Emergency Medicine Association of Turkey Disaster Committee Summary of Field Observations of February 6th Kahramanmaraş Earthquakes

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Event Identifiers

Event Type: Turkey Kahramanmaraş Earthquake

Event Onset Date: February 6, 2023 at 04:17AM in TURKEY

Location of Event: In Kahramanmaraş, a 7.7 magnitude earthquake erupted, followed by a second 7.6 magnitude earthquake nine hours later and a third 6.4 magnitude earthquake in Gaziantep.

Geographic Coordinates in Latitude, Longitude, Elevation: Coordinates of the first earthquake 37,288K - 37,043D, focal depth 8.6 km; coordinates of the second earthquake 38,089K - 37,239D, focal depth 7.0 km

Dates of Observations Reported: February 6, 2023-February 12, 2023 (first week after the disaster)

Response Type: Emergency Physicians (EPs)

Abstract

An earthquake measuring 7.7 magnitude on the Richter scale occurred at 04:17AM on February 6, 2023 in the Pazarcık district of Kahramanmaraş province Turkey. In the hours following the 7.7 magnitude event in Kahramanmaraş, a second 7.6 magnitude earthquake struck the region and a third 6.4 magnitude earthquake struck Gaziantep, causing extensive damage and death. A total of ten provinces directly experienced the earthquake, including Kahramanmaraş, Hatay, Gaziantep, Osmaniye, Malatya, Adana, Diyarbakır, Şanlıurfa, Adıyaman, and Kilis. The official figures indicate 31,643 people were killed, 80,278 were injured, and 6,444 buildings were destroyed within seven days of the earthquakes (as of 12:00PM/noon on Monday, February 13th). The area affected by the earthquake has been officially declared to be 500km in diameter. This report primarily relies on observations made by pioneer Emergency Physicians (EPs) who went to the disaster areas shortly after the first earthquake (in the early stages of the disaster). According to their observations: (1) Due to winter conditions, there were transportation problems and a shortage of

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Keywords: earthquake; field observations; Turkey; Kahramanmaraş

Abbreviations:
EP: Emergency Physician
HIMS: hospital information management system
USG: ultrasound
WHO: World Health Organization

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personnel reaching disaster areas on the first day after the disaster; (2) On the second day of the disaster, health equipment was in short supply; (3) As of the third day, health workers were unprepared in terms of knowledge and experience for the disaster; and (4) The subsequent deployment of health personnel to the disaster area was uncoordinated and unplanned on the following days, which resulted in the health personnel working there not being able to meet even their basic needs (such as food, heating, and shelter). During the first week, coordination was most frequently reported as the most significant problem.

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Introduction

Earthquakes are one of the most frequent and dangerous natural disasters, affecting millions of people world-wide each year and resulting in fatalities.[1] In an urban area, a major earthquake can be one of the most devastating natural disasters. Unprepared low- and middle-income countries can suffer serious health consequences from major disasters.[2] Early post-disaster periods are particularly vulnerable to catastrophic destruction of health systems. A quality and coordinated emergency response requires significant effort that usually lasts only a few weeks. There are, however, long-term consequences of disasters and their management extends beyond emergency measures.[3] In the aftermath of disasters, health systems react accordingly based on the scale of the damage. A destructive, catastrophic earthquake with a magnitude of 7.7 struck Kahramanmaraş, Turkey at 04:17AM on February 6, 2023. The 7.7 magnitude earthquake in Kahramanmaraş was followed nine hours later by an earthquake of 7.6 magnitude and a third earthquake of 6.4 magnitude in Gaziantep, which caused extensive damage to the area and resulted in several deaths. The earthquake directly affected at least ten provinces, including Kahramanmaraş, Hatay, Gaziantep, Osmaniye, Malatya, Adana, Diyarbakır, Şanlıurfa, Adıyaman, and Kilis. Approximately 13.5 million people, including two million Syrian refugees, were affected by the earthquake.[4] The World Health Organization (WHO; Geneva, Switzerland) estimates that 23 million people, including 1.4 million children, live in the affected areas in Turkey and Syria.[5] As a result of the ethnic composition of the affected cities, the fact that they were located in high-migration areas and in rural areas, and the fact that the earthquake occurred in winter, the disaster had devastating effects. As of 12:00PM/noon on Monday, February 13th, a total of 31,643 people had lost their lives in the earthquakes, 80,278 had been injured, and 6,444 buildings had collapsed. It was officially announced that the area affected by the earthquake was 500km in diameter.[6]

Methods

The observations presented in this report were obtained from Emergency Physicians (EPs) who were already actively working in the affected area and continued to do so after the disaster in the ten affected provinces, and EPs who were living outside of the disaster area and arrived on duty or as volunteers within the first three days. Selected representatives from these ten provinces compiled daily reports on their observations. During the preparation of the report, EPs' daily field observation reports were analyzed and teleconferences were held in regions in which sufficient data could not be obtained. In the analysis, the following subheadings are included: physical conditions of hospitals; evacuation and transfers of patients from hospitals and cities; hospitals' information technology systems; the number, condition, and needs of health staff members; logistics and medical supplies in disaster areas; treatment and patient care; and transportation. Qualitative analyses were conducted on the observation reports prepared in the disaster area under these subheadings. The problem most frequently mentioned by the observers was chosen as the prominent problem for the day.

