako Negahdarpanirani[1], Nushin Yazdi[1], Samaneh Parchehbafieh[2]*

[1] Bachelor of Science in Nursing (BSN) Islamic Azad University Tehran Medical Science, Tehran, Iran.
[2] Instructor, Department of Nursing, Tehran Medical Sciences Branch, Islamic Azad University, Tehran, Iran.

*Corresponding Author

Abstract: Introduction: Training has an integral role in the execution of cardiopulmonary resuscitation principles. Not only does it assure nurses in the acquisition of cardiopulmonary knowledge, but also is effective in the settlement of what is learned. This study aimed to determine the effect of cardiopulmonary resuscitation training on nursing students in Islamic Azad University, Tehran Medical Branch using a lecturing method and with the aid of question and answer. Methodology: This study was a quasi-experimental type of research in which 79 nursing students were trained by the conventional lecturing method with the aid of slides, and question and answer. The test for investigating their knowledge level was presented before and after the training. A researcher-made questionnaire comprising 16 items was employed for the pre- and posttest. To analyze the data, the SPSS, version 23, software was utilized and the value of P was considered significant at p<0.05. Results: The students' performance in the pre-and posttest was 18.46±6.20 and 23.25±4.94, respectively. The comparison of means before and after the training revealed a significant difference. Thus, using this method was effective in the promotion of the students' knowledge level.

Discussion: Concerning the present deficits and financial problems, it seems that the lecturing method with the use of question and answer is ever influential in learning as well as promoting the cognitive domains of nursing students. Conclusion: Contrary to the presence of modern methods in student training, it seems that the conventional lecturing method is continuously effective in Iran, and, particularly, in regions where it is impossible to use modern training methods.

Keywords: Cardiopulmonary resuscitation, CPR Training, Nursing, Cardiovascular Disease

INTRODUCTION

Cardiovascular diseases are the most prevalent reason for death all over the world. (He et al., 2004) Every day, the hearts of some humans stop beating and it occurs at early ages for many of them. (Davari et al., 2004) Cardiac arrest is the first symptom of cardiovascular disease in 40% of the victims. (Davies and Gould,

2000) It may happen anytime and anywhere. According to studies, 84.7% of the cardiopulmonary arrests take place at home, and the rest takes place in public places. That is, there is mostly an observer when a cardiopulmonary arrest occurs. (Davari et al., 2004) Cardiopulmonary resuscitation is a process during which it is attempted to resuscitate the two vital organs of the body (heart and lung) and help the patient continue his/her life. The resuscitation operation is performed by the use of medicines and advanced instruments in the two stages of the first main vital steps and the advanced heart preservation steps. (Mokhtari Noori et al., 2007) The brain damage occurs 4-6 minutes after the deficiency in oxygen delivery to the brain. The shortness of time, lack of information and enough skills result in individuals' death. However, this tragic event can be percluded by providing some hours of practical and theoretical training. (Thorén et al., 2004) Training has an integral role in the execution of cardiopulmonary resuscitation principles. Not only does it assure nurses in the acquisition of cardiopulmonary knowledge, but also is effective in the settlement of what is learned. (Mäkinen et al., 2009) In clinical environments, nurses are the first people that are present during the cardiopulmonary arrests of the patient. Thus, their ability to execute cardiopulmonary resuscitation is a vital factor in the successful resuscitation of the patient. (Madden, 2006) The studies have suggested that the CPR training methods be evaluated and corrected so that the operation is promoted. (Davies and Gould, 2000) Researchers believe that any training leads to learning; however, the depth and constancy of learning is different in varying training methods. (Borimnejad et al., 2008) Therefore, to increase the knowledge and ability of students regarding CPR, those modern training methods should be selected that not only lead to better and deeper learning, but also affect the learning constancy more, and, lastly, result in more success in saving the lives of the patients. (Omidifar et al., 2008) However, because of the high number of nursing students in Iran along with budget deficits, the modern methods are costly and they are not cost-effective. Some of these studies have emphasized on the need for training medical students the principles and methods, especially CPR, of saving the lives of the patients. (Robak et al., 2008) On the other hand, the comparison between self-learning without a teacher intervention and a training course with a teacher in three studies on health service providers showed no performance difference in the self-learning case. The self-regulating groups had not only higher levels of success at the onset of "change" into CPR dyads, but they also were not different from the students trained by the conventional methods. (Roppolo et al., 2011) Meanwhile, the cardiopulmonary resuscitation training via lecturing has a positive effect on the nurses' awareness, although it is brief and cost-effective. (Imani and Abdolkarimi, 2010) No teaching method is inherently good or bad; however, the way and conditions of its use result in its strengths or weaknesses. Maudlin Hunter, regarding teaching, wrote that there is no best teaching method, best coaching method, and best learning method, and the proper teaching method and behavior could be chosen concerning the elegance and consequences of what happens in the classroom. (MehrMohammadi and Abedi, 2001) Contrary to the presence of teaching methods, the lecturing method is still the most conventional teaching method at universities. There are different reasons for its use. In this method, the theme is presented more orderly, the classes are more peaceful, and the schools are quieter. (Golafrooz Shahri and Khaghanizade, 2010) Lecturing is the commonest teaching method that trains all students in the same condition regardless of their individual differences. (Momeni and Malekzadeh, 2000)

