

## Original Research

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### Corresponding author:

Ahmad I. Soltani,  
Email: [soltani.amd@gmail.com](mailto:soltani.amd@gmail.com).

# Challenges of Emergency Medical Teams and Deploying a Field Hospital in the Aftermath of the Beirut Blast: A Qualitative Study

Lara A. Hamdanieh<sup>1</sup> , Milad E. Ahmadi Marzaleh<sup>2</sup>, Abbas Y. Ostadtaghizadeh<sup>1</sup> and Ahmad I. Soltani<sup>3,4</sup>

<sup>1</sup>Department of Health in Emergencies and Disasters, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran; <sup>2</sup>Department of Health in Disasters and Emergencies, School of Management and Medical Informatics, Shiraz University of Medical Sciences, Shiraz, Iran; <sup>3</sup>Iran-Helal Institute of Applied-Science and Technology, Red Crescent Society of the Islamic Republic of Iran, Tehran, Iran and <sup>4</sup>Health in Emergency and Disaster Research Center, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran

## Abstract

**Objective:** The huge explosion that occurred at Beirut Port led to a high number of casualties. Consequently, 7 field hospitals (FHs) were deployed in Lebanon. The purpose of this study is to explore the challenges that emergency medical teams (EMTs) faced and explain the gaps at the national level related to deploying a FH.

**Methods:** A qualitative study was conducted. To collect the data, semi-structured interviews were done with 8 key informants (5 from the FHs, 2 from Lebanese Army Forces, and 1 from Ministry of Public Health). In this study, purposive sampling was used and data were analyzed using Braun and Clarke (2006) thematic analysis and MAXQDA software.

**Results:** Three major themes (logistical challenges, staff challenges, and coronavirus disease [COVID-19] pandemic) and 10 subthemes emerged for the challenges that EMTs faced. The gaps at the national level were categorized into 2 themes (absence of needs-based response and limited effective coordination between the host country and donor countries) and 5 subthemes.

**Conclusion:** Lebanon focuses on response rather than preparedness for disasters. EMTs that arrived didn't meet the medical needs. Hence, there is a need to strengthen the national capacities and to ensure better communication and coordination between the disaster-affected country and the EMTs.

On August 4, 2020, a massive blast occurred in Beirut, Lebanon's capital. A warehouse containing 2750 tons of ammonium nitrate exploded at Beirut Port.<sup>1</sup> More than 6500 people were injured, 220 lost their lives, and 300 000 were left homeless.<sup>2</sup> The health system was already overburdened due to the economic crisis, coronavirus disease (COVID-19) pandemic, and large number of refugees. The explosion further exacerbated the situation.<sup>1,3</sup> According to the World Health Organization (WHO), out of 16 hospitals in Beirut, 3 were non-functional and 3 were partially functional as a result of the explosion. Moreover, 4 primary health care centers and the central drugs warehouse were extremely damaged.<sup>4</sup> The blast led to the destruction of 17 WHO essential medical supply containers at the port.<sup>1</sup> Thousands of personal protective equipment (PPE) that were stored in the Ministry of Public Health (MOPH) containers were destroyed.<sup>5</sup> All of these were prepared to fight the COVID-19 epidemic.<sup>3</sup> During this unprecedented situation, Lebanon received humanitarian and medical aid from many countries. Also, 7 field hospitals (FHs) were deployed during the first month to ease the burden on the hospitals and help them in managing the health crisis.<sup>6</sup>

Disasters can damage health care infrastructure and result in increased demand for medical care.<sup>7</sup> In some cases, the high number of casualties that are affected by the disaster exceeds the health care system's ability to provide the required service.<sup>8</sup> Although dispatching FHs and medical teams at the right time might be one of effective solutions for surge capacity,<sup>7,8</sup> they pose challenges to both donor and recipient countries.<sup>8</sup> Experience showed that they neither met the recipients' nor the donor institutions' expectations.<sup>7</sup> Their timing, adaptation to the local health systems, service quality, self-sufficiency,<sup>9</sup> and cost effectiveness were questioned.<sup>8</sup>

