

Determining the Training Requirements of Disaster Medical Assistance Teams (DMATs) in Iran; A Novel Approach

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Abstract

Background: Empowering and improving the preparedness of DMATs plays a vital role in the effectiveness of the medical relief process. Integrated training of rapid response teams is a significant goal to promote coordination in the response phase. Determining educational requirements is an essential prerequisite for developing educational programs.

Objectives: This study was conducted to determine the training requirements of Disaster Medical Assistant Teams (DMATs) in Iran.

Methods: This mixed methods study was conducted in 3 steps. In the first step, the roles and duties of DMATs were identified using a narrative review. Then, training requirements were determined using a focused group discussion method. Finally, the three-round Delphi survey was used to finalize the study's findings in the third step.

Results: Using a narrative review of the texts from 2428 articles, 15 addressed the roles and duties of DMATs and were included in the study as final texts. The roles and duties of the health, treatment, and support teams, as well as the team managers and seniors, were identified. In the second step, based on expert opinions in FGD, 105 specific and 16 general training requirements were found. The findings of this step were entered into the Delphi for finalization. Finally, the training requirements of DMAT members were determined. These requirements are divided into specific and general requirements.

Conclusion: DMATs are an integral part of disaster response operations, and their actions can play a vital role in the success of disaster response. On the other hand, DMAT members usually work individually in healthcare jobs and join each other as a team, depending on emergency conditions. Therefore, they need continuous training to perform their duties. The findings of this study can be a starting point for the training program of DMATs because, in addition to showing the roles and duties of the teams and sub-teams in disasters, it specifies the necessary skills and training requirements of the members.

Keywords: Disaster Medical Assistance Teams (DMAT); Roles and Duties; Training Requirements

Background

Disasters have killed millions of people and caused significant financial problems. Facing natural phenomena has always been the primary concern of human beings, from the time the early men started their

lives inside caves to the new era when people dwell in their modern and advanced structures (1). Disaster is a complete or partial cessation of a group or community's activities that leads to casualties, material damage, and environmental damage that the community cannot

compensate for with its existing resources (2). Nowadays, disasters and accidents account for a large portion of government resources and programs. The news carries daily information about various accidents worldwide. Climate change, human manipulation, and the rapid growth of technology have increased people's vulnerability (3).

Health has a special place among all the elements involved in disaster management because it is people's first and foremost demand and concern (4). Health plays a role in meeting people's needs in various ways. The health system's objective in disasters and emergencies is to deliver prompt medical care to stop the deaths and disabilities of affected people (5). The fourth priority for disaster risk reduction mentioned in the 2030–2015 Sendai framework is "increasing preparedness to provide an effective response to the effects of disasters at all national, local, and regional levels," emphasizing the provision of effective health and medical services in disasters (6). Strengthening local medical response capability through preparation, practice, and lesson learning is one suitable approach to achieving the objectives outlined in the aforementioned priority (7). One action taken by the health systems of several countries to improve their capacity to respond to disasters' consequences has been the development of Disaster Medical Assistant Teams (DMATs). These teams comprise medical professionals, including nurses, midwives, emergency medical technicians, general practitioners, specialists, and logisticians (8). These staff are dispatched to places where the healthcare system has been destroyed or overwhelmed and lacks the capacity and capability to deliver healthcare services (9). According to experience, the most efficient method to lessen the effects of disasters is to create and develop agile and multidisciplinary teams with proper training, exercises, and particular management strategies before disasters and emergencies occur (10).

Empowering and improving the preparedness of DMATs plays a vital role in the effectiveness of the medical relief process. Training is one of the most critical components in developing DMAT preparedness and empowerment. For a group of people who have yet to work together daily, staying together, working together, and providing high-quality services requires ongoing training (11). On the other hand, getting to know colleagues, doing team activities, working with equipment, etc., increases familiarity and empathy between team members and can lead to increased cooperation and coordination in an emergency.

Training includes classroom programs, on-site training, and workshops. Training can guarantee that the team members will act according to the unit instructions in line with their tasks and that errors will likely be reduced (12). The training should focus on the teams' roles and duties, which is the most crucial aspect of preparedness. Otherwise, it could result in resource waste (13).

Iran is a developing country in the Middle East, where numerous natural and artificial events have occurred in the last few decades. In 2003, the Bam earthquake killed more than 26,000 people. After that, several other earthquakes (Zarand, Borujerd, Kermanshah, Varzeghan, Khoi, etc.) led to many financial and human losses. In recent years, due to weather events, more than 70% of Iran's people have been affected by floods and storms (14). As a result, due to the human losses caused by disasters and their effects on the delivery of health services, the emphasis of Iran's disaster management program is health (15). Recent research and experience in responding to medical requirements caused by disasters revealed that teams of medical experts would go to disaster-affected areas voluntarily or as part of their job duties (16). In a study conducted by Tavan et al. in Iran regarding the risks threatening the participants in mass gatherings, it was pointed out that the DMATs could not perform appropriately in the incidents because they did not have proper training. In addition, a coordination challenge was observed among the teams. In this study, the lack of specific roles and tasks for teams is pointed out as one of the reasons for inconsistency (17, 18). In his research, Sorani et al. state that pre-hospital measures have faced many challenges in various incidents in Iran in the last decade. One challenge is changing the composition of DMATs to 4-member teams, which has led to parallel work and interference with some tasks. Another challenge is how to select and train members of the DMATs, which has reduced the efficiency and effectiveness of pre-hospital activities. In addition, the lack of training programs has been identified as another reason for the ineffectiveness of DMATs (19).