Analysis

The first earthquake in Pazarcık with a magnitude of 7.8 was the second largest earthquake recorded in Anatolia after the 1668 North Anatolian earthquake with an estimated magnitude of 7.8-8.0 and the largest earthquake recorded in the history of the Republic of Turkey according to the surface wave magnitude scale.[7,8]

Transportation

By the end of the first day, most of the volunteer health teams had been unable to reach the earthquake zone due to damage to the highways from the earthquake, snow on the roads due to winter, and a high density of civilian vehicles. Road transportation was determined along more than one route, but most routes did not provide access to the region. The highway routes were frequently altered based on information received from the region. Within the first day of the earthquake, military and civilian evacuation planes were used to transport personnel to the affected areas, but most of the airports in earthquake zones were damaged (at 20 hours after the earthquake). Adana Incirlik Airport was particularly used for air transportation. Medical personnel were transported from Incirlik to other areas affected by disasters by military helicopters. Health workers' transportation to disaster areas was the most frequently mentioned problem on the first day of the disaster.

Health Care Workers

In Malatya, Adyaman, Kahramanmaraş, and Hatay, which were severely affected by the earthquake, the number of health care workers was inadequate due to the influx of injured patients. There was an insufficient number of health care workers working in the disaster areas in the first days, as many health care workers had lost their lives, families, or homes in these areas. A lack of coordination in the disaster areas and the winter season delayed health workers from outside the disaster areas from reaching the disaster areas. During the next few days, it was observed that although personnel shortages and material shortages were partly overcome, coordination was achieved only by the sixth day. As the amount and type of health personnel required in disaster areas could not be determined, and the deficiencies in the disaster areas were not identified, disaster areas were formed with more personnel than necessary. Thus, by the end of the first week of the disaster, there were more health personnel than needed in the region, and they had difficulties meeting their basic needs (such as shelter, food, and heating). The number of patients transferred from disaster areas to transport centers had increased dramatically, as most of these patients are treated in these centers for major surgery, interventional procedures, and dialysis, resulting in an increase

in health care workers in these transport centers. Despite the need for physicians with a variety of specialties in transport centers, these physicians were allocated to tents on the ground.

Logistics and Medical Supplies

The hospitals in the disaster area ran out of medical supplies on the second day due to the overwhelming number of patient applications, resulting in inadequate and uncoordinated treatments. It was observed that supplies and logistics were not coordinated, similarly to the planning of the health workers. The second day of the disaster was the most frequent day of shortages of health care supplies. On the second day following the disaster, many health workers served in the disaster areas, but they were not able to provide adequate medical care because the materials were used the day before.

Physical State of Hospitals

There was no clear disclosure by the administrators as to how many hospitals were destroyed in the earthquakes. After the earthquake, many hospitals were locally damaged in the ten provinces, and patient care was generally limited to the ground floors and emergency departments of hospitals. In particular, patients on other floors and wards evacuated the hospital after the second earthquake (7.6 magnitude). Evacuation plans, however, could not be activated. Emergency departments became chaotic as a result. There were many heavily damaged hospitals that had to be evacuated. The use of field tents after the evacuation of the hospitals was initially attempted, but due to lack of planning (medications, materials, and coordination) and cold weather conditions, their performance did not meet expectations. Field tents were hindered most by parking lots in hospital yards. Medical treatment was difficult due to insufficient hygienic and sterilization standards in these tents.

Evacuation from Hospitals and Cities

While difficulties were encountered in establishing the transfer system in the initial days following the disaster, it was observed to succeed in the following days. Adana, Mersin, and Diyarbakır provided early-stage treatments (dialysis, surgery) to patients from the other seven provinces, and after these early-stage treatments were completed, patients were transferred to more distant provinces. Those provinces that acted as transport hubs had better access to air, land, and sea transportation, and these routes were less damaged by the earthquake.

