



Effect of education using the virtual social network on the knowledge and attitude of emergency nurses of disaster preparedness: A quasi-experiment study



Tahereh Najafi Ghezeljeh^{a,b}, Jaleh Mohammad Aliha^{b,*}, Hamid Haghani^{b,*}, Naser Javadi^{b,*}

^a Nursing Care research Center, Iran University of Medical Sciences, Tehran, Iran

^b School of Nursing and Midwifery, Iran University of Medical Sciences, Tehran, Iran

ARTICLE INFO

Keywords:
Attitude
Disaster
Distance learning
Knowledge
Nurse

ABSTRACT

Background: Nurses play an important role in helping people to cope with disasters. Dealing with disasters requires proper knowledge, attitudes and skills that can be achieved through education. Education through virtual social networks as a method of distance education can be used due to its accessibility and ease of use.

Objectives: To investigate the effect of education using the virtual social network on the knowledge and attitude of emergency nurses of disaster preparedness.

Design: This was a pre-test and post-test quasi-experimental study with a control group.

Setting: The study was conducted in two hospitals in Tehran, Iran.

Participants: A total of 60 nurses (n = 30 nurses in each group) participated in this study. Before the study, they signed the informed consent form.

Methods: They were selected using a census method and were divided into two control (n = 30) and intervention groups (n = 30). Data was collected before and after the intervention using the disaster preparedness questionnaire. The intervention group received 34-session education of disaster preparedness via the virtual social network (Telegram application). Data was analyzed using descriptive and inferential statistics via the SPSS v.22 software.

Results: No statistically significant difference was reported between the groups regarding the pretest knowledge score, but the posttest knowledge score was significantly higher in the intervention group compared to the control group (p < 0.001). In the intervention group, knowledge scores significantly increased at the posttest compared to the pretest (p < 0.01). No a similar condition happened in the control group. While the posttest attitude score was higher than the pretest attitude score, it was not statistically significant.

Conclusions: A significant increase in the knowledge score of the intervention group was reported compared to the control group indicating the effectiveness of learning through the virtual social network. Also, the high level of attitude scores before and after education indicated the positive attitude of emergency nurses toward the need for disaster preparedness.

1. Introduction

Disaster is a serious disruption of the society function that results in economic and environmental problems (de Boer, 1990). Various disasters occur every day all over the world and have significant impacts on individuals and societies (Masellis, 1992; Sanyal and Routray, 2016).

According to the disaster statistical review, in the previous decade, the number of deaths of disasters was reported as 76,416 people, the

number of affected individuals are 199.2 million people, and the cost of damage was 153.7 million US dollars. In 2015, the mean of disaster occurrence was reported as 376, where the number of deaths and number of affected people were 22,765 and 110.3 million, respectively. The cost of damage was reported as 70.3 million dollars (Guha-Sapir, 2016). In 2017, 335 natural disasters affected over 95.6 million people, killed an additional 9697 people and costed a total of 335 million US dollars. Of 335 disasters, 136 occurred in Asia, 93 occurred in the US, 42 in Africa, 39 in Europe and 8 in the Oceania (CRED CRUNCH, 2018).

* Corresponding authors.

E-mail addresses: najafi.t@iums.ac.ir (T. Najafi Ghezeljeh), mohammadaliha.j@iums.ac.ir (J. Mohammad Aliha), haghani511@yahoo.com (H. Haghani), javadi.n@tak.iuums.ac.ir (N. Javadi).

<https://doi.org/10.1016/j.nedt.2018.12.001>

Received 17 August 2018; Received in revised form 4 November 2018; Accepted 2 December 2018

0260-6917/ © 2018 Elsevier Ltd. All rights reserved.

Asia is the most vulnerable continent with 44% of all disaster events, accounting for 58% of total deaths, and 70% of the total people affected. Asia-Pacific is the most disaster-prone region across the globe, but Iran among Asian countries has always been one of the most vulnerable countries to natural disasters. Iran as a developing and transitional country with a specific political and geographic map, has always been exposed to natural disasters including floods, earthquakes, droughts as well as man-made disasters such as war, car/aircraft accidents, industrial accidents so on (Ardalan et al., 2016). In 2015, the number of deaths caused by disasters and the number of people affected by disasters in Iran was reported as 109 and 26,493, respectively, with the damage cost of 636,000 dollars (Guha-Sapir, 2016). The 2017 Earthquake in western Iran was the fourth deadliest natural disaster and with the death of 454 people (CRED CRUNCH, 2018).

Iran as a country with specific geographic features has been exposed to natural and man-made disasters (Hossein Mardi et al., 2018; Sheikhbardsiri et al., 2018). Of 40 types of disasters happening over the globe, 31 disasters occur in Iran (Salari et al., 2013). The Center for Research on the Epidemiology of Disasters (CRED) has recorded the risks and consequences of disasters since 1900, and that the incident and consequences of disasters are increasing (Ardalan et al., 2016).

