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ORIGINAL RESEARCH

Challenges of Emergency Medical Services Response to Arasbaran Twin Earthquakes; a Content Analysis

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Abstract: **Introduction:** One of the most important concerns in responding to disasters is providing Basic Life Support (BLS) services. Considering the key role of Emergency Medical Services (EMS) in providing BLS, the purpose of this study is to investigate the experience of provincial EMS during their response to the Arasbaran twin earthquakes and its challenges in Iran. **Methods:** This study was conducted using a qualitative approach and the conventional content analysis method. Data were collected through Focused Group Discussions (FGD) and semi-structured in-depth interviews with purposively-selected EMS paramedics and officials in East Azerbaijan Province, Iran. To form the main categories, the interviews were encoded in three stages and the similar codes were placed under the same subcategories and merged. **Results:** A total of 26 EMS paramedics participated in the study. The codes extracted from the interviews, after three stages of reduction, were placed in the top ten categories, including the lack of preparedness and coordination, dead bodies' management challenges, responders' psychosocial support, deficiencies in supplies and ambulances, difficulty of access to rural areas, volunteer management, non-documentation of the experiences, communication challenges, recalling, and deploying of EMS responders. **Conclusion:** Timely response of the EMS and paramedics' sense of responsibility for providing services were positive and successful points about the emergency response operations. The weaknesses of EMS should, therefore, be addressed through transferring of experiences and by planning and arranging training courses.

Keywords: Emergency Medical Services; Earthquakes; Disasters; Emergencies

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1. Introduction

Disasters are destructive phenomena imposed on human life (1-3). Every year, hundreds of disasters occur around the world. In 2017, for example, 318 disasters occurred throughout the world, with 9503 deaths, more than 96 million affected, and more than $314 billion in financial damages (4). Iran is one of the most disaster-prone countries. More than 90% of the country and almost all its mega cities are at risk of floods and earthquakes (5). On average, in Iran, more than 4000 die each year due to natural disasters and more than 55,000 are affected (6). Disasters, particularly those who release a lot of energy, damage the structures and injure the people living in them. Rescuing these casualties from the rubble and providing immediate medical care can reduce the number of deaths and complications (7). Medical services are the most important requirement of the affected people during the first moments after disasters. Therefore, EMS is one of the key components of every disaster response (7). EMS is the main provider of basic life support (BLS) in the early moments after a disaster (8). Since the launch of these systems around the world, they have become a leading organization in response to disasters (8). The preparedness of these systems, and their timely effective response has sig-

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Table 1: The demographic characteristics of the study participants

Variable	Number (%)
Education	
General physician	5 (19.23)
Masters Degree	4 (15.38)
Bachelors Degree	11 (42.31)
Associate Degree	6 (23.08)
Work Experience	
More than 25 years	4 (15.38)
20-24 years	6 (23.08)
15-19 years	5 (19.23)
10-14 years	4 (15.38)
5-9 years	3 (11.54)
Less than 5 years	4 (15.38)
Workplace	
Emergency Department	11 (42.31)
City EMS headquarters	5 (19.23)
EMS headquarters of the province	10 (38.48)

EMS: emergency medical service

nificantly reduced the number of deaths and adverse effects caused by disasters (9).

Absence of triage on the disaster scene, lack of basic life-supporting services, and unplanned transportation of injured people to other cities were the main limitations of EMS in Bam earthquake (7).

According to Sorani et al., Iranian EMS is faced with six main categories of challenges in response to disasters; namely: people-related problems, infrastructural shortcomings, mismanagement of information, management obstacles, insufficient number of paramedics and presence of concerns regarding their safety/security, and challenges of medical services (10).

Findings of Khankeh et al. reveals that unplanned response, chaotic service providing, duty overlaps, and lack of coordination between different service providers were the main challenges of Iranian health system in response to Bam earthquake (5).