Objectives

This study was conducted to determine the training requirements of Disaster Medical Assistant Teams (DMATs) in Iran.

Methods

This mixed-methods study was conducted in three steps, which are shown in Figure 1. In the first step, due

to the lack of clear roles and duties for the teams in Iran, this study sought to identify the roles and duties of DMAT teams by raising a question. For this purpose, a narrative review was performed in the databases based on the guidelines of Baumeister et al. (20).

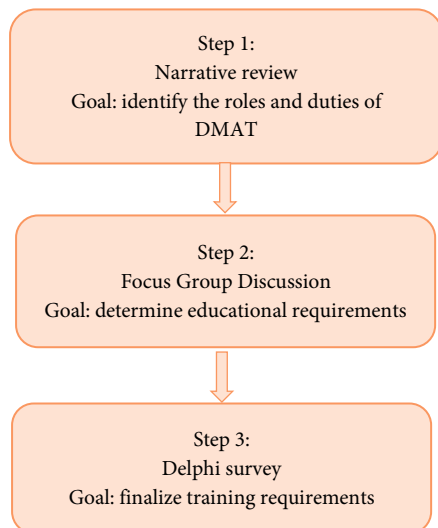


Figure 1. Study steps

The research question in the first phase of the study was as follows:

What are the roles and duties of DMAT teams?

The search strategy and keywords were selected based on the study's objectives and research question, with the opinion of experts and study partners. The search strategy is in Appendix 1. Pubmed, Scopus, Web of Science, and Google Scholar databases were searched until July 2022. Among the texts found, articles that specifically addressed the roles and tasks of the teams were selected. Articles were included for review if they met the following criteria: (1) published in English; (2) published until June 2022; and (3) original articles and conference papers. A systematic review, letters to the editor, editorials, and articles that did not attempt to investigate the roles and duties of DMATs were excluded from the study. Qualitative and quantitative CASP tools were used to evaluate the quality of articles. Direct content analysis of articles was used to extract the roles and duties of DMATs. Using this method, the full text of the articles was reviewed, and the roles and duties that were directly mentioned were selected for each team. Finally, duplicate roles were removed, and similar roles were merged. To achieve validity and reliability, the study was conducted by two independent researchers and then reviewed by a third person. The

data from this phase was used as a guideline for the second stage of the research. This table was provided to the participants in the focus group discussion in the second stage of the study to determine the educational requirements. The aim was to determine the training needs based on the roles and tasks of the teams. In this way, unnecessary or repetitive cases were avoided.

In the second step, a focus group discussion (FGD) was conducted to determine educational requirements. The meeting lasted 150 minutes. One person managed the meeting as a facilitator. First, the study and meeting objectives were explained to the participants. In this meeting, the findings of the first stage were presented to the participants. The facilitator reviewed the roles and duties of each DMAT team and asked the participants' opinions about the type of skills and training requirements. The meeting was recorded entirely, and the project executors made notes during the meeting. The inclusion criteria in FGD were at least five years of experience in medical education, experience membership in DMATs, familiarity with disasters and how to provide relief, and interest in the subject.

The meeting was held in September 2022 with 14 experts in various fields. The characteristics of the participants in the FGD are shown in Appendix 2. Finally, the meeting video was reviewed, and all its content was transcribed and entered into MAXQDA Ver 2020 software for content analysis. According to the research objectives, the categorical content analysis method was used. In this way and based on the questions raised in the FGD, the findings of this stage were classified as the educational requirements of DMAT members in the form of general and specific skills. The research team evaluated the findings twice to identify all the cases.

After FGD, the three-round Delphi survey was used in the third step to finalize training requirements. 25 knowledgeable and experienced specialists in medical education, rapid response teams and pre-hospital emergency were selected using the purposeful sampling method. Inclusion criteria were five years or more of service experience in a job position as a member of DMAT, or experience of being a member of this team for more than five years, and high interest and motivation to participate in the research. It should be noted that the participants in Delphi were not present in any of the previous two stages of the study.

Out of 25 selected experts, 22 experts participated in the study. The characteristics of the participants in the Delphi are shown in Appendix 3. To perform the first

round of Delphi, the initial list of roles, duties, and training requirements was sent to the study participants as a 5-scale Likert checklist. Participants were asked to comment on each of the identified items by choosing one of the options: strongly disagree (0 points), disagree (1 point), no comment (2 points), agree (3 points), and strongly agree (4 points). According to the number of participants in the study (22 people), the score of each item (based on a 5-point Likert scale) was considered between 0 and 88. Based on the opinions of experts and participants, Items that obtained more than 80% of the total score (70.4) were included in the findings as the main items. Items that scored between 60 and 79.99% of the total score (52.8 and 70.39) were used as guidelines for the second round of Delphi, and those with less than 59.99% total score (52.79) were eventually excluded. In the second round of the Delphi survey, items with a score of 60 and 79.99% were sent back to the participants after a week to receive their final comments. Items receiving more than 80% of the total scores in the second round were included as the main items.

