Original Article

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Comparison the impact of face-to-face training package for resuscitation with presentation by messaging software on emergency medicine rotation interns

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Abstract

Introduction: Conventional approaches in advanced cardiac life support (ACLS) are used, including; lectures, video presentations, practical educations on moulage, also employing messenger applications can potentially be regarded as a method to train interns.
Objectives: The current study aims to compare two methods of face-to-face and virtual training by WhatsApp messenger, regarding the impact of training on interns' knowledge and satisfaction for advanced cardio resuscitation rotational interns in emergency medicine.
Patients and Methods: In this cross-sectional study, 73 rotation interns of emergency medicine of Tehran University of Medical Sciences from 2017 to 2018 were divided into two groups: 1) face-to-face training, 2) virtual training by using WhatsApp messenger application. Initially, a pretest of 10 questions about main topics in advanced cardiac support was conducted on interns. At the end of training course, a posttest of 20 questions was conducted for both groups.
Results: Mean value of pretest was 6.46 for face-to-face training group and 5.97 for WhatsApp group ($P = 0.29$). Posttest mean score was 14.08 for face-to-face group and 12.03 for WhatsApp ($P = 0.003$). Interns' satisfaction scores were 7.68 and 7.36 for face-to-face and WhatsApp group respectively ($P = 0.25$). Mean scores of pretest and posttest within group had no significant differences between groups, but Cohen's effect size for face-to-face group was greater than WhatsApp trained group.
Conclusion: Face-to-face training was associated with better results in promoting knowledge of interns, compared to WhatsApp training. That's advisable to employ face-to-face training for interns.

Introduction

All physicians need to be very familiar with advanced cardiac life support (ACLS), which is a fundamental skill. ACLS is a collection of skills and interventions which can be applied by medical staff as they encounter patients suffering from heart stroke. America health association has provided this collection. There are reports showing that this skill is not educated or in case of training, sufficient confidence is not available for students to apply these skills through their education career. Accordingly, the necessity of true training of ACLS is more evident than ever (1).

There are many methods for training ACLS. Various studies have currently been devoted to investigate highly effective ways in ACLS. Conventional approaches in ACLS are used, including; Lectures, video presentations, practical educations on moulage. Several studies have been performed on this method, where its effectiveness is approved. Many medical centers have developed simulation centers as well as obligatory and formal courses for students, where student shall attend periodically to learn ACLS skills (2,3). Some recent studies have introduced other methods, showing more effectiveness compared to the traditional old method, like multimedia programs, online training programs to simulate ACLS (2).

Each proposed method follows its own advantages and disadvantages, and researchers have attempted to practice methods with high capability of providing better grounds of learning with higher level of durability.

Providing multimedia sharing, messaging services provide simple and economical methods for groups to be organized in order to have possibility of sharing and proposing contexts and questions or educational posters. Since physical presence is not required in

Key point

The current study aims to compare two methods of face to face and distance training by WhatsApp messenger, regarding the impact of training on interns' knowledge and satisfaction for advanced cardio resuscitation rotational interns in emergency medicine. Seventy-three rotation interns of emergency medicine divided into two groups. Post-test mean score was 14.08 ± 2.84 for face to face group and 12.03 ± 3.22 for WhatsApp ($P = 0.003$). Interns' satisfaction score were 7.68 ± 1.08 and 7.36 ± 1.19 for face to face and WhatsApp group respectively ($P = 0.25$). By comparing mean scores of within group pretest and post-test, there was not any significant difference between face to face and WhatsApp groups ($P = 0.89$), however Cohen's effect size was 0.34 for face to face group which was greater than WhatsApp trained group value. That's advisable to employ face to face training method for interns. In case of need to smart phones applications, other applications with different training approaches can be examined in future studies.

this approach and can be conveniently accessed any time and everywhere, capabilities of this messenger can come into interest by trainees.

