



## Needs assessment for standardized educational program for Iranian Medical Students in crisis and disaster management

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### Abstract

**Introduction:** Early education and training are mandatory to raise the knowledge and awareness of the healthcare staff. Iran is a disaster prone area with a high number of emergencies. This study aimed to assess the need for disaster and emergency management education for Iranian medical students.

**Methods:** Using two-round Delphi technique in 2017, 15 experts within the field of disaster and emergency management were asked for their opinions concerning the education required for Iranian medical students. Highly important educational domains and their sub-domains selected with an agreement of above 70-80% were prioritized by AHP technique.

**Results:** Of 41 identified and prioritized educational subjects, four main groups were obtained: 1) crisis and disaster primary concepts, 2) disease control skills, 3) management skills, and 4) medical care skills. The medical care skills had the highest priority (with a weight of 0.546), compared to other areas after the final analysis.

**Conclusion:** Different areas of competency are needed to raise awareness and preparedness in medical students in combating crisis and disasters. We propose a curriculum for Iranian medical students and suggest it to be used for other professionals, who are involved in the process of disaster management.

**Keywords:** Disasters, Crisis, Medical students, Education, Interdisciplinary, Awareness

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### Introduction

The International Federation of Red Cross and Red Crescent Societies (IFRC) define disaster as a sudden catastrophic event that seriously disrupts the functions of a community, causing physical, financial, and environmental damages, which are out of the control of the impacted community (1). In general, disasters may be caused by either natural phenomena or by human interference. Although both categories

have increased considerably and globally, disaster statistics in developing countries indicate that most of the disasters fall into the first category (natural disasters), which not only harm the world economy, ruin the environment, and cause the emergence of mental illnesses, but also result in high mortality and morbidity (2-8).

Iran is a disaster-prone country. The occurrence of 31 out of 40 natural disasters in Iran has caused our country to be among the top

10 countries in the world (9). Although 6% of the world's casualties belong to Iran, it accounts for only 1% of the world's population (10). This calls for preparedness and raised awareness by introducing fundamental theoretical and practical knowledge in crisis management. Crisis management is an applied science that, by systematic observation of crises and their analysis, seeks to find necessary preventive measures in the event of a crisis to combat any emergencies by increasing the readiness of public and the competency of professionals in some key management functions, e.g. organizing, commanding and controlling, communicating, coordinating, and planning (11). The lack of knowledge and readiness in these key functions may lead to organizational dysfunction, chaos, and confusion (12).

A successful management needs the right knowledge, attitude, and skills to further develop a competency. Since such a learning process cannot be gained by exposure to emergencies, educational interventions and training programs might be safer and cheaper alternatives. Furthermore, an educational intervention within an organization or an interdisciplinary network increases the possibility of coordination and cooperation among all involved organizations and leads to standardization of efforts to improve the quality of the response and its effectiveness (13-15). Earlier studies have shown shortcomings in the educational initiative, planning, and implementation for medical staff (16, 17). They also confirm the significance of inclusion of crisis management in nursing students' and other professional's curriculum, in acquisition of the needed skills to deal with the crisis (18-21). Needs assessment, as a process of collecting and analyzing information, identifies the needs of individuals in groups and communities. Determining educational needs, the first step in student education planning, is, in fact, the first factor in creating and guaranteeing the effectiveness of educational and improvement work that is done correctly. Educational needs are the distance between what a particular person or group needs to know and do and what they know and do in the desired conditions (22). Educational needs can be characterized by lack of necessary knowledge, behavioral skills, or conditions that prevent work from satisfying and satisfactory, and can be addressed through education. Iranian disaster and emergency preparedness is in need of continuous risk assessment and educational interventions to a wider group of professionals. According to the medical doctors on the front lines of the crisis and disasters, and the lack

of educational programs and specifications for medical doctors in Iran, the importance of developing this curriculum appears. This study was conducted to assess the need for disaster and emergency management education for Iranian medical students.

## Methods

This study was conducted using the 6-step medical education of curriculum development approach of Kern et al. (23). In this study, however, only needs assessment and prioritization of educational needs were addressed. Current issues including the lack of proper education and curriculum and public needs were evaluated and identified by consulting and interviewing specialists in the relevant fields.

Fifteen professionals with previous experience in disaster and crisis management and at least two years of work experience in their fields were consulted and semi-structurally interviewed in this Delphi study. Sampling with maximum diversity was used. They were seven men and eight women. Four were general practitioners, six had PhD in health in disasters and emergencies, and five were specialists in emergency medicine. They were affiliated to different Iranian universities. They were all divided into four focus groups and identified major educational needs, domains and sub-domains. Ethical considerations were observed and if a participant did not agree to participate in the study, he/she was not included.