On August 21, 2012, two earthquakes, with a magnitude of 6.2 and 6.3 on the Richter scale, shook Haris, Varzaghan and Ahar (Arasbaran) districts in East Azerbaijan Province and injured more than 3000 (11). The provincial pre-hospital emergency department was involved in response to the earthquakes. After the disruptive earthquake in Bam, it was the first experience of Iranian EMS in response to such a major disaster. It was so important for us to examine this experience and explore their challenges. Disaster management specialists believe that such investigations can improve/help resolve the current challenges of health systems in facing with disasters (7). The aim of this study is, therefore, to investigate the experiences of EMS in response to Arasbran twin earthquakes.

2. Method

2.1. Study design and setting

Purposively selected EMS paramedics and officials who were directly involved in responding to Arasbaran (Ahar, Haris and Varzaghan) twin earthquakes in 2012 (August-September) were the participants of this qualitative study. After receiving the approval of Tabriz University of Medical Sciences (ethics code of study: IR.TBZMED.REC.1396.535), the researchers were referred to the central EMS organization in Tabriz. The selected participants were then interviewed or coordinated by Focused Group Discussions (FGD) (2017 September) for data collection. The number of participants in each FGD was five to seven. The group discussions and interviews continued in Ahar, Haris, and Varzaghan EMS posts until data saturation was achieved.

2.2. Participants

The inclusion criteria for this study consisted of having been involved in response operations as an EMS paramedic or official. The exclusion criteria were unwillingness to participate in the study and being unavailable.

2.3. Data gathering

The interviews and group discussions began with the interviewer presenting a summary of the project and its objectives to the interviewees. The interviews then continued with general questions, and based on participants' responses, more in-depth questions were asked to extract rich interviewee experiences. All the responses were recorded by a recorder and immediately transcribed after the completion of the interview. A summary of all the discussions and participants' behavior and body language during the sessions were recorded. All the statements made by the participants were then transcribed on paper with the exact same wording and were submitted to each participant to confirm or correct their statements. The text of the interviews and discussion was repeatedly studied to achieve immersion.

2.4. Data analysis

Data analysis was carried out in the form of conventional content analysis, and started simultaneously in three stages (simultaneous analysis). At first, the initial codes were determined. The duplicate codes were then removed and the codes with the same concept were placed together to form the subcategories. The main categories were formed out of the merged subcategories.

For meeting credibility, conformability, dependability, and transferability criteria, proposed by Lincoln and Cuba for qualitative researches, were considered. So, for increasing generalizability, transcriptions, meaning units, and extracted codes were sent to some of the participants. Then we revised

the codes based on their comments.

3. Results

Four FGDs and five interviews were held with 26 participants. Eighteen of them were EMS paramedics and eight were officials. Seven of the participants were women and 19 were men. All of them had either participated directly in providing services to the injured people in the early hours after the earthquakes or had been involved in managing the response. Table 1 presents their profiles.

After the earthquakes, EMS started its response operation at two levels, including the district (local) and the provincial level. The paramedics who were present at the local EMS posts in the earthquake-affected area had gone to the nearest villages from the very first moments after the turmoil along with other people and began to gather the injured in certain points, prioritize them and provide basic medical services for them; then, using ambulances, they began transferring the injured to district hospitals. At the local level, since the earthquake occurred in the afternoon and the buildings were closed and since the cities themselves were not severely damaged, the paramedics first ensured the family's health and then deployed them locally (mostly to relatives' homes) and immediately went to their departments and started the response operation.

In the provincial department, almost all the officers had set up their families in a safe place after the earthquakes and had come back to their workplace within the first minutes. They had then begun getting information from earthquake-affected districts. After getting the initial information, three rapid assessment teams were deployed to the affected areas. Afterwards, the officers began calling on other coworkers from the provincial towns, and after about two hours, ambulances were deployed to the affected zones. Since the earthquake-affected cities were in the neighboring of Ardabil province, ambulances were immediately sent from this province to the city of Ahar for relief. More ambulances were sent from West Azerbaijan Province. Despite these efforts, most of the injured had reached the hospitals using their own personal cars, which were mostly unsuitable for carrying an injured. Overall, more than 3000 earthquake victims were transferred to hospitals in the region. The initial response was almost completed around 2:00 AM (approximately eight hours after the first shakes).