Objectives

According to the studied literature, there was not any case of study in this area for cardiac resuscitation so far. Thus this research decides to investigate and study cardiac resuscitation training by means of these kinds of services and then compare them with traditional method of face-to-face training.

Patients and Methods

Study design

In this cross-sectional study, two training methods were applied and compared, regarding their role in improving emergency medicine department interns' knowledge of advanced cardiac support during one year.

All interns were randomly (according to random number table) divided into two groups. A group of direct training comprised of 6 to 10 individuals (at two sessions from 1 to 2 hours) corresponding with 4 scenarios. Distance training group were educated through forming virtual groups where WhatsApp messenger was used for ACLS skills at two sessions from 8 AM to 4 PM. Context of session was available for members for 8 hours in virtual groups.

Statistical population of current project included all emergency medicine interns who were working in emergency department at the time of study. Convenience sampling was applied as sampling method. This research studied 73 rotation interns of emergency medicine.

For each group, a pretest was performed before rotation to evaluate knowledge level of interns about how they would act in cardiac arrest situation. Then, at the end of rotation, they were reevaluated about their knowledge on cardiac arrest. Emergency medicine assistant designed pretest and posttest items. Toward this goal, 80 questions (4 items) which were similar in number, taxonomy

and complexity aspect and could cover all stages from diagnosis to curing, designed and verified by emergency medicine experts who were university members. For each period of tests, 20 items were randomly selected as posttest questions. All pre-test and post-test questions each had one score. Finally, the test scores of the two tests, before and after the training were calculated by the assistant.

Ethical issues

All legal permissions were acquired from Tehran University of Medical Sciences. The ethical committee of Tehran University of Medical Sciences (Ethical code# IR.TUMS.MEDICINE.REC.1396.4196) approved the study. This study followed ethical principles of Declaration of Helsinki. Moreover, This paper was extracted from the specialty medical thesis in emergency medicine of Farnaz Takavar (Thesis #43294) in Tehran University of Medical Sciences Faculty of Medical (Emergency Department).

Statistical analysis

Gathered data were analyzed using SPSS 23 software. Descriptive analysis was conducted through mean values of qualitative data and accordingly, frequency and frequency percent amounts were reported. 0.05 was regarded as the significance level. In order to analyze data, central indexes and distributive indexes were used. In analytic study, the normality of data was examined by Kolmogorov–Smirnov test and accordingly student t test or Mann-Whitney U test were selected. For each step of training of two groups, the level of interns' satisfaction was compared according to obtained scores. Moreover, analysis of covariance (ANCOVA) was aplied to compare posttest results based on the effect of pretest scores in two groups. Then, paired t test was established to separately compare pretest and posttest scores. In addition, Cohen's suggested method evaluated effect size to compare pretest and post-test scores. Interns' satisfaction level of courses was examined according to 10-point Likert scale.

Results

In this study, 34 men (46.6%) and 39 women (53.4) participated in this study. In face-to-face group 30 interns in their 4th month of internship and 7 interns in their 9th month of internship were studied. In WhatsApp group 31 interns of 17-month of internship and 5 interns of 11-month of internship were present.

Mean score of pretest (range 0 to 10) for face-to-face training was 6.64 ± 1.93 and 5.97 ± 2.0 for WhatsApp group. According to t test results, there was no significant difference between two groups in terms of pretest scores ($P = 0.29$; 95% CI= -14 to 0.43).

Post-test mean score (range 0 to 20) was 14.08 ± 2.84 for face-to-face group and 12.03 ± 3.22 for WhatsApp group. The median score of post-test were 14 and 12 for face-to-face and WhatsApp groups respectively. Mann–Whitney U test revealed that posttest score is significantly higher

than for face-to-face group compared to WhatsApp group (P = 0.03).

Establishing ANCOVA test as well as pretest scores monitoring, revealed that there is a significant difference between posttest scores of two groups of face-to-face and WhatsApp training (P = 0.01).