After sudden onset disasters (SODs), many foreign medical teams (FMTs) go to the affected area to provide medical care to patients.<sup>10</sup> There were many FHs and FMTs after the earthquakes that hit Iran (2003), Pakistan (2005), China (2008), and Haiti (2010).<sup>9</sup> In some cases, deployment of medical teams was done without the required experience, logistical support, and coordination.<sup>10</sup> Therefore, in 2013, WHO published the "Classification and Minimum Standards for Foreign Medical Teams in Sudden Onset Disasters" guideline,<sup>11,12</sup> which facilitates coordination and cooperation mechanisms by allowing affected countries to state their

needs and FMTs to declare their capacities and services.<sup>10</sup> FMT was later named emergency medical teams (EMTs) to emphasize on having national teams.<sup>11,12</sup>

There is lack of information about EMT activities. Several studies consider that EMTs are reluctant to share information about their services,<sup>13,14</sup> because they know the gap between what was expected and the reality and don't want this to be known to the public.<sup>15</sup> Most of the existing documents are from press releases and reports from service providers, but experts in host countries rarely publish their feedback or refute the success claims by EMTs.<sup>16</sup> Thus, to bridge the gap in science, the purpose of this study is to explore the challenges of EMTs and the gaps at the national level regarding deploying a FH.

## Methods

Qualitative data were derived from semi-structured telephone and face-to-face interviews with 8 key figures, including: 1 from MOPH (expert in health care management with more than 20 years of experience in MOPH and was in direct contact with some EMTs), 2 from Lebanese Army Forces (LAF) who were also members in post-explosion disaster response team, and 5 key informants in the FHs. Participants were selected using a purposive sampling method, that is, selecting participants who are rich with data and are going to give accurate information about the research topic. The interviews were carried out in August–October 2020 and each lasted for 40 to 60 minutes. Before starting the interviews, the interviewer introduced herself and informed all participants about the topic and purpose of the study. During the interviews, recording wasn't allowed. Therefore, the interviewer took notes during the discussion and then wrote the details on Microsoft Word Version 16.50 after the interview. Data were then translated to English.

It was reported that 7 FHs were deployed in Lebanon, only 5 of which accepted to participate in this study. Out of these 5, 3 EMTs arrived with their FH and 2 FHs were donated. For the latter, Lebanese members who were responsible for these FHs were interviewed. In FHs with EMTs, the manager, director, or a doctor (with more than 10 years of experience in such settings) was interviewed. These interviews were done inside the FH, and for the interviews with MOPH and LAF, they took place in their office. Interviewees in the FHs were asked to explain the challenges that they encountered and how they solved them. The interviews with LAF and MOPH focused on the gaps at the national level and their opinion concerning accepting and deploying an FH. Two EMTs went back to their countries before this study started. The research team tried to contact them either via the country's center in Lebanon or by contacting the member who was in the team. However, they either stopped replying or considered that the data are confidential and refused to participate. Only information from press releases and MOPH and LAF websites was found about these 2 teams. No information was found about the challenges that they faced.

Braun and Clarke (2006) thematic analysis and MAXQDA software Version 2020 were used to analyze the data. Thematic analysis is a general approach to analyze qualitative data. The researcher has to code the qualitative data and identify themes that are related to the research questions.<sup>17</sup>

Two researchers independently analyzed the data based on the purpose of the study. There were 4 main steps that the researchers followed to conduct the analysis: (1) reading the data several times while analyzing them to be familiar with the gathered data; (2) coding the data by classifying ideas that have similar meanings;

(3) searching for the themes and identifying the relationship between them; and (4) rereading and reorganizing the data under the related themes or subthemes.