After the analysis of the FGDs and interviews and encoding them, the codes were finally extracted by eliminating the repetitive codes and merging the similar items. The similar codes (99 codes) were placed into subcategories, yielding 29 subcategories (table 2).

The similar subcategories were also merged to form the top ten categories, including:

1- Lack of preparedness (14 codes; 3 main codes/categories)
2- Lack of coordination (18 codes; 4 main codes/categories)
3- Challenges of dead bodies' management (4 codes; 2 main codes/categories)
4- Psychosocial support for the EMS responders (11 codes; 5 main codes/categories)
5- Deficiencies and the lack of facilities, equipment, supplies and ambulances (13 codes; 3 main codes/categories)
6- Difficulty in access to damaged rural areas (7 codes; 3 main codes/categories)
7- Relief volunteers' management (9 codes; 2 main codes/categories)
8- Lack of documentation of experiences (7 codes; 3 main codes/categories)
9- The challenges of communicating with the earthquake-affected areas and between teams (7 codes; 2 main codes/categories)
10- Recalling and deploying EMS responders (9 codes; 2 main codes/categories)

1- Lack of preparedness

The lack of preparedness among the EMS paramedics and officers was one of the main issues discussed by most interviewees. This challenge was reported at different levels and has been divided into three sub-categories: The lack of paramedics' and officers' preparedness, the lack of EMS organizations' preparedness, and the lack of community preparedness. Examples of participants' statements are given below:

"... We did not know that there was an earthquake; we were afraid, but did not know what to do ..." "... We have been trained to provide services in the case of road accidents and emergency situations such as heart attacks. We did not know what to do there ..." "... We never had a maneuver that covered such a situation ..." "... People didn't know what triage was. They didn't know how to help us. They put a lot of pressure on us ..."

2- The lack of coordination

The most frequently discussed issue by the interviewees was the lack of coordination, which entailed internal (EMS) and external (between the different relief organizations) levels. The lack of internal coordination refers to coordination in missions, dispatches, and organization of responders and equipment, and the lack of external or intersectional coordination mainly means the inconsistency of different organizations with each other in providing services. There were numerous challenges in managing and organizing relief affairs in the affected areas. Rapid assessment was not carried out in the early hours of the incident, and more pressure was put on EMS organizations that revealed their managers' weakness in the allocation of equipment and human resources.

"... We became involved with the police forces and the police

hit our colleagues. They insisted that we should take the corpses with us ..." "... We didn't know where to go; the division was poor, and everyone gave a command. He said you were going to the village of Varzaghan, or you go to the villages around Tabriz, and so on" "... Another problem was protection..." "...The university had good facilities; we couldn't serve them all though ..." "The security forces contacted our colleagues; unfortunately, they think we are under their control and should listen to whatever they say ..." "... The school watchman resisted opening the school ..." "... In that village, there were a few injuries, but the number of ambulances was higher ..."

3- The challenge of managing dead bodies

Another challenge noted by the interviewees was the challenge of managing the dead bodies; that is, the inability to identify, organize, and transport the bodies.

"... Some of the corpses were not recognizable ..." "I saw an ambulance bring a corpse ..." "... We didn't know what to do with the bodies, and people also pressured us ..." "... Where should we put them? ...".

4- Psychosocial support for the EMS responders

From the viewpoint of the interviewees, the lack of mental support for the EMS personnel, the lack of attention to their safety and security and their families, the lack of proper water and food supply, and the presence of fear and unrest in emergency situations affected correct decision-making and deployment of responders and put the personnel in unfavorable conditions.

"... I gave everything to my nephew and carried my car to Varzaghan ..." "... I was able to call my family, who said they were good and safe ..." "... We were worried about our own families ..." "They said all the troops have gone to their own families' rescue ..." "... Everyone received tents and the basic necessities except our own families ..." "... After the earthquake, nobody came to us to see how we were finally doing ..." "... We are always neglected by the staff..."

