

# Comparison of CPR training by social media networks and workshop on CPR skill of nursing and midwifery students

**Sara Ghorbani**

Zanjan University of Medical Sciences

**Mansour Ghafourifard**

Tabriz University of Medical Sciences

**Mohammadreza Dinmohammadi**

Zanjan University of Medical Sciences

**Ramezan Fallah**

Zanjan University of Medical Sciences

**ali aghajanloo** (✉ [aliaghajanloo2001@yahoo.com](mailto:aliaghajanloo2001@yahoo.com))

Tehran University of Medical Sciences

---

## Original research

**Keywords:** Cardiopulmonary resuscitation (CPR), nursing student, midwifery student, social media networks, workshop

**Posted Date:** May 17th, 2020

**DOI:** <https://doi.org/10.21203/rs.3.rs-28610/v1>

**License:**  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

---

# Abstract

**Background:** Smartphone-based education has been recommended in different areas of medical education. Considering the capabilities and features of social media, this study aimed to investigate the effect of social media and workshop on CPR performance of nursing and midwifery students.

**Methods:** In this quasi-experimental study, 59 nursing and midwifery students were randomly divided into two groups (WhatsApp- and workshop-based training). Students' CPR skill was assessed at four time-points including before the training, one week, one month and three months after the training.

**Results:** The results showed that the mean score of CPR skill in the workshop group was higher than WhatsApp in one week, one month, and three month later ( $p < 0.05$ ). **Conclusions:** Despite the effectiveness of both methods, workshop had a better effect on students' performance. Therefore, social media should not be considered a substitute for conventional training such as the workshop.

## Introduction

Cardiac arrest is a major public health issue accounting for 15–20% of all deaths (1, 2). The initiation of optimal cardiopulmonary resuscitation (CPR) by health care providers could help more people to survive and recover from cardiac arrest(3).

The CPR is considered as an important procedure at which all health care providers, particularly the nurses, need to be skillful in this field (4). Since nurses are commonly first responders in hospital settings, they need to have sufficient knowledge and skills on CPR (5). Therefore, CPR training is an essential component of the undergraduate curriculum in different fields of healthcare disciplines to prepare students for their careers in the future (6). The literature review shows that improvements in CPR training could help students to improve their CPR knowledge and performance (7, 8).

Based on developments in information and communication technologies (ICTs), there is now a new perspective on learning and teaching methods (9). Recently, smartphone-based education has been recommended to be utilized in different areas of medical education (10, 11). It helps to provide a flexible and self-directed learning environment for users. Furthermore, learners could access the information and skills without any time and space constraints (12). The students may come under pressure when they learn and practice procedures in a classroom or skill lab. However, the provision of a safe and non-judgmental learning environment through smartphone-based education could help students to practice many times with no time constraint and concern with committing errors (11). The cost-effectiveness of using electronic technology in the delivery of health education has been also documented in the medical literature (13).

Today, e-learning (learning utilizing electronic technologies) approaches and interactive multimedia are suggested for students' learning (14). For this, some capabilities of smartphones such as social media networks could be used for e-learning. Social media networks as an interactive smartphone-mediated

facility can be used to share information between students, share ideas with other students, share personal academic interests, engage students in education and understand what they are thinking about during the education, create an effective study group, and enhance functions of e-textbooks through connecting students with social media for collaborative purposes (15). In fact, by using smartphone and social media networks, students can take more responsibility for their learning, learn in their own pace and in their own time, access a massive pool of knowledge, communicate and share their experiences and ideas with their teachers and peers in a format of articles, videos, picture, and so on; All of these activities could help them to improve their learning experiences (9).

According to the literature review, different teaching and methods have been proposed for developing of CPR skill among students in different fields of healthcare professionals. These methods include watch-and-practice technique (16), video training (17–19), CPR feedback device and manikin (20), simulation (3, 21), Automated audiovisual feedback (22), Peer-assisted Education(23), Virtual Simulation Game (7), Blending Teaching (24), and workshop(25).

Although there have been proposed many methods for CPR training, to the best of our knowledge, there is no study relating to the effect of social media training on CPR skills among student. Moreover, the efficacy of social media training has remained unknown as compared with other training methods. Therefore, the present study aimed to investigate the effect of social media education on CPR performance in nursing and midwifery students and to compare it with the workshop method.

## Methods

### Study design and setting

This is a quasi-experimental study conducted using a pretest-posttest design. The research setting was the School of Nursing and Midwifery of Zanjan University of Medical Sciences, Iran. A total of 59 second-year nursing and midwifery students were enrolled in the study.