The disaster management cycle includes steps of reduction or prevention of losses, preparedness, response and recovery. Measures that should be taken by organizations to provide aid and healthcare services and reduce the risk of disasters are global challenges. In developing countries, lack of adequate funding for readiness in case of disasters increases vulnerability in terms of health, economic and social care issues (Abdelalim and Ibrahim, 2014). Therefore, disaster preparedness refers to activities that result in an appropriate response to disasters (Mathbor, 2007). Disaster preparedness ensures a readiness to effectively assist disaster victims (Fox et al., 2007).

The purpose of disaster preparedness is to ensure the presence of appropriate systems, procedures and resources and effective assistance to victims. Hence, disaster preparedness at hospitals is so important at local, provincial and national levels (Savoia et al., 2013). While World Health Organization (WHO) has emphasized the readiness of healthcare staff to deal with disasters, many countries are poorly prepared to deal with disasters (Aldrich and Benson, 2008; Bissell et al., 2004; Watson et al., 2007).

Emergency nurses are the important part of the healthcare system and should be fully aware of the importance and necessity of disaster preparedness (Hammad et al., 2017; Sonneborn et al., 2018). Nurses should develop their own ability, knowledge and attitude before and after disasters to provide appropriate healthcare services (Alzahrani and Kyratsis, 2017; Park and Kim, 2017; Tavan et al., 2016).

Recently, disaster preparedness has received considerable attention by researcher across the globe (Lam et al., 2018). With regard to disaster preparedness, the importance of nurses' readiness has been subject to a considerable debate. Hospitals' emergency departments are at the front line of the healthcare system. Nurses play an important role in disaster preparedness in emergency departments. Emergency department nurses should have sufficient experience and knowledge about how to manage different emergency situations (Leiba et al., 2006; Li et al., 2017). It is believed that Iranian nurses need improvement of their knowledge and preparedness in dealing with disasters because of their important role in the health care system in maintaining and promoting health during disaster (Aliakbari et al., 2014a, 2014b; Seyedin et al., 2015). Therefore, nurses, especially emergency nurses should be prepared to respond to any disaster condition to save people life.

2. Background

In Malaysia, researchers suggested that education of disaster preparedness for emergency nurses and community healthcare providers could improve their knowledge and practice in disaster management (Ahayalimudin et al., 2012). In the Roadmap of Iran's Disaster Health

Management, specialized education for healthcare workers has been emphasized (Ardalan et al., 2012).

The education approach should be tailored to the target group. Educational methods can be divided into distance and face-to-face methods. In the face-to-face education method, healthcare educators and learners are connected to each other, but in the distance method, the educator and learner can be far from each other (Baraz and Boromand, 2006).

In an Iranian study the effect of face-to-face education (via lecture) and distance education (via multimedia CDs) on nurses' clinical skills was examined and their equal effects were reported. Shortage of human resources, the importance of remaining up-to-date to provide healthcare services highlight the development of distance education for nurses (Ebadi et al., 2010). Another study showed that information presented via the distance learning method via software systems was more stable than the face-to-face method via lecture, and it saved time and energy (Farshi et al., 2011).

Advances in technology and communication increase the amount and speed of information sharing. In the past, books and teachers were the most important sources of information, but current information sources including personal computers and mobiles have been made widely and easily available to the general public (Rahal et al., 2018; Dehzingi and Farooq, 2018). Several studies indicated the important role of digital devices in raising knowledge and attitude of people (McDonald and Boulton, 2018; Yazdannik et al., 2018). Mobile learning is a form of distance education that promotes cognitive thinking skills (Carpenter et al., 2013).

In a systematic review on the use of mobile learning in higher education, Crompton and Burke (2018) reported that this method was considered for education especially in Asia (50%), and mobile devices with 43% were the most commonly used devices for this purpose. The social network is a social structure that is created by the collection of individual or organizations who have similar ideas. Therefore, social media can be used at individual and social levels for educating, sharing ideas, identifying issues and problem-solving, establishing social relationships, organizing corporate affairs, public policy-making, and guiding individuals to achieving education goals (Otte and Rousseau, 2002). In a study on nursing students' use of social media, they had positive perspectives about the use of social media and found it an engaging way to promote discussion and share related information (Price et al., 2018).

Recent developments in the communication technology have led to renewed interest in the use of virtual social networks in education (Rahal et al., 2018; Yazdannik et al., 2018). The number of virtual social network users is continually increasing worldwide, and the highest growth is observed in the Middle East. Telegram® with over 100,000 channels in Iran is one of the most popular social networks due to its high speed, users' active participation, and possibility of sharing multimedia (Ghaffari et al., 2017).

While some studies have been carried out on disaster preparedness (Fox et al., 2007; Sonneborn et al., 2018), no study has investigated disaster education through virtual social networks such as the Telegram software. Thus, the major objective of this study was to investigate the effect of education using virtual social networks on the knowledge and attitude of emergency nurses of disaster preparedness.

The necessity of emergency nurses' preparedness before the occurrence of a disaster, heavy workloads and time shortages of nurses, the efficacy of education via social media, as a type of distance education, was investigated in Iranian emergency nurses.

3. Participants and Methods

3.1. Study Design

This was a pre-test and post-test quasi-experimental study with a control group.

3.2. Sample and Recruitment

Participants were recruited from the emergency department of two hospitals in Tehran affiliated with Iran University of Medical Sciences (IUMS).

