



Survey of individual readiness of the emergency department nurses in dealing with disasters

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Abstract

Background and aims: Examining the preparedness of nurses, including the individual preparedness of emergency nurses, has yet to be investigated. Given the hypocrisy of emergency nurses as the first group of the treatment team in responding to accidents and disasters and reducing the amount of damage to patients, the present study aims to investigate the individual preparedness of emergency nurses of Iran University of Medical Sciences in facing disasters in 2019.

Methods: The present study was descriptive-cross-sectional in which the preparedness of 190 nurses in the emergency departments of the teaching and therapeutic hospital affiliated with the Iran University of Medical Sciences was investigated. Data collection was done using a demographic characteristics checklist and the 37-item questionnaire on than individual preparedness of nurses in disasters. Data analysis was done by SPSS version 21 using descriptive statistics (frequency, percentage, mean \pm standard deviation). To determine statistical significance, inferential statistics (independent t, analysis of variance, Spearman's correlation coefficient, Tukey's test) were used at the significance level ($P < 0.05$).

Results: The study's results showed that nurses' preparedness was at a reasonable level. The highest average score was obtained for the teamwork communication skills domain (86.35 ± 14.01), and the lowest average score for the clinical skills in the disaster response phase domain (10.55 ± 20.50) based on 0 to 100 was obtained ($P < 0.001$). Among the demographic variables, age (31.84 ± 5.81 years) and nursing experience in the emergency department (7.02 ± 5.24) had a significant relationship with nurses' preparedness ($P < 0.001$).

Conclusion: Having experience in nursing work and working in the emergency department plays a role in increasing the level of individual preparedness of nurses in disasters. Therefore, the recruitment of experienced staff in the emergency department and their hiring to training less professional staff should be encouraged. Implementing educational programs in the form of theoretical training and the performance of practical programs can effectively improve the level of preparedness of nurses, especially novice and apprenticeship ones, in facing disasters.

Keywords: Preparedness, Disasters, Emergency nursing, Disaster nursing

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Introduction

Nurses' preparedness as the first responders in emergencies and disasters (1) is considered one of the keys to success in prevention, reducing the effects of disasters and the mortality rate of victims (2).

Nurses spend the most time at the patient's bedside in different departments, in addition to relieving the physical pain of the injured and people affected by accidents and disasters, in various aspects such as psychological-spiritual-social-cultural dimensions, and support and care for clients, patients, and their families (3). The available statistics show an increase in the occurrence of natural disasters or the lack of preparedness to respond to them (4).

Hazard refers to an unpredictable and often sudden situation or incident that includes extensive human-related, material, economic or environmental losses, and impacts and causes severe disruption in the functioning of the community, which cannot deal with it using its resources (5).

During disasters, one of the first responding organizations is the healthcare system, mainly the emergency department of hospitals and medical centers. Subsequently, emergency nurses play a fundamental and critical role in dealing with disasters (6,7). The presence of nurses in disasters can reduce casualties and deaths from 70% to 50% (8).

For example, in the 21st century, as a result of 20 major earthquakes in Iran, 140 000 people lost their lives, which can be specifically attributed to the Bam earthquake in Kerman province in 2003, which killed more than 40 000 people and injured 25,000 ones. The earthquake in Kermanshah province in 2017 left 620 people dead and 8000 wounded (9).

Among other cities of Iran, the capital of Tehran will face irreparable damages and adverse effects at the national level in the event of any natural or man-made disasters due to its numerous and scattered worn-out structures and being located on earthquake faults (10).

Therefore, according to Tehran's political and

geographical context, it is necessary to have more codified and strategic disaster management plans (11).

The preparedness stage in the disaster management cycle means planning, setting goals, and choosing and implementing training methods (12). The number of studies conducted on disaster nursing preparedness is limited, and the results of most studies showed that nurses need to prepare to respond to disasters (4,12).

For example, the results of Sand study showed that the preparedness and competence of nurses in hospitals in rural areas of America could have been better in caring for emergency patients, and nurses needed training in several skills (13).

The results of a review study by Labrague et al showed that nurses needed adequate preparedness and self-confidence to deal with disasters (14).

The study by Usher addressed the preparedness, knowledge, and skills of nurses in Asia and the Pacific and showed that the nurses in Bangladesh and Eleusis do not have sufficient preparedness to deal with disasters without the presence of a physician, while in Colombia and Iceland, nurses facing biological and chemical agents do not have the necessary preparedness (15).