The outcome of each working group was compared and a preliminary checklist was created. The participants were also asked to write other areas of significance that were not included primarily included in the Classic Delphi questionnaire. Delphi technique is one of the methods for gaining group knowledge, which is a process of predicting and helping decisions through surveys, collecting information, and eventually group consensus. Delphi answers the question "What should be". Repeating is the key to the Delphi technique (24). It is a suitable method for obtaining opinions from different experts on educational areas, so this method was used. Because the experts did not know each other, and they could freely express their opinions, the questionnaires were sent to the participants in person or on the e-mail. The completed version was later evaluated, using Delphi technique in two rounds. The level and threshold of agreement given as percentage or scales was suggested by the participants to be 70-80% as an indication of consensus. Thus, statements over 70-80% of agreement or score over 3.75 in a 5 point scale were accepted as the right statement in this study.

Those within 50-70% of agreement entered the second round of Delphi technique, using the same participants one month later to finally identify the proposed educational and training initiatives (25-27). Descriptive statistics such as mean, frequency and percentage were used to describe the participants' characteristics, using SPSS version 23 and Expert Choice version 11.

Finally, the educational subjects (ES)/areas required for medical students were extracted and later prioritized using the Analytic Hierarchy Process (AHP) technique. For scoring and determining the priority and significance of each theoretical and practical training, the criteria were compared two by two, using a pairwise statistical analysis of the scale 0.111-9. The average of all given points by our 15 experts for each subject was analyzed and the elements of each level were compared in a pairwise manner, using Expert Choice software and to the respective element at the higher level and their relative weights were calculated. Furthermore, by combining the relative weights, the final specified weight of each option was determined by the multiplication of the significance of the criteria in the weight of the options (28). The acceptable range of inconsistency in each system depends on the number of decision makers, but, in general,

it is suggested that it would be better for the decision-maker to review his/her judgments if the decision inconsistency coefficient is greater than 0.1. Decisions with an inconsistency coefficient less than or equal to 0.1 represent an acceptable system consistency (29).

Descriptive statistics such as mean, frequency and percentage were used to describe the participants' characteristics, using SPSS version 23 and Expert Choice version 11.

## Results

In the first round of Delphi, 30 educational subjects (sub-domains) had an agreement rate of over 75%, 11 subjects had an agreement rate of 50-75%, and one case had an agreement rate below 50%. Subjects with an agreement rate of less than 75% were given to the experts in Delphi's second round. The final result of the two-round Delphi identified 42 educational subjects, divided into four main domains of 1) crisis and disaster primary concepts, 2) disease control skills, 3) management skills, and 4) medical care skills. Only one educational subject was deleted and all the educational components were agreed upon by the experts. The four main final domains are shown in Table 1 and the results of paired comparison and prioritization of educational

**Table 1:** Four domains extracted from Delphi plus a number of subfields

N	Domain	Sub-domains
1	Medical care skills	12
2	Disease control skills	6
3	Primary concepts of crisis and disasters	9
4	Management skills	14

**Table 2:** Prioritizing domains and sub-domains of crisis and disasters

Main domain	Domain weight	Priority	Sub-domain	Sub-domain weight	Combined weight	Priority
Medical care skills	0.546	1	Medical and psychological Triage (START and SAVE)	0.398	0.2173	1
			Decontamination	0.356	0.1943	2
			Launching and setting up ventilator	0.234	0.1277	3
			Self-care and self-help skills	0.164	0.0895	4
Disease control skills	0.282	2	Prevention, control and management of post-disaster infectious diseases	0.336	0.0947	1
			Outbreak survey	0.187	0.0527	2
			Surveillance	0.141	0.0397	3
Primary concepts of crisis and disasters	0.124	3	Types of disaster scenarios (natural hazards, socioeconomic factors, and complexity issues)	0.245	0.0303	1
			Epidemiology of disasters	0.217	0.0269	2
			Cultural aspects of crisis and disasters	0.169	0.0209	3
Management skills	0.048	4	Hospital and pre-hospital emergency management during crisis and disasters	0.490	0.0235	1
			Incident Command System (ICS and HICS)	0.361	0.0173	2
			Hazard assessment skills in hospitals and health centers	0.359	0.0172	3

subjects (sub-domains) are shown in Table 2.