5- Deficiencies and the lack of facilities, equipment, supplies, and ambulances

The most common problems noted by the participants included the lack of equipment, especially in the early hours after the incident, the lack of supplies and treatment facilities, the failure to supply appropriate medications to the injured, presence of inappropriate ambulances or lack of ambulances, and the lack of proper and balanced allocation of equipment to the earthquake-affected areas. "... There was an ambulance and we brought eight patients on it ..." "... Our ambulances are Sprinter and not suitable for our area ..." "... The equipment is very important. We have many shortcomings..." "... We are not equipped with clothes..." "... We didn't have tags for the triage".

6- The challenge of access to villages and damaged areas

Reaching the villages was very difficult, and the rural texture of the earthquake-affected areas (narrow streets and rural roads) also exacerbated this problem. Some road bridges were either destroyed or completely unreliable. Some roads could not be crossed due to the collapse of the mountains or because they were subsiding. In the first moments, heavy traffic was created on the roads, which delayed the response. "... We went there and I saw that both the entrance and the exit were destroyed. We had to keep/stay on the bridge ..." "... There was about 30 centimeters subsidence in the direction of the road ..." "... Our second problem was the traffic; after the announcement of the earthquake in these three areas, the road was actually blocked ..." "... On the Khaje-Haris path, the mountain had collapsed ..."

7- Relief volunteer and donation management

The participants discussed the role of volunteers, and public and organizational donations in the process of providing relief to the injured. They also discussed problems and challenges of people's presence in the regions, which mainly included people's pressures to receive services, invasions to and gatherings in health centers, and interferences in the provision of health care.

"... Several trucks brought in patients ..." "... I think about 10% of the injured were brought in by EMS personnel and the rest by the locals. People themselves took over the situation and did everything by themselves ..." "... People insisted that we take their patients and did not let us do triage ..." "... They disturbed our efforts for triage as soon as they saw us in our uniforms ..." "People came and went to help the injured trapped beneath the rubble ..."

8- The lack of documentation of experiences

Almost all the EMS responders had not recorded their experiences, including the actions taken, the existing problems and challenges, potential solutions, and the strengths and weaknesses of each decision and action. This lack of documentation impedes the transfer of experience to other responders and is not conducive to the improvement of weaknesses, the promotion of preparedness, the enhancement of skills, and the strengthening of management in similar future situations.

"... We did not record our experiences and everything remained only in our minds; after we're gone, there'll be no trace of our experiences ..." "... Whenever there's an earthquake, I believe these problems will be repeated ..." "... We constantly talk about problems at our meetings, but that's only talk ..." "... The experiences have not been transmitted even then, even if they move, they cannot solve the problem, they must work on the thoughts of managers...".

9- The challenges of communicating with the earthquake-affected areas and between teams

The participants noted communication problems, including the disconnection of communication systems in the early hours and the lack of communication equipment. According

to the participants, it later became clear that communication problems had led to a lack of communication with the health centers and relief organizations. Other problems in this domain included the lack of public awareness, not knowing about the center of the earthquake during the early hours, and the lack of coordination between the organizations. There was a disorder in the provision of services as a result of these shortcomings.

"... Landlines and cellphones were completely cut off ..." "... We were not connected anywhere; our sites were mostly wireless. We did not have any other connections with the ambulance ..." "The satellite phone does not help much ..." "... We couldn't communicate with the hospitals and we didn't know which hospitals would take in the patients ..." "... They couldn't call us from the villages".

10- Recalling and deploying EMS responders

The interviewees discussed some positive points in their statements, such as the good recall and dispatch of EMS paramedics and the rapid receipt of donations from other provinces and neighboring cities. The high motivation and sense of responsibility in the relief forces to provide services and the spontaneous hastening of the pre-hospital personnel to help the earthquake victims were constantly discussed by the participants of this study.

"... All our colleagues came, because everyone felt responsible ..." "... Several surgeons, anesthesiologists, physicians, and nurses came ..." "... Our colleagues from Ardabil and Meshkin Shahr had reached Ahar even earlier than ourselves..."