A week later, in the third round, the results were sent to the participants to finalize the items of the previous two rounds. After a week, the answers were collected. Data analysis at this stage was done using Excel software. We only mentioned the report of the final results due to the prevention of repetition and multiplicity in the tables.

Results

Results of Step 1(roles and duties of DMATs): Based on the purpose of the study in the first stage, 2428 articles were found in the mentioned databases in the initial search; all of them were entered into the EndNote software. After the duplicate articles were deleted, 1439 articles remained. Finally, after studying the titles and abstracts of the articles, 15 articles that specifically addressed the roles and duties of DMATs were included in the study as final texts. Considering that a narrative review was used in this study, only studies directly about the roles and tasks of DMATs were selected. The bibliographic information of the selected studies is summarized in [Table 1](#). This table includes the author's name, the year of the study, the article type, the research place, and the Summary of roles and duties. DMATs are generally divided into three main subgroups: health team, treatment team, and logistics team (support). According to the study's findings, the health team has nine sub-units and one senior health person, the support team has three

sub-units and one senior support person, and finally, the treatment team has three sub-units, one senior treatment expert, and 1 DMAT boss. Studying the articles in [Table 1](#), the roles and duties of DMATs were identified. These roles and duties were divided into two general and specific categories. Specific roles are shown in column 3, [Table 2](#), and general roles in column 3, [Table 3](#).

In these tables, it is demonstrated that rules and duties obtained from which study. As can be seen, six general roles have been identified for all DMAT members. In the health team, there were two main roles for the senior manager, five roles for the Expansion unit, seven roles for the disease control unit, four roles for the environmental health unit, seven roles for the family health unit, four roles for the health education unit, ten roles for the nutrition unit, eight roles for the mental health units, five roles for the laboratory unit and four roles for the drug unit. Moreover, in the logistics team, there were three roles for the senior manager: two roles for the statistics and communication unit, three roles for the service unit, and two roles for the logistics unit. In the treatment team, there were nine roles for the DAMT head, three roles for the senior treatment officer, six tasks for the triage unit, eight roles for the AMP unit, and five roles for the transfer unit.

Step 2 and 3(training requirements of DMATs): In the second step, 105 specific and 16 general training requirements were found based on expert opinions in FGD. The findings of this step were entered into Delphi for finalization. Due to the large number of tables, the findings of this step were not presented in a separate table, and only the final training requirements obtained from Delphi were reported.

Finally, in the third step of the study, the training requirements of DMAT members were determined. Specific training requirements are in column 4, [Table 2](#), and general training requirements are in column 4, [Table 3](#). The agreement percentage of the items can be seen in the last column of [Tables 2](#) and [3](#). Seven general training requirements have been identified for all DMAT members. Five specific training requirements were identified for the health unit chief.

In addition, there was one specific training requirement for the expansion unit, 8 for the disease control unit, 5 for the environmental health unit, 2 for the family health unit, 3 for the health education unit, 5 for the nutrition unit, 9 for the mental health unit, 3 for the laboratory unit and finally 2 for the drug unit. Moreover, in the logistic team, there were four specific

training requirements for the senior: 5 for the statistics and communication unit, 1 for the service unit, and two skills for the support unit. Finally, the treatment team had five specific training requirements for the DAMT commander: 7 for senior treatment members, 4 for the triage unit, 9 for the AMP unit, and 5 for the transfer unit.

Discussion

Roles and duties of DMATs: In the first step of the study, the roles and duties of the DMATs were identified and were shown in health, treatment and support teams. Each team has units that perform their specific roles and duties to provide medical services for affected people in a disaster. Other studies have been conducted on DMATs that emphasize the necessity of creating a clear structure as well as the roles and duties of members. Foo et al. emphasize in their study that the main teams and sub-teams of DMAT should have distinct and separate roles. In this study, they have focused more on the roles of the treatment team, especially the AMP and triage units. Roles such as immediately creating a triage location, performing triage based on START and JUMP START methods, and monitoring the timely treatment of the injured have received more attention (21). Although the primary duty of the treatment team is to care for the injured, they cannot manage every aspect of emergencies alone. Health and logistics team members must be fully informed of their responsibilities to manage emergencies effectively. In their study, Suner et al. examined the historical process, the organizational structure, and the roles and responsibilities of DMATs. They stated that assigning roles to specialized health, treatment, and logistic teams was very important and could be done specifically for educational programs. This study defines roles for each team and sub-teams that guide emergency operations. Roles such as psychological support for the injured and DMAT members for the health team, transport of the injured and DMAT members for the logistics team, and finally, triage of the injured for the treatment team have received more attention than others (22). In their study, Lyama et al. stated that each team had specific tasks that differed from the functions and roles of the other teams. They pointed out that the ultimate goal of DMATs was to save the lives of accident victims; however, this was done by different specialized teams. In addition, within each team, small groups should have more specialized tasks for specific situations to help the victims more effectively. The treatment team has received more

attention in this study, and duties, including triage, patient admission and initial treatment, and patient transfer, have received more focus than other roles (23). These studies show that separating roles and duties into specialized groups is critical in DMAT. Educational planning will be ineffective without recognizing the roles and duties as well as the training requirements of the members. In this case, the members of the specialized teams recognize their respective roles and, as a result, are trained in the same field; the presentation of voluminous and sometimes irrelevant information is thus avoided.

