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Operating room technologists' knowledge, attitude, and preparedness for disaster management of a Zahedan: Implications for nursing disaster education

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Abstract:

BACKGROUND: During the occurrence of accidents and disasters, the role of hospitals and healthcare centers is very sensitive and they are among the first units that with their quick, optimal, and timely healthcare services provision can reduce mortality and increase the number of survivors. For this purpose, this study was conducted to investigate the knowledge, attitude, and level of preparedness of operating room technologists of educational hospitals of Zahedan University of Medical Sciences in relation to disasters.

MATERIALS AND METHOD: The present research is a cross-sectional descriptive study that was conducted with the participation of 60 operating room technologists of Zahedan educational hospitals from January 2022 to December 2022. The sampling was performed by the census method. The data collection tool was a demographic characteristic and a researcher-made questionnaire for the assessment of attitude, knowledge, and preparation against the occurrences of accidents and disasters was completed during 2 months by referring the researcher to the hospitals. For the data analysis, descriptive statistics and analytical statistical tests were used. The data were analyzed using IBM SPSS Statistics 26. Corp., Armonk, NY, USA. The significance level was considered $P < 0.05$.

RESULTS: The results showed that the average scores of attitude, preparation, and knowledge are 9.3 ± 6.1 , 75.8 ± 9.9 , and 5.7 ± 4.1 , respectively, and the majority of operating room technologists have a favorable level towards attitude and have relatively favorable level towards preparation and knowledge during the occurrence of disasters. The average score of knowledge and attitude of operating room technologists with work history had a significant difference from each other ($P < 0.05$). Technologists with less work experience have more knowledge and a more positive attitude towards disaster.

CONCLUSION: Measuring the level of knowledge, attitude, and preparedness of surgical technologists to deal with disasters as one of the ways of receiving feedback from employee training can be a useful reflection of the success of training programs in creating the necessary capabilities in various fields of disaster preparedness, and it can be a powerful tool for increasing individual and group dynamics and organizing individual learning in coping training. Furthermore, disaster education should be incorporated into the operating room curriculum, which would play a seminal role in preparing them for future disaster management. It is also suggested to investigate the impact of intelligent training on the level of knowledge, attitude, and preparation of operating room personnel regarding disasters and obstacles in this regard in future research.

Keywords:

Disasters, knowledge, operating room technologist, preparation

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Introduction

Disasters are defined as a “sudden, calamitous event that seriously disrupts the functioning of a community or society and causes human, material, economic or environmental losses that exceed the community’s or society’s ability to cope using its own resources.”^[1] Disasters are classified into two general groups which are as follows: natural and man-made. Natural disasters are caused by natural phenomena and are divided into three subcategories based on their origin which include terrestrial origin such as earthquake, volcano, or tsunami, weather origin such as flood, hurricane, drought, extreme cold and heat, landslide, and biological origin such as widespread epidemics of disease.^[2] Man-made disasters are created by an intentional or unintentional error of humans, such as fire, leakage of hazardous materials, laboratory and industrial pollution, nuclear and radioactive activities, toxic waste, transportation accidents, explosion, fire, bombing, terror, etc.^[3] The occurrence of disasters influences the lives of millions of people around the world and it causes problems for the development of nations and societies.^[4] In recent years, the world has been affected by the increasing incidence of major disasters, such as earthquakes, hurricanes, floods, and tsunamis. These events involve an enormous number of deaths and damaged properties and affect the economy of the countries concerned.^[5] In the twenty-first century, we were witness to an upward trend in the number of natural and man-made disasters and following it an increase in the casualties and the heavy economic costs caused by them. During the last 30 years, the rate of occurrence of disasters around the world has doubled and the amount of damages and personal injuries caused by it has increased three times.^[6] The number of people affected by disasters worldwide has increased by 17 percent over the past few decades.^[5] The incidence and susceptibility of disasters have substantially increased globally and affected the economy, services, health, and well-being of households and communities.^[7] In 2019, 396 natural disasters were recorded, with 11755 deaths, approximately 1 billion people affected, and 103 billion US\$ in economic losses worldwide. In developing countries, compared to developed countries, the rate of mortality caused by natural disasters has been three to four times and the number of injured people has been 40 times. Asian countries are the most disaster-prone areas in the world, as 40% of the events of the disaster occurred in this region.^[8] According to the EM-DAT Report 2022, 49% of the total mortality is in Asian countries, with 66% of the people affected due to disasters.^[9] Iran is considered a developing country in the region. Iran is a country prone to disaster; according to the World Risk Report, Iran is one of the countries

with high vulnerability in the world, which has had significant effects of disasters, including financial, physical, and social damages, on the country.^[10]