Inclusion criteria consisted of the following: Second-year nursing and midwifery students who had no CPR experience, having no participation in similar courses on CPR, and having a smartphone to install WhatsApp Messenger as a social network. Exclusion criteria consisted of the following: participant's withdrawal from the study at any time, absence from the CPR training sessions, and incomplete questionnaires.

In this study, nursing and midwifery students were randomly divided into two groups of which one received WhatsApp-based training and another one received workshop-based training. So that based on random allocation, the nursing students were assigned to the WhatsApp-based training group and the midwifery students were assigned to the workshop-based training group. The nursing students received CPR training using the social network software (WhatsApp Messenger) and the midwifery students received the same contents by using the workshop method. In the WhatsApp-based group, students were first asked to install WhatsApp Messenger. Then, the main researcher created a new channel, added the

students to the channel, and provided the information and explanations on the responsibility of the students. The CPR training topics were then uploaded on the channel over a week. Students' activities and behaviors in the network were constantly monitored by the researcher. Moreover, the researcher provided the feedbacks on the students' activities and answered their questions. In the workshop-based training group, CPR training was conducted using a 3-hour educational workshop. The list of CPR training materials were similar between the two groups. These contents were based on American Heart Association (AHA) CPR guidelines and included the history of CPR, the chain of survival, cardiac arrest, CPR sequences, and information on how to use an automatic external defibrillator (AED).

## **Data collection**

Data collection was conducted at four time-points including before the training, one week, one month and three months after the training.

Data collection tools consisted of the following: (a) Demographic questionnaire and (b) a researcher-made checklist of CPR-skill assessment. The demographic questionnaire consists of the following variables: age, gender, marital status, and clinical work experience. Checklist of CPR assessment was a researcher-made tool developed based on a literature review and the latest AHA guidelines for CPR. The checklist consisted of 20 items. Each item was scored from 0 to 2 as 0 = incorrect action, 1 = impaired action, and 2 = correct action. The total score was the sum of scores of all items ranging from 0 to 40. The higher scores show the higher skill of students.

All CPR skill assessments were done at the skill lab of the School of Nursing and Midwifery. The students were asked to do CPR on manikin and respond to the researcher questions, then the evaluator filled the checklist based on the students' performance. To avoid evaluation bias, all tests were taken by the main researcher who had a certificate in the CPR.

## **Ethical Considerations**

The present study was approved by the Ethics Committee of Zanjan University of Medical Sciences (IR.ZUMS.REC.1398.237). Prior to the beginning of the study, all participants were provided with explanations of study objectives and methodology. They were also assured of the confidentiality of information collected. Furthermore, written informed consent was obtained from all participants before enrolling them in the study. They were also free to withdraw from the study at any time for any reason.

## **Data Analysis**

The collected data were entered into SPSS software (version 16.0; SPSS Inc., Chicago, IL, USA) and analyzed using descriptive and inferential statistics. The descriptive data were presented using mean, standard deviation, and percentage. Moreover, statistical analysis such as independent t-test and Generalized Estimating Equation (GEE) were used to compare the mean scores of the two groups and determine the training effect over time. The significance level was set at  $p < 0.05$ .

## **Results**

The mean age of the participants in the WhatsApp and workshop group was  $20.9 \pm 2.64$  and  $19.77 \pm 1.21$ , respectively; there was no statistically significant difference between the two groups in this regard ( $p > 0.05$ ). All participants in the two groups were single. All of the participants in the workshop-based training group were female ( $n = 27$ ), and 63% ( $n = 20$ ) of the participants in the WhatsApp group were male (Table 1). Moreover, none of the participants had experienced an actual CPR and CPR training courses in the past.

Table 1  
Characteristics of the participants in each group.

Variable	Workshop group (n = 27)		WhatsApp group (n = 32)		P-value
	Mean $\pm$ SD	n(%)	Mean $\pm$ SD	n(%)	
Age (years)	$19.77 \pm 1.21$		$20.09 \pm 2.64$		0.54
Gender	0		20(63)		0.001
Male	27(100)		12(37)		
Female					
Marital status	27(100)		32(100)		
Single	0		0		
Married					
<p>Prior to the training, the students in both of the groups had merely a limited amount of knowledge about CPR. Before the training, the mean score of CPR-skill in the WhatsApp- and the workshop group was <math>1.71 \pm 1.95</math> and <math>2.07 \pm 2.46</math>, respectively. The results showed that there was no statistically significant difference between the two groups in the mean score of CPR-skill before the training (<math>p = 0.54</math>). However, the mean score of CPR skill in the WhatsApp (<math>27.09 \pm 7.52</math>) and the workshop (<math>34.37 \pm 5.56</math>) groups showed a statistically significant difference one week after the training (<math>p = 0.001</math>). One month after the training, the mean score of CPR-skill in the WhatsApp-based training group was <math>31.12 \pm 6.07</math> and in the workshop-based training group was <math>36.11 \pm 2.83</math>; these values were statistically significant (<math>p = 0.001</math>). Moreover, there was a significant difference between the mean score of CPR skill in the WhatsApp (<math>31.21 \pm 5.76</math>) and workshop (<math>35.25 \pm 3.30</math>) groups at the point of three months later (<math>p = 0.001</math>) (Table 2).</p>					