The aim of rigor in qualitative research is to minimize bias risk<sup>18</sup> and increase trustworthiness.<sup>19</sup> Study rigor was confirmed through editing the interview questions based on the opinion of 2 experts in disaster risk management, purposive sampling, thick and rich description of data, using a computer software for analysis, taking into consideration the ethical issues in research design, and having 2 members who independently analyzed the data. In order to meet the credibility requirement, the first author always engaged with the participants. All authors monitored the data collection and analysis process. Triangulation was used to ensure the credibility and confirmability of data by gathering data from 3 different sources (MOPH, LAF, and EMTs). Moreover, member (participant from the MOPH), peer, and expert (expert in qualitative studies and disaster management) checking were used to ensure credibility. Transferability of the data was established by detailed description of the method, so that it can be repeated by other researchers in the future (dependability of data).

## Results

The average daily consultations was 175 patients. After analyzing the data, 3 major themes and 10 subthemes emerged for challenges that EMTs faced (Table 1).

### Challenges of EMTs

#### Logistical challenges

*Medicines and medical supplies availability.* Although some EMTs had pharmacies, they didn't have all the needed medicines to perform their work and they had to contact nearby pharmacies or hospitals for supplying it.

*The deployment of the FH occurred with short notice and therefore the availability of drugs and medical supply for the field hospital was limited to the stocks in the homeland. In order to prepare the shipment with all necessary materials, we took the sanitary and medical stocks originally intended for another area of operation. (FH Director, 45 years old)*

*Cold chain management.* One of the participants highlighted that there wasn't a refrigerator to preserve anesthesia drugs that need cold temperature.

*We needed cold chain for anesthesia, but we didn't have a refrigerator. Later the MOPH bought it for us. (Doctor in FH, 52 years old, more than 10 years of experience in FHs)*

*Food supply chain.* An FH had a kitchen where they cooked for their staff and inpatients. In another FH, food was available for the staff only in the hotel and not in the FH. In other FHs, there was a problem with supplying food for the workers and inpatients.

*At the beginning, there was difficulty in providing food for the personnel and inpatients. This was resolved by the support of our country that sent a ship with these needs. Later, we contracted with a local catering company. (FH Director, 45 years old)*

*Disposal of medical wastes.* All EMTs weren't able to fully manage medical wastes and they needed Lebanon's support. They collect and segregate wastes, and the host country gathers and properly disposes them. Partially damaged hospitals were responsible for managing the medical wastes of the nearby donated FHs, while others had contracts with local hospitals to solve this problem.

**Table 1.** Challenges that EMTs faced

Themes	Subthemes
Logistical challenges	Medicines and medical supplies availability
	Cold chain management
	Food supply chain
	Disposal of medical wastes
Staff challenges	Language barrier
	Long shifts and staff burnout
	Accommodation far from the FH
	Engagement of local health care providers
	Weather condition
COVID-19 pandemic	Screening patients and delay in treatment

*We collect medical wastes in boxes and bags. We did a contract with a public hospital to manage these wastes. (FH Director, 45 years old)*

### Staff challenges

**Language barrier.** Absence of members in the team who can speak the local language created difficulty in communicating with the patients.

*There was difficulty in dealing with the patients, since they speak different language. This was quickly resolved by having interpreters in the FH. (FH Director, 45 years old)*

**Long shifts and staff burnout.** A participant pointed out that the team members complained about the long working hours, which affected their productivity.

*It was tiring to provide services from 9 am till 8pm. This was very long time which exceeds the standard working hours. (Doctor in FH, 52 years old, more than 10 years of experience in FHs)*

**Accommodation far from the FH.** The accommodation of EMTs was in hotels either near or far from the FH. Some considered that remoteness of accommodation from the FH is time-consuming and much time was lost on the road instead of spending it in treating patients.

*One of our challenges was the far distance between the hotel and FH and this was time-consuming. (Doctor in FH, 52 years old, more than 10 years of experience in FHs)*

**Engagement of local health care providers.** One of the FHs involved local health care providers such as nurses and gynecologists to assist them in performing their mission. However, these volunteers were inexperienced in this setting and they posed obstacles in the workflow.

