



Organization of Emergency Medical Services After an Earthquake: The Case of Adiyaman, Türkiye

ABSTRACT

Objectives: In this manuscript, we aimed the explanation of health organization of Adiyaman Province after the 5 day of earthquake.

Methods: The data presented herein were compiled from the experiences of emergency medicine specialists sent to Adiyaman Province by the Ankara Emergency Medical Services (EMS) Administration. We discuss the personnel and administrative management of Adiyaman Training and Research Hospital, the working system of Adiyaman EMS, patient transport to other provinces by land ambulances and air ambulances, establishment of tent hospitals, medical care point management, and environmental safety.

Results: After the earthquake, a total of 396 patients were transferred from Adiyaman to other provinces by aircraft. The average age of the patients was found 32.8 ± 17.6 years. The most common diagnosis was general body injuries. Patients were most frequently transferred to Ankara. The most commonly used aircraft for transportation was the Cargo Aircraft of the Turkish Armed Forces.

Conclusion: It should be considered that local administrators are also disaster victims. The fact that teams from other provinces undertake health management in the disaster area will facilitate the process. EMS management in the acute period is particularly important in terms of saving the lives of earthquake victims and preventing disabilities.

Keywords: Disaster, earthquake, Türkiye

On 06.02.2023, at 04:17, an earthquake of magnitude 7.7 occurred in the Pazarcık District of Kahramanmaraş Province. Before the area affected by the earthquake and the severity of the destruction were fully understood, a second major earthquake of 7.7 magnitude occurred in the Elbistan District of Kahramanmaraş Province at 13:24. The earthquake affected an area of 108,812 square kilometers covering 11 provinces (Kahramanmaraş, Hatay, Adiyaman, Gaziantep, Malatya, Kilis, Diyarbakır, Adana, Osmaniye, Şanlıurfa, and Elazığ) in Eastern and Southeastern Anatolia (1). A total of 11,020 aftershocks occurred (2). On 20.02.2023, an earthquake of 6.4 magnitude occurred in the Defne District of Hatay Province at 20:04 (3). The Ministry of Environment, Urbanization, and Climate Change conducted damage evaluation of 3,273,605 independent units in 830,783 buildings. In these evaluations, it was determined that 384,545 independent units in 105,794 buildings were heavily damaged and destroyed, and it was concluded that they should be demolished immediately. It was also determined that 133,575 independent units in 24,464 buildings were moderately damaged (4). According to the official statistics announced by the Disaster and Emergency Management Authority of the Ministry of the Interior on 23.03.2023, 50,096 people died and 107,204 people were injured in the earthquakes (5). It is known that the earthquakes also caused thousands of deaths and injuries in Syria (6).

The Republic of Türkiye declared a level 4 alarm, which is the highest emergency level and includes calls for help from international organizations and countries in emergencies such as natural disasters and epidemics for the earthquake region (7). In addition, while a state of emergency was declared for 3 months in 10 provinces affected by the earthquakes, the World Health Organization declared a level 3 emergency for the earthquakes that shook Türkiye (8).

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Table 1. Demographic characteristics of the patients transported from Adıyaman district

	n=396	%
Gender		
Men	197	49.7
Women	199	50.3
Age (Years)*		
All	32.8±17.6	31.0 (0.5-83.0)
Women	32.2±17.0	30.0 (1.5-65.0)
Men	33.4±18.2	31.0 (0.5-83.0)
Diagnostic Groups		
General Body Injuries	229	57.8
Lower Extremity Injuries	74	18.7
<i>Amputations</i>	11	2.8
Upper Extremity Injuries	16	4.0
<i>Amputations</i>	6	1.5
Crush Syndromes	20	5.1
Vertebral Fractures	14	3.5
Head Traumas	12	3.0
Pelvic Fractures	7	1.8
Chest Traumas	5	1.3
Pregnancies	2	0.5

*: Mean ± SD

In this manuscript, we aimed the explanation of health organization of Adıyaman Province after the 5 days of earthquake.