For sampling, of 34 nurses working at an urban hospital (hospital A) and 36 nurses at another urban hospital (Hospital B); from each hospital, 30 nurses were recruited for taking part in this study. Hence, the study population was consisted of 60 volunteer nurses working in the emergency department of hospital A, and hospital B in Tehran, Iran. They were selected using a census method. First, a hospital was randomly assigned to the control group (hospital A) and another was assigned to the intervention group (hospital B). Eligible nurses were selected using inclusion criteria. Inclusion criteria were willingness to participate, bachelor degree in nursing, work experience in the emergency department for at least 6 months, and use of a smartphone or any other digital device with the ability to install the social network of Telegram. Exclusion criteria included unwillingness to participate in the study and failure to fill out the questionnaire.

The subjects were divided to the control group ($n = 30$) and intervention group ($n = 30$).

3.3. Intervention

A social group was created in Telegram for the subjects of the intervention group, and they received education about disaster preparedness in 34 sessions, once per day in the form of text, image, and video clips. The number of education sessions was based on the education process in [Diab and Mabrouk's study \(2015\)](#). The educational content was consisted of materials presented in the book entitled "Hospital Preparedness for Disasters: A National Plan". This book was supported to be used by five faculty members of the School of Nursing and Midwifery at IUMS. The education outlines were hospital preparedness planning for disasters, guidelines for designing an early warning system for hospitals, explaining the process of activating the response program in hospital events, hospital incident command system (HICS), activating the HICS, and comprehensive guide to plan and response to HICS ([Khanke et al., 2013](#)). To ensure of reading the materials by the subjects, their online availability was checked every day. Also, they were asked that after reading materials in each session, they were required to send the message "done" via the Telegram to the group's admin (researcher). They were told that if they had any questions about the study topic, they could send messages to the researcher through the Telegram. Moreover, they were informed that in case of any technical problem and disruption in the Telegram, other social online messengers such as WhatsApp® would be used. In the control group, routine education was provided by the disaster management committee of the hospital during the study. At the end of the study and after the post-test phase, the control group also received the education materials.

3.4. Data Collection

The Farsi version of the disaster preparedness questionnaire (DPQ) was used. It was designed by [Ghanbari et al. \(2011\)](#) and was consisted of three sections: the first section had 8 items to survey individuals' demographic characteristics including age, gender, work experience, education level, management experience, history of attending educational classes in the field of disaster management, and history of disaster relief. These questions were answered by the subjects before the intervention. The second section included questions regarding the knowledge of disaster management and nursing responsibilities during disasters (27 items) based on the 4-point Likert type scale as score 1 was for the correct answer and score 0 was for the wrong answer. So, the total score range was from 0 to 27. Reliability of this section was examined by 20 emergency nurses working at an urban hospital in Noorabad, Lorestan. The Kuder-Richardson reliability coefficient was

calculated and was reported as 0.659. The test-retest correlation coefficient was reported as 0.87.

The third section was consisted of 20 questions regarding the attitude of nurses with a 4-point Likert-type scale (4 = very high, 3 = high, 2 = low, 1 = very low). The maximum and minimum knowledge scores were 27 and 0 and for the attitude were 80 and 20, respectively. The Cronbach's alpha coefficient was reported as 0.849, and the test-retest correlation coefficient was reported as 0.945. Validity of this section was confirmed by 10 instructors affiliated with Iran University of Medical Sciences. Questions were answered before and after the intervention by groups.

3.5. Data Analysis

Data analysis was conducted using descriptive statistics (frequency, mean and standard deviation) and inferential statistics (independent *t*-test, paired *t*-test, chi-squared test, and Fisher's exact test). Kolmogorov-Smirnov test was used to assess the normal distribution of data. Data was analyzed via the SPSS v.22 and the significance level was set as $p < 0.05$.

3.6. Ethical Issues

Prior to the study, ethical approval was sought from the Ethics Committee of Iran University of Medical Sciences (decree code: IR.IUMS.REC.1396.9411706004). The study was registered at the Iranian Registry of Clinical Trials (decree code: IRCT.20171011036720 N1). All nurses participating in this study signed the written consent form before taking part in this study.

4. Results

4.1. Demographic Data Characteristics

The demographic characteristics of the groups were examined for homogeneity ([Table 1](#)). There was no significant difference between the groups in terms of age, gender, the education level, work experience, work experience in the emergency room and history of education for disasters.

4.2. Knowledge Score

According to [Table 2](#), no statistically significant difference was reported between the groups in mean pretest knowledge scores. However, the mean posttest knowledge score was significantly higher in the

Table 1
Demographic characteristic of the participants.

Variables	Groups	Experimental	Control	P-value
		No. (%)	No. (%)	
Age, year, Mean \pm SD		29.10 \pm 4.29	28.20 \pm 3.20	0.565*
Work experience, year, Mean \pm SD		6.50 \pm 4.20	5.80 \pm 3.10	0.526*
Work experience in emergency room, year, Mean \pm SD		4.23 \pm 2.26	3.41 \pm 1.05	0/079*
Sex	Male	12(40)	11(36)	0.791***
	Woman	18(60)	19(63)	
Education	Bachelor	30(100)	28(93)	0.492**
	Master	0(0)	2(7)	
History of disaster class	Yes	8(26)	7(23)	0.766***
	No	22(74)	23(77)	

* Were analyzed by independent *t*-test.