Since the incidents and events following the occurrence of disasters cannot be predicted accurately and entirely due to the nature, time of occurrence, and even the geographical area of the affair.

Therefore, the higher the level of preparedness in the disaster management cycle, the better the response to the incident, and the return to the time before the disaster (recovery phase) will take place faster and better (16).

In Iran, studies have examined the readiness of educational and medical centers, especially the emergency department, in disasters. For example, Seyedin et al conducted a study on the preparedness of nurses in the emergency departments of university-affiliated hospitals in Tehran regarding triage, communication, biological agents, decontamination and quarantine, vulnerable groups and psychological issues, clinical decisions, and the incident command system (17).

Another study was conducted to determine the preparedness of the emergency department in facing terrorist radiological incidents and nuclear attacks and pointed out challenges in the infrastructure of the studied hospitals (18). Another study was conducted to examine the experiences of nurses present in the Bam earthquake (19).

Very few studies have been conducted on the preparedness of nurses in disasters. Studies in Iran and other countries have focused more on nurses working in different departments or other aspects, such as biological agents and terrorist attacks or disaster management and hospital preparedness.

Because the emergency department is the primary entity responsible for responding to disasters, and subsequently, the nurses of this department are considered the front line of care service providers, the preparedness of nurses at the highest level is required to face disasters and provide an

appropriate response.

A review of available evidence shows that nurses' disaster preparedness level differs in different countries. The general result is that most studies have low scores in such cases.

Given the importance and role of the preparedness of emergency nurses in facing all forms of disasters as a challenge in the healthcare system, the researchers were encouraged to conduct the present study to investigate the individual preparedness of nurses working in the emergency department in facing disasters.

Materials and methods

The current descriptive cross-sectional study was conducted to determine the preparedness to deal with disasters in emergency department nurses of Iran University of Medical Sciences in 2018.

Study design

Participants and setting

The study set consisted of all the selected hospitals affiliated with the Iran University of Medical Sciences in Tehran (Hazrat Rasool Akram (PBUH), Firouzgar, Firouzabadi, Hafte Tir, Shohadaye Yaftabad, and Lolagar).

Some hospitals affiliated with the Iran University of Medical Sciences, such as Mottahari Burn Center or Ali Asghar Children's hospital, were not included in this study due to their specialization.

The samples were selected using a non-probability, available sampling method based on inclusion criteria.

Holding at least a bachelor's degree in nursing, having at least one year of work experience in the emergency department, and continuous presence in the emergency department were considered the inclusion criteria. The history of participating in training disaster courses and attending the disaster response phase was considered exclusion criteria. At the beginning of the study, written consent to participate in the study was obtained from participants.

Instrument

Data collection tools were a demographic characteristics checklist consisting of 15 items (age, gender, marital status, education level, employment history in the hospital, current employment status, clinical work experience in the emergency department, employment status, university graduate, the type of shift, the type of university from which they graduated, history of being deployed in disasters, history of participating in training disaster courses, the last training disaster course completed) and a 37-item questionnaire to assess the individual preparedness of nurses in disasters (Readiness Estimate and Deploy Ability Index Japanese (READIJ) was used.

The above tool was designed by Maeda et al in 2017 in Japan (20). This tool was chosen because of the clear separation of domains in measuring nurses' preparedness and short and clear items. This tool includes six domains

and a total of 37 subscales.

- Domain no. 1: Teamwork communication skills (8 items [15-22])
- Domain no. 2: adaptability to the stressful situation at the disaster site (8 items [30-37])
- Domain no. 3: Practical skills related to the disaster response phase (8 items [7-14])
- Domain no. 4: Emergency nursing skills (6 items [1-6])
- Domain no. 5: Collaboration skills (6 items [25-29])
- Domain no. 6: effective adaptation to daily stress (2 items [23 and 24])

A 5-point Likert scale (absolutely agree=5, agree=4, have no idea=3, disagree=2, and absolutely disagree=1) was used to score the items. The scores range between 37 and 185 and are divided into three ranges: poor, medium, and good. A score of 37-86 indicates poor preparedness, a score of 87-136 indicates moderate preparedness, and a score of 137-185 indicates adequate preparedness.

Because the domains are not of the same range, the domains were calculated based on 0-100 so that in this way, the scores of the domains can be compared, and it can be determined which domain or domains have obtained the highest and the lowest score and individual preparedness of nurses can be examined.

The tool's validity in this study was investigated using the content validity method and the comments of 10 experts on disaster management and disaster nursing. To determine the tool's reliability, Cronbach's alpha coefficient (0.90) was calculated, and the internal consistency (0.78-0.91) was confirmed for the six domains.