Hence, concerning the importance of cardiopulmonary resuscitation as well as the nurses' role in possessing sufficient knowledge on it, it is necessary to develop their knowledge level correctly, which requires true education. This study aimed to determine the effect of the cardiopulmonary resuscitation training on nursing students in Islamic Azad University, Tehran Medical Branch via a lecturing method and with the help of question and answer.

Methodology

This quasi-experimental study was conducted in the nursing and midwifery faculty of Islamic Azad University, Tehran Medical Branch in 2019 by taking into account ethical considerations. First, the

researcher spoke to the faculty professors of coronary care course and requested them to accommodate one session of this course related to CPR training to the researchers. This study had a pre-and posttest design and made use of a researcher-made questionnaire. All the students participating in the study were in the 6th term of nursing. They were explained about the significance of the pre-and posttest. They were not compelled to write their names on the questionnaires and they were assured that their information would not be disclosed and the test would not influence their scores in the coronary care course. To measure the students' prior knowledge in the pretest, 16 items comprising 4 choices were designed. The same questions were employed in the posttest, as well. The questionnaires were distributed among students in a printed form and the questions were around 10 pivots including diagnosing background rhythm (1 item), the necessity to use defibrillator shock or Cardioversion (1 item), choosing the proper medicine (4 items), airway management (2 items), proper medicine management (2 items), identifying the background disorder (1 item), the true sequence of cardiopulmonary resuscitation (2 items), an urgent action in case of fatal arrhythmia (1 item), evaluating the effect of cardiopulmonary resuscitation (1 item), and the cares after the cardiopulmonary resuscitation (1 item). The pretest was presented just before the cardiopulmonary resuscitation training and the students were given enough time to answer the questions. Then, the questionnaires were collected and the cardiopulmonary resuscitation was taught by a professor in concern. A lecturing method was used via PowerPoint presentation and in accompany with question and response. Firstly, the stages of basic life support were presented. Thereafter, the stages of advanced life support were trained. The training lasted 90 minutes. Finally, after the training course, the posttest questionnaires were distributed among students and they were given enough time to answer the questions. The number of students participating in the study was 79, 6 of whom were male and 73 of whom were female.

After collecting data, they were analyzed by the SPSS software. Descriptive statistics including mean, standard deviation, and frequency was employed. The mean scores of the pretest and posttest were compared by the paired-samples T-test at the significance level of ≤ 0.05.

Results

The study samples were 79 B.A. nursing students, 6 (8%) of whom were male and 73 (92%) of whom were female. The mean scores were compared before and after the training by the paired-samples` t-test whose results are presented in Table 1.

Cronbach alpha test was used to compute the reliability of the questionnaire. It equaled $\alpha = 0.879$, which showed a suitable reliability concerning $\alpha > 0.7$.