4. Discussion

Providing BLS in the early phase of disasters is a key component of disaster management. Following the twin earthquakes of East Azerbaijan, provincial EMS tried to provide BLS to the injured. This qualitative study was conducted to investigate the EMS response experience to the earthquake in Varzaghan, Haris and Ahar. According to the results of the interviews, there were many challenges in the EMS response to this incident, including preparedness and coordination, the challenges of managing dead bodies, psychosocial support for responders, deficiencies in supplies and ambulances, difficulty of access to rural areas, volunteer management, lack of documentation of experiences, communication challenges, and calling and deploying EMS responders.

In a recent study, Sorani et al. reviewed the challenges of pre-hospital emergency systems in disasters. They extracted six main categories of data, and apart from the challenges of medical care, the rest of the challenges were in line with those noted in the present study (10). The six main categories of challenges in Sorani's study were people challenges, infrastructure challenges, information management system challenges, staff challenges, managerial challenges, and challenges in providing medical care.

In a study by Babaie et al. (2015) on the challenges of hospital response to disasters, the main challenges extracted were the lack of coordination, preparedness, equipment and supplies, which are in line with the results of this study (12).

In a study by Khankeh et al., the poor planning in providing health services, poor division of labor, unclear duties, overlapping tasks, parallel functioning, and poor connection between the managers and the service providers were major problems and obstacles in disaster management (13).

Almost all the available health sectors, including pre-hospital EMS, hospitals, public health, and support departments, were involved in the response to disasters; however, there was no coordination among them (either within the Ministry of Health (MOH) between the different departments or outside the MOH), as they kept their organizational boundaries rather than reinforcing each other, although the purpose of all of them was to provide health care to all those affected by the disaster.

In one study, Rubin (1998) stated that the initial response to disasters should include the transfer of the injured to healthcare facilities, the recall and management of healthcare personnel, and the supply of medical equipment and other required facilities. Therefore, at this stage, the main activity is to properly coordinate the storage and distribution of facilities. The management of disaster response should immediately activate all the related organizations, issue necessary permits for resource consumption, specify the priorities and progress of work, and assess and monitor the provision of services tailored to the objectives. The obtained information is collected, interpreted and explained, and the service provider should also be introduced (14).

The results of the study by Emami et al. (2005) entitled "Strategies in evaluation and management of Bam earthquake victims" revealed that a comprehensive plan is needed to ensure a comprehensive and consistent response to harmful events. A comprehensive plan affects the provision of required services for injured people and screening the victims of accidents has many benefits in their rapid and effective assessment and management (15).

People develop extensive health needs due to the wide disruptions that occur after disasters (13). Responding to all these needs is almost beyond the control of the health authorities, and people, themselves, should act too, irrespective of the health system in place in their country (16).

In the studied earthquakes, people came to the scene from the very first moments after the incident. Since the earthquake had affected a vast area –mostly rural areas– it was not possible to provide services to all of them in a limited time. The arrival of ordinary people helped quickly rescue the ca-

sualties from the rubble and transfer them to the health facilities. Many of these people had no training in emergency services and some of the volunteers may have been harmed themselves; in fact, some of them died in the second post-seismic period. In addition, their lack of awareness about the principles of service provision could have harmed other people as well. Previous studies have made note of similar problems (17).

One of the challenges expressed by the interviewees was that the forces active on the scene did not use the lessons learnt from the past, which demonstrates the lack of documentation of the actions and the failure to transfer them to others for future use. The lessons learned in every disaster can become the basis of training and help increase the skills and readiness of the medical personnel and the general public in the face of similar situations. Therefore, by recording and documenting experiences, the level of preparedness, knowledge and skills can be raised in the community by organizing training courses for pre-hospital staff and ordinary people.

In the study by Khankeh et al., one of the solutions proposed for improving the services provided in critical situations was proper management, and planning and preparation based on past experiences and the information derived from regional reviews, which facilitate planning and decision-making based on actual data (18).