** Were analyzed by Fisher exact test.

*** Were analyzed by chi-square test.

Table 2
Comparing mean scores of Knowledge and Attitude between and within experimental and control groups.

Groups		Experimental	Control	t-test result
		Mean ± SD	Mean ± SD	
Knowledge	Pre-test	13.53 ± 2.23	13.83 ± 2.24	t = 0.518, df = 58 p = 0.606
	Post-test	12.66 ± 2.65	20.16 ± 1.83	t = 12.71, df = 58 *p < 0.001
	Paired t-test result	t = 2.05, df = 29 p = 0.059	t = -17.75, df = 58 *p < 0.001	
	Changes	-0.86 ± 2.31	6.33 ± 1.95	t = 13.018, df = 58 *p < 0.001
Attitude	Pre-test	65.53 ± 9.40	67.40 ± 4.90	t = 0.958, df = 58 p = 0.342
	Post-test	66.53 ± 8.79	69.06 ± 3.84	t = 1.44, df = 58 p = 0.156
	Paired t-test result	t = -2.14, df = 29 p = 0.07	t = -3.259, df = 29 p = 0.057	
	Changes	1.00 ± 2.55	1.66 ± 2.81	t = 0.961, df = 58, p = 0.341

* statistically significant.

intervention group compared to that in the control groups ($p < 0.001$).

Also, a statistically significant difference was reported between the mean pretest and posttest knowledge scores in the intervention group ($p < 0.001$), but not in the control group (Table 2).

4.3. Attitude Score

In the pretest and posttest, the mean of attitude scores in the intervention group was higher than the control group. No statistically significant difference was reported between the groups (Table 2). No statistically significant difference was seen between the groups in terms of the mean scores of pretest and posttest knowledge (Table 2).

5. Discussion

This study aimed to investigate the effect of education using virtual social networks on knowledge and attitude of emergency nurses of disaster preparedness. No statistically significant differences in demographic characteristics, knowledge and attitude scores between the groups were found indicating that the groups are homogeneous.

The mean pre-test knowledge scores of the intervention and control groups were reported as 13.83 ± 2.26 and 13.53 ± 2.23 , respectively. There was no statistically significant difference between the groups in terms of knowledge of disaster preparedness before the intervention. At the beginning of the study, participants' knowledge was at a low level indicating an inadequacy of disaster management education at the hospital for nurses. The mean pre-test score of disaster preparedness knowledge in the nurses was at the middle range of DPQ's total scores. This can be related to the failure of considering appropriate courses regarding disaster and related topics in nursing education curriculum in Bachelor of Science degree.

The poor knowledge of disaster preparedness has been reported in previous studies. Consistently, Seyedin et al. (2015) indicated that the poor knowledge of emergency nurses about disaster preparedness in hospitals affiliated to IUMS. In the study by Ghanbari et al. (2011), the mean score of disaster preparedness knowledge in nurses was even lower than the second quartile of scores. In Shahrekord city in Iran, emergency nurses did not have necessary qualifications to deal with disasters (Aliakbari et al., 2014a, 2014b). Diab and Mabrouk (2015) also reported low knowledge scores of nurses before the intervention. In a descriptive study in Saudi Arabia, nurses' knowledge of disaster preparedness was undesirable (Abdelalim and Ibrahim, 2014). In Malaysia, emergency nurses had also inadequate knowledge of disaster management (Ahayalimudin et al., 2012).

Results of this study reported that the mean post-test knowledge scores of the intervention and control groups were reported as 20.16 ± 1.83 and 12.66 ± 2.65 , respectively. The mean post-test scores of disaster preparedness knowledge in the control group was at a middle range and in the intervention group, it was at the third quartile of DPQ's total scores. After the intervention, the knowledge of emergency nurses in the control group was still at a low level, but the knowledge of nurses increased in the intervention group.

The mean posttest knowledge scores increased significantly by about 25% in the intervention group compared to the control groups. Also, the difference between the mean knowledge scores of pretest and posttest was higher significantly in the intervention group compared to that in the control group. While changes in the knowledge of nurses in the control group were not statistically significant, but in the intervention group, they were statistically significant. Hence, disaster preparedness education via virtual social networks increased the knowledge of emergency nurses. This finding confirmed the effectiveness of education via Telegram in nurses' education about disaster preparedness. In the control group, no statistically significant difference was found in the mean scores of nurses' knowledge indicating that education provided by disaster management committee of hospital was inadequate. A possible explanation for this increase could be the effectiveness of education through Telegram. Similarly, Ghaffari et al. (2017) reported the effectiveness of Telegram in the education of breastfeeding to mothers. A few studies investigated the impact of virtual social networks on education. Lin and Lin (2016) and Button et al. (2014) reported that mobile education could be beneficial for nurses. Kenny et al. (2012) reported that about 75% of faculty members and nurses used mobile phones as an education method. However, Zare and Sarikhani (2015) stated that the use of mobile phones for education is affected by some limitations. The American Center for Disease Control and Prevention considers social networks a useful tool for health education (Crespo, 2007). Therefore, in this study, nurses were educated in disaster preparedness using the Telegram, as the most popular and most engaging social network among Iranians.