Iran is considered one of the most prone geographical areas for unexpected events and it is considered one of the 10 most vulnerable countries in the world, where almost 90% of its population is exposed to natural disasters. According to the statistics provided in 2017, Iran is one of the five countries with the most loss of life caused by natural disasters.^[11]

In the last 30 years, more than 80 thousand people in Iran have lost their lives directly due to natural disasters

Throughout the history of Iran, many disasters such as severe floods, extreme temperatures, and droughts have occurred there. This country is also highly prone to earthquakes. In 2016, with 120,000 human casualties, it is considered one of the countries with the most casualties in the field of the earthquake. Among the 31 possible natural disasters, an earthquake is the most important disaster in Iran.^[12] Sistan and Baluchestan Province has a population of 2 million and 800 thousand people, 3% of whom are older adults. Zahedan, the capital of this province, is prone to natural disasters due to the excessive expansion of the city, population growth, deteriorated urban fabrics in many parts of the city, use of materials with poor durability, existence of residential areas in slums and outskirts, informal settlements, lack of utilities and infrastructure, absence of urban services, environmental hazards such as exposure to fine dust, as well as being located in a fault zone and a flood-prone area.^[13]

Given that natural disasters affect the health and well-being of society, the provision of appropriate health services is the main factor in the survival and reduction of mortality and well-being of people in the post-occurrence stages. Such events when disasters occur, can use human, physical, and reception resources.^[14] Effective response and preparedness strategies are increasing. The most effective way to improve the appropriate response to the needs created in disasters is preparedness, which the World Health Organization has raised as its long-standing concern and emphasizes this by introducing it as part of the sustainable development process in societies. The importance of those activities required to achieve readiness is emphasized. It has been proven that in societies that have started planning before accidents and disasters, the amount of casualties and lack of coordination in performing assigned tasks has been significantly reduced.^[15,16] The attendance rate of the hospital, as the main authority providing health services in disasters, in addition to including the facilities and

equipment, is itself a reflection of the knowledge, attitude, and performance of the personnel.^[17] **Awareness of, and preparedness for, disasters by healthcare workers are essential for the management of associated injury, death, and loss of health service infrastructure.**^[18] Disaster preparedness is defined as the reserve of knowledge and capacity to effectively respond to disasters. Disaster preparedness may be divided into three dimensions (knowledge, skills, and post-crisis management) and four periods (prevention, preparedness, response, and recovery; International Council of Nurses, 2009). To improve disaster preparedness capabilities, healthcare workers should be a priority focus.^[19]

The conducted research in Iran shows the lack of preparation of the medical staff in the occurrence of disasters. Abbasi Dolatabadi and colleagues have introduced the lack of knowledge and lack of preparation as a factor for the inefficiency of the medical staff while performing their duties in crisis and disaster situations.^[11,12] In a study which was conducted by Gorji *et al.*, with the aim of the determination of the level of knowledge and attitude of nurses in Sari City of Mazandaran province about bioterrorism, it was shown that 91.7% of nurses had little knowledge about bioterrorism and regarding the attitude, 93.3% of nurses did not know bioterrorism.^[20] Khanke *et al.*'s^[14] study also revealed the lack of a proper plan and preparation of health service providers to respond to disasters.^[21]

Considering that the previous studies conducted in other countries indicate the necessity of healthcare personnel's preparation in dealing with disasters and the studies conducted in Iran also indicate the lack of appropriate training programs and the preparation of health service providers to respond to disasters. Considering the lack of research conducted in the field of disaster preparedness in the operating room and surgical technologists who make up a large part of the treatment staff, this study aims to investigate the knowledge, attitude, and level of preparation of operating room technologists of medical-educational hospitals of Zahedan University of Medical Sciences to disasters.

Materials and Method

Design and setting

This research is a cross-sectional, analytical study, which was implemented in the operating room ward of Imam Ali Hospital, Khatam and Al-Zahra Ophthalmology Hospital affiliated with Zahedan University of Medical Science from January 2022 to December 2022. The aim was to investigate the knowledge, attitude, and level of preparation of operating room technologists

of medical-educational hospitals of Zahedan University of Medical Sciences to disasters.

Participants and sampling

Sampling was done by census method. All surgical technologists working in Zahedan University of Medical Sciences hospitals (60 people) who were engaged in an operating room ward attended the study with written consent. The eligibility criteria included employees in educational hospitals of Zahedan City, working in the operating room from the beginning to the end of the study and not transferring to another ward, with working experience in the operating room for more than one year, and with informed consent. The exclusion criteria were incomplete questionnaires.