Percentage of scores was regarded to evaluate questions, since the number of pretest and posttest varied. Paired t test was established to compare the percent of correctly answered items in both pretest and posttest (Table 1). Although, a significant difference between pretest and posttest results was not observed for face-to-face training group, effect size measurement of 0.34 revealed that average knowledge level of interns is increasing for ACLS components.

In order to compare correctly answered items percentage in pretest and posttest, paired t test was employed (Table 2). There was no statistically significant difference between pretest and posttest for both groups. In addition, calculated effect size was very small (effect size = 0.02).

Mean value of interns' satisfaction in face-to-face training groups and WhatsApp groups were 7.68 ± 1.08 and 7.36 ± 1.19 respectively. Following abnormal distribution, Mann-Whitney U test was established to compare satisfaction values. Median value of satisfaction was 7 for both groups. The results of mentioned test suggested that there was no significant difference (P = 0.25).

Discussion

Based on finding, two groups have not shown substantial differences with respect to advanced cardiac resuscitation knowledge and their pretest scores were not significantly different. Although the two groups differed in the number of months they were interns, this difference was not large enough to lead to a significant difference in pre-test scores. After concluding training course, results were analyzed and it was revealed that directly trained group scored higher than WhatsApp group.

Between-groups (pretest and posttest) showed no meaningful difference in any studied group, but, direct (face-to-face) training group obtained a Cohen's effect size of 0.34 resulting to more prominent role of face-to-face

group on interns' ACLS knowledge.

Benefits of using applicable smart phone software has been shown in medical education area and for promoting students contribution, better process of feedback delivering, improving student-teacher communication (18-20). WhatsApp is an instant messaging mobile application that has been utilized in some primary health programs. Benefits of using this application are; a useful way to motivate users to have active collaboration. However, this application may not be useful for all kinds of training, as the current study suggested that slight improvement of interns' knowledge on ACLS can't be regarded statistically significant.

Applications like messengers can potentially improve and facilitate doctors' and students' communications. WhatsApp provides a secure and interactive platform for groups. This matters when students can easily state their questions, which leads to higher levels of motivation for users to be involved in training process.

Goals of learning and its complex concepts may be considered as a potential drawbacks of using messengers like WhatsApp. Another limitation that must be carefully monitored in using WhatsApp is the probability of delivering an incorrect or irrelevant message. Previous studies have announced concerns on distance training, which may be associated with students avoidance in case of presenting contexts out of class environment (18-21).

According to findings face-to-face training group showed better performance. However, this result may not accord other studies results, but various cases of subjects for training and study theme should be noticed to have more precise inferences. In this study, the critical subject of advanced cardiac resuscitation was chosen for interns' education, where there has never been a study about WhatsApp to be published yet. In addition, some interns in this study had not experienced advanced resuscitation course. There is the chance of different results in case of using WhatsApp for medical studies graduates who have passed these courses in order to be under continuous training in this area. Face-to-face training along with feedbacks allows teachers to identify any kind of problem and understand the content of it. That is a significant

Table 1. Mean value of correctly answered questions in pretest and posttest for face to face group

	Mean (SD)	Pretest and post-test mean difference	95 % CI	P value[a]
Pretest	64.59 (19.37)	5.81	- 1.11 to 12.71	0.09
Posttest	70.41 (14.21)			

[a] Paired t test.

Table 2. Mean value of correctly answered questions in pretest and posttest for WhatsApp group

	Mean (SD)	Pretest and post-test mean difference	95 % CI	P value
Pretest	59.72 (20.06)	0.41	- 6.02 to 6.85	0.89
Posttest	60.14 (16.10)			

[a] Paired t test.

matter, since there are concerns about decrease of active interactions during online learning procedure compared to conventional framework (22,23). This matter is approved in this study.

In a study in New York, the impact of face-to-face training (using moulage) and online simulated training (using computer) were studied. Four to 6 members groups of third year of medical college participated in a three-day training course. Second group consisted of those who were trained by computer and remotely. Comparing results of two groups showed more effectiveness of online courses (24).