METHODS

The data presented herein were compiled from the experiences of emergency medicine specialists sent to Adıyaman Province by the Ankara Emergency Medical Services (EMS) Administration. We discuss the personnel and administrative management of Adıyaman Training and Research Hospital, the working system of Adıyaman EMS, patient transport to other provinces by land ambulances and air ambulances, establishment of tent hospitals, medical care point management, and environmental safety.

Findings

After the earthquake, a total of 396 patients were transferred from Adıyaman to other provinces by aircraft. The average age of the patients was found 32.8 ± 17.6 years. The most common diagnosis was general body injures (Table 1). Patients were most frequently transferred to Ankara. The most commonly used aircraft for transportation was the Cargo Aircraft of the Turkish Armed Forces (Table 2).

Day 1

After receiving the news of the earthquake at around 04.30 on the morning of 6 February, the provinces affected were determined at the meeting held at the Ministry of Health. Ankara EMS teams were assigned to Adıyaman Province. Two CN-235 CASA type ambulance aircraft belonging to the General Staff took off from Etimesgut Military Airport with a health team of 15 professionals (2 emergency

Table 2. Diagnoses of transferred patients, transferred provinces and aircraft types

	n	%
Province of the receiver hospital		
Ankara	275	69.4
İstanbul	58	14.6
İzmir	49	12.4
Malatya	12	3.0
Adana	1	0.3
Diyarbakır	1	0.3
Type of the aircraft		
Jet belonging to the Presidency of Turkey	22	5.6
Jet belonging to the Turkish Ministry of Health	33	8.3
Military Helicopter (Skorsky)	11	2.8
Aircraft Ambulance of the Turkish Armed Forces	71	17.9
Cargo Aircraft of the Turkish Armed Forces	259	65.4

medicine specialists, 3 general practitioners, and 10 paramedics) working in Ankara EMS. The aircraft could not land at Adıyaman Airport due to adverse weather conditions and landed at Adana İncirlik Military Airport. With the improvement in weather conditions, the aircraft departed at around 12:00 and reached Adıyaman Airport at around 13:00 (Figure 1A). The team was in Adıyaman during the second earthquake that took place in Elbistan in Kahramanmaraş Province.

When the team reached Adıyaman, there were many injured people in the hospital emergency room (on stretchers, in corridors, waiting chairs, and chairs). Physicians and nurses in the emergency room were trying to give medical attention to the injured. To determine the situation, the team met with the Provincial Health Director and the Chief of the Hospital. There was a shortage of medical personnel. There was no news from most of the hospital staff. Due to the large number of patients, intervention was difficult. There were patients in intensive care units and wards other than the emergency room. It was determined that there might be a gas leak in the operating room and therefore it was unsuitable for use. When the building was evaluated quickly, it was observed that the ceiling of the main entrance area had collapsed, and the walls were partially cracked, but the hospital was in good condition in general. Later, engineers from the Ministry of Health visited the hospital and confirmed that the building was in good condition.

Due to the high number of patients and the lack of health personnel, it was decided to transport the patients after their first intervention. The COVID polyclinic, a prefabricated building right next to the hospital emergency room, was transformed into a crisis center, and a provincial coordination desk was created there. The first patient transport was carried out by 2 ambulance aircraft (each had 6 stretchers) available at Adıyaman Airport. These aircraft were fully equipped air ambulances and could carry 6 intensive care patients at a time (Figure 1A). Then patients started to be transported to the surrounding provinces (Diyarbakır, Urfa, Gaziantep, and Elazığ) that were not affected by the earthquake or were less affected. Patient transport was started immediately



Figure 1. (A) CN-235 CASA type ambulance aircraft. (B) A C130 cargo plane which has 72 stretchers. (C) Jet engine ambulance planes. (D) Helicopter ambulance.

using the land ambulances available in Adiyaman. Then ambulances from neighboring provinces came to Adiyaman and took part in patient transport.