*Unfortunately, some volunteers and medical personnel who were sent to the FH didn't have previous experience in health response following disasters and it was challenging to work with them especially that we had heavy workload. (Doctor in FH, 52 years old, more than 10 years of experience in FHs)*

**Weather condition.** While visiting an FH, the tent was so hot and it was obvious that personnel were tired from the high temperature.

*At first, we had air conditioner only in the operating room and we turn it on when there is a surgery. However, due to the extremely hot weather in Lebanon, we bought air conditioner for the tent. (Doctor in FH, 52 years old, more than 10 years of experience in FHs)*

**Table 2.** Gaps at the national level

Themes	Subthemes
Absence of needs-based response	Absence of needs assessment
	Accepting offers that are not needed
	Accepting not self-sufficient FH
Limited effective coordination between the host and donor countries	Before EMTs' arrival
	After EMTs' arrival

### COVID-19 pandemic

Due to the COVID-19 pandemic, EMTs had to take further precautions to ensure staff's and patients' safety. The researcher realized that all FHs followed COVID-19 preventive measures. Results showed that none of the FHs were prepared to provide services for coronavirus patients. Doing PCR test and adding tents for screening the patients led to a delay in providing services.

*There aren't negative pressure rooms in the FH, since it isn't prepared for receiving COVID-19 patients. We do the PCR test for patients who will be admitted in our FH and we wait for the result. This led to delay in treating the patients. (FH Director, 45 years old)*

A thematic analysis of the semi-structured interviews that focused on the gaps at the national level resulted in the identification of 2 main themes and 5 subthemes (Table 2).

### Gaps at the National Level

#### Absence of needs-based response

**Absence of needs assessment.** Participants from LAF and MOPH ensured that they didn't conduct needs assessment in the aftermath of the explosion and this led to chaos in the response phase. They considered that a needs assessment will lead to an organized response, since the affected country will select the needed donations instead of randomly accepting all of them.

*We don't have a team to do rapid needs assessment; thus, no assessment was done after the explosion. (Key informant in MOPH)*

Another participant mentioned:

*The main problem is that needs aren't equal to donations. There should be needs assessment and we have to set requirements for EMTs that will come. (Key informant in LAF and member in disaster response team)*

**Accepting offers that are not needed.** Local hospitals were able to treat those affected by the explosion. There was need for medical supplies and an FH for COVID-19 patients, but none of these were received.

*EMTs didn't play a major intervention in emergency medical care, rather in the follow up process of the injured patients. Usually what increases hospitals' profit is minor surgeries, which EMTs are performing. We want countries to send all the needed medical supplies for one year. We need FHs for coronavirus patients. Investing in primary healthcare centers would have been a better decision than deploying FHs. (Key informant in MOPH)*

Another participant considered that Lebanon should refuse any donation that is not needed:

*If I don't want a specific help or not in need for resources provided by a donor country, I shouldn't accept this donation. (Key informant in LAF and member in disaster response team)*

When asked why authorities accept offers that aren't needed, the participant answered:

*It is known that host countries can't reject help from donors, since it might be considered a subjective political response. (Key informant in MOPH)*

**Accepting not self-sufficient FH.** One of the countries promised to send FHs that are fully equipped and that have many intensive care unit rooms. Therefore, they were placed near damaged hospitals. After field visits, the researcher realized that only a steel structure tent and beds were donated without medical supplies or international EMT (I-EMT). According to the definition of the FH,<sup>1</sup> this facility can't be considered an FH. Having not a self-sufficient FH is a burden on the host country, since investing in it is expensive.

*The facility isn't self-sufficient, all the services are provided by the affected hospital (infrastructure, medicines, equipment). Providing only tent with beds without medical supplies is a burden on the hospital. It is costly to equip it specially that we have a hospital that should be renovated. To do further minor surgeries, we need medical supplies, medical sets, stretchers (not only beds). (Doctor and manager of the FH, 48 years old)*

Another participant added:

*When a disaster/emergency occurs, it will be effective to receive more equipped FH instead of only receiving a tent and beds. (Doctor and manager of the FH, 46 years old)*

**Limited effective coordination between the host and donor countries**

**Before EMTs' arrival.** The coordination between donor countries and Lebanon concerning deploying an EMT mainly focused on site selection. Neither the host country sent a list indicating their needs, nor the donor country announced EMTs' services before their arrival. Therefore, representatives from MOPH and LAF had to do field visits to determine further details about EMTs' work.