The researcher provided an introduction letter from the officials and obtained permission in the study setting; the necessary explanations about the study were given to the participants, the nurses entered the study after completing a written consent form, and they were assured that their answers contained in the questionnaires would be kept confidential. There was no need to write identifying information in the questionnaire.

Then, the demographic information checklist and the JDNREI were provided to the participants. The researcher (an undergraduate student) attended for two months during the weekdays and in different shifts (morning, evening, and night) in the emergency departments of selected centers. To facilitate completing the questionnaires, the nurses provided the questionnaires during breaks and hours when the number of patients in the emergency department was comparably less.

The approximate time to complete the questionnaires was 30 minutes, and during the completion of the questionnaires, the researcher was available to answer the participants' possible questions in case of ambiguity. A total of 320 questionnaires were distributed, but in some hospitals, people with academic degrees other than nursing were working (e.g., midwives and anesthesiologists) or were undergraduate nursing students. Very few did not volunteer to participate, so they were excluded from the

study. Finally, 290 questionnaires were included in the data analysis.

A total of 30 questionnaires were excluded from the study due to lack of completion of all items or lack of return by the participants.

Data analysis

To conduct data analysis according to the objectives of the study and research questions, the descriptive statistics (absolute and relative frequency, mean, standard deviation) and inferential statistics (independent *t* test, analysis of variance, and Pearson's correlation coefficient) and for paired comparison, Tukey's test in SPSS version 21 were used.

Results

The majority of our participants were female (73.2%) with a mean (\pm SD) age of 31.84 ± 5.81 years, mean (\pm SD) work experience of 5.24 ± 7.02 years, and mean (\pm SD) work experience in the emergency department of 5.4 ± 4.52 years. The average score of nurses who completed the last disaster training course was 2.24 ± 1.22 (Table 1).

The mean (\pm SD) individual preparedness of nurses was 145.26 ± 16.94 , and because the number of items was not the same, scores were calculated from 0 to 100 to compare the domains. As a result, the mean \pm SD score of our participants in individual preparedness was 73.15 ± 11.45 .

The results showed that the highest score (mean: 86.35) was obtained for "teamwork communication skills" attained and the lowest score (mean: 55.10) for "clinical skills in the disaster response phase" among the domains of individual preparedness of nurses (Table 2).

The range of the total score obtained by the participants was 100-178, and 129 (67.0%) had an acceptable level of individual preparedness (Table 3).

The results showed that among the demographic variables, there was a statistically significant relationship between the individual preparedness of nurses and their employment status ($P < 0.001$). Hence, a paired comparison showed that the average score obtained by registered nurses was significantly higher compared to contractual nurses ($P = 0.002$), apprenticeship nurses ($P > 0.001$), and other nurses ($P > 0.001$).

The results of the study indicated that there was a statistically significant relationship between the individual preparedness of nurses and the current employment status ($P = 0.023$), so a paired comparison determined that the average score obtained by department nurses was significantly higher than those obtained by head nurses ($P = 0.047$) and staff nurses ($P = 0.047$).

Work experience in the emergency department ($P < 0.001$) exhibited a statistically significant and positive correlation with the individual preparedness of nurses, so with increasing work experience in the emergency department, the personal preparedness score of nurses increased.

Table 1. Mean \pm standard deviation preparedness of emergency nurses by demographic variables

		Number	Percent
Individual characteristics			
Age (y)	<30	78	41.1
	30-34	49	25.8
	35-39	47	24.7
	≥ 40	16	8.4
	Total	190	100
Gender	Female	139	73.2
	Male	51	26.8
	Total	190	100
Education level	BSc	181	95.3
	MSc	9	4.7
	Total	190	100
Marital status	Married	85	44.7
	Single	99	52.1
	Divorced	6	3.2
	Total	190	100
The university graduate from	Governmental	116	61.1
	Private	74	38.9
	Total	190	100
The type of university graduate from	Type 1	167	87.9
	Type 2	23	12.1
	Total	190	100
Employment characteristics			
Employment status	Head nurse	6	3.2
	Department nurse	178	93.6
	Staff	6	3.2
	Total	190	100
The last disaster training course (y)	2-1	4	2.1
	3-4	14	7.4
	5-6	3	1.6
	Total	21	11.1
Nursing experience (y) Mean \pm SD 7.02 \pm 5.24	<5	76	40
	5-10	52	27.4
	11-14	54	28.4
	≥ 15	8	4.2
	Total	76	40
Work experience in the emergency department (y) Mean \pm SD 5.40 \pm 4.52	<5	105	55.3
	5-10	57	30
	11-14	23	12.1
	≥ 15	5	2.6
	Total	190	100
Work shift	Morning shift	34	17.9
	Night shift	23	12.1
	Rotating	133	70
	Total	190	100
History of the disaster training course Mean \pm SD 2.24 \pm 1.22	Yes	21	11.1
	No	169	88.9
	Total	190	100