The team contacted the General Staff and requested more air ambulances so that the patients could be transported faster. Cargo planes were converted into ambulance planes by the General Staff. A C130 cargo plane (Figure 1B) was sent to Adiyaman Airport by the Air Operations Center of the Ministry of Health. The first C130 cargo plane landed at Adiyaman Airport at 17:30. This aircraft was inspected by our ambulance crews and it was concluded that although it had 72 stretchers, it would be appropriate to load 50 patients since medical intervention would be difficult because some stretchers were above head height. It was decided to transport patients who did not need intensive and urgent care on this plane (Picture 1a or 2). Working with the Adiyaman EMS Administration, the patients were sent to Adiyaman Airport in the existing ambulances in the province and loaded onto the C130 cargo plane. Then 3 jet engine ambulance planes (Figure 1C - one

with 4 stretchers, one with 2 stretcher ambulances, and one with a single stretcher) belonging to the Ministry of Health were sent to Adiyaman. These aircraft ambulances were fully equipped and were capable of transporting patients in need of critical care. After that, patient transport continued with CN235-CASA and C130 cargo planes, and ambulance planes belonging to the Ministry of Health.

The 1-1-2 Emergency Call Center building in Adiyaman was unusable due to damage. Therefore, emergency calls in Adiyaman were routed to the EMS Call Center in Eskişehir Province, which was not affected by the earthquake. Emergency requests received by Eskişehir EMS Call Center were sent to the EMS teams in Adiyaman by calling their mobile phones.

Support was requested by contacting the Ministry of Health in order to eliminate the health personnel shortage. Towards evening, many health personnel were sent to the region to help. These personnel included physicians from all branches such as general

practitioners, emergency medicine specialists, anesthesiologists, internists, orthopedists, general surgeons, thoracic surgeons, and cardiovascular surgeons. In addition, many nurses were assigned to the region. Many EMS and National Medical Rescue teams were deployed to Adiyaman.

The hospital was quite dirty due to dust from the walls and roofs that cracked during the earthquake. First, the operating room and intensive care units were cleaned by the cleaning staff. In the evening, as a result of the work of the technical teams, the gas problem in the operating room was solved and the operating room became usable.

Day 2

On the second day after the earthquake, new medical personnel continued to arrive in the region. It was decided to create a new organizational chart because the hospital administrators were also victims of the disaster. Accordingly, a new provincial coordinator, hospital coordinator, and hospital chief physician were assigned from the team. In addition, an administrative financial affairs manager, health care services manager, coordination officer, transport manager, intensive care manager, and emergency supervisors were appointed. A communication system was established between the intensive care unit, emergency room, wards, and crisis center. Thanks to the emergency room-intensive care unit-wards communication, the hospitalization of patients started. The hospital-crisis center communication also eased the transport of patients. The intensive care unit supervisor evaluated the transport requests from all intensive care units, determined the patients who needed to be transported first, and forwarded them to the transport center. In this way, triage was applied for transport. After determining the patients to be transported, it was determined which plane was suitable according to the conditions of the patients, and their transport was facilitated with that plane.

On the second day, the crisis coordination center started to be used more effectively. A human resources unit was established within the crisis coordination center to keep track of the personnel assigned to Adiyaman and to determine their duties. A transport coordination unit was established and the patients to be transported to other provinces were registered by this unit, and the transportation of patients by land or air ambulance was provided by this unit. In coordination with Adiyaman EMS Administration, ambulances in the province were grouped as 'transport ambulances' and 'emergency aid ambulances'. The transport ambulances were parked in the garden of the hospital, and they constantly transported patients to air ambulances and other provinces. Emergency ambulances were assigned to respond to earthquake victims when they were removed from the rubble.

Picture Archiving and Communication Systems (PACS) were activated in the hospital, and after CT scans were performed on patients, images were made to appear on the physicians' computers instead of the tomography computers. In this way, the crowding in the tomography unit was eliminated. The need for medicines and materials in the hospital was met by sourcing them from other provinces that were not affected by the earthquake. The hospital parking lot was converted into a warehouse to store incoming aid such as medicines, materials, food, and clothing. While pharmacists categorized drugs, warehouse managers categorized food

and clothing materials. The dialysis unit was activated and patients with crush syndrome started to be admitted.