Data collection tool and technique

After the inclusion in the study, it was asked from the participants to fill out a demographic information questionnaire such as age, gender, work history, and the history of receiving in-service training, and for the collection of data, the researcher-made questionnaire to assess the level of knowledge, attitude, and preparation of operating room technologists in relation to disasters was used. Also, to check the face validity of the questions, it was given to five disaster and operating room experts from several universities of medical sciences to apply their corrective comments regarding the grammar, phrasing, and placing of phrases in the right place. To check the content validity, CVR (Content Ratio Validity) and CVI (Content Validity Index) coefficients were used quantitatively. To measure CVR, the group of lecturers were asked to examine each question based on the three-part spectrum of necessary, useful but unnecessary, and unnecessary, and finally based on the answers, the validity ratio was calculated. The content was calculated based on the following formula. The acceptable range depends on the number of experts, which in this study was considered 0.99 based on the judgment of five experts. In the present study, CVI was calculated using the average CVR of all the remaining items. To determine the level of external reliability, the questionnaire was completed by 10 employees and was measured using the test-retest method and checking the correlation coefficient over 14 days. If the obtained correlation is 0.7 or more, it can be said that the tool has a reliable feature. To calculate the internal reliability of the questions, Cronbach's alpha coefficient of internal consistency was used, which varies from zero to one. Cronbach's alpha of this questionnaire was obtained equal to 0.88.^[5] The preparation questionnaire contains 35 questions. This tool has been classified on a five-point Likert scale that were scored on the five ranges (I am absolutely sure = 5, I am sure = 4, no idea = 3, uncertain = 2, I am not sure = 1). The minimum score obtained from this questionnaire is equal to 35 and the maximum

score obtained is equal to 175. This tool is classified into three levels which are as follows: favorable (120-175), relatively favorable (60-120), and unfavorable (1-60). The attitude measurement questionnaire contains 10 statements and the measurement criterion is based on the answers of I completely agree (5), I agree (4), I have no opinion (3), I disagree (2), and I completely disagree (1). The minimum score of this questionnaire is 10 and the maximum score of this questionnaire is 50. This tool is classified into three levels which are as follows: favorable (34-50), relatively favorable (17-33), and unfavorable (1-16). The knowledge questionnaire contains 10 questions. This tool is classified into Yes, No. For the Yes option, the number 2 is dedicated and for the No option, the number 1 is dedicated. The minimum score of this questionnaire is 10 and the maximum score of this questionnaire is 20. This tool is classified into three levels which are as follows: favorable (13-20), relatively favorable (6-13), and unfavorable (1-6). After approval of the project by the research council of Zahedan University of Medical Sciences and its approval by the ethics committee of this university, the number IR.ZAUMS.REC.2022.415 was received from the code of ethics. The necessary permissions of the researcher after assuring the participants about the information confidentiality, the way to carry out the project, and also the purpose of carrying out this project, and informed written consent from the operating room technologists to collect data during 2 months were obtained.

After data collection, it was analyzed using SPSS version 26 statistical software (IBM Corp, Armonk, NY, USA). The significance level was considered $P < 0.05$. Analysis of the data was done using descriptive statistics methods such as mean and standard deviation along with the median as well as analytical statistics including Pearson's correlation coefficient and ANOVA (analysis of variance) test were used for the relationship between the variables. Kolmogorov-Smirnov test was used to check the normality of quantitative variables and frequency and percentage were used to check the normality of qualitative variables.

Ethical consideration

After the approval of the research project (10819), an ethics code was obtained from the ethics committee of the university (IR.ZAUMS.REC.1401.415). All participants provided their informed written consent, and they were made aware of the research process and were assured of the confidentiality of their information. In addition, they were allowed to withdraw at any stage during the study.

Results

In the present study, the number of 60 operating room technologists working in Zahedan University

of Medical Sciences in the age range of 20 to 60 years were investigated. Table 1 showed that the majority of participants were female (60%) with a bachelor's educational level (94%) and married (60%) with less than 10 years of work history (58%) and none of the operating room technologists had not received training course related to disasters.

Table 2 shows that the average scores of attitude, preparation, and knowledge are 9.3 ± 6.1 , 75.8 ± 9.9 , and 5.7 ± 4.1 , respectively, and most of the operating room technologists have a favorable level towards attitude, preparation, and knowledge.

Table 3 shows that the average score of knowledge, preparation, and attitude of operating room technologists is not significantly different between the female and male gender ($P > 0.05$).