Discussion

The present study was conducted to investigate emergency nurses' preparedness in facing disasters in teaching hospitals in Iran in 2019. The results showed that the individual preparedness of nurses was at a reasonable level.

The study of Mohammadi and colleagues' showed that the preparedness of nurses in crises and disasters in emergency centers in terms of patient admission and transfer, communication, security, training, and management in dealing with trauma patients was at a reasonable level (21).

In the study of Maeda et al, the lowest score was obtained for "clinical skills in the disaster response phase," followed by "teamwork communication skills," along with the two domains of "adaptability to stressful conditions in disaster site" and "cooperation skills" are essential for coordination and unity in disaster relief activities and were scored higher. And "adaptation to stressful situations in disaster sites" plays a crucial role in creating order and controlling the situation (20).

The study of Heidari et al showed that the preparedness of emergency nurses in selected hospitals in Qom was favorable, and the readiness of nurses for the assessment and care of trauma patients with particular conditions was better than the primary and secondary assessment and triage. Also, nurses with master's degrees, older age and higher work experience, history of participation in educational seminars, clinical expertise, and advance trauma life support (ATLS) and triage certificate were more prepared than other groups (22).

According to the above-cited studies, the reasons for the lack of preparedness of nurses include lack of continuous training disaster programs, lack of participation in fake maneuvers, lack of presence of nurses in real crises, and lack of experience with and lack of involvement in developing programs on disasters.

In the present study, the lack of preparedness of nurses is due to the lack of participation in programs on disasters, lack of involvement in fake maneuvers, and lack of experience.

A study conducted by Taskiran and Baykal showed high scores in the domain of communication skills (23). O'Daniel and Rosenstein argued that effective communication among staff encourages effective teamwork, promotes continuity and transparency within the patient care team, and helps prevent errors (24).

Therefore, "teamwork communication skills" are essential for coordinating and balancing disaster relief activities (24).

In this regard, Powers and Daily stated that the goal of disaster nursing is to ensure that the highest level of care is achieved by identifying, supporting, and caring for all affected individuals at all stages of an incident, including active participation at all levels, planning and disaster preparedness (25).

In other words, having communication skills in

Table 2. Mean \pm standard deviation of individual preparedness of emergency nurses in six domains

Domains (n=6)	Mean	SE	Minimum	Maximum	Scores (range: 0-100)			
					Mean	SE	Minimum	Maximum
Teamwork communication skills	35.64	4.48	23	40	86.35	14.01	64.88	100
Adapting to stressful situations in disaster areas	28.83	6.16	12	40	65.08	19.27	12.50	100
Clinical skills in disaster response	25.63	6.56	13	38	10.55	50.20	15.63	93.75
Emergency skills	24.93	3.95	14	30	78.88	16.45	33.33	100
Collaboration skills	21.44	2.57	14	25	82.18	12.89	45	100
Effective adaptation to daily stress	80.8	1.45	3	10	85	23.18	5.12	100
Total score (37-185)	145.26	16.94	100	178	15.73	45.11	57.42	27.95

Table 3. Frequency distribution of individual preparedness of emergency nurses

The level of individual preparedness of nurses	Number	Percent
Low	-	-
Moderate	61	32.1
Acceptable	129	67.9
Total	190	100
Mean \pm standard deviation	145.26 \pm 16.94	

teamwork helps maintain the acceptable level of services provided by nurses during disasters (25). The study conducted by Al-Ali and Abu Ibaid also showed the low scores obtained in the domain of clinical skills in disaster response (26).

The results of the present study showed that the lowest score was obtained for “clinical skills in disaster response phase” (domain no. 3). Also, the results of this study showed that “communication skills for teamwork,” along with the two domains of “adaptability to stressful conditions in disasters” and “collaboration skills” were essential for coordination and uniformity of disaster relief activities. Comparably higher scores were obtained for them. In addition, “adaptability to stressful situations at disaster sites” plays a crucial role in creating order and controlling the situation.

