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Utilizing mobile health method to emergency nurses' knowledge about Emergency Severity Index triage

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Abstract:

BACKGROUND: Mobile health has the potential to revolutionize the role of educators by empowering nurses to take more responsibility for their own learning**.** Hence, this study was designed to examine the effect of mobile health method to emergency nurses' knowledge about Emergency Severity Index triage.

MATERIALS AND METHODS: A two groups' pool blind quasi-experimental study was performed on emergency department nurses working in hospitals affiliated with Isfahan University of Medical Sciences. The study was conducted from September to November 2014. Sample size was calculated as 35 participants in each group (a total of seventy participants). Participants were divided into two groups of mobile health and workshop, randomly. Participants' knowledge score was collected according to researcher-made questionnaire with twenty questions. SPSS version 11.5 was used to conduct statistical tests such as independent *t*-test and paired *t*-test for analyzing the data with the significant level <0.05.

RESULTS: The results show that there was not any significant difference between the knowledge scores of mobile health and workshop group before intervention, but there was a significant difference after 2-week intervention ($P = 0.012$).

CONCLUSION: The electronic program was an attractive education method for emergency nurses because in these method educators by empowering nurses to take more responsibility for their own learning. Hence, it is suggested that mobile health is used by authorities along with routine training, due to its less cost and spending less time.

Keywords:

Electronics, emergency service, hospital, knowledge, learning, nurse

Introduction

The Emergency Severity Index (ESI) is a system of triage categorization that is based on both treatment acuity (How soon should a patient be seen?) and resource consumption (What resources is the patient likely to require?). If a patient does not meet high acuity level criteria (ESI level 1 or 2), the triage nurse then evaluates expected resource needs to help determine a triage level (ESI level 3, 4, or 5). The ESI is intended for use by emergency nurses with triage experience or those who have attended a separate, comprehensive triage educational program.[1] Then, in addition to having enough experience, the triage nurse must have a thorough and comprehensive knowledge about the triage system.[2,3]

This is while there is no comprehensive university course for triage system in Iran, and most of the trainings are limited to issues of nursing and emergency, and there is only in-service retraining course for this group. In this regard, Aghababaeian *et al*. reported in their study that the awareness and practice of emergency nurses about triage need to attention more.[4] The results

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of a study by Mirhaghi and Roudbari also point in the same direction, such that in this study, too, the knowledge and practice of the nurses about triage is estimated to be poor in Zahedan University of Medical Sciences.[5] These studies suggest that triage is run in hospitals while enough knowledge is not provided to nurses about it, and it is the responsibility of nursing teachers to teach effectively and efficiently to improve knowledge and even decision-making skill in nurses as a member of health-care system.

Meanwhile, the use of modern training methods can help nursing teachers achieve this goal. E-learning can be cited as one of the modern training methods. In other words, in today's world, nursing teachers have also concluded that training and learning cannot be limited in the form of class and even school days, and they are seeking a way to take the process of learning and training out of the limits of time and space.[6] E-learning is one of the modern training methods that eliminates these limitations and put a new horizon to the nursing teachers. In this regard, Wilkinson *et al*. showed that most nurses prefer using e-learning to learn because this type of training has minimized the limitations of time and space and ultimately has increased the quality of learning.[6]

Electronic learning, as one of the most important applications of information technology, is a type of solitary education which is offered in various forms, such as online learning, computer-based learning, web-based learning, and offline learning, and mobile technology,[4,7-9] in which learners will have the opportunity to achieve educational goals depending on their talents.[10]

Mobile technology is one of the new concepts which is used to describe the services supported by mobile communication services such as patient monitoring, smartphones, tablet, and computers.[11] In clinical and educational environments, using mobile technology has grown significantly as other forms of e-learning. In nursing training programs, mobile health expanded the learning capacity by strengthening the process of remembering and organizing a large number of variables and data in clinical setting.