Table 2  
Comparison of the mean score of CPR skill in workshop and WhatsApp groups

Variable	Group		P value
	Workshop group(n = 27)	WhatsApp group (n = 32)	
	Mean ± SD	Mean ± SD	
Pretest (T0(	2.07 ± 2.46	1.71 ± 1.95	0.54
Week1 (T1(	34.37 ± 5.56	27.09 ± 7.52	0.001
Month1 (T2(	36.11 ± 2.83	31.12 ± 6.07	0.001
Month 3 (T3(	35.25 ± 3.30	31.21 ± 5.76	0.001

The results of the GEE test demonstrated that by controlling confounding variables, the mean score of CPR-skill in the workshop-based training group was 5.5 point higher than in the WhatsApp-based training group at three points after the training. These differences were statistically significant (p = 0.001) (Table 3).

Table 3  
Generalized estimating equation (GEE) analysis of longitudinal outcome of the CPR skill among workshop and WhatsApp groups.

Variable	GEE (Interaction between time and groups)					
	β	SE	95%CI		Wald X2	P-value
			Lower	Upper		
Intercept	45.534	6.5549	32.686	58.381	48.254	0.001
Group (WhatsApp vs. workshop)	-5.539	1.0718	-7.640	-3.438	26.707	0.001
Gender (WhatsApp vs. workshop)	0.734	1.227	-1.670	3.139	0.358	0.53
Age (WhatsApp vs. workshop)	-.541	.2982	-1.125	.044	3.286	0.70
Pretest (WhatsApp vs. workshop)	-.085	.1844	-.446	.277	.210	.647

## Discussion

The results of the present study indicated that students' skill to perform CPR increased significantly among both groups after the training. However, the mean scores of CPR-skill in the workshop group were higher than WhatsApp group in three points and this difference was statistically significant. This result is in line with a study done by Rehberg et al (2009) in the USA that the findings indicated that CPR training based on the computer did not develop the quality of CPR performance as compared with traditional classroom-based trainings(26). They concluded that computer-based CPR education could be a possible

facility for training of lay rescuers, but is not a suitable method for CPR training in health care professionals.

The results showed that social media such as WhatsApp is not alone an effective method for training of CPR; this result is not in line with other study (27). In a quasi-experimental study, Zia Ziabari et al(2019) allocated 100 medical interns who have completed the emergency medicine course into two groups. One group received distance education by Telegram software for three consecutive months, and the other group did not receive any education in the field of CPR. The results showed that the mean score of basic life support (BLS) awareness among the telegram group was significantly higher than in another group. A probable reason could be that they evaluated the effect of social media training on BLS, but we evaluated the advanced life support (ALF). It is notable that ALS learning is hard that BLS.

In a randomized clinical trial, Nord et al. (2016) compared the influence of 30 min mobile application-based and the 50 min DVD-based on students' skills in CPR. After 6 months follow-up, the DVD-based group showed significantly better performance in CPR skills compared with the app-based group(28).

According to the literature review, there is not consistency in the studies in the field of CPR trainings. A probable reason could be related to the diversity in the teaching methods, sample size, location, and research designs. In another study, Ahn et al.(2011) showed that sending a reminder phone message to watch the CPR training videos can be effective in improving the retention of CPR skills(29). They concluded that sending a reminder video clip by a mobile phone could have a good influence on the retention of skills among lay responders. It seems that the mobile-based education could be effective in the lay responders. Moreover, it alone is not a suitable method for improving the CPR skills but it could be used as an adjuvant method for CPR training.

According to the results of our study, students in the workshop group showed a better performance compared with social media training. Reder et al.(2006) believe that CPR skills are a set of hard psychomotor skills and actions that needs hands-on practice. They argue that computer-assisted trainings only could be useful for explaining the series of actions needed for CPR skills, not for CPR practices(30).

It seems that computer-based and mobile-based education improve cognitive skills. Therefore, since the CPR skills need psychomotor skills, it requires face-to-face and practical training.