In the study of Ghanbari et al. (2011) in Tehran, nurses received face-to-face education in a one-day workshop on disaster preparedness and management as well as group discussions. It was shown an increased knowledge of nurses about disaster preparedness. In Egypt, disaster preparedness education via both distance (educational booklet) and face-to-face methods (lecture) after one month increased nurses' knowledge. Farshi et al. (2011) showed that distance education (via multimedia CDs) was more effective than face-to-face education (via lecture), and saved nurses' time and energy. In this study, distance

education was provided via the Telegram software and could considerably improve the disaster preparedness knowledge of emergency nurses. Therefore, it can be applied for nurses' education in various topics.

This study reported that the mean pre-test attitude scores in the intervention and control groups were reported as 67.4 ± 4.9 and 65.53 ± 9.4 , respectively. The mean attitude scores were not significantly different between the groups before the intervention. The reported scores were at the third quartile of DPQ's total scores indicating their attitudes about getting ready to respond to disasters appropriately. It is believed that education provided by the disaster management committee of hospitals on nurses' attitudes of disaster preparedness was adequate. This positive attitude can be attributed the Iran's disaster-proneness. Iran as a developing country with a specific political and geographic role, has always been exposed to natural disasters such as floods, earthquakes and droughts as well as man-made disasters such as war, car/aircraft accidents, and industrial accidents (Ardalan et al., 2016). Similarly, in the study of Ghanbari et al. (2011), the mean pre-test attitude scores of nurses were high. In the study of Abdelalim and Ibrahim (2014) in Saudi Arabia, the attitudes of subjects regarding disaster preparedness was at a good level before the intervention. In Malaysia, the attitude of emergency nurses and community health nurses of the need for disaster preparedness was positive before education (Ahayalimudin et al., 2012). However, in Egypt, the attitude of nurses of the necessity of disaster preparedness was reported as poor before the intervention (Diab and Mabrouk, 2015). The difference could be related to differences in countries in terms of type of disasters, educational priorities in nursing schools and hospitals so on. More studies are needed on factors affecting the attitudes of nurses in different wards of the hospital and different countries in terms of disaster preparedness.

Furthermore, the mean post-test attitude scores of subjects in the intervention and control groups were reported as 69.06 ± 3.84 and 66.53 ± 8.79 , respectively. No statistically significant difference was reported between the groups in terms of the attitude after intervention. Comparing the pre-test and post-test attitude scores of the subjects in both groups, no statistically significant difference was reported. The post-test attitude scores was at the third quartile of DPQ's total scores. Comparing the pre-test scores, no considerable improvement in the attitudes of nurses after the intervention was reported. In the study of Ghanbari et al. (2011), both test and post-test attitude scores were at the third quartile of total scores. In the Diab and Mabrouk (2015)'s study, nurses attitudes after the intervention through educational booklets and lecture were changed from poor to moderate. Attitude is a set of beliefs, emotions and behavioral intentions in relation to an object, person or event. It is a relatively stable tendency towards a person, something or an event that manifests itself in the feeling and behavior (Gholipour, 2007). It is believed that nurses have a relatively high tendency to disaster preparedness, and by choosing this new education nurses' preparedness to respond to disasters was achieved. The use of virtual social networks for nursing education makes that individuals with personal and portable digital devices such as cell phones can easily benefit from it.

The effectiveness of Telegram in nurses' education in disaster preparedness has been shown before. A possible explanation for such an increase can be the effectiveness of the Telegram for education. Similarly, Ghaffari et al. (2017) reported the effectiveness of Telegram for educating breastfeeding in mothers. A few studies investigated the impact of virtual social networks on education. Lin and Lin (2016) and Button et al. (2014) reported that mobile education was beneficial for nurses. Kenny et al. (2012) reported that about 75% of faculty members and nurses used mobile phones as an education method. However, Zare and Sarikhani (2015) stated that the use of mobile phone for education has some limitations. The American Center for Disease Control and Prevention considers social networks a useful tool for the education of health-related topics (Crespo, 2007).

The disaster preparedness education via the Telegram software in this study had no considerable effect on the attitudes of emergency nurses of disaster preparedness. More studies are recommended to determine the appropriate educational approach to improve nurses' attitudes. This technique can be used in combination with other educational methods to affect nurses' attitudes. More studies are required to examine factors affecting the knowledge and attitudes of nurses of disaster preparedness at the international level. Therefore, nurses were educated for disaster preparedness using the social network of Telegram, as the most popular and most engaging social network in Iran.

6. Limitations of Study

In this study, a random allocation method was not used to avoid contamination. Also, this study only studied the effect of the knowledge and attitudes of nurses of disaster preparedness. Moreover, only emergency nurses of two hospitals were recruited in our study. Since a standard tool for measuring the performance of nurses or healthcare staff in dealing with disasters was not found, a tool for measuring performance of nurses in dealing with disasters should be developed.