Training requirements of DMATs

General training requirement: As the main objective of the study, the training requirements for each DMAT unit were identified. It was shown in these stages that some tasks, such as the skill of putting up a tent, had a general aspect, and all members of the DMAT should know how to do it because there is an urgent need to put up a tent in an emergency to do the work. Planning, cooperation, coordination, and communication were other general skills that were emphasized in this study. Such skills can be taught in groups, and training programs can be arranged so that more people can be trained simultaneously. Akbari et al. state in their study that DMATs need training programs to improve their performance. According to them, the members of DMATs in Iran should learn some aspects of management in general because these teams include people with different expertise. In this study, planning and communication skills have received more attention than general skills (24). Lee et al. pointed out in their research that in addition to the specific skills of the health, treatment, and support teams, there were skills common to all members of the rapid response teams, and all members of the teams should receive training in these skills. These skills included putting up and collecting tents, using communication tools, documenting skills, cooperating with other members and teams, and coordinating. This study stated that general skills, such as those mentioned above, could save time because people were trained in critical situations and could take immediate action to perform any activity, such as putting up a tent (25). This study mainly considers the general training requirements of DMATs, and as seen, they are consistent with our results. Sklar et al. also emphasize in their study that recognizing the types of disasters and their specific needs and planning are skills that all DMAT members should be trained on. According to them, the uniqueness of disasters can lead to mistakes in rescuers' decision-making. Therefore,

DMAT members must learn these skills and be able to plan correctly in any situation (11).

Health team training requirement: The most crucial training requirement identified in this study for the health team is to know the types of disasters and their health needs. Each type of disaster is unique, and its health needs are entirely different. In general, the activities of this team ensure the continuation of the functions of DMAT. Since the health team has many sub-teams and each has different roles, we mention only a few of this team's most essential training requirements here. In the present study, the analysis of health statistics, quick assessment of health needs, immunization of the population affected by disasters, and finally, mental health were the skills that were emphasized more than others by the experts. Arizman et al. emphasized the most prominent skills required for health teams in their study. They stated that analyzing and interpreting information to calculate health indicators was the main skill these teams must be trained in this field. In addition, recognizing different types of accidents and their health needs, as well as taking action to meet the health requirements of the affected area based on the type of the accident and the amount of damage, are other vital issues in this regard. According to them, the activities of the health team ensure the continuation of rescue operations in the affected areas, which can lead to the overall success of the DMATs (10). The findings of this study are closely aligned with the results of the present study. In their study on the simulation of the accident and the deployment of rapid response teams at the scene, Barelli et al. pointed out that the health team should be able to assess the area's health needs quickly, assess the amount of damage to the health infrastructure, analyze and interpret information, and take immediate and appropriate measures to meet essential needs (26). This study explores the health team and their roles in providing services. Additionally, some of the team's training requirements for performing the duties have been presented, which are compatible with the current study's findings.

Logistic team training requirement: The present study determined the training requirements of logistics teams, which play a vital role in the continuation of DMAT activities. The nature of logistics team training is different from that of treatment and health teams because the team members haven't a direct relationship with the injured. In the current study, alternative communication methods and providing alternative resources (fuel, electricity, etc.) were recognized as the

most important training requirements of the logistics team, which were emphasized more than other skills. Masudome et al. state that although logistics teams do not directly relate to the injured in accidents, their performance can strongly affect the function of DMAT. For example, the lack of fuel or suitable vehicles to move the injured disrupts other teams' activities. According to them, this team's most important training requirements are providing different communication platforms, fuel, amenities, alternative transportation methods in disasters, etc. (27). The findings of this study also confirm the results of the present study. In their study on a logistic team of DMAT, Aitken et al. noted that recognizing the types of accidents and understanding their logistic needs was one of the most crucial skills needed for support team members. Thus, they know the needs of every kind of accident and can plan to respond to it. In addition, members of this team should be familiar with various methods of transporting and carrying logistic supplies such as water, food, and fuel, and if necessary, try to take them depending on the type of the accident and the amount of damage to the infrastructures (28). The study's findings are consistent with the training requirements determined for the logistics team in the present study.