In another study, Arabs et al. also emphasized the significant relationship between the knowledge and performance of executive directors and demonstrated the importance of the development and implementation of short-term training programs to increase the knowledge and awareness of hospital executives about coping with natural disasters and hazards, including earthquakes. In addition, general training and pre-event planning help provide an effective response to health services during a disaster (19). Nonetheless, these lessons are usually not taken into account for a variety of reasons (20).

The lack of psychosocial support for the staff was a neglected issue in participants' experience. The EMS personnel also have their own family, who may be living in the earthquake-stricken areas themselves and may have been harmed and in need of help. Meanwhile, almost no action was taken to help ensure the safety of the personnel's family, and the EMS personnel had to personally ensure their family's health and safety. Furthermore, disasters create frustrating scenes that disturb the viewers' mental health. Ensuring that these issues are well taken care of requires actions that were not taken into consideration in this earthquake. Similar problems were noted in previous studies.

Communication is one of the main infrastructures and needs of any disaster response and is one of the essential tools for establishing coordination. The first consequence of disasters is the disconnection of communication or excessive burden on the means of communication due to the increased need for communication. Many disaster-responding organizations have a multi-layered communication facility for themselves, and although the pre-hospital emergency department also has a separate communication system of its own, one of the biggest drawbacks discussed in the present study was the lack of communication facilities at the time of the earthquake. The failure to plan for a rapid assessment of the health needs, dispersion and inconsistency, and prolonged data collection and analysis process mean that many decisions taken in response to emergency situations are based on previous experiences rather than actual data from the field, which was one of the problems discussed in the present study too.

5. Limitations

This study is being conducted 5 years after the earthquakes. The main limitation was recall bias in presenting details by the study participants. We tried to show some recorded clips of response moments to them and tried to have deep interviews for extraction of their experiences.

6. Conclusion

According to the research findings, the EMS response to the twin earthquakes of Arasbaran was a positive and successful experience in delivering emergency services regarding the presence and recall of paramedics and their sense of responsibility for providing services; however, there were challenges and weaknesses in the management and coordination of the paramedics, most of which were due to the lack of preparedness. The transfer of experiences by planning and organizing courses can address the weaknesses of the current EMS system and will and help better address disasters in the future.

7. Declarations

7.1. Acknowledgments

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7.2. Author contribution

FGDs were directed by MP, LRS transcribed and typed data. Data extraction, coding and categorization were conducted by JB and LRS. Paper draft was prepared by LRS and JB revised and edited it, finally all authors contributed in finalizing the manuscript.

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7.4. Conflict of Interest

There is no conflict of interest.

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Table 2: The categories and sub-categories extracted from the interviews and Focused Group Discussions (FGDs)

Category	Subcategory	Code
Psychosocial support for the responders	Lack of attention to the safety and security of the personnel's family	Workers' concerns about their families
		The importance of family status
		Authorities' failure to support the responders' families
	Lack of mental support	Psychological disorders developing in the personnel
		Employees' fatigue because of high volumes of work
		Failure to deal with personnels' problems after the disasters
	Little attention to the safety and security of the responders	Lack of personal security
		Fear of showing up on the field and its impact on decision-making
	Lack of support	Failure to supply water and food to the responders
	The difficulty of decision-making in emergency situations	The difficulty of making decisions in the early moments
		Simultaneously treating several patients
The challenge of managing dead bodies	Identification problems	Impossibility to identify the deceased
		Improper handling of corpses
	Lack of a well-developed program	Undefined corpse management process
		Transporting dead bodies by ambulances instead of the injured
Lack of preparedness	Lack of EMS paramedics' and officers' individual preparedness	Unfamiliarity of paramedics with the basics of triage
		Inadequate training of paramedics and the lack of necessary skills
		Lack of paramedics' readiness for providing services in disaster situations
		Personnel's lack of familiarity with earthquake signs
		Lack of familiarity about how to react when it is shaking
	Lack of organizational preparedness	Lack of prior organizational preparedness
		Lack of accurate planning to cover the costs of the disasters
		Lack of readiness to confront the disasters
		Failure to perform (between organizations and between relief agencies)
		Lack of a disaster management office in EMS
	Lack of community preparedness	People disrupting the first responders
		Lack of familiarity of the residents with relief issues
		The local people's inability to perform proper triage
		The people's inability to perform medical first aids
Lack of facilities, equipment, supplies, and ambulances	Lack of equipment	Not properly equipping the responders
		Lack of equipment in the early hours
		Equipment disproportionate to geographic area
		Lack of basic relief supplies
	Lack of supplies	Failure to supply appropriate medications
		Lack of triage tags
		Shortage of first-aid equipment
	Lack or presence of inappropriate ambulances	Small number of ambulances in the early hours
		The number of ambulances being disproportionate to the mission volume in the first hours
		Ambulances being disproportionate to the region
		Ambulances not appropriate for disaster situations
		Lack of advanced facilities and ambulances
		The impossibility of helicopters landing