In another study conducted in India, two conventional and hybrid methods of problem based learning for basic and advanced resuscitation were compared. This study considered learners' satisfaction about their understanding of the concepts, passion and motivation, personal skills and self-esteem for each mentioned method. In this study, lecture was initially performed and as a result, basic and advanced resuscitation practices were educated. All students participated in this part and then divided into two groups.

First group completed problem-based learning process at first day by collective discussion. Next day, second group completed collective discussion. In order to run collective discussions, students were divided into six group where each group included 10 to 12 members and administered by a teacher who has been certified by American Heart Association. Students filled course-satisfaction poll in two stages, one at the end of conventional training and another at the end of problem-based learning approach of training. Reported results of this research, suggested that the majority of students preferred problem-based learning method rather than conventional lecturing method. Likert scale scores showed that satisfaction level was significantly higher in problem-based learning group. Researchers concluded that simultaneous usage of problem-based learning approach and lecturing, promises higher level of satisfaction for students (25).

Conclusion
Advanced cardiac resuscitation training for face-to-face method was associated with better results in promoting knowledge of rotation interns of emergency medicine department, compared to WhatsApp training group. That's advisable to employ face-to-face training method for interns. In case of need for smart phones applications, other applications with different training approaches can be examined in future studies.

Limitations
The most prominent constraint is about lack of practical sessions on Moulage, the matter that has been focused on other studies. To have more reliable feedbacks, that would be advised to initially design the study in a way that interns could have been contributed in practical sessions and then have collective discussions on WhatsApp platform.

Another limitation was short-term presence of interns in emergency medicine rotation, where long time presence is preferred to show up at distance meetings on WhatsApp platform. For example, two more sessions provide an opportunity to introduce more scenarios leading to various outcomes.

Suggestions
Using different applications with other kinds of application as well as establishing other training approaches with more training time and by participating a larger statistical population of emergency medicine interns can be suggested as future studies, to gain better insight into the role of this kind of application in this area.

References
1. Nacca N, Holliday J, Ko PY. Randomized trial of a novel ACLS teaching tool: does it improve student performance? West J Emerg Med. 2014;15:913-8. doi: 10.5811/westjem.2014.9.20149.
2. Stempien J, Betz M. A prospective study of students' and instructors' opinions on Advanced Cardiac Life Support course teaching methods. CJEM. 2009;11:57-63. doi: 10.1017/s1481803500010927.
3. Lee CC, Im M, Kim TM, Stapleton ER, Kim K, Suh GJ, et al. Comparison of traditional advanced cardiac life support (ACLS) course instruction vs. a scenario-based, performance oriented team instruction (SPOTI) method for Korean paramedic students. J Emerg Med. 2010;38:89-92.
4. Lo BM, Devine AS, Evans DP, Byars DV, Lamm OY, Lee RJ, et al. Comparison of traditional versus high-fidelity simulation in the retention of ACLS knowledge. Resuscitation 2011;82:1440-3. doi: 10.1016/j.resuscitation.2011.06.017.
5. Delasobera BE, Goodwin TL, Strehlow M, Gilbert G, D'Souza P, Alok A, et al. Evaluating the efficacy of simulators and multimedia for refreshing ACLS skills in India. Resuscitation. 2010;81:217-23. doi: 10.1016/j.resuscitation.2009.10.013.
6. Wu WH, Jim Wu YC, Chen C-Y, Kao HY, Lin CH, Huang SH. Review of trends from mobile learning studies: A meta-analysis. Comput Educ. 2012;59:817-27.
7. Rambe P, Bere A. Using mobile instant messaging to leverage learner participation and transform pedagogy at a South African University of Technology. Br J Educ Tech. 2013;44:544-61.
8. Ventola CL. Mobile devices and apps for health care

professionals: uses and benefits. Pharmacy and Therapeutics. 2014;39:356-64.

