

DESIGNING A DISASTER TRAINING PROGRAM AND EXAMINING ITS IMPACT ON THE LEVEL OF COMPETENCE OF NURSING STUDENTS

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ABSTRACT

INTRODUCTION: Core competencies required for a nurse to be ready for disaster response. The gaps in education make it difficult to recruit nurses prepared to respond to a disaster. The aim of this study was to design a disaster preparedness training program and examine its impact on the level of competence of nursing students.

MATERIAL AND METHODS: A quasi-experimental design was used for 50 nursing students in semester 8 randomly assigned to the experimental and the control groups. A disaster educational program for nursing students was developed based on Harden's model. First need assessment was done and then the goals of the program were determined in the next stage, the educational content was organized based on the priorities of the students and teacher recommendations. In the next stage, the program was implemented and finally, the evaluation was carried out.

RESULTS: The mean age of the participant was 21.4 ± 2.14 and 57.1% of them were women. Compared with the control group, the experimental group showed a significant increase in disaster nursing competency after intervention ($t = 12.37, p < 0.001$).

CONCLUSIONS: This study provides evidence of the need and potential positive impact of disaster education opportunities for nurses.

KEY WORDS: training program; nursing student; competence; disaster

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INTRODUCTION

In recent years, the number and intensity of disasters have increased dramatically across the world. Due to its location, Iran is one of the most prone geographical areas for disaster. Disaster can occur at any time and create emergencies for the community, so

the preparation of the health care team as an important member of the disaster team to respond effectively to the disaster is essential [1]. Nurses play a key role in providing clinical care and they are essential members of the health care team that responds to disaster events. It is therefore important that nurs-

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es be adequately prepared during their education and graduate with the necessary competencies to effectively respond to disasters [2]. The definition of disaster nursing is currently a topic of discussion because in critical situations nursing is a unique job. Disaster nursing requires new concepts such as disaster care [3]. The international council of nursing (ICN) has defined nursing in disaster as follows: Systematic and flexible use of specific knowledge and skills related to disaster nursing and the expansion of a wide range of activities to reduce health risks and life threats that may arise due to the disaster and in other specific areas [4]. When a disaster occurs, a large number of people in the nursing profession need to provide the necessary support and care to the victims, so nurses must be able to use their skills and speed of action to provide the necessary care for these people, to prevent the aggravation of the problem and the occurrence of complications in them [5]. Therefore, they must acquire the necessary ability to participate effectively in providing services and give a systematic and efficient response to a disaster, since the lack of skills and competence of nurses in playing their role effectively and providing the necessary care to clients in a disaster can lead to aggravation of the problem and irreparable damage to victims and society [6], so we cannot wait for nurses to gradually gain the necessary experience. Also, it is necessary to assess the ability of nurses before being in real situations. Assessing the nurses' competence is crucially important to identify areas on professional development and educational needs, and also to make sure that nurses' competencies are put to the best possible use in disaster relief [7]. In spite of attempts to clarify the meaning and different aspects of disaster nursing competence, debates still continues [2].

One task for disaster preparedness is to prepare well-educated nurses to engage in relief operations, therefore, effective preparation of nurses and competency-based education is crucial [8]. One of the best times to improve students' knowledge and skills in this field is before they enter the clinic. In this time education can be more effective and improve their performance after attending the clinic. The clinical aspect of nursing education covers more than half of the training programs of the nursing course [9], and due to the creation of conditions and the real environment, prepares learners for the role of care, education, rehabilitation, and so on. according to the educational goals set for the disaster nursing in-

ternship unit, students must have the skill of managing pre-hospital situations related to emergencies and disasters after passing this course [10], and are expected to have a good level of competence in this field after passing the theory course and passing its internship courses in the clinic, but unfortunately in Iran, the results of researchers show that the quality of clinical education is not desirable and there are shortcomings in that field [11].

In Iran, besides mentioned issues, disaster nursing is poorly defined, required competencies have not been clearly stated, and education opportunities are scarce. For example, Salimi et al. [11] state that the clinical skills of nursing students in intensive care units are not at a good level, and Farnia [12] also reports that most nursing students believe that they have not been able to learn the skills needed to work in critical situations during their training. On the other hand, there are problems such as student density, lack of space, reduction of inpatient wards, shortening of hospital stays, student stress in the first encounter and consideration of patients' rights [13], and also in critical hospital situations, students are usually withdrawn and they are invited to remain silent, in which mere observation of such situations does not produce learning [14]. Therefore, in order to teach these skills, new ways must be used so that the student can better deal with real dangerous situations by focusing on dangerous situations without fear of harming the patient. One of these teaching methods is clinical simulation. Clinical simulation is the creation of an educational environment in which learning takes place through the use of a mannequin or group tool without the presence of a real patient. Nursing students in the simulated environment in the clinical skills center acquire the right skills by practicing and repeating and performing well in dealing with patients in a real environment [15]. Various researches have been done on the effect of simulated training by acquiring different skills. In a study, Faraji et al. [16] examined the effect of simulated training on nurses' readiness to perform triage of accidents. They concluded that there was a significant difference between the mean score of nurses' readiness to perform triage (knowledge and accuracy) in the intervention and the control groups.