## **Limitations**

The present study is the first study examined the effect of social media on CPR-skill and provides more information on this area. However, the study has some limitations. The limitations of the present study consisted of the following: Small sample size, the impossibility of random assignment, and the lack of blinding. Furthermore, all students in the field of the midwifery in Iran are female. Therefore, all participants in the workshop group were female, and this could be considered as a limitation.

## Conclusion

Based on the results of the present study, it was found that despite the effectiveness of both WhatsApp- and workshop-based CPR training methods on CPR skills, workshop-based training had a better effect on students' performance. Therefore, the workshop is recommended as an effective method for CPR training. In conclusion, mobile-based CPR training using social media networks should not be considered a substitute for conventional training such as the workshop. Rather, social media networks can be used as an adjuvant method with other teaching methods by considering the limitations of educational facilities and the advantages of social media training including cost-effectiveness, timelessness, generality, user-friendliness, etc. Therefore, the evaluation of the combination of social media training and other teaching methods is recommended for future studies.

## Declarations

### Acknowledgments

This study is part of the project related to MSc thesis at Zanjan University of medical sciences. So, the authors would like to thank all students who participated in this study.

### Ethics approval and consent to participate

The study was approved by the Ethics Committee of Zanjan University of Medical Sciences(IR.ZUMS.REC.1398.237).

### Authors' contributions

Sara Ghorbani: Conceptualization, Methodology, acquisition of data, Formal analysis, Writing - Review & Editing, Mansour Ghafourifard: Conceptualization, , Writing- Reviewing and Editing, Mohammadreza Dinmohammadi: Conceptualization, Writing- Reviewing and Editing, Ramezan Fallah: Formal analysis, Writing- Reviewing and Editing, Ali Aghajanloo: Conceptualization, Formal analysis, acquisition of data, Writing - Original Draft, Investigation, Supervision, Project administration

### Funding

This study received no funding.

### Competing interests

The authors declare that they have no competing interests

### Availability of data and materials

The datasets analysed during the current study are available from the corresponding author on reasonable request.

## Consent for publication

Not applicable.

## References

1. Hayashi M, Shimizu W, Albert CM. The spectrum of epidemiology underlying sudden cardiac death. *Circ Res*. 2015;116(12):1887–906.
2. Perman SM, Stanton E, Soar J, Berg RA, Donnino MW, Mikkelsen ME, et al. Location of In-Hospital Cardiac Arrest in the United States-Variability in Event Rate and Outcomes. *Journal of the American Heart Association*. 2016;5(10).
3. Berger C, Brinkrolf P, Ertmer C, Becker J, Friederichs H, Wenk M, et al. Combination of problem-based learning with high-fidelity simulation in CPR training improves short and long-term CPR skills: a randomised single blinded trial. *BMC Med Educ*. 2019;19(1):180.
4. Allah EE, Abd-Allah KF, El Sapour MA, Mohammed SS. Effect of Educational Program for Cardiopulmonary Resuscitation Using Simman versus Traditional Manikin on 2nd Year Nursing Students' Performance. 2017.
5. Rajeswaran L, Ehlers VJ. Cardiopulmonary resuscitation knowledge and skills of registered nurses in Botswana. *Curationis*. 2014;37(1):e1–7.
6. Mohamed EA. Effect of Cardiopulmonary Resuscitation (CPR) Training program on knowledge and practices of Internship Technical Institute of nursing students. *IOSR J Nurs Health Sci*. 2017;6(3):73–81.
7. Keys E, Luctkar-Flude M, Tyerman J, Sears K, Woo K. Developing a Virtual Simulation Game for Nursing Resuscitation Education. *Clinical Simulation in Nursing*. 2020;39:51–4.
8. Tastan S, Ayhan H, Unver V, Cinar FI, Kose G, Basak T, et al. The effects of music on the cardiac resuscitation education of nursing students. *International emergency nursing*. 2017;31:30–5.
9. El Bialy S, Jalali A. Go Where the Students Are: A Comparison of the Use of Social Networking Sites Between Medical Students and Medical Educators. *JMIR Med Educ*. 2015;1(2):e7-e.
10. Bonabi M, Mohebbi SZ, Martinez-Mier EA, Thyvalikakath TP, Khami MR. Effectiveness of smart phone application use as continuing medical education method in pediatric oral health care: a randomized trial. *BMC Med Educ*. 2019;19(1):431.
11. Kim S-J, Shin H, Lee J, Kang S, Bartlett R. A smartphone application to educate undergraduate nursing students about providing care for infant airway obstruction. *Nurse education today*. 2017;48:145–52.
12. Pyo MY, Kim JY, Sohn JO, Lee ES, Kim HS, Kim KO, et al. The effects of an advanced cardiac life support training via smartphone's simulation application on nurses' knowledge and learning satisfaction. *Journal of Korean Clinical Nursing Research*. 2012;18(2):228–38.