Based on the calculated weight of each area, medical care skills had the highest and management skills had the lowest priority for educational interventions. Within the area of primary concepts of crisis and disaster, the highest priority was given to the types, categorization and characteristics of disasters and crises sub-domain and the lowest priority to the types of studies on crisis and disasters. Considering disease control skills, the highest priority was given to prevention, management and control of post-disaster infectious diseases, while prevention of environmental health problems had the lowest priority. In management skills area, hospital and pre-hospital emergency management during crisis and disasters had the highest and documentation of care provided to patients had the lowest priority. Finally, within the medical and medical care skills area, the highest priority was given to medical and psychological triage, while intra-osseous infusion had the lowest priority (Table 2). Compatibility of all the examined items was less than or equal to 0.1 and it was acceptable.

Following a needs assessment, the experts were also asked about the goals, which aimed to improve the knowledge and awareness of medical students about disasters and its management methods. After holding focus groups, the experts agreed that 4 courses on disaster management should be added for medical students. They agreed that various educational methods, such as class training, lectures, problem-solving, exercise, teamwork, electronic and virtual could be used. However, to meet different learning styles and motivations, we should maintain the learners' interest and reinforce learning (to deepen learning and promote retention). We need to choose educational methods that are feasible in terms of resources. The experts emphasized the training needed to implement this educational curriculum, including equipment, facilities, funding, and personnel. Also, successful implementation of this curriculum requires ongoing evaluation.

## Discussion

The aim of this study was to determine and prioritize the educational needs within the disaster and crisis management for Iranian medical students. Earlier studies have shown that knowledge and awareness of medical staff, in particular medical students, with regard to disaster and crisis management is low, indicating that disaster-related educational programs should be initiated and implemented at universities with an emphasis on its usefulness (15, 20, 30, 31). A German study proposed 14 educational modules,

e.g. medical responses, laws, coordination, medical aides, command and control, mass casualty management, communications, etc. for German medical students (32). In another study, medical students considered disaster education, first aid skills, epidemic control and prevention, post-disaster psychological problems, and discharge principles as essential educational needs (33). Although we did not prioritize our educational subjects, many of the proposed educational subjects were similar to and in accordance with our findings.

Various studies have proposed different measures as necessary for crisis and disaster management. Obtaining proper education in command, control, coordination, and communication domains is proposed by one group, while proper and continuous evaluation of all educational initiatives and training programs has been mentioned by others (34, 35). Using educational subjects in a curriculum as foundation for new educational initiatives and trainings has been proposed and utilized by earlier studies such as control of diseases and relief and rescue skills and have proven to raise the awareness and knowledge of both medical students and other medical staff (36-39).

Medical students can be a valuable resource at the time of crisis. However, they need to be engaged and trained properly through formal education and simulation training in which different important subjects are discussed and trained in an environment where they can make mistakes and learn by doing (34, 40-42). Using domains and sub-domains mentioned in this report, a curriculum through which standardized educational initiatives can be given in several universities might be created. It is of high importance to evaluate and validate these educational initiatives. The current educational initiatives worldwide aim to focus on medical assessment of a disaster and emergency. Although this is important, there are other important factors that must be taught by medical professionals. The importance of 4C (command, control, coordination and communication) and also the fifth C (collaboration) in the process of decision-making has been discussed in the literature (31, 34). Such educational programs should be implemented for all medical students, including those in Iran with proper university credits. Similar development should be encouraged in other specialties and professions engaged in disaster and emergency management.

In our study, medical care domain had a higher priority and management skills had the lowest. This might be the bias of having

physicians as the reference group and also indicates the need for education in the latter as medical professionals should master the medical care before any emergencies. In this perspective, they must learn the principles of risk assessment, be trained in interdisciplinary engagement, and understand other organizations' capabilities and limitations (43, 44). Knowledge about triage and decontamination has the highest priority for physicians in order to save lives and stop the spread of contaminated materials (45). It is also important that triage used at pre-hospital and hospital settings be compatible. Knowing how to work with a ventilator is also another important area of knowledge which might be needed in the absence of emergency medical technicians. Learning self-care skills is another important aspect of management which medical students should be trained in along with tracheal intubation, and different ways of venous access in emergency care. Cricothyrotomy and intraosseous injections are rare requirements and have the least priority.

Disease control skills had the second priority among our domains. During an emergency and disaster and due to environmental changes, new diseases may emerge, causing epidemics and disease outbreak. Recognition of disease surveillance system, investigation on outbreaks, awareness of the issues related to environmental health, and the control of contagious diseases and other public health issues are important learning issues for medical staff including medical students (2).