In other words, in the mobile health method, by participation of the learner in the process of learning, training has been made an active process and part of the training is put on the learner's shoulders. In this regard, Chioh *et al*. reported in their study that 81.9% of nursing students believed that using personal digital assistant (PDA) has been useful in the clinical setting and even class.[12] In addition, in the study conducted by George *et al*. in the setting of clinic, class, and even the daily schedule, the results showed that 71% of nursing students are using these tools to increase their efficiency.[13] This is while in Schlairet study aiming to assess the knowledge and attitudes of nurses in the clinical setting following the use of PDA, the results showed that the average knowledge score between the two groups of intervention and control had no significant difference before and after the intervention.[14]

In total, according to the contradictory results above, and that no study has been reported in Iran aimed at using mobile technology in triage training, and due to the fact that virtual training methods in lifelong and continuing trainings are important and binding in all jobs and occupations, especially the nursing profession,[5] the present study has been designed to investigate the impact of mobile-based training on nurses' knowledge of ESI triage training.

Materials and Methods

A randomized, quasi-experiment, pre- and post-test, control group, and single-blind design was used to investigate the effect of mobile health method to emergency nurses' knowledge about ESI triage. The study was conducted from September to November 2014. The study was approved by the Ethics Committee of Isfahan University of Medical Sciences (IUMS). For blinding purposes, the results from the random allocation of participants into the study groups were not disclosed to the research assistant who was analyzing the data. Sample size was calculated as 35 participants in each group (a total of seventy participants) by the use of mean comparison formula:

$$n = \frac{Z^2 P(1-P)}{d^2}$$ (n = sample volume, Z = confidence level, P = expected prevalence, d = accuracy).

Sampling method was random. From the list of hospitals affiliated to IUMS, two hospitals were selected based on random number table, and mobile health and workshop methods were considered for the first and second hospitals, respectively. In the next phase, based on the census method and the list of emergency department nurses, training of workshops and mobile was assigned to each of the groups. In mobile group, the software of triage training was put in the mobile of each training unit. The software contained ESI triage education through text, pictures, animation, and sound, as well as a slideshow. This 45-min software contained ESI triage education. Educational content was in the type of a web page or Flash Video, Windows Media Video, and MPEG-4 (MP4) as these formats can be used in a closed line web. After the explanation was given to the nurses as to how to use the software, they were informed that they would be asked some related questions 2 weeks later.

In the second group, after the choice of participants and coordination with them, to participate in the triage training workshop, they are asked to complete the occupational demographic questionnaire and then knowledge questionnaire. Similar to the e-learning group, the nurses participating in the workshop were also informed that 2 weeks after the end of the workshop, knowledge questionnaire will be completed. In this method, triage training was presented to the participants in the form of workshops running by researchers. In this method, all participants underwent in-person training for 2 h using lecture with questions and answers and teaching aids such as slides and video projector. The training contents will be prepared based on the latest items and resources available about the issues and trainings of triage under the supervision of emergency medicine expert, faculty member of IUMS. Before both training interventions, triage training knowledge questionnaire of emergency intensity profile was completed for both groups. Moreover, 2 weeks after the intervention in both groups, the questions related to knowledge were recollected by visiting the participants' working place at their resting time.

The inclusion criteria were as follows: having a phone number to contact; having a computer or a VCR at home and being able to use them. Furthermore, the exclusion criteria of the study included attending classes related to the teaching of triage during the study and failure to participate in one of the stages of the test. The instrument used in this study was consisted of two parts. The first part included eight questions on demographic data. The second part of the instrument was knowledge' questionnaire related to ESI triage. The questionnaire was included twenty questions with a score range of 0–20. This questionnaire was designed through the use of references and textbooks, and its validity was confirmed by faculty members of IUMS. Its reliability was confirmed by use of a pilot study (questionnaire was given to ten nurses and calculation of Cronbach's alpha ($\alpha = 0.83$). Data were analyzed by Student's *t*-test and paired *t*-test (acknowledge score after and before in each groups) through SPSS version 11.5 (SPSS Inc., Chicago, IL) with a significance level of $P < 0.05$.

Results

In this study, 63% were female, 57% were single, and 80% had a bachelor in nursing. Furthermore, the mean ± standard deviation age, the mean working experience, and the mean working hours of the nurses were 33.21 ± 7.31 years, 6.12 ± 7.42 years, and 49.12 ± 6.64 h/week, respectively [Table 1].