7. Conclusion

This was the first study on the use of virtual social networks to educate nurses for disaster preparedness. Disaster preparedness education via online social networks could affect the knowledge of emergency nurses, but had no impact on their attitudes of disaster preparedness. Due to the high workload and time shortages of nurses, online education via social media can be used for disaster preparedness education and improve the knowledge of nurses in emergency departments. This study did not evaluate the performance of nurses. Therefore, further research on the effect of education using virtual social networks on the performance of nurses is suggested.

Conflict of Interest

There is no conflict of interest.

Acknowledgment

This article was the result of a master's degree thesis in nursing at Iran University of Medical Sciences. The authors would like to thank the research deputy of the university, faculty of nursing and students for participating in this study.

Funding

This project was funded by Iran University of Medical Sciences.

References

- Abdelalim, F., Ibrahim, A., 2014. Nurses knowledge, attitudes, practices and familiarity regarding disaster and emergency preparedness – Saudi Arabia. *A. J. Nurs. Sci.* 3 (2), 18–25.
- Ahayalimudin, N., Ismail, A., Saiboon, I.M., 2012. Disaster management: a study on knowledge, attitude and practice of emergency nurse and community health nurse. *BMC Public Health* 12 (Suppl. 2), A3. <https://doi.org/10.1186/1471-2458-12-S2-A3>.
- Aldrich, N., Benson, W.F., 2008 Jan. Disaster preparedness and the chronic disease needs of vulnerable older adults. *Prev. Chronic Dis.* 5 (1), A27. 18082016.
- Aliakbari, F., Aein, F., Bahrami, M., 2014a. Assessment competencies among emergency nurses for responding in disaster situation with objective structured clinical examination. *J. Health Promot. Manag.* 3 (3), 47–57.
- Aliakbari, F., Bahrami, M., Aein, F., Khankeh, H., 2014b. Iranian nurses' experience of essential technical competences in disaster response: a qualitative content analysis study. *Iran. J. Nurs. Midwifery Res.* 19 (6), 585–592. 25558255 (Nov).
- Alzahrani, F., Kyratsis, Y., 2017. Emergency nurse disaster preparedness during mass gatherings: a cross-sectional survey of emergency nurses' perceptions in hospitals in Mecca, Saudi Arabia. *BMJ Open* 7 (4), e013563. <https://doi.org/10.1136/bmjopen-2016-013563>. (Apr 11).