Table 1. The Frequency (Percentage) and Comparison of Means and Standard Deviations of the Nursing Students' Scores in the Pre- and Posttest

Score Range	Pretest Frequency (%)	Posttest Frequency (%)	Change Percentage	
1-4	34 (40.03%)	7 (0.08%)	-39.95	
5-8	34 (40.03%)	23 (29.11%)	-10.92	
9-12	10 (12.65%)	48 (60.75%)	+ 48.10	
13-16	1 (0.01%)	1 (0.01%)	0	
	Mean ± SD	Mean ± SD	P	t
	18.20 ± 6.20	23.25 ± 4.94	0.00	-7.40
Total	79 (100%)	79 (100%)		

Since p-value < 0.00; thus, the observed statistical difference was significant.

Discussion

This study exploited the conventional teaching method used in the majority of universities of medical sciences to measure the knowledge level of students before and after the training.

The nursing education as a part of medical education has faced rapid advances in recent two decades concerning the number of general B.A. and extra M.A. courses; however, it has led to worriedness respecting the quality of education. (Khodaveisi et al., 2012) The CPR can be organized in different forms (for example, the kits guided by teachers or self-learning, practical or theoretical, video-based, plan-based, and electronic training). The efficacy of different methods of CPR learning was unidentified. (Greif et al., 2015)

In their study conducted in Shiraz, Babanazari et al., (2012) measured the effect of cardiopulmonary resuscitation on the knowledge and skill level of nursing students. They used modified team-based learning and conventional training methods. Finally, it seemed that the team-based learning method could be employed as a proper method for more effective learning of medical students. (Babanazari et al., 2012) Although this method was effective, it should be noted that the modified team-based method required a long time and high cost, which was practically impossible for faculties and some educational centers with a large number of students. In a study conducted by Navard et al., (2013-2014) in Sweden, 13-year-old students were only presented cardiopulmonary resuscitation training in two control groups and the intervention group was presented a web-based course in addition to the cardiopulmonary resuscitation training. A web-based course before CPR training didn't influence the practical CPR skills or action readiness skills; however, it enhanced the theoretical knowledge of AMI, apoplexy factors, and lifestyle. (Nord et al., 2017)

In another study, Mirorkomarparik et al., (2018) investigated the effect of basic and advanced cardiovascular resuscitation training to registered nurses in coronary care units on patients' mortality. It was a one-year study on 632 adult patients with cardiac arrest. The results revealed that the presentation of training before the resuscitating operation had a remarkable and noticeable effect on the number of recovered and discharged patients compared to no training before the resuscitating operation. The age and gender of the patients didn't have any significant relationship with the results of the study and the training of nurses had a positive effect in this regard. (Pareek et al., 2018) Mostafa Abul-Fath et al., (2017) conducted a quasi-experimental study on two groups and showed that the repetition of training programs can enhance the way of executing cardiopulmonary resuscitation as well as the employment of external defibrillator machine. The interest relevant training of healthcare providers can promote these attitudes. (Abolfotouh et al., 2017) The study conducted by Nicolas Nika et al., (2014) identified that the defibrillation time reduction in the ventricular fibrillation and symptomatic bradycardia among the subjects in the intervention group showed that the online ACLS simulator based on the supplementary computer of the ACLS training tool was effective. They guessed that the students in the intervention group may, due to the wide vision of the ACLS material which they accessed in many ACLS scenarios in computer simulation programs, feel less self-confident in the resuscitation remanagement. But, this issue needs more investigations for its proof. (Nacca et al., 2014) Johnson thought that there is convincing evidence that students in collaborative training achieve higher levels of reflection and remember the information and findings longer than the students performing individually. According to the results of this study, the ACL of students engaged in universities and the nursing students are at average or low levels requiring the careful attention of teachers, managers, and syllabus designers in this respect. Finally, it is recommended to develop educational strategies and employ active educational methods as well as shared learning to promote students' participation in scientific engagements. (Ranjbar and Esmaili, 2006) Another study introduced a computer-based multimedia learning package for teaching cardiopulmonary resuscitation. According to this study, those students that were trained by this multimedia package significantly performed better than those trained by other teaching methods. (Clark et al., 2000) Furthermore, in a similar study in Kerman, Mohsenipour et al., (2010) trained nurses and cardiopulmonary resuscitation team members and showed that training through lecturing is not only effective but also cost-effective. (Khodaveisi et al., 2012)

Concerning the different methods exploited in cardiopulmonary resuscitation training, it could be percieved that all methods are effective in enhancing the awareness and knowledge level of students and the subjects under investigation. However, the availability of these methods as well as the cost of their use are still questionable and require more investigations. The method employed in the present study was a conventional,

cheap, and available method widely utilized not only in the educational system of the medical sciences of Iran, but also in retraining courses. Hence, this method is suitable for promoting the awareness level as well; however, its long-term and functional efficacy is still questionable. Although the promotion of an awareness level cannot guarantee the performance and clinical judgment by itself.