Table 4 shows that the average score of knowledge and attitude of operating room technologists with work history had a significant difference with each other ($P < 0.05$). In other words, technologists with less work history had more knowledge and a more positive attitude in relation to disasters, and in other cases, there was no significant relationship.

Table 5 shows that the average score of the level of knowledge of operating room technologists with different ages had a significant difference from each other ($P < 0.05$). In other words, operating room technologists with a lower average age have more knowledge in relation to the occurrences of disasters, and in other cases, there was no significant relationship between them.

Table 1: The demographic information of operating room technologists

Demographic characteristics	Subgroup	Frequency	Percentage
Gender	Male	24	40%
	Female	36	60%
Type of employment	Official	39	65%
	Contractual	9	15%
	Planned	12	20%
Educational level	Diploma and post-diploma	3	5%
	Bachelor	57	94%
Marital status	Single	24	40%
	Married	36	60%
Work history	Under 10 years	35	58%
	10-20 years	19	63%
	20-30 years	6	10%
	31-40 years	25	41%
Age	41-50 years	5	8%
	51-60 years	6	10%
	20-30 years	24	40%
	31-40 years	25	41%

Discussion

This study was designed to investigate the knowledge, attitude, and level of preparation of operating room technologists of medical-educational hospitals of Zahedan University of Medical Sciences. Among the 60 technologists participating in the research, 24 people (40%) were men and 36 people (60%) were women, which shows the greatest of the gender was related to women and the greatest of the participants in the study were married people, which was consistent with Khosravi study.^[22] The majority of the studied samples (65%) consisting of the official forces were working in hospitals, while in the study of Habibinezhad and his colleagues,^[23] the largest number of planned forces were working in hospitals. Based on the findings of this study, the average score of attitude in relation to disasters was evaluated on the medium level and Tabiee and Nakhaei^[24] in their study evaluated the level of attitude of nurses on the medium level. Also, in the studies of Tzeng *et al.* in China, the level of attitude was reported on a medium level.^[25] In the study

Table 2: The average score of attitude, preparation, and knowledge of operating room technologists in relation to disasters

Variable	Mean±standard deviation
Attitude	9.3±6.1
Preparation	75.8±9.9
Knowledge	5.7±4.1

Table 3: The average score of attitude, preparation, and knowledge of operating room technologists based on gender

Variable	Gender		P
	Female	Male	
Attitude	9.2±6.4	8.1±5.8	0.069
Preparation	74.2±2.1	4.5±3.75	0.078
Knowledge	8.4±5.5	7.2±6.1	0.052

Table 4: The average score of attitude, preparation, and knowledge of operating room technologists in relation to disasters based on work history

Variable	Work history			P
	Below 10 years	10-20 years	20-30 years	
Preparation	74.7±5.8	73.5±05.5	71.5±5.2	0.060
Knowledge	9.3±4.1	8.3±8.9	5.1±2.9	0.0001
Attitude	9.5±4.2	7.2±8.2	4.3±1.2	0.0001

Table 5: The comparison of the average score of preparation, attitude, and knowledge of surgical technologists in relation to disasters based on age

Variable	Age				P
	20-30 years	31-40 years	41-50 years	51-60 years	
Preparation	75.4±4.3	74.7±3.7	71.4±3.2	68.5±4.1	0.082
Attitude	11.4±5.3	9.4±2.5	4.2±9.3	3.3±6.00	0.0001
Knowledge	9.2±9.7	8.1±1.9	5.4±3.2	4.1±10.6	0.0001

of Tercan *et al.*,^[26] to investigate the treatment of nurses against disasters, the results showed that operating room nurses had the highest level of attitude among different departments. The study of Abdelalim and his colleagues in Saudi Arabia also indicated the positive attitude of nurses in relation to getting prepared to deal with disasters. The positive attitude of nurses to deal with disasters shows their agreement about the possibility of disasters. Since attitude is a combination of beliefs and emotions that prepares a person in advance to look at others, objects, and groups positively or negatively, it summarizes people's evaluation of objects and, as a result, predicts or directs actions or behaviors. They take charge of the future. It is very important to have a positive attitude towards disaster preparedness.^[27]

In addition, the level of knowledge of the operating room technologists towards disasters in this study was reported on a favorable level. In line with the present study, Mallick *et al.*'s^[28] study in Bangladesh showed sufficient knowledge of nurses about disasters. In the study of Ghanbari *et al.* and Rawool *et al.*,^[29,30] the results showed that nurses have not good knowledge about disasters, which is contrary to the results of the present study. In a study which was conducted by Gorji *et al.*, to determine the level of knowledge of nurses in Sari City of Mazandaran province about bioterrorism, it was shown that 91.7% of nurses had little knowledge about bioterrorism, and 93.3% of nurses had no knowledge about bioterrorism.^[13,20] Alrazeeni *et al.*^[31] showed that undergraduate medical students have little knowledge about disasters. The reason may be due to differences in the nursing education of the studied universities and due to special reasons, such as the lack of training courses and training classes around disasters in the university, and the authorities' lack of attention to this issue. It is believed that adding applied disaster training to the nursing curriculum or implementing in-service training in hospitals will make nurses more knowledgeable and prepared to deal with disasters.