13. Ruggeri K, Farrington C, Brayne C. A global model for effective use and evaluation of e-learning in health. *Telemed J E Health*. 2013;19(4):312–21.
14. Tsaloukidis N, Michopoulou V, Peponi M, Papageorgiou D, Lazakidou A. Evaluation of Nurses' Perceptions on Cardiopulmonary Resuscitation (CPR) Education. *J Health Educ Res Dev*. 2017;5(209):2.
15. Lau WW. Effects of social media usage and social media multitasking on the academic performance of university students. *Computers in human behavior*. 2017;68:286–91.
16. Ribeiro LG, Germano R, Menezes PL, Schmidt A, Pazin-Filho A. Medical students teaching cardiopulmonary resuscitation to middle school Brazilian students. *Arq Bras Cardiol*. 2013;101(4):328–35.
17. Panchal AR, Meziab O, Stolz U, Anderson W, Bartlett M, Spaite DW, et al. The impact of ultra-brief chest compression-only CPR video training on responsiveness, compression rate, and hands-off time interval among bystanders in a shopping mall. *Resuscitation*. 2014;85(9):1287–90.
18. Kim SH, Shin JH. Effects and retention of self-re-learning using video recording of CPR on nursing student's knowledge, self-efficacy, and skill performance. *Resuscitation*. 2019;142:e71-e2.
19. Spence AD, Derbyshire S, Walsh IK, Murray JM. Does video feedback analysis improve CPR performance in phase 5 medical students? *BMC medical education*. 2016;16(1):203.
20. Yeung J, Meeks R, Edelson D, Gao F, Soar J, Perkins GD. The use of CPR feedback/prompt devices during training and CPR performance: A systematic review. *Resuscitation*. 2009;80(7):743–51.
21. Toubasi S, Alostta MR, Darawad MW, Demeh W. Impact of simulation training on Jordanian nurses' performance of basic life support skills: A pilot study. *Nurse Educ Today*. 2015;35(9):999–1003.
22. Bishop R, Joy B, Moore-Clingenpeel M, Maa T. Automated audiovisual feedback in cardiopulmonary resuscitation training: Improving skills in pediatric intensive care nurses. *Critical care nurse*. 2018;38(5):59–66.
23. Javaheri Arasteh A, Najafi Ghezeljeh T, Haghani S. Effects of Peer-assisted Education on the Knowledge and Performance of Nursing Students in Basic Cardiopulmonary Resuscitation. *Iran Journal of Nursing*. 2018;31(115):6–19.
24. Zhang T, Hu J, editors. Application of Blending Teaching Based on MOOC in the Training of Undergraduate Nursing Students' Cardiopulmonary Resuscitation Skills. 2nd International Conference on Education & Education Research (EDUER 2017) UK; 2017.
25. Afzalzadeh M, Saraj Khorami N, Nazari AA, Lari Najafi M. The effect of training workshops and problem solving methods in the training of cardiopulmonary resuscitation (CPR) on nursing and anesthesia students' performance of medical sciences university, Dezful. *Life Science Journal*. 2013.
26. Rehberg RS, Diaz LG, Middlemas DA. Classroom versus computer-based CPR training: A comparison of the effectiveness of two instructional methods. *Athletic Training Education Journal*. 2009;4(3):98–103.
27. Zia Ziabari SM, Monsef Kasmaei V, Khoshgozaran L, Shakiba M. Continuous Education of Basic Life Support (BLS) through Social Media; a Quasi-Experimental Study. *Archives of academic emergency*

medicine. 2019;7(1):e4.

28. Nord A, Svensson L, Hult H, Kreitz-Sandberg S, Nilsson L. Effect of mobile application-based versus DVD-based CPR training on students' practical CPR skills and willingness to act: a cluster randomised study. *BMJ open*. 2016;6(4).
29. Ahn JY, Cho GC, Shon YD, Park SM, Kang KH. Effect of a reminder video using a mobile phone on the retention of CPR and AED skills in lay responders. *Resuscitation*. 2011;82(12):1543–7.
30. Reder S, Cummings P, Quan L. Comparison of three instructional methods for teaching cardiopulmonary resuscitation and use of an automatic external defibrillator to high school students. *Resuscitation*. 2006;69(3):443–53.