In contrast, some researchers have concluded that simulated training is not significantly superior to traditional training. Anderson et al. [17] in a study examined the effect of teaching the basics of disaster management in the traditional compared with

role-playing simulation. They conclude that there is no significant difference in the behavior or satisfaction of nursing students in the two groups. So considering that appropriate training programs should be used for nurses before placing them in critical situations to improve their level of preparedness [18], the most important issue that should always be considered by the officials of health care providers is to develop a training program and train students effectively to prepare them to play an effective role in critical situations [19]. Training and acquiring competency in disaster nursing is an important part of students' preparation for disaster. Student courses based on needs assessment and review of graduates' opinions can well identify the various dimensions of the gap in this field and in the next step can be used to plan and design an appropriate program. In Iran, disaster nursing is poorly defined, required competencies have not been clearly stated, and educational opportunities for students, and other nurses, are scarce [20].

This research identifies the areas of required professional development and the associated educational needs of students, and will help to ensure that nursing students' competence is put to the best possible use in disaster relief. Considering the occurrence of disasters in different parts of Iran and the lack of a proper program for the readiness of nurse students to respond to disasters [21]. This study was conducted with the aim of designing a training program for disaster preparedness and investigating the effect of the program on the level of competence of nursing students to participate in disaster situations.

MATERIAL AND METHODS

Study design and setting

This quasi-experimental study was performed on 50 nursing students of Shahrekord School of Nursing and Midwifery in 2020. All students entered the study through a total census sampling method. First, a list of all nursing students was prepared, and all students who met the inclusion criteria (studying in the 7th and 8th nursing semester, and consented to participate in the study) entered the study. Then, the studied samples were assigned to the intervention and control groups using random number assignment software. Before and after the intervention, both groups completed a questionnaire to assess the level of competence of nurses to attend disaster situations. Then the intervention group was

educated through the designed training program and the control group received only the routine program. Harden's general step model was used to design the training program. Thus, in the first stage, the needs of the graduates were assessed regarding the gaps in the educational program, and also the professors of the nursing school who were in charge of teaching this course were surveyed. Based on the needs assessment and survey of professors and review of texts, the educational needs of students were determined (Tab. 1). In the second stage, after determining the educational needs, the goals of the program were determined, and in the next stage, based on the set goals, the educational content was organized. In the next stages, the program was implemented and an evaluation was performed [19].

According to the results of the survey, the educational contents were prepared and presented in the form of a three-day workshop program and educational maneuver. The main topics of the training program include: (1) special concepts and meanings related to disasters and the effects of disasters on health (2) disaster management and disaster management stages (3) risk assessment and possible vulnerabilities (4) disaster planning stages and (5) triage. Also, technical and specialized skills were taught to students in the form of working with anatomical models, role-playing simulation, educational videos, and working with pre-hospital emergency equipment. Finally, based on students' opinions, techniques that needed more practice were educated in the clinical skills center of the nursing school in a two-hour training session for two weeks.

Regarding moral and legal skills, a four-hour workshop was held for two days on moral and legal challenges in the caregiver in disaster situations, and supplementary contents were provided to students in the form of training files. Also, problem-based training and critical thinking approach were educated. Immediately after and three months after the intervention, both groups completed a questionnaire to assess the level of competence of nurses to participate in the disaster.

Ethical consideration

The present study was approved by Ethical Committee Medical Sciences University of Shahrekord (*Ethics code*: IR.SKUMS.REC.1398.075). Written informed consent was gained from all participants and they were assured that their provided information will remain confidential. After clarifying the