Primary skills of crisis and disaster were the third priority. In this section, the categorization and types of disasters (natural, human, and complex) had the highest priority. However, these subjects are missing within the medical curriculum and should be included. Epidemiology of disasters was the second priority of this domain. It examines the spatial frequency and severity of disasters in different parts of the country. It also surveys the early and quick assessment of disaster-affected areas. Cultural aspects of disasters are another important issue to be considered. Given the fact that Iran has many ethnic and cultural groups, cultural differences must be taken into account at an incidence and even before any crises and disasters. In the event of a disaster, the use of local experts is a better choice, if possible. In addition to familiarity with the language of the area, they should also be familiar with the native culture of the people. Physicians should also be familiar with local, national and international laws and regulations in order to avoid legal problems and better coordinate the crisis management.

The fourth and last priority was managerial skills. Hospital and pre-hospital emergency management was given the highest priority. In many cases, these units are managed by general physicians, who have had no basic education in the managerial field and usually act based on their experience. The incident command system was the second priority of management skills. The hospital incident command system (HICS) is an incident management system designed to manage the threats, planned events, or emergencies by each hospital. As a system, HICS is very useful because it not only provides organizational structures for incident management, but also contributes to planning, construction, and compliance with this structure. HICS in incidents will also maintain and enhance the skills required for larger-scale incidents. HICS is based on the same rules as the Incident Command System (ICS) components of the National Incident Management System (NIMS), which has been well adapted to healthcare settings. The rules contained in the HICS materials and procedures are applicable to all missions and departments (such as prevention, protection, mitigation, response, and accountability and recovery), as well as all hazards (46, 47). The knowledge and awareness of the system and its implications and limitations should be included in the curriculum of all medical staff including medical students.

The quality of training for medical students should be upgraded day by day. New training makes better productivity and faster learning (48). Unfortunately, in Iran, educational problems are very high and there are still some old methods that are not effective.

Of course, these trainings should be held at different levels. Medical students and residents are also included in this training. Training is very important for readiness. If students are offered regular courses, they will increase their knowledge and awareness in disasters and crises. The important point is that the level of risk perception of students can be changed and through training and exercise, the individual's mental assessment of the risks increases and their safe behaviors can be increased. The main problem is the lack of training courses. Various educational methods can also be used, such as virtual training, lectures, practical work, and exercises.

The steps of Kern model include identification of the problem and assessment of general needs. This phase, by reviewing the available data (reviewing the texts, reports), consulting and asking experts in the field, finally had a problem that was the lack of a curriculum for

medical students in Iran. The second step was assessing the needs for the learner's target group. This phase was addressed by interviewing the experts, focus group discussions, and formal discussions on educational needs. The other steps were determination of general and minor goals, educational strategy, implementation, evaluation, and feedback (23, 49, 50).

Various methods such as lectures, new educational methods such as e-learning and virtual education, and exercises for student education can be used. For evaluation of this program, the Formative and Summative evaluation methods can also be used. In formative evaluation, after each didactic lecture of the ambulatory rotation, the learners fill out an evaluation form. Summative evaluation of the pilot clinical skills program for medical students showed a high level of satisfaction and learner proficiency, so the curricular dean sought resources and time to expand the program. These types of evaluations can be done at individual and program levels (23, 50).

#### Limitations

There were some limitations in this study. One of them was the absence of other professionals in the reference group, which may cause bias in some of the outcomes. The next limitation was inability to access all the experts identified from the study. Another limitation was the fact that it expressed the result of the study in a specific cultural and educational context. However, it may represent many other developing and some developed countries.

#### Implications

The results of this study can be used by medical students in medical faculties, research centers, policymakers, and health and disaster authorities. It is recommended that the authorities should prioritize according to different categories of education contents; more training can be considered for a more important area.

#### Conclusion

Management of disasters demands good access to qualified personnel and material resources and planning. Personal resources should be established and planned long before any event. Qualified physicians with full awareness are an important asset. They should obtain the knowledge and awareness during their educational period to be able to join the management teams before graduation. An appropriate educational and training curriculum might be a good start. To obtain a better outcome of the next disaster, we challenge policy makers and the Ministry

of Health to use the result of this study in order to initiate a standardized curriculum for future medical education and encourage other professionals for similar investigations in their fields. The important principle in the face of crisis and disaster preparedness is training. Therefore, it is recommended that this program should be implemented for all medical students in Iran.

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