Conclusion

Concerning the results of this study as well as the previous literature, it can be concluded that training cardiopulmonary resuscitation to students is possible with different methods. Each of these methods has positive and negative properties. Moreover, today, much emphasis is on training via virtual methods and engaging students actively in the training process. The conventional method employed in this study was capable to create an improving effect on the knowledge level. Of course, it should be noted that it doesn't guarantee other learning levels and necessitates more studies. If the uses of modern learning methods were possible in universities and training centers, using these methods could be effective. However, it seems that the lecturing method with the aid of question and answer can be used in universities with insufficient facilities and budget. Because of these reasons that the studies showed, and as the results of the present study revealed, personal learning or receiving training through lecturing and via slides have been effective in learning. One limitation of the study was the small number of students. Moreover, the posttest was exercised immediately after the intervention. This made the students use their short-term information. Thus, the in-depth learning of the students could not be measured.

Acknowledgment

References

1. Abolfotouh, M. A., Alnasser, M. A., Berhanu, A. N., Al-Turaif, D. A., & Alfayez, A. I. (2017). Impact of basic life-support training on the attitudes of health-care workers toward cardiopulmonary resuscitation and defibrillation. *BMC health services research*, *17*(1), 674. doi: 10.1186/s12913-017-2621-5. PubMed PMID: 28938914; PubMed Central PMCID: PMC5610457.
2. Babanazari, Zh. et al., (2012). Comparing the effect of cardiopulmonary resuscitation training between modified team-based learning and the conventional method on the knowledge and skill of nursing students in the Hz. Fatima faculty of nursing and midwifery in Shiraz.
3. Borimnejad, L., Nikbakht Nasrabadi, A., & Mohammadi Mohammadi, H. (2008). The effect of cardiopulmonary resuscitation workshop on nurses' sustained learning. *Iranian Journal of Medical Education*, *7*(2), 209-215.
4. Clark, L. J. R., Watson, J., Cobbe, S. M., Reeve, W., Swann, I. J., & Macfarlane, P. W. (2000). CPR '98: a practical multimedia computer-based guide to cardiopulmonary resuscitation for medical students. *Resuscitation*, *44*(2), 109-117.
5. Davari, F., Khanjari, S, Assemi, S., & Haghani, H. (2004). Basic Cardiopulmonary Resuscitation Training and Its' Effect on Knowledge and Skill Level of High School Students. *IJN. 17*(39), 57-63
6. Davies, N., & Gould, D. (2000). Updating cardiopulmonary resuscitation skills: a study to examine the efficacy of self-instruction on nurses' competence. *Journal of Clinical Nursing*, *9*(3), 400-410.
7. Golafrooz Shahri H. & Khaghanizade M. (2010). Introduction to oral presentation teaching method. *Educ Strategy Med Sci. 2* (4), 161-166. URL: http://edcbmj.ir/article-1-44-en.html

8. Greif, R., Lockey, A. S., Conaghan, P., Lippert, A., De Vries, W., & Monsieurs, K. G. (2015). European resuscitation council guidelines for resuscitation 2015 section 10. Education and implementation of resuscitation. *Resuscitation. 95*, 288–301. doi: 10.1016/j.resuscitation.2015.07.032.

9. He, J., Neal, B., Gu, D., Suriyawongpaisal, P., Xin, X., Reynolds, R., ... & Whelton, P. K. (2004). International collaborative study of cardiovascular disease in Asia: design, rationale, and preliminary results. *Ethnicity and Disease*, *14*(2), 260-268.

10. Imani, Z., & Abdolkarimi, M. (2010). The effect of education of cardiopulmonary resuscitation (CPR) on knowledge of nursing staff and CPR team members in a hospital in Kerman province. *Journal of qualitative Research in Health Sciences*, *9*(1and 2), 1-7.