Table 1. Educational need assessment and training activities		
Domain	Educational needs	Teaching and learning activities
Teamwork and specific personal competence	<ul style="list-style-type: none"> • Knowledge about duties and organizational hierarchy, • Unity of command, • Self-management in a disaster situation, • Communication skills, • Skills of coordination and cooperation with the leader, • Ability to communicate and cooperate with relief forces and other team members 	<ul style="list-style-type: none"> • Increase communication skills and self-resilience through a Skill training program, • Lecture for increase knowledge about team working in disaster, • Tabletop maneuver for increase Critical thinking ability
Technical competence	<ul style="list-style-type: none"> • Ability to perform triage and ongoing assessment, • Ability to use their clinical skills to assist victims during a disaster; • Care of patients with multiple trauma, recognizing the types of shocks and related nursing care, • Providing essential care for a person with life-threatening injuries, • Familiarity with the CAB process, • Implementation of fluid therapy protocol in patients with burns during a crisis, • Ability to sew, provide care to victims of poisoning and bites, • Providing care to injured people suffering from frostbite or heatstroke during a disaster, • Ability to do endotracheal intubation, • Working with medical equipment (electroshock, suction, ventilator, electrocardiography, etc.) in times of disaster, • Ability to collect and record clinical information (reporting, etc.) in disaster, ability to implement or participate in decontamination 	<ul style="list-style-type: none"> • Field visit, • Increase knowledge about temporary settlement and tent hospitals through lecture practical exercises for trauma care, triage, and CPR, • Problem-based learning for dealing with problems in floods and earthquakes, • Skill training for: <ul style="list-style-type: none"> – Prehospital transfer skill – Wound management – Interviewing skill – Psychological first aid and – Need assessment – Skill lab training for working with medical equipment
Legal and ethical competence	<ul style="list-style-type: none"> • Ethical commitment, • Observing ethics, • Familiarity with the legal requirements, • Observing requirements 	<ul style="list-style-type: none"> • Problem-based learning for ethical value underpinning decision making in disaster, • Lecture for increase knowledge about legal rules in disaster and patient rights
Management competence	<ul style="list-style-type: none"> • Psycho-emotional stress management • Scene safety, • Assessment of required human and other resources, • Operational coordination and management of resources 	<ul style="list-style-type: none"> • Field visits for hazard assessment in a different disaster situations, • Action learning for distribution of resources in a disaster situation, • Role-playing in practical exercise for psycho-emotional stress management

study purposes and obtaining written consent from nursing students, students were allowed adequate time to complete the competency assessment questionnaire. The researcher reminded students that their participation in the study was voluntary and their information would be anonymous and confidential.

Data gathering

The study data were collected using the disaster nursing competency scale designed by Aliakbari et al. in 2014 [22]. This questionnaire has two parts. The first part collects demographic information and the second part consists of 50 research

Table 2. Sample characteristics						
Variable		Control group		Intervention group		p-value
		M ± SD		M ± SD		
*Age [years]		20.85 ± 3.25		12.12 ± 3.48		0.68
Characteristics		N	%	N	%	p-value
**Sex	Male	10	40	12	48	0.39
	Female	15	60	13	52	
**Participation in disaster education	Yes	7	26	10	22	0.45
	No	18	74	15	78	
**History of participating in the exercise and drills	Yes	5	20	8	32	0.61
	No	20	80	17	68	
**History of participating in disaster	Yes	1	4	2	8	0.50
	No	24	96	23	92	

* — based on independent t-test; ** — based on the chi-square test

questions with 4 subscales. These subscales were “management competency (12 questions)”, “individual-specific competency (6 questions) and “technical competency (23 questions)” rated on a 5-point Likert scale from very high (5) to very low (1), and “ethical and legal competency (9 questions)” rated on a 4-point Likert scale from rarely (1) to always (4). The minimum and maximum attainable scores in all domains are 50 and 244, respectively; obtaining a higher-than-cut-off point indicates the optimality of nurses’ disaster response competencies (The calculated cut-off for the whole tool was 95.91). This questionnaire is a valid and reliable tool. The validity of the tool has been demonstrated by Aghaei et al. [23]. The internal consistency assessed by Cronbach’s α coefficient has been reported to be higher than 0.88 for all subscales of the questionnaire and 0.96 for the whole scale. The test-retest method was also used to assess the reliability of the questionnaire. For this purpose, the questionnaire was twice administered to 20 nurses (not included in the main study) at a 2-week interval. The correlation coefficient between the 2 administrations in all subscales of the questionnaire was higher than 0.8.

Data analysis

Data were analyzed by SPSS version 21 (IBM Corp, Armonk, NY) using descriptive and analytical statistical tests. P-value of less than 0.05 was considered significant.

RESULTS

The demographic characteristics of the sample showed that out of 50 participants, 28 (56%) were female and 41 (82%) were single. The mean age of participants was 21.4 ± 2.14 . In responding to “disaster training course” (64.3%), did not receive any disaster-related training, in responding to “maneuver training experience” (88.6%) did not attend exercises, and in responding to “history of disaster participation” (71.4%), did not have a history of disaster participation. there was no significant difference between the two groups in terms of age based on the independent t-test ($p = 0.72$) and sex-based on the chi-square test ($p = 0.004$). Other demographic characteristics of nurses in comparison between the two groups are presented in Table 2.

The results showed that nurses’ student disaster competence in the control group was (121.58 ± 35.27) and in the intervention group (121.19 ± 16.29). At the beginning of the study, there was no statistically significant difference between the two groups ($p = 0.038$).