9. Ventola CL. Social media and health care professionals: benefits, risks, and best practices. Pharmacy and therapeutics. 2014;39:491-520.

10. Walsh K. Mobile learning in medical education: review. Ethiop J Health Sci. 2015;25:363-6. doi: 10.4314/ejhs.v25i4.10.

11. Mars M, Scott RE. WhatsApp in clinical practice: a literature review. Stud Health Technol Inform. 2016;231:82-90.

12. Ajuwon A, Pimmer C, Odetola T, Gröhbiel U, Oluwasola O, Olaleye O. Mobile Instant Messaging (MIM) to support teaching practice: Insights from a nurse tutor program in Nigeria. Malawi Med J. 2018;30:120-126. doi: 10.4314/mmj.v30i2.12.

13. Kleinman ME, Brennan EE, Goldberger ZD, Swor RA, Terry M, Bobrow BJ, et al. Part 5: Adult Basic Life Support and Cardiopulmonary Resuscitation Quality: 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 2015;132:S414-35.

14. Link MS, Berkow LC, Kudenchuk PJ, Halperin HR, Hess EP, Moitra VK, et al. Part 7: Adult Advanced Cardiovascular Life Support: 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care.Circulation. 2015;132:S444-64.

15. Chilkoti G, Mohta M, Wadhwa R, Saxena AK, Sharma CS, Shankar N.Students' satisfaction to hybrid problem-based learning format for basic life support/advanced cardiac life support teaching. Indian J Anaesth. 2016;60:821-6.

16. Thorne CJ, Lockey AS, Bullock I, Hampshire S, Begum-Ali S, Perkins GD. E-learning in advanced life support–an evaluation by the Resuscitation Council (UK). Resuscitation. 2015;90:79-84. doi: 10.1016/j.resuscitation.2015.02.026.

17. Subramanian A, Timberlake M, Mittakanti H, Lara M, Brandt ML. Novel educational approach for medical students: improved retention rates using interactive medical software compared with traditional lecture-based format. J Surg Educ. 2012;69:449-52.

18. Makoe M. Exploring the use of MXit: a cell-phone social network to facilitate learning in distance education. Open Learning. 2010;25:251-7.

19. Nicholson S. Socialization in the "virtual hallway": instant messaging in the asynchronous web-based distance education classroom. Internet High Educ. 2002;5:363-72.

20. Bere A. Using mobile instant messaging to leverage learner participation and transform pedagogy at a south African university of technology. Br J Educ Technol. 2013;44:544-61.

21. Morton CE, Saleh SN, Smith SF, Hemani A, Ameen A, Bennie TD, et al. Blended learning: how can we optimise undergraduate student engagement? BMC Med Educ. 2016 4;16:195. doi: 10.1186/s12909-016-0716-z.

22. Kiviniemi MT. Effects of a blended learning approach on student outcomes in a graduate-level public health course. BMC Med Educ. 2014;14:47. doi: 10.1186/1472-6920-14-47.

23. Thorne CJ, Lockey AS, Bullock I, Hampshire S, Begum-Ali S, Perkins GD; Advanced Life Support Subcommittee of the Resuscitation Council (UK). E-learning in advanced life support--an evaluation by the Resuscitation Council (UK). Resuscitation 2015;90:79-84. doi: 10.1016/j.resuscitation.2015.02.026.

24. Nacca N, Holliday J, Ko PY. Randomized trial of a novel ACLS teaching tool: does it improve student performance?. West J Emerg Med. 2014;15:913-8. doi: 10.5811/westjem.2014.9.20149.

25. Chilkoti G, Mohta M, Wadhwa R, Saxena AK, Sharma CS, Shankar N. Students' satisfaction to hybrid problem-based learning format for basic life support/advanced cardiac life support teaching. Indian J Anaesth. 2016;60:821-6. doi: 10.4103/0019-5049.193669.