*We don't know what the FHs have and what services they provide. The main role of LAF before EMTs' arrival was site selection. (Key informant in LAF and member in disaster response team)*

Another participant pointed out:

*EMTs didn't send us a list of the services that will be provided in their FHs. Therefore, we had to visit the FH after they arrived to check their services, number of beds, facilities available, etc. (Key informant in MOPH)*

An FH director considered that coordinating with the host country ahead of time to know the epidemiological conditions and their needs will result in a more effective response.

*Next time we go to a country, we should know in advance the available health resources and epidemiological conditions. (FH Director, 45 years old)*

**After EMTs' arrival.** There weren't clear defined roles and responsibilities at the national level, especially that sometimes while interviewing someone in LAF, they refer us to the MOPH, and vice versa. Also, this was the complaint of one of the participants:

*When we arrived to Lebanon, it wasn't clear who is responsible for FHs. (Doctor in FH, 52 years old, more than 10 years of experience in FHs)*

Furthermore, there was a gap in following up with the donor country:

*The MOPH didn't follow up with us concerning the donated FH. The donor country promised to send us medical supplies, but we don't know why they didn't. (Doctor and manager of the FH, 48 years old)*

## Discussion

The number of daily consultations was high. A study considers that the high number of patients treated in the FH isn't necessarily due to the disaster, rather it might be attributed to poverty or poor coverage of the local health services.<sup>7</sup> Thus, increasing the health care coverage for all is needed in Lebanon.

It is important to note that there weren't any security problems reported by the EMTs, since the LAFs were responsible from the beginning to choose a safe and secure place for the deployment of the FHs. LAFs were present all the time in the scene to ensure the security of the FHs and EMTs. In addition to the LAFs, military FHs had security members from their own country to protect them.

Availability of medicines, medical supplies, food, and refrigeration for anesthesia was a problem that EMTs faced. Logistical issues that should be taken into consideration by EMTs include water, power and lighting, food, shelter, waste disposal, sanitation, transport, and communication systems.<sup>10</sup> Logistical challenges were reported in the response to Typhoon Haiyan, which included not being self-sufficient for medical supplies, drugs, and food.<sup>20</sup> One of the core standards of EMTs is to be self-sufficient and don't require logistical support from the host country, unless they agreed on that before the team's deployment.<sup>1</sup> To achieve WHO verification status, EMTs should be self-sufficient for 14 days, not to pose burden on the affected country.<sup>21</sup> Indeed, EMTs should be self-sufficient when arriving to the affected country.

Medical waste management was another issue that was resolved through disposal contracts. A previous study considered that managing medical or general wastes is the responsibility of the EMT.<sup>22</sup> The core standards of EMTs include compliance with hygiene and sanitation standards (which include medical waste management).<sup>10</sup> Therefore, abiding by the standards set by the WHO is required to arrive well prepared to the host country.

Some EMTs didn't have interpreters at the beginning. Language barrier was of major concern by some EMTs in response to Typhoon Haiyan<sup>13</sup> and the Nepal earthquake.<sup>14</sup> A study mentioned that some members in the FH should be able to speak the local language or have interpreters to easily communicate with the local authorities and patients.<sup>7</sup> Therefore, it is important to plan for having translators to prevent misunderstanding the patients and consequently misdiagnosing them.

Some team members were tired from long shifts. It is essential to remember that health care personnel are a critical asset and they should be looked after. Providing secure accommodation, food, and climate compatible conditions will help in taking care of the team members and ensure their satisfaction,<sup>22</sup> thus increasing their productivity.