Treatment team training requirement: The main mission of the treatment team in DMAT is to help and rescue injured people immediately and transport them to medical centers. The current study highlighted training requirements such as triage, first-and second-aid, save and rescue, and principles of transferring the injured. In addition, suitable physical characteristics for relief activities were another training requirement addressed in this study. Experts advise that the treatment team members have solid physical constitutions since, in some circumstances, it may be necessary to transport the injured person right away. In a study on the skills of the treatment team, Hanlon et al. concluded that there were three vital skills for the treatment teams at the time of the accident. The first skill is to identify the types of accidents and the medical needs of each. Thus, unforeseen cases are less likely to be faced, and people are prepared to treat different types of injured people and other victims. The second skill is triage and information collection. Many resources are well-spent with triage, and people who need help faster and sooner are deprived of services. First and second aid skills are the last skills that team members need to learn and improve because their main mission is to help and rescue injured people immediately. In addition to

having scientific and practical qualifications, treatment team members must be periodically and continuously trained and put into operational conditions (29). This study considers the treatment team and their role in disaster response. In addition, several items have been suggested as training requirements for this team. The results of this study are closely aligned with the present study's findings. In their study on the physical characteristics of members of rapid response teams, Romney et al. noted that members of the treatment team should be physically fit and be able to treat people appropriately in various situations. In addition, they should be familiar with the different methods of transporting and carrying the patients and do the necessary physical exercises. In their opinion, physical fitness is more important for treatment team members than for other team members because they often provide direct treatment and first aid help, and they should carry the patients or change their positions in certain circumstances. Therefore, they must be able to rely on their strength to take immediate action to help the victims (30).

Since the main focus of DMATs is to provide medical care to the injured, the DMAT commander and the treatment senior are included in the treatment team. As seen in Table 2, some of the team senior skills for all three teams overlap. We discuss some of them here. For senior teams, safety principles, management skills, and communication and alternative communication skills were recognized as training requirements in the current study. In their study, Choa et al. introduced more practical skills for team commanders and seniors; concerning their scientific credentials, they pointed out that familiarity with skills such as the ability to use electronic communication devices, the ability to interpret information, and the ability to present reports was of great importance. According to them, using electronic communication devices during accidents or disasters is crucial because various communication methods may be disrupted due to the accident's severity, and the rapid response team may need help communicating. Thus, commanders must be aware of alternative approaches and know how to use them (31). This study mainly focused on training commanders and senior teams, and its results are visible in the present study.

As observed, the findings of other studies confirmed the results of this study in identifying the skills and training requirements of DMAT teams. A noteworthy point in this study is the comprehensiveness of

recognizing skills and training requirements that have attempted to cover all components of DMAT teams and provide a better understanding of the interactions between team members. Most studies in this field have only sporadically or specifically addressed a particular team's skills and training needs and need more comprehensiveness to design a training program. It was shown in the present study that members of DMAT teams, in addition to field knowledge, which is the primary qualification for membership, must have skills that can only be displayed in emergencies; thus, paying attention to them is very important. One of the most critical points in this study is that its results can be used to formulate educational programs for DMATs. Revising or developing a new curriculum based on scientific findings can improve the performance of these teams in emergencies.

Limitations: There may be some limitations in this study. The main limitation is the need for previous research studies in Iran. Several studies have been conducted on DMATs in Iran, but they have not paid attention to their training requirements and duties. In this way, it is impossible to compare the study results with the findings of others in this country. It has been attempted to address this limitation by discussing the findings of research that are most similar to the current study in terms of objectives, study methodology, and DMAT structure. The inability to generalize the study findings to other countries is another limitation of this study. As mentioned in the method, this study is designed based on the structure of DAMT in Iran. In this way, the roles and duties, as well as training requirements of the members, are consistent with this structure. DMATs do not have the same structure in all countries, and each uses a different structure depending on its conditions. In this way, the results of this study may not be applicable in some countries. However, the methodology of this study can be used in any country, and the training requirements of DMATs can be determined accordingly. Despite the mentioned limitations, the study results can be used as a preliminary step in designing educational programs. In this way, it is suggested that future studies on educational programs be developed based on these findings.

Conclusion

DMATs are among the first teams to be dispatched to the disaster area to provide health care services to the disaster victims. DMATs are an integral part of disaster response operations, and their actions can play a vital role in the success of disaster response. On the other

hand, DMAT members usually work individually in healthcare jobs and join each other as a team, depending on emergency conditions. Therefore, they need continuous training to perform their duties. The findings of this study showed that different skills are necessary for each role of DMATs. In addition, each skill requires special training. This study also notes the separation of training requirements for other teams. This allows for the consideration of training for specific target groups, saving time and money. Finally, the findings of this study can be a starting point for designing training programs for these teams.

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Conflict of interests: There is no conflict of interest.

Ethical approval: The ethics committee of Kerman University of Medical Sciences (code number: IR.KMU.REC.1401.213) approved the study protocol. All participants were informed about the purpose and method of the research and informed consent was obtained from them. In addition, participants were assured of confidentiality and anonymity. In addition, participants were told that they could withdraw at any stage of the study for any reason. All study procedures were performed according to the guidelines of the Declaration of Helsinki.