Table 2: The categories and sub-categories extracted from the interviews and Focused Group Discussions (FGDs) (continued)

Category	Subcategory	Code
Lack of access to villages and damaged areas	Closure of rural roads and alleys	Lack of access due to the severe destruction of the villages
		The entrance of villages being obstructed
		Lack of access to the areas in the early hours
	Poorly-constructed rural roads	Poorly-constructed regional roads
		Geographical conditions
	Destruction of communication routes	Damage to the roads and bridges
		Road traffic and closure
Managing Volunteers and People's Aid	Community relief	Inviting people to help the responders
		Transferring of injured by people
		Community members rescuing and prioritizing the injured
		People dominating management on the scene
	Community donations	The abundance of public gifts
		The existence of spontaneous help from the people
	Challenges of people's presence on the scene	People's insistence on receiving donations themselves
		The influx of people and residents into health and service centers
		Involvement of ordinary people in therapeutic measures and triage
		The gathering of people and residents in health centers
Recalling and managing of volunteers	Calling on and dispatch of forces	Calling on all the ready paramedics
		Quickly sending donations
		Deployment of paramedics from different routes
		Rapid deployment of responders from Tabriz center
		Cooperation and readiness of other provinces
		The arrival of auxiliary forces from neighboring cities
	High motivation to provide services	High sense of responsibility among the personnel
		Rapid arrival of equipment and assistance from Tehran
		Fast delivery of equipment
No lessons learnt from the past	No lessons learnt from the past	Failure to transfer experiences to other relief forces
		No lessons learnt from the past
		Suspension of measures after the change of management
	Not learning from this earthquake	Failure to improve post-earthquake affairs
		Failure to act on the experiences of the Ahar-Haris incident
	Lack of documenting actions	Not taking advantage of past experiences
		Failure to record the response experience
The challenges of communication with affected areas	Communication interruptions	Disconnection from all sources of communication in the early hours
		Satellite phones not operating
	Lack of communication equipment	Difficulty of communication with the rescue teams
		Lack of communication equipment
		Lack of private communication systems
		Lack of communication equipment in ambulances
		Lack of physical facilities for communication

Table 2: The categories and sub-categories extracted from the interviews and Focused Group Discussions (FGDs) (continued)

Category	Subcategory	Code
Lack of coordination	Lack of inter-sectional coordination	Misalignment in missions by ambulances
		Inconsistencies between pre-hospital and hospital emergencies
		Uncoordinated paramedics' decisions
		Uncoordinated management of ambulances
		Lack of full access to all the facilities available at the local level
	Lack of intra-sectional coordination	Non-therapeutic intervention in treatment area
		Unfamiliarity of the response organizations involved with each other's tasks
		Lack of coordination between organizations
		Lack of coordination in supplying staffing needs
	Lack of unity of commands	Relief turmoil in the affected villages
		Lack of access to the authorities
		Unaccountability of the officials
		Not offering a definition of responsibility to the forces
		Lack of time management for helping in the early hours
		Poor allocation of paramedics to the areas
	Failure to perform a quick assessment in the first hours	Collecting earthquake information by visiting the site
		Dispersed information in the first minutes of the incident
		Failure to perform an early initial needs assessment

EMS: emergency medical service