Disaster-Affected Hospitals' Information Management Systems

Hospital information management systems (HIMS) can be used to register and identify patients, create forensic reports, notify death notifications, perform consultation procedures, create burial certificates, and schedule examinations. Following the earthquake, the internet and electricity networks were damaged, especially in three towns, Hatay, Adayaman, and Maraş, so patient transactions made through the HIMS could not be processed. There were difficulties even communicating within the same institution, and this could only be accomplished by individual effort. The first week of the disaster was left behind, but communication between institutions and with field tents continued to be partially maintained.

Treatment and Patient Care Provided

Health care centers in the disaster area were observed to have designed treatment based on patient transfer, especially in the first days after the disaster, since hospital buildings were unavailable. During the third day of the disaster, most of the health workers who reached the region expressed their lack of knowledge and experience in approaching the disaster patients. During the early stages of the disaster, hospital admissions had a high mortality rate. A rigid triage was also required because of the large number of dead-on-arrival patients brought to the emergency departments by their relatives in the disaster areas. Early on, most emergency department physicians were also victims of disasters. Physicians who carried out disaster triages had difficulty coding patient triaged in black. While health care professionals from many specialties were involved in the treatment of the disaster area, EPs were involved in organization and triage, surgeons were involved in amputations and fasciotomies, and medical doctors were involved in treating dialysis and complications caused by patients who could no longer take their chronic medications during the disaster. One of the most common reasons for emergency admissions of disaster victims in the first three days after the disaster was the applications of patients whose diagnosis was incomplete in the first evaluation and whose treatment couldn't be completed during the early period after the disaster. A number of people were poisoned with carbon monoxide while trying to keep warm in tents using wood and coal or when attempting to keep warm near a fire. Observations have shown that not all emergency departments have bedside imaging capabilities, requiring patients to be taken to the radiology department inside the hospital building for imaging. Thus, there was a shortage of hospital transportation personnel and stretchers. The emergency departments equipped with ultrasound (USG) devices were better able to manage these processes. Bed-side USG facilitated the diagnostic process, and since it is the only advanced examination independent of HIMS, it was available to every patient in need.

Conclusions

As a result of the EPs' observations of the disaster area in general, inadequate coordination is considered to be the major issue. There were 45,968 deaths reported in the Interior Ministry's statement dated March 5th, of whom 4,267 were under temporary protection. The WHO identifies emergency trauma treatment and post-trauma rehabilitation care for the injured as priority health conditions, as well as the provision of medicine and emergency supplies and the prevention and control of disease outbreaks. One month after the disaster struck, the region still faces problems similar to those suffered during the first week. The health system's response to the disaster in the first week and the response it should have given will be discussed for years to come.

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Author Contributions

The analysis and publication preparation for this article was done by Sarper Yilmaz, Assoc. Prof., MD, secretary of the Disaster Commission of the Emergency Medicine Association of Turkey.

References

1. A multi-disciplinary view on earthquake science. *Nat Commun*. 2022;13(1):7331.
2. Guha-Sapir D, van Panhuis WG. Health impact of the 2004 Andaman Nicobar earthquake and tsunami in Indonesia. *Prehosp Disaster Med.* 2009;24(6):493–499.
3. Lawther PM. Towards a natural disaster intervention and recovery framework. *Disasters.* 2016;40(3):494–517.
4. Tatlı I. "Deprem Sonrası Göç ve Mültecilerin Yeniden Yerleşimi Meseleleri." ["Post-Earthquake Migration and Refugee Resettlement Issues"]. İNSAMER Analiz. 06.03.2023. https://www.insamer.com/tr/uploads/pdf/deprem-sonrasi-go-c-ve-multecilerin-yeniden-yerles-imi-meseleleri.pdf. Accessed March 9, 2023.
5. World Health Organization (WHO). Turkey earthquake: health infrastructure intact, WHO supporting emergency response. https://www.who.int/europe/news-room/photo-stories/item/turkey-earthquake-health-infrastructure-intact-who-supporting-emergency-response. Accessed March 7, 2023.
6. News. T24. Deprem bölgesindeki 830 bin binada hasar tespit çalışması; 105 bini ağır hasarlı. [Damage assessment work for 830 thousand buildings in the earthquake zone; 105 thousand of them badly damaged]. https://t24.com.tr/haber/deprem-bolgesindeki-830-bin-binada-hasar-tespit-calismasi-105-bini-agir-hasarli,1093300. Accessed March 9, 2023.
7. Albini P, Musson RM, Rovida A, et al. The global earthquake history. *Earthquake Spectra.* 2014;30(2):607–624.
8. Emergency Situation Report. Support to Life (STL) Türkiye. Published date: 03.03.2023. https://www.supporttolife.org/wp-content/uploads/2023/03/230303-stl-sitrep-9.pdf. Accessed March 9, 2023.

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