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Table 1. Characteristics of selected studies

Author name	Year	Article type	Location	Summary of roles and duties
Al-Shehri	2022 (9)	Original	KSA	The roles of communication and information about the affected community have been considered.
Bodas	2022 (7)	Original	Germany and Turkey	The structure, some roles and tasks of the DMATs are described
Foo	2021 (21)	Original	Taiwan	The structure and composition of DMATs in Taiwan as well as the roles and tasks of each team are described.
Waganew	2021 (5)	Original	Ethiopia	The roles and duties of the treatment team during disasters have been defined.
Lyama	2021 (23)	Original	Japan	The treatment team has received more attention in this study, and duties including triage, patient admission and initial treatment, and patient transfer have received more focus than other roles.
Akbari	2020 (32)	Original	Iran	The organizational structure and composition of DMATs in Iran as well as their tasks have been studied and suggestions have been made to improve the preparation of the teams.
Kondo	2019 (33)	Original	Japan	DMATs are divided into three teams: hygiene, Treatment and Logistics and their composition and functions in Japan have been examined and suggestions have been made to improve their performance
Bartolucci	2019 (34)	Original	Netherlands	The role of data manager and epidemiologist in the health team has been considered
Arziman	2015 (10)	Original	Turkey	Outlines the roles and responsibilities of health, treatment and logistics teams in general and emphasizes that a number of these roles are shared between different teams
Suner	2015 (22)	Original	Turkey	Roles such as psychological support for the injured and DMAT members for the health team, transport of the injured and DMAT members for the logistics team, and finally triage of the injured for the treatment team have received more attention than others
Djalali	2014 (35)	Original	Italy	Some of the roles and tasks of the DMAT trio teams are mentioned. The importance of cooperation as well as the integration of teams and groups in some emergencies to increase productivity and efficient use of resources has also been expressed.
Abbasi	2013 (36)	Original	Iran	The roles and responsibilities of the DMAT commander and the treatment team in the accidents are stated.
Aitken	2012 (28)	Original	Australia	The structure, roles and tasks of the DMATs are described. Also, the observance of standards and protocols by members of operational teams and commanders has been reviewed.
Sklar	2007 (11)	Original	USA	The general roles of DMATs in responding to disasters are described. This study emphasizes that it is impossible to provide relief to the injured and affected people without dedicated DMAT teams. In addition, the roles and tasks of treatment and logistic teams in disasters are described.
Franco	2007 (37)	Original	USA	The roles and responsibilities of the healthcare team in disasters are mentioned and it is emphasized that the duties of these two teams are in line with each other and they should have additional cooperation and coordination with each other.

Table 2. Specific roles and duties and specific training requirements

Main team	Subunits	Roles and duties	Skills and Training requirements	Agreement percentage–Delphi round
Health Team	Health Senior	Supervising, directing, coordinating and commanding the health units of the subdivision Collect statistics and reports of sub-units and present them to the team commander and the university's rapid reaction team statistics unit (21, 38, 39)	Management skills include command, coordination and control How to work with communication and alternative communications tools Designing and implementing group exercises Knowledge of safety principles (personal-environmental) Interpretation of statistics and information and reporting	89- R1 80.3- R2 91- R1 82.7- R1 83.9- R2
	Expansion unit	Holding various meetings with experts Reporting existing health bottlenecks and deficiencies and suggest appropriate solutions Utilizing statistical data collected for planning purposes Coordination and cooperation with current health programs in the region Analysis of statistics and information to calculate health indicators (10, 33, 37)	Analysis and interpretation of statistics and information in order to calculate health indicators	92- R1
	Disease control unit	Rapid assessment of infectious diseases Assessment the extent of injury and disease Estimating the extent of damage to health infrastructure Prevention and control of infectious and non-communicable diseases vaccination Investigation of disease outbreaks Collecting data such as basic health information, population structure, mortality, the main disease of the region and ... (21, 33, 35, 37)	Recognizing of common diseases in different types of disasters How to collect, analyze and interpret data such as basic health information, population structure, mortality, the main disease of the region and ... How to quickly assess the area to identify the disease Assessment the extent of injury and disease How to estimate the amount of infrastructure damage How to prevent and control infectious and non-communicable diseases Immunization methods Investigation of disease outbreaks	96.6- R1 91.2- R1 82.1- R2 91.2- R1 80.3- R2 96- R1 100- R1 98- R1
	Environmental Health Unit	Rapid environmental health assessment Monitoring water hygiene and wastewater disposal Health monitoring of the shelter and rapid response team Hygiene monitoring of food, spraying and disinfection of contaminated environments (10, 33, 38)	How to collect, analyze and interpret environmental data rapid assessment of environmental health status How to monitor water hygiene and wastewater disposal How to monitor the health of the shelter and the rapid response team Recognizing the types of disinfectants and perform disinfection in different conditions	93- R1 96.2- R1 90- R1 82.3- R2 80.9- R2
	Family Health Unit	Providing maternal care Providing neonatal care Providing child care	Recognizing the needs of different age groups in different types of disasters How to provide care to target groups	98.1- R1 96- R1