Independent *t*-test showed that there was no significant difference in mean total age ($P = 0.23$), working experience ($P = 0.12$), and working hours of the nurses ($P = 0.41$), before the study between the two groups that meant the two groups were homogeneous.

Table 2 shows that the mean knowledge' score related to triage education within two groups, that is, electronic and workshop after the intervention in compared to before the intervention has increased significantly.

In addition to these changes, knowledge' scores in both groups showed the highest increase in electronic (78%) compared to workshop group (41%). Furthermore, mean difference results showed a significant difference in the percentage of knowledge score change (an increase) in both groups ($P = 0.013$).

Discussion

According to the study results, there was a significant increase in the mean score of knowledge after intervention than before the intervention in both workshop and mobile health groups. In other words, this increase reflects the effectiveness of both educational methods in changing the level of nurses' knowledge about ESI triage training. It should be noted that the low level of nurses' knowledge about the ESI triage is an undeniable matter; therefore, the low mean score of knowledge before training shows the insufficient training courses for the nurses and the need for more effective training courses in the field of triage.

In this regard, findings of the current study indicated that the mobile health improves nurses' knowledge level.

Table 1: The demographic characteristics of emergency nurses participated in the study

Variables	*n* (%)
Gender	
Male	45 (63)
Female	25 (37)
Marriage	
Single	40 (57)
Married	30 (43)
Education	
Bachelor of nurse	56 (80)
Master of nurse and more	14 (20)

Table 2: Comparison of mean scores of nurse's knowledge with Emergency Severity Index triage education before and 2 weeks after intervention in two groups

Knowledge	Mean±SD		*t*-test results
	Electronic learning group	Workshop group	
Before intervention	11±1.41	12.01±2.13	*P*=0.231
2 weeks after intervention	18.40±3.14	15.71±2.23	*P*=0.012
Paired *t*-test results (*P*)	0.025	0.003	

SD=Standard deviation

Therefore, the use of mobile health not only increases nurses' knowledge of triage trainings but also saves time and possible costs knowledge.[15] In this regard, the results of a study conducted by Mohamadirizi *et al*. (2015) showed that the learners' knowledge about postpartum health multimedia group was higher than the pamphlet group.[16] Therefore, using of mobile health can be suggested as an effective alternative method for improving the quality of training in nurses. Studies have also shown that virtual method has beaten facilities and conditions for learners in terms of time, place, and even economy.[7,17]

Another advantage of using mobile health is using various forms of training including texts, images, animations, and sound which would cause better content lasting and learning. In virtual learning, information can be delivered to nurses at home, when traveling, and at any time and can be printed when necessary. In this regard, Langkamp *et al*. (2001) state that when a combination of verbal and written teaching is used, it is more useful than verbal learning alone.[17] Findings of Mohamadirizi *et al*. (2017) Iran also shown that using virtual education has increased the level of satisfaction and acknowledge of patients with multiple sclerosis of the trainings related to the disease.[9]

Another advantage of mobile health method is setting the programs for nurses training according to the plan of their works while low Internet speed and inability to download many training program are of limitations of mobile health. Moreover, electronic education method had a higher effect on level of knowledge about ESI triage among emergency nurses compared to workshop method; health providers are suggested to apply this method to increase nurses' knowledge.

Conclusion

The results obtained are evidence to confirm the effects of mobile health; they also suggest that using of mobile health method increases the knowledge of nurses more than the workshops. Since organizing educational programs is highly effective in increasing the knowledge of nurses, mobile health can be used by authorities alongside traditional training due to its less cost and time needed. Although the participants were assured about the confidentially of the data, it is possible that some questions were not sincerely answered. In addition, due to heavy workload, researchers could not gather the questionnaires immediately after completion, and the participants were asked to hand in their own questionnaires at the end of their work shifts. It is recommended that further studies be conducted on other groups of health-care providers with larger sample sizes.

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Conflicts of interest

There are no conflicts of interest.

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