To solve the resting needs of the personnel, they were accommodated in the crisis coordination center. In addition, 2 large sheltering tents were set up in the garden of the hospital for the accommodation needs of the personnel. In addition, tent cities started to be established for the shelter needs of the earthquake victims. Two field hospitals were established in Adiyaman (Figure 2A). These were fully equipped hospitals with operating rooms and intensive care units. While one hospital was planned as an adult hospital, the other hospital was planned as a gynecology, maternity, and children's hospital.

On the 2nd day, patient transfers continued with the C130 cargo plane, CASA ambulance plane, and ambulance planes belonging to the Ministry of Health. In addition, jets belonging to the Presidency provided the transport of patients who did not need emergency intervention.

Tent health facilities were established at 17 medical care points in order to provide health services to patients staying in tent cities and container cities (Figure 2B). A physician and 4 health workers were employed in these tents. Medical care points had medical devices and drugs that could be used to respond to emergencies. In addition, in these medical care tents, there were drugs to be used to treat the acute diseases of the earthquake victims and the drugs they needed for their existing chronic diseases. These drugs were provided to all patients in need.

Day 3

On the 3rd day, the numbers of personnel (doctors, nurses, paramedics, and National Medical Rescue Team personnel) and ambulances became sufficient. The radio communication system was activated and communication with the ambulances over the radio began.

Day 4

For infection control, 4 infection physicians and 5 infection nurses arrived at the hospital. Precautions were implemented based on their suggestions about intensive care units, operating rooms, and patients. Angiography began and patient admission started.

Day 5

Critically ill patients who were rescued from the wreckage and required urgent intervention were transported to neighboring cities by helicopter ambulances (Figure 1D). Water safety and environmental safety were ensured by monitoring of the water by public health teams. Malignant patients were transported to various hospitals in the province of Urfa, in consultation with the Urfa Provincial Health Directorate for chemotherapy treatments.

From the 5th day, it was observed that the personnel were both psychologically and physically worn out. Therefore, they were replaced by other personnel. The minimum number of personnel needed was determined, and a request for staff was made to the Ministry of Health. An aircraft was allocated by Turkish Airlines for the transfer of personnel and as of the 6th day personnel replacement began.

DISCUSSION

In the 7.0 magnitude earthquake that occurred in Haiti in 2010, 316,000 people were killed and 300,000 more were injured. After



Figure 2. (A) Field hospitals were established in Adiyaman. (B) Medical care points.

the earthquake, an international call for help was made and aid teams from abroad arrived in Haiti (9). In addition, many volunteers went to the region and helped the injured (10).

Many people were affected by the 7.8 magnitude earthquake that occurred in Nepal in 2015. It was reported that in the first aid center during the Nepal earthquake, there were patients on stretchers and on the ground, similar to the situation we experienced. In Nepal, as in our country, patients were transported by helicopters, but due to the large number, the patients were triaged (11).

In another study conducted on the earthquake in Türkiye, it was reported that patients were transported both by land and air not only from Adiyaman but also from other provinces affected by the earthquake (12). It has also been reported in other studies that medical aid was delivered to the disaster area in a short time by volunteer health workers (13).

CONCLUSION

It should be considered that local administrators are also disaster victims. The fact that teams from other provinces undertake

health management in the disaster area will facilitate the process. EMS management in the acute period is particularly important in terms of saving the lives of earthquake victims and preventing disabilities. In addition, we recommend that primary health care services, infection control, and treatment of chronic diseases throughout the province should not be ignored after the disaster.

Ethics Committee Approval: This study was conducted with the permission of the Ankara Bilkent City Hospital Local Ethics Committee (decision no: E2-23-4180, date: 26.05.2023).

Informed Consent: Written informed consent was obtained from the patients who agreed to take part in the study.

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