In this study, the level of preparation in facing crises was evaluated on a favorable level. In the study of Tzeng in Japan, the level of preparedness of nurses in dealing with disasters was reported as average.^[25] The results of these studies are consistent with the results of the present study.

Labrague *et al.*,^[32] in a systematic review study that was conducted to determine the preparedness of nurses in facing disasters in the years 2006 to 2016, showed that nurses in response to disasters were not prepared and this lack of preparation is more evident in Asian countries, that is, where most of the disaster events are taking place. The low level of preparation of nurses in Labrague's study can be related to the weak infrastructure of Asian countries.

One of the reasons for the inconsistency between the results of this study and the current research can be due to the difference in the collection tools. In Labrague's research, things like education, self-protection, and patient management have been taken into consideration.

The results of studies by Lock and colleagues in Hong Kong and Diab and colleagues in Egypt showed that the level of preparation of nurses is low.^[16,33] This difference can be attributed to the areas investigated in the studies, environmental and regional conditions, the type of hospital and the method of designing and implementing training programs related to disaster preparedness.

Other differences were the time of the research and the number of samples, which due to the extreme importance of preparation in dealing with natural disasters, it is necessary to periodically measure this preparation and preserve it and be promoted. In other words, the technologists with less work experience and lower average age have more knowledge and preparation and a more positive attitude about disasters. While in the study of Nakhaei *et al.*,^[34] there was no significant difference in the average score of knowledge, attitude, and preparation of nurses in terms of the work experience and age variable. This issue is due to the difference in nursing education in the two studied universities. Contrary to the present study, in the research of Saadoni *et al.*,^[35] in Shushtar city, it was found that the preparation of nurses with older age and work experience was more.

Soltani *et al.*,^[36] studied nurses in Yazd city and concluded that nurses with more age and experience have higher knowledge, attitude, and performance. The difference in the time and place of the research and the conditions at the time of the study can be one of the most important reasons for the difference in the results of these studies with the present study. In most of the studies, advanced age has been effective along with gaining experience and improving work history in this field, but perhaps the small number of elderly workers, the youth of the workers, their energy, and even their higher education in the current study has led to a higher score.

In this study, no statistically significant relationship was observed in the average score of knowledge, attitude, and preparation with the gender index, while in the study by Habibinezhad *et al.*,^[23] the level of knowledge and attitude in female nurses was better than the male nurses with a significant difference. Raredon *et al.*'s^[37] study showed that male nurses are more prepared in the face of disasters. The difference in the results of the studies with the present study can be caused by various factors, from the demographic characteristics of the nurses to the factors related to accidents and as mentioned earlier, such as the previous experience of the nurses and the extent of an accident. The gender of a man is one of the factors that go back to the physical and psychological condition of people. Since male nurses have more resilience and emotion control power, they can perform better in dealing with disasters. The special needs of female nurses in dealing with disasters can be a challenge that needs attention to reduce their psychological and emotional problems in these situations.

Limitation and recommendation

Limited disaster management skills were investigated in a specific setting with a small number of surgical technologists by self-reporting method, which may limit the generalizability of the obtained results. Therefore, similar studies are recommended for other surgical technologists in hospitals and different environments.

Conclusion

The level of preparedness of surgical technologists in responding to disasters is at an average level, maintaining and improving this level of preparedness requires appropriate, effective, and periodic interventions. Measuring the level of knowledge, attitude, and preparedness of surgical technologists to deal with disasters as one of the ways of receiving feedback from employee training can be a useful reflection of the success of training programs in creating the necessary capabilities in various fields of disaster preparedness, and it can be a powerful tool for increasing individual and group dynamics and organizing individual learning in coping training with disasters. Furthermore, disaster education should be incorporated into the operating room curriculum, which would play a seminal role in preparing them for future disaster management. It is also suggested to investigate the impact of intelligent training on the level of knowledge, attitude, and preparation of operating room personnel regarding disasters and obstacles in this regard in future research.

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Conflicts of interest

There are no conflicts of interest.

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