- Ardalan, A., Rajaei, M.H., Masoumi, G.H., Azin, A., Zonoobi, V., Sarvar, M., Vaskoei Eshkevari, K.H., Ahmadnezhad, E., Jafari, G.H., 2012. Roadmap of I.R. Iran's disaster health management. *PLoS Curr.* 4, e4f93005fbc34. <https://doi.org/10.1371/4f93005fbc34>. (Jul 16).
- Ardalan, A., Khanke, H.R., Mehrabi Tavana, A., Nejati, A., Masoumi, G., Hajebi, A., Nekoei Moghadam, M., Yarmohammadian, M.H., Hoseinzadeh, M.J., Jonidi Jafari, A., Sorani, M., Nasiri, A., Mohammadi, H., 2016. Textbook of Health in Emergencies and Disasters. Mehr Ravash, Tehran, pp. 2–14.
- Baraz, S.M.E., Boromand, B., 2006. Comparison of two methods of face to face and distance education self-care on quality of life and physical problems in patients treated with maintenance hemodialysis. *Rahavard-e-Danesh.* 9 (1), 1–13.
- Bissell, R.A., Pinet, L., Nelson, M., Levy, M., 2004. Evidence of the effectiveness of health sector preparedness in disaster response: the example of four earthquakes. *Fam. Community Health* 27 (3), 193–203. <https://doi.org/10.1016/j.fch.2004.07.002>. (Jul–Sep).
- Button, D., Harrington, A., Belan, I., 2014. E-learning & information communication technology (ICT) in nursing education: a review of the literature. *Nurse Educ. Today* 34 (10), 1311–1323. <https://doi.org/10.1016/j.nedt.2013.05.002>. (Oct).
- Carpenter, R., Theeke, L., Smothers, A., 2013. Enhancing course grades and evaluations using distance education technologies. *Nurse Educ.* 38 (3). <https://doi.org/10.1097/NNE.0b013e31828dc2d7>. 114–7. (May–Jun).
- CRED CRUNCH, 2018. Natural Disasters in 2017: lower mortality, higher cost. Research Institute Health and Society, Université Catholique de Louvain, Brussels, Belgium. www.cred.be.
- Crespo, R., 2007. Virtual community health promotion. *Prev. Chronic Dis.* 4 (3), A75. [17572979](https://doi.org/10.1186/1745-2979-4-3-A75) (Jul).
- Crompton, H., Burke, D., 2018. The use of mobile learning in higher education: a systematic review. *Comput. Educ.* 123, 53–64. <https://doi.org/10.1016/j.compedu.2018.04.007>.
- de Boer, J., 1990. Definition and classification of disasters: introduction of a disaster severity scale. *J. Emerg. Med.* 8 (5), 591–595. [2254608](https://doi.org/10.1016/0729-6622(90)90008-8) (Sep–Oct).
- Dehzangi, O., Farooq, M., 2018. Portable brain-computer interface for the intensive care unit patient communication using subject-dependent SSVEP identification. *Biomed. Res. Int.* 2018, 9796238. <https://doi.org/10.1155/2018/9796238>. (Feb 5).
- Diab, M., Mabrouk, S., 2015. The effect of guidance booklet on knowledge and attitudes of nurses regarding disaster preparedness at hospitals. *J. Nurs. Educ. Pract.* 5 (9), 9–17.
- Ebadi, A., Khaghanizadeh, M., Hosseini, S., Raeisifar, A., Masoumi, M., Mahmoudzadeh, F., Mollahadi, M., 2010. Comparison the effect of conventional and distance training on nurses' clinical skills. *J. Mil. Med.* 12 (2), 71–74.
- Farshi, M., Babatabadardarzi, H., Mahmoudi, H., Mokhtarinori, J., 2011. Comparison of nursing care learning in air evacuation and transport by lecture and e-learning methods. *Iran. J. Mil. Med.* 14 (1), 27–31.
- Fox, M.H., White, G.W., Rooney, C., Rowland, J.L., 2007. Disaster preparedness and response for persons with mobility impairments: results from the University of Kansas nobody left behind study. *J. Disabil. Pol. Stud.* 17 (4), 196–205. <https://doi.org/10.1177/10442073070170040201>.
- Ghaffari, M., Rakhshanderou, S., Mehrabi, Y., Tizvir, A., 2017. Using social network of TELEGRAM for education on continued breastfeeding and complementary feeding of children among mothers: a successful experience from Iran. *Int. J. Pediatr.* 5 (43), 5275–5286. <https://doi.org/10.22038/ijp.2017.22849.1915>.
- Ghanbari, V., Maddah, S.S., Khankeh, H.R., Karimloo, M., Ardalan, A., 2011. The effect of a disaster nursing education program on nurses' preparedness for responding to probable natural disasters. *Iran J. Nurs.* 24 (73), 72–80.
- Gholipour, A., 2007. Organization Behavior Management. Samt, Tehran, pp. 107.
- Guha-Sapir, D., Ph, Hoyois, R., Below, 2016. Annual Disaster Statistical Review 2015: The Numbers and Trends. CRED, Brussels.
- Hammad, K.S., Arbon, P., Gebbie, K., Hutton, A., 2017 Nov. Moments of disaster response in the emergency department (ED). *Australas. Emerg. Nurs. J.* 20 (4), 181–185. <https://doi.org/10.1016/j.aenj.2017.10.002>.
- Hossein Mardi, A., Khaghani, A., MacDonald, A.B., Nguyen, P., Karimi, N., Heidari, P., et al., 2018. The Lake Urmia environmental disaster in Iran: a look at aerosol pollution. *Sci. Total Environ.* 633, 42–49. <https://doi.org/10.1016/j.scitotenv.2018.03.148>. (Aug 15).
- Kenny, R.F., Van Neste-Kenny, J.M., Burton, P.A., Park, C.L., Qayyum, A., 2012. Using self-efficacy to assess the readiness of nursing educators and students for mobile learning. *Int. Rev. Res. Open Distributed Learn.* 3 (3). <https://doi.org/10.19173/irrold.v13i3.1221>.
- Khanke, H.R., Talebian, M.N., Masoumi, G., Sarvar, M., Daddost, L., Miadfar, J., Moradian, M.J., Ranjbar, M., Soltani, A., Babaii, J., Najani, M., Hoseini, A., Ardalan, A., 2013. Hospital Preparedness in Incidents and Disaster: National Program. University of Social Welfare and Rehabilitation Sciences, Tehran, pp. 25–250.