The pre-test and post-test difference between the intervention and control groups were assessed using the independent samples t-test. The results revealed a significant difference between the two groups after intervention ($p < 0.001$). Also, based on the analysis of the variance of repeated observations, the interaction between group and time was significant, which shows a different trend in the

Table 3. Comparison of mean competence of nurses in two groups

Variable	Stage	Control group	Intervention group	p-value
		M ± SD	M ± SD	
Nurse Competency	Before intervention	121.58 ± 35.27	121.19 ± 16.29	0.038
	Immediately after intervention	123.21 ± 31.32	137.51 ± 11.57	> 0.001
	3 months after intervention	122.39 ± 29.26	149.19 ± 25.72	> 0.001
p-value between groups		> 0.01	> 0.001	> 0.001*
Changes during the intervention		-1.5 ± 5.13	65.3 ± 28.38	> 0.001

* — Based on independent t-test

competency score of nursing students in the two groups during the study ($p < 0.001$) (Tab. 3).

DISCUSSION

The aim of this study was to design and develop a disaster preparedness training program and to investigate its impact on the level of competence of nursing students to participate in disaster situations. The results of the study showed a significant increase in students' competency scores after providing education based on students' needs assessment. In the training program of the present study, the courses were organized in such a way as to prepare students to perform tasks in the areas of management, personal, personal, ethical, and *carte blanche*.

At present, in Iranian nursing schools, the curriculum of the disaster, emergencies, and unit is presented in the form of 1.5 theoretical and practical units and the internship unit in the amount of 2 units. A study conducted by Jalalinia and Alhani [24] entitled pathology of disaster education emergencies and unexpected accidents in nursing students indicates there are shortcomings in educational planning and implementation of this curriculum, and graduate nurses schools are not sufficiently prepared for disaster and disaster management, and existing training methods are not sufficient to prepare nurses for clinical practice. Also, Nejadshafiee et al. [25] in their study stated that training and empowering nurses to respond optimally to the needs of injured people by reviewing the current curriculum and paying attention to the required content is emphasized and the current curriculum does not meet the needs of students.

In the recent study, we tried to provide educational materials based on the needs assessment

of students because the final year students have passed all theoretical and practical courses and are expected to be ready to work as a nurse in critical situations [26]. The results of the initial needs assessment showed the weakness of students in various fields, which tried to design educational content in accordance with these sections and using skills training methods, practical training and problem-solving processes in a practical way. Findings from a study conducted on the educational needs of undergraduate students in relation to disaster preparedness and response in Turkey and Japan show that nursing students in both regions tend to participate in disaster preparedness training courses are required and it is necessary to include the topics of care in major accidents as well as disaster management skills in the content of the undergraduate curriculum [27].

Also, a study was conducted by Poursoleyman et al. [28] with the aim of designing a training program for mother and infant care in disasters. The proposed program was developed and evaluated by referring to domestic and international sources and according to the results obtained from the needs assessment. The maternal and neonatal disaster care curriculum was developed based on a six-step process. The desirability of the Delphi curriculum was approved by experts in two rounds. During the evaluation of the program developed in this study, it was found that this program has practical features and can play a decisive role in raising the level of knowledge of health service providers of the armed forces to provide services to mothers and infants in disasters.

The results of the current study consist with the other studies that the students believed that it is better to include these contents in their training course in the undergraduate course and also in

the form of in-service training courses so that in addition to holding periodic maneuvers, they can prepare for situations and maintain the critical level [29, 30]. In this regard, Nejadshafiee et al. in Kerman in 2020 [18] conducted a study entitled professional competence in nurses for disasters in which the results showed that the participation of nurses in maneuvers and regular training courses has the greatest impact on the professional competence of nurses in disasters and Participants believed that they did not receive adequate training during their studies, which is consistent with the present study. Chan et al. [31] in a study conducted in 2010 with the aim of designing and implementing a training course for nursing undergraduate students in China, prepared educational content based on the competencies provided in the ICN, and the results showed that the program was useful in increasing students' competency. This is similar to the results of a recent study, but one of the strengths of the recent study was the design of the curriculum based on Harden's planning model and the needs assessment of students and surveys of professors about the educational content.

CONCLUSIONS

Considering that Iran is one of the countries where the occurrence of natural disasters is high and nurses as a member of the medical team should have the necessary qualifications to play a role in responding to the disaster. The findings of this study indicated the effect of educational programs in improving students' competence. Considering that this training program, considering the two important elements of goals and content in the curriculum of nurses' education, has considered various and comprehensive aspects of empowering nurses in the field of disaster, especially the practice and skill aspect, it is recommended that the content of this program be used in the training course for undergraduate students and in-service training course for nurses.

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Conflict of interest

There are no conflicts of interest.

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