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Therefore, “teamwork communication skills” are essential for coordinating and balancing disaster relief activities (24).

In this regard, Powers and Daily argued that disaster nursing aims to ensure that the highest level of care is achieved by identifying, supporting, and caring for all affected individuals at all stages of an incident, including active participation at all levels, planning, and disaster preparedness. In other words, having communication skills in teamwork helps maintain the acceptable level of services provided by nurses during disasters (25).

In the present study, the individual preparedness of nurses showed a statistically significant correlation with work experience in the emergency department.

The results of consistent studies by Maeda et al (20), Taskiran and Baykal (23), and Tzeng et al (27) showed that having work experience in the emergency department had a statistically significant and positive relationship with the preparedness of nurses in disasters.

Among the non-aligned studies, the study of Taskiran and Baykal reported the score obtained in the domain of clinical skills to be high, which can be explained by the difference in the instrument used and the history of the participants in the disaster response phase (23).

There is a statistically significant relationship between the individual preparedness of nurses and the history of disaster training courses, so the average score obtained by nurses who have had a history of disaster training courses is significantly higher than that of nurses who have not had a history of participating in this course ($P < 0.001$).

Among the similar findings, we can mention those of the studies conducted by Maeda et al (20), Taskiran and Baykal (23), and Tzeng et al (27). The results of all three of these studies indicated that nurses who had completed training disaster courses, compared to those who had not completed these courses, had obtained a higher score in the examination of disaster preparedness. Age had a statistically significant ($P < 0.001$) and positive correlation with the individual preparedness of nurses, so with increasing age, the score of personal preparedness of nurses grows. Among similar studies, the study conducted by Park and Kim showed a statistically significant and positive correlation between the age and preparedness of nurses in disasters (28).

Many victims and patients are admitted to the emergency departments after various disasters (29). Therefore, healthcare systems should be more than ever prepared to accept patients and injured people and take care of them without the risk of system breakdown (30).

To maintain the quality of services and manage emergencies as well as possible, emergency nurses are expected to have the necessary preparedness in disasters and perform daily activities (31).

The most obvious limitation of the present study is that the study was conducted in some university-affiliated hospitals in Tehran. The specialization of some hospitals covered by the Iran University of Medical Sciences, such as Mottahari burn center or Ali Asghar children’s hospital, prevented them from being included in this study. As a

result, the findings could be more generalizable due to the small size of the study population.

Conclusion

The results of the present study showed that the individual preparedness of emergency nurses in facing disasters is generally acceptable. The study's findings showed that the emergency department nurses generally scored well in dealing with disasters and scored the highest in the *teamwork communication skills* domain. Performing coordinated group activities during disasters can effectively prevent unnecessary repetition and forgetting of some actions.

Obtaining the lowest score for the *clinical skills in the disaster response phase* domain can be explained by the fact that none of the participants in the present study had a history of participating in the disaster response phase. Also, many participants (169, 88.9%) had yet to participate in training disaster courses.

To solve this problem, appropriate educational and training programs such as simulated scenarios can be used, and conditions should be provided so that the emergency department nurses have a lived experience of the response phase.

The review of studies showed that nurses who had the experience of being present in disasters, nurses working in critical care and emergency units, and nurses with a higher salary level and job position obtained higher scores on preparedness.

Also, the results of the cited studies showed that the nurses' preparedness level in disasters was poor and moderate. Given that there needs to be more information on the individual preparedness of emergency nurses in Iranian university-affiliated hospitals, the necessity of conducting a study on this subject was raised. The results of this study may help develop educational programs on disasters, especially the curricula of MSc. in emergency nursing.

Study implications

This study can serve as a basis for identifying new issues in the field of nursing and disasters. Recruitment of experienced staff in the emergency department, hiring them to train less professional staff, and participating in disaster preparedness training programs can effectively increase nurses' preparedness.

The results obtained from this study can be used in disaster education at the Iran University of Medical Sciences and in improving the level of preparedness of human resources, especially nurses, in facing disasters.

Educational programs on disasters, both in the form of theoretical training and the implementation of training programs, can be effective; however, the continuation of the performance of educational programs can be crucial.

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Authors' Contribution

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Competing Interests

None.

Ethical Approval

Before starting the data collection, obtaining permission from the Ethics Committee (IR.IUMS.REC.1398.69), coordinating with the authorities of the studied hospitals, explaining the purpose of the research and emphasizing the confidentiality of the information, and obtaining written, obtaining informed consent from the nurses working in these hospitals to participate in the study were accomplished.

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