- Lam, R.P.K., Balsari, S., Hung, K.K.C., Hsiao, K.H., Leung, L.P., Leaning, J., 2018. How do doctors and nurses in emergency departments in Hong Kong view their disaster? A cross-sectional territory-wide online survey. *Disaster Med. Public Health Prep.* 12 (3), 329–336. <https://doi.org/10.1017/dmp.2017.71>. (Jun).
- Leiba, A., Goldberg, A., Hourvitz, A., Amsalem, Y., Aran, A., Weiss, G., Leiba, R., Yehezkeili, Y., Goldberg, A., Levi, Y., Bar-Dayyan, Y., 2006. Lessons learned from clinical anthrax drills: evaluation of knowledge and preparedness for a bioterrorist threat in Israeli emergency departments. *Ann. Emerg. Med.* 48 (2), 194–199. [16953532](https://doi.org/10.1016/j.annemergmed.2006.08.002) (Aug).
- Li, Y.H., Li, S.J., Chen, S.H., Xie, X.P., Song, Y.Q., Jin, Z.H., Zheng, X.Y., 2017. Disaster nursing experiences of Chinese nurses responding to the Sichuan Ya'an earthquake. *Int. Nurs. Rev.* 64 (2), 309–317. <https://doi.org/10.1111/inr.12316>. (Jun).
- Lin, Y.T., Lin, Y.C., 2016. Effects of mental process integrated nursing training using mobile device on students' cognitive load, learning attitudes, acceptance, and achievements. *Comput. Hum. Behav.* 55, 1213–1221. <https://doi.org/10.1016/j.chb.2015.03.076>.
- Masellis, M., 1992. Thermal agent disaster and fire disaster: definition, damage, assessment and relief operations. In: Masellis, M., Gunn, S.W.A. (Eds.), *The Management of Mass Burn Casualties and Fire Disasters: Proceedings of the First International Conference on Burns and Fire Disasters*. Springer Netherlands, Dordrecht.
- Mathbor, G.M., 2007. Enhancement of community preparedness for natural disasters: the role of social work in building social capital for sustainable disaster relief and management. *Int. Soc. Work.* 50 (3), 357–369. <https://doi.org/10.1177/002087280707604>.
- McDonald, E.W., Boulton, J.L., 2018. Davis J.L. E-learning and nursing assessment skills and knowledge - an integrative review. *Nurse Educ. Today* 66, 166–174. <https://doi.org/10.1016/j.nedt.2018.03.011>. (Jul).
- Otte, E., Rousseau, R., 2002. Social network analysis: a powerful strategy, also for the information science. *J. Inf. Sci.* 28, 441–453. <https://doi.org/10.1177/016555150202800601>.
- Park, H.Y., Kim, J.S., 2017. Factors influencing disaster nursing core competencies of emergency nurses. *Appl. Nurs. Res.* 37, 1–5. <https://doi.org/10.1016/j.apnr.2017.06.004>. (Oct).
- Price, A.M., Devis, K., Lemoine, G., Crouch, S., South, N., Hossain, R., 2018. First year nursing students use of social media within education: result of survey. *Nurse Educ. Today* 61, 70–76. <https://doi.org/10.1016/j.nedt.2017.10.013>. (Feb).
- Rahal, Z.A., Vadas, L., Manor, I., Bloch, B., Avital, A., 2018. Use of information and communication technologies among individuals with and without serious mental illness. *Psychiatry Res.* 266, 160–167. <https://doi.org/10.1016/j.psychres.2018.05.026>.
- Salari, H., Esfandiari, A., Heidari, A., Julae, H., Rahimi, S., 2013. Survey of natural disaster preparedness in public and private hospitals of Islamic republic of Iran (case study of shiraz, 2011). *Int. J. Health Syst. Dis. Manag.* 1 (1), 26–31. <https://doi.org/10.4103/2347-9019.122441>.
- Sanyal, S., Routray, J.K., 2016. Social capital for disaster risk reduction and management with empirical evidences from Sundarbans of India. *Int. J. Dis. Risk Reduct.* 19, 101–111. <https://doi.org/10.1016/j.ijdrr.2016.08.010>.
- Savoia, E., Preston, J., Biddinger, P.D., 2013. A consensus process on the use of exercises and after action reports to assess and improve public health emergency preparedness and response. *Prehosp. Disaster Med.* 28 (3), 305–308. <https://doi.org/10.1017/S1049023X13000289>. (Jun).
- Seyedin, H., Abbasi Dolatabadi, Z., Rajabifard, F., 2015. Emergency nurses' requirements for disaster preparedness. *Trauma Mon.* 20 (4), e29033. <https://doi.org/10.5812/traumamon.29033>.
- Sheikhbardsiri, H., Yarmohammadian, M.H., Khankeh, H.R., Nekoei-Moghadam, M., Raeisi, A.R., 2018. Meta-evaluation of published studies on evaluation of health disaster preparedness exercises through a systematic review. *J. Educ. Health Promot.* 7, 15. <https://doi.org/10.4103/jehp.jehp15917>.
- Sonneborn, O., Miller, C., Head, L., Cross, R., 2018. Disaster education and preparedness in the acute care setting: a cross sectional survey of operating theatre nurse's disaster knowledge and education. *Nurse Educ. Today* 65, 23–29. <https://doi.org/10.1016/j.nedt.2018.02.015>. (Jun).
- Tavan, H., Menati, W., Azadi, A., Sayehmiri, K., Sahebi, A., 2016. Development and validation of a questionnaire to measure Iranian nurses' knowledge, attitude and practice regarding disaster preparedness. *J. Clin. Diagn. Res.* 10 (8), IC06–IC09. <https://doi.org/10.7860/JCDR/2016/19894.8337>. (Aug).
- Watson, J.T., Gayer, M., Connolly, M.A., 2007. Epidemics after natural disasters. *Emerg. Infect. Dis.* 13 (1), 1–5. <https://doi.org/10.3201/eid1301.060779>. (Jan).
- Yazdankh, A., Dastjerdi, E.I., Mohamadirizi, S., 2018. Utilizing mobile health method to emergency nurses' knowledge about emergency severity index triage. *J. Educ. Health Promot.* 7 (10). https://doi.org/10.4103/jehp.jehp_29_17.
- Zare, M., Sarikhani, R., 2015. Obstacles to implementation of mobile learning in universities of medical sciences. *Iran. J. Med. Educ.* 15 (72), 571–578.