		Providing teen care Providing middle-aged care Providing healthy reproductive care Providing care for the elderly (10, 35, 37, 39)		
	Health Education Unit	Analyze the health status of the area Evaluating existing communication tools Determining the educational priorities Separation of the target population from the general public to increase awareness and maintain health (21, 33, 37)	How to determine the educational priorities of the region Different training methods in emergency situations Analysis and interpretation of regional health information	93.6- R1 83.1- R1 88- R2
	Nutrition unit	Assessing the nutritional status of the affected population Determination of nutritional deficiencies and water and foodborne diseases in vulnerable groups Review equipment and provide a list of equipment required for nutrition to the Chief of Health Complete the nutritional assessment form of children under 5 years old in disasters Complete the rapid assessment of the nutritional status of the household in disasters Monitoring the food security of affected households Food basket monitoring in terms of safety and health Monitoring the nutritional needs of infants Teaching proper nutrition in crisis to employees and the affected community Referrals to medical centers for people with malnutrition (10, 33, 38)	Recognizing nutritional needs in different types of disasters How to perform rapid nutritional assessment in various disasters Equipment assessment and provide a list of equipment required for nutrition to the Chief of Health Identify target populations and monitor their nutritional status Skills to provide training to the target population	89.7- R1 93.2 – R1 83.5 – R2 96.3- R1 80.3 -R2
	Mental health unit	Gather the necessary information about the dead, injured, dispatched and orphaned children Record essential information on family health cards Photographing all corpses Proper performance of funeral and mourning ceremonies based on local customs and traditions Perform special interventions for specific groups, children, the affected and PTSD Formation of an executive committee to reduce the psychological effects of disasters Psychological support for DMAT personnel Establish a proper connection between the survivors (33, 37)	Recognize mental needs in different types of disasters Skills in collect and record essential mental health information Photography skills Gathering the necessary information about the dead, injured, dispatched and orphaned children Proper performance of funeral and mourning ceremonies based on local customs and traditions Planning for group interventions in psychosocial support Perform special interventions for specific groups, children, the elderly and people with PTSD Formation of an executive committee to reduce the psychological effects of disasters Understanding the psychological needs of DMAT members	91.6- R1 96.5-R1 80.9- R2 83.7- R2 89.7-R1 83.9 – R1 93.8- R1 88.3- R2 85.1- R2

	Laboratory unit	Investigation of common diseases in the area for the transfer of related kits (usually before moving) Announce samples of feasible tests and referrals Collaborate with the Environmental Health Unit for water health assessment Perform tests required for the care of infectious and non-communicable diseases communication with other teams' labs regarding experiments were can be performed by them (10, 33, 37, 38)	Recognizing common diseases in different types of disasters Investigation of common diseases in the area for the transfer of related kits (usually before moving) Perform tests required for the care of infectious and non-communicable diseases	89.1- R1 81.3 –R1 81.2- R2
	Drug unit	Designing the layout of existing drugs to increase productivity Reassess, check for outbreaks or damage, and anticipate medications needed Preparation of drug checklists Preparation a checklist of medications to report and replace (10, 37)	Recognizing common diseases and drugs needs in different types of disasters Designing the arrangement of available drugs for efficiency in time and distribution of drugs	92.3- R1 83.2- R1
Logistic team	Logistic Senior	Supervising, directing, coordination and command Logistic units Providing the vehicles needed to transport personnel and equipment to the accident area Continuous communication with the DMAT commander and reporting to him (10, 32, 36, 38)	Recognizing logistical needs in different types of disasters Management skills include command, coordination and control Designing and implementing group exercises Knowledge of safety principles (personal-environmental)	93.1- R1 95.7- R1 83.9- R2 91.3 – R2
	Statistics and Communications unit	Establishing communication network via wireless, mobile phone, satellite phone and walkie-talkie between the transfer, triage, treatment, health, command, mobile units and regional headquarters teams Collecting information and transferring them to the relevant units (33, 39)	Recognizing communication needs in different types of disasters Recognizing and applying alternative communication methods Maintenance of communication devices Skills how to create a communication network in different situations Different methods of collecting information	96.8- R1 97.6- R1 86.1- R1 89.1- R2 86.9- R1
	Service unit	Setting up a place for staff to rest and eat Transportation (Corpses, affected people and personnel) Providing staff supplies and amenities (10, 11, 35)	Recognizing communication needs in different types of disasters	96.8- R1
	Logistic unit	Procurement of equipment and manpower Providing optimal conditions to provide services to the victims such as electricity supply, water supply, fuel supply (21, 33, 38)	Recognizing communication needs in different types of disasters Identifying alternative resources in the affected area	91.4- R1 89.6- R1
Treatment team	DMAT Commander	Supervision, coordination and command Continuous communication with the team headquarters commander at the university Continuous communication with team senior Determining the appropriate location for the team Command to set up a command and logistic tent at the beginning of the deployment	Management skills include command, coordination and control Designing and implementing group exercises Knowledge of safety principles (personal-environmental) Interpretation and analysis of information General concepts of public health	96.2- R1 89.7-R2 91.2-R1 80.2- R2 96.1- R1