It was challenging for EMTs to work with the local health care personnel and volunteers, since some of them had limited experience in such setting. However, previous study recommended the integration of local health care workers into EMTs to ensure a harmless exit of the team.<sup>23</sup> Another study considered that integrating I-EMTs with local medical teams optimized the patient care in the 2008 Wenchuan earthquake.<sup>24</sup> This shows the importance of training the local health care members on working in such settings.

A study considered that EMTs, in the planning phase, should know whether they can transform from providing trauma care to managing an outbreak emergency.<sup>22</sup> Medical personnel should be familiar with the health profile of the host country.<sup>7,24</sup> If the EMTs knew ahead of time that Lebanon wanted FHs that provide

COVID-19 services, the response would have better met the local needs.

One of the principles that governs EMT practice is to offer a needs-based response.<sup>1</sup> At the national level, absence of a needs-based response was mainly due to the absence of a needs assessment. The WHO ensures that the deployment of EMTs in many cases isn't based on a needs assessment,<sup>10,21</sup> although several assessment tools exist.<sup>10,25,26</sup> Lebanon has a sufficient number of doctors and nurses, and the lifesaving trauma care was provided by local health care staff after the explosion.<sup>3</sup> According to the WHO, as of August 7, 2020, public and private hospitals treated 6014 casualties.<sup>5</sup> The huge surge of COVID-19 cases was the medical need that had to be urgently tackled.<sup>27</sup> For an efficient response, a rapid needs assessment indicating vulnerabilities and capacities is crucial.<sup>24,28,29</sup> This emphasizes the importance of building capacities to be able to take the right evidence-based decision at the right time.

Absence of needs assessment led to accepting offers that are not needed. The findings of the present study are in line with results of the study by Goyet who considered that health authorities in the affected country, often with limited experience in disaster management, won't be in a position to refuse offers. With the availability of excess offers, local authorities might set high expectations without willing to conduct cost benefit assessment for the intervention to make sure it meets their needs—and if it was done, it is often not available to the researchers and public.<sup>16</sup>

Accepting not fully self-sufficient FH was a burden on the country, since investing in it is expensive. Similarly, a study considered that FH should be self-sufficient, or else it will be a burden on the health system or affected community.<sup>22</sup> Hence, coordination is needed before EMTs arrive to the affected country.

Although some FHs were satisfied and appreciated the coordination with LAF, MOPH, and the Lebanese Red Cross, there was the absence of effective coordination. Lebanon needed an FH that provides COVID-19 services. Limited coordination between EMTs and the host country has been highlighted in previous studies such as after the Pakistan floods and Haiti earthquake in 2010.<sup>10,11</sup> In Lebanon, the overlapping responsibilities between LAF and MOPH were clear, and there wasn't a person responsible for coordinating between all the EMTs.

### Limitations

The limitation of this study is that researchers were not able to interview all EMTs that arrived to Beirut. Also, they couldn't stay for several days in the FHs due to the complicated procedure, since a majority of them were military. Personal observations would have increased the quality of the analysis. In addition, not being allowed to interview more than 1 person in each FH affected the data saturation.

### Conclusions

The results of this study indicate that EMTs that arrived to Beirut had logistical and staff challenges and challenges related to the COVID-19 pandemic. The gaps at the national level were absent of a needs-based response and had limited coordination. EMTs that arrived didn't provide services that coincide with the medical needs.

Logistics personnel should be involved in all phases while planning for EMT deployment. The WHO should ensure that its guidelines are being implemented for a better response. In Lebanon,

local health authorities should turn down any offer that doesn't meet the national needs. Furthermore, there is need to strengthen the national capacities and international coordination.

More studies are needed to determine the challenges that EMTs face and the long-term hospital care needs in the aftermath of SODs.

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**Conflict(s) of interest.** The authors declare no competing interests.

**Ethical standards.** Official approval of Lebanese MOPH was taken to conduct the study and it received a registration number (20/1/29286). A consent form was prepared in Arabic and English languages, which included the study's purpose, data confidentiality, and that participation was voluntary. A written or oral consent was obtained from the interviewees.

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