11. Khodaveisi, M., Pazargadi, M., Yaghmaei, F., & Bikmoradi, A. (2012). Identifying challenges for effective evaluation in nursing education: A qualitative study. *Journal of research in medical sciences: the official journal of Isfahan University of Medical Sciences*, *17*(7), 710.

12. Madden, C. (2006). Undergraduate nursing students' acquisition and retention of CPR knowledge and skills. *Nurse education today*, *26*(3), 218-227. doi: 10.1016/j.nedt.2005.10.003 PMID: 16314002

13. Mäkinen, M., Niemi-Murola, L., Kaila, M., & Castrén, M. (2009). Nurses' attitudes towards resuscitation and national resuscitation guidelines—nurses hesitate to start CPR-D. *Resuscitation*, *80*(12), 1399-1404.doi:10.1016/j.resuscitation.2009.08.025

14. MehrMohammadi, M., & Abedi, L. (2001). The nature of teaching and its aesthetic dimensions. *Quarterly Journal of Teacher*, *5*(3), 43-57.

15. Mokhtari Noori, J., Khadem Al-Hosseini, S. M., Karimi Zarchi, A. A., Naeimabadi, T. & Saghafinia, M. (2007). Investigating the effect of the basic cardiopulmonary resuscitation retraining course on the rate of awareness and skill of the personnel. *Kosar Journal, 12* (2), 261-271.

16. Momeni, E. & Malekzadeh, J. M. (2000). Investigating the effect of training via lecturing method and pamphlet on the nurturing knowledge of health volunteers in Yasuj city. *Journal of Yasuj University of Medical Sciences, 5* (19 & 20), 49-53.

17. Nacca, N., Holliday, J., & Ko, P. Y. (2014). Randomized trial of a novel ACLS teaching tool: does it improve student performance?. *Western Journal of Emergency Medicine*, *15*(7), 913. doi: 10.5811/westjem.2014.9.20149. Epub 2014 Oct 9. PubMed PMID: 25493153; PubMed Central PMCID: PMC4251254.

18. Nord, A., Svensson, L., Claesson, A., Herlitz, J., Hult, H., Kreitz-Sandberg, S., & Nilsson, L. (2017). The effect of a national web course "Help-Brain-Heart" as a supplemental learning tool before CPR training: a cluster randomised trial. *Scandinavian journal of trauma, resuscitation and emergency medicine*, *25*(1), 93. doi: 10.1186/s13049-017-0439-0. PubMed PMID: 28899418; PubMed Central PMCID: PMC5596498.

19. Omidifar, N., Yamani, N., & Changiz, T. (2008). The efficacy of new method of cardiopulmonary resuscitation training in promoting knowledge and skills of 4th year medical students. *Iranian Journal of Medical Education*, *8*(1), 23-31.

20. Pareek, M., Parmar, V., Badheka, J., & Lodh, N. (2018). Study of the impact of training of registered nurses in cardiopulmonary resuscitation in a tertiary care centre on patient mortality. *Indian journal of anaesthesia*, *62*(5), 381-384. doi: 10.4103/ija.IJA_17_18. PubMed PMID: 29910497; PubMed Central PMCID: PMC5971628.

21. Ranjbar, H., & Esmaili, H. (2006). A comparative study of the effects of individual and collaborative learning on thinking. *J Nurs Midwifery*, *14*(1), 17-22.

22. Robak, O., Kulnig, J., Sterz, F., Uray, T., Haugk, M., Kliegel, A., ... & Domanovits, H. (2006). CPR in medical schools: learning by teaching BLS to sudden cardiac death survivors–a promising strategy for medical students?. *BMC medical education*, *6*(1), 27.

23. Roppolo, L. P., Heymann, R., Pepe, P., Wagner, J., Commons, B., Miller, R., ... & Idris, A. H. (2011). A randomized controlled trial comparing traditional training in cardiopulmonary resuscitation (CPR) to

self-directed CPR learning in first year medical students: the two-person CPR study. *Resuscitation*, *82*(3), 319-325. doi: 10.1016/j.resuscitation.2010.10.025.

24. Thorén, A. B., Axelsson, Å., & Herlitz, J. (2004). The attitude of cardiac care patients towards CPR and CPR education. *Resuscitation*, *61*(2), 163-171.