		Proper distribution of personnel among the regions Monitoring and evaluating the performance of operational units Issuance of transit permit Continuous communication with the ICP General Area Command (21, 32, 36, 39)		
	Treatment Senior	Receive statistics and reports from the triage, treatment and transfer unit Providing statistics to the statistics unit and team command Supervise, direct and coordinate sub-units (32, 33, 35, 36)	Management skills include command, coordination and control Designing and implementing group exercises Knowledge of safety principles (personal- environmental) General concepts of public health Interpretation and analysis of information Knowledge of different triage methods First and second aid	95.1- R1 83.1- R1 80.1- R2 82.1- R1 81.5- R2 100 – R1 100- R1
	Triage unit	Deployment at the designated location and setting up a triage tent Perform triage based on START and JUMP START methods Triage location zoning based on triage colors Complete the triage card Storing the equipment of the injured and installing the triage code on the equipment Announce statistics and needs to the head of the triage unit (33, 38, 39)	Understanding the different methods of triage and how to zone and complete the triage card How to collect information First aid How to deal with the injured and psychological support	100- R1 87.1- R2 100 – R1 90.9- R1
Treatment team	AMP unit	Patient admission Re-triage Performing basic therapeutic measures Displacement of patients Reporting deficiencies and needs to the AMP manager Monitoring the treatment process of the injured Check equipment and announce needs Coordinating the referral of patients to field hospitals or other medical centers (32, 33, 35, 38)	First and second aid Recognition of drugs Familiarity with different triage methods and knowledge of different codes and colors How to work with rescue equipment, communications and their maintenance Physical fitness and physical training How to deal with the injured and psychological support Knowledge of safety principles (personal- environmental) Methods of transporting the injured and training them General concepts of public health	100 – R1 93.2- R1 100 – R1 87- R2 91.3- R1 89.3-R1 85.4- R2 89.4 – R1 98.1 – R1
	Transmission unit	Deployment of ambulances Complete the patient dispatch form Record reports and statistics to the head of the transfer unit Familiarity with the location of AMPs and field hospitals Continuous monitoring and coordination of all ambulance dispatches (10, 33)	Understand the types of transfer methods and alternative methods Physical fitness and physical training First aid Knowledge of safety principles (personal- environmental) How to deal with the injured and psychological support	96.8 – R1 96.5- R1 82- R2 80.8-R2 81.6 – R2

Table 3. General roles and duties and general skills and training requirements

Main team	Subunits	Roles and duties	Skills and training requirements	Agreement percentage – Delphi round
All teams	All Subunits	Planning how to perform actions Setting up equipment tent Coordination and cooperation Documentation actions Reporting to the Chief of teams Communication with other subunits and other teams (11, 21, 32, 35-37, 39)	Recognizing the types of accidents and disasters Skills for setting up tents and equipment Planning skill based on information obtained and condition Coordination and cooperation with other sub-teams and other responders Documenting the actions taken and reporting to the team leaders Communication skills included (communication within the team, communication with the target group) Understanding how to use personal communication equipment	96.2 –R1 98.1- R1 81.3- R2 86.7- R2 93.2 – R1 87.6- R1 95.2- R1

Appendix 1. Search Strategy

The search strategy in this study was as follows: (((((((("disaster medical assistance team"[Title/Abstract]) OR (DMAT[Title/Abstract])) OR ("emergency medical teams"[Title/Abstract])) OR (EMTs[Title/Abstract])) AND (tasks[Title/Abstract])) OR (roles[Title/Abstract])) OR (duties[Title/Abstract])) OR (functions[Title/Abstract])) OR (missions[Title/Abstract])) OR (responsibilities [Title/Abstract])).

Appendix 2. Characteristics of the participants in the FGD

Characteristics of the participants in the FGD									Field of Study
Participant code	Sex		Education level			Work experience			
	Male	Female	Bachelor	MSc	MD or PhD	5-10	10-15	More than 15	
P1	✓			✓			✓		Medical education
P2		✓			✓	✓			Medical education
P3		✓			✓	✓			Medical education
P4	✓				✓	✓			Health in emergencies and disasters
P5	✓				✓		✓		Health in emergencies and disasters
P6		✓			✓			✓	Health in emergencies and disasters
P7	✓				✓	✓			Health in emergencies and disasters
P8	✓				✓	✓			Health in emergencies and disasters
P9	✓				✓		✓		Health care management
P10		✓			✓			✓	Health care management
P11	✓			✓				✓	Public administration
P12	✓			✓				✓	Human Resource Management
P13	✓				✓			✓	Medical Doctor
P14		✓		✓			✓		Nurse

Appendix 3. Characteristics of the participants in the Delphi

Characteristics of the participants in the Delphi									Field of Study
Participant code	Sex		Education level			Work experience			
	Male	Female	Bachelor	MSc	MD or PhD	5-10	10-15	More than 15	
P1	✓				✓	✓			Emergency medicine
P2	✓				✓		✓		Emergency medicine
P3	✓				✓		✓		Emergency medicine
P4	✓				✓		✓		General surgery
P5	✓				✓			✓	General surgery
P6		✓			✓	✓			General physician
P7	✓				✓		✓		General physician
P8	✓		✓			✓			Nurse
P9		✓	✓			✓			Nurse
P10		✓	✓			✓			Nurse
P11	✓			✓			✓		Nurse
P12	✓		✓				✓		Nurse
P13	✓		✓			✓			Pre-hospital emergency technician
P14	✓		✓				✓		Pre-hospital emergency technician
P15	✓		✓				✓		Pre-hospital emergency technician
P16	✓		✓			✓			Pre-hospital emergency technician
P17		✓			✓	✓			Medical education
P18		✓			✓		✓		Medical education
P19		✓			✓		✓		Medical education
P20	✓				✓			✓	Health in emergency and disasters
P21	✓				✓	✓			Health in emergency and disasters
P22		✓			✓	✓			Health in emergency and disasters