

The 6th February 2023 Turkey Earthquake and Emergency Department Admissions: A Catastrophic Disaster

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Abstract

Objective: This study aimed to examine the impact of the February 6th, 2023 earthquake in Turkey on emergency department (ED) admissions, especially at the Ankara Bilkent City Hospital, and to identify the lessons learned from this disaster.

Materials and Methods: The study analyzed the data of all earthquake victims who applied to the Ankara Bilkent City Hospital ED between February 6th and February 28th, 2023, after the earthquake. The patients' demographic characteristics, reasons for application, transfer methods, hours of application after the disaster, diagnosis, the service where they were hospitalized, and patient outcomes were recorded. A total of 1.577 earthquake victims were admitted to the ED during the study period, and their data were analyzed using IBM SPSS software.

Results: Of the patients, 719 (45.59%) were male and 858 (54.40%) were female, and the average age was 42±12.63. During their follow-up, 770 (48.82%) patients were hospitalized, 783 (49.65%) were treated and discharged, and 27 (1.71%) patients refused treatment. ED admissions were mainly related to trauma, fractures, and injuries from falling debris. Crush syndrome developed in 393 (24.92%) of the 1.577 patients. Of the patients with crush syndrome, 211 (53.60%) were on dialysis during their follow-up. Compartment syndrome developed in 215 (13.63%) patients. Fasciotomy was performed on 155 (9.82%) patients.

Conclusion: The February 6th, 2023 earthquake in Turkey resulted in overwhelming ED admissions, highlighting the importance of disaster preparedness and the need for trained medical professionals equipped with the necessary resources to respond quickly and effectively to such disasters. The study revealed that the emergency response system needs to be improved to handle large numbers of patients during a disaster. The study also emphasized the importance of effective communication and coordination among emergency response teams, aid organizations, and government agencies.

Keywords: Earthquake, emergency department, disaster

Introduction

On February 6th, 2023, Turkey experienced a catastrophic disaster when a massive earthquake measuring 7.7 on the Richter scale struck the city of Kahramanmaraş at 04.17 in the morning. The earthquake was felt in at least 10 provinces throughout the country, causing widespread damage and loss of life. Just hours later, at 13.24, a second earthquake with a magnitude of 7.6 struck the Elbistan district of Kahramanmaraş, adding to the devastation. The aftermath of the earthquake, in which over 100.000 buildings were destroyed, has been overwhelming, with the emergency department (ED) inundated with patients

seeking medical care. As of March 20th, the death toll has risen to 50.096, the number of injured has reached 107.204, and 100 thousand or more buildings were demolished [1].

The 6th February 2023 earthquake in Turkey, especially in Kahramanmaraş, has been one of the deadliest earthquakes in the country's recent history. The earthquake has left thousands homeless and caused significant damage to infrastructure, including hospitals and healthcare facilities. The emergency response system, including the ED and hospitals, was quickly overwhelmed by the influx of patients seeking medical assistance.



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Received: 01.06.2023 **Accepted:** 02.08.2023

In the aftermath of the earthquake, the Turkish Government and aid organizations mobilized quickly to provide assistance to those affected by the disaster. Emergency shelters were established to provide temporary housing for the displaced, and food and water supplies were distributed to those in need. The healthcare sector played a vital role in the relief efforts, with medical teams working around the clock to treat the injured.

Despite the challenges faced by the ED, the medical professionals demonstrated extraordinary dedication and resilience. Their tireless efforts to save lives and provide medical care to the injured were commendable.

A lesson learned from the earthquake was the importance of preparedness in disaster response. This includes having well-equipped and well-staffed EDs and hospitals, trained medical professionals, and sufficient medical supplies and equipment to handle large numbers of patients.

Another crucial lesson was the need for effective communication and coordination among emergency response teams, aid organizations, and government agencies. Efficient sharing of information and resources can greatly improve response efforts and ensure that aid reaches those who need it most.

The impact of the earthquake on ED admissions highlights the importance of disaster preparedness and the need for trained medical professionals equipped with the necessary resources to respond quickly and effectively to such disasters. However, the disaster also revealed weaknesses in the emergency response system that need to be addressed to improve future disaster response efforts.

Despite not being located in one of the cities at the epicenter of the Ankara earthquake, Ankara Bilkent City Hospital experienced a high influx of patients from the earthquake zone, both through air and land ambulances, because it is the most well-equipped and highest-capacity hospital in Turkey. In our study, we shed light on the impact of the earthquake on ED admissions and the lessons learned from this devastating disaster.

Materials and Methods

Our hospital has an annual patient admission of 470.000 and is located in the capital city. We accept intensive referrals from surrounding provinces with the highest bed capacity. During this process, patients from earthquake-stricken cities mainly visited our ED via air ambulances, land ambulances, and their own means. The study was conducted with the approval of E1-23-3355 dated 22.03.23 and numbered 3355 of the Number 1 Clinical Applications Ethics Committee of the Ankara Bilkent City Hospital. In our study, 1,577 earthquake victims

who applied to the Ankara Bilkent City Hospital ED between February 6th and February 28th, 2023, after the February 6th earthquake, were retrospectively examined. Demographic characteristics of the patients, reasons for application, transfer methods, hours of application after the disaster, diagnosis, the service where they were hospitalized, and patient outcomes were recorded. Patients whose data could not be accessed from the hospital automation system were excluded from the study.

Statistical Analysis

The study data were analyzed using IBM SPSS Statistics for Windows, Version 22.0 (Armonk, NY: IBM Corp.) software package. The Kolmogorov-Smirnov test was used to test the normality of the distribution of the study data. Normally distributed study data are reported as mean \pm standard deviation, and non-normally distributed study data are reported as median (minimum-maximum). Non-normally distributed quantitative data were compared using the Mann-Whitney U test, whereas normally distributed quantitative data were compared using the independent samples t-test. A p value of <0.05 was considered statistically significant.

Results

During the planned duration of the study, 1,577 earthquake victims were admitted to the ED with the X-31 code assigned to the automation system. The average age of the patients was 42 ± 12.63 , with 719 (45.59%) male patients and 858 (54.40%) female patients. Of the patients, 526 (33.35%) were transferred to our clinic by ambulance from the earthquake zones, while 1,051 (66.64%) came to the ED on their own.

During their follow-up, 770 (48.82%) patients were hospitalized, while 783 (49.65%) were discharged. Twenty seven (1.71%) patients refused treatment and left the ED voluntarily. Among the 526 (33.35%) patients transferred by ambulance, 490 (93%) were hospitalized and 36 (6.82%) were discharged. The hospitalization rate was found to be significantly higher among patients transported by ambulance ($p < 0.001$) (Table 1).

Crush syndrome developed in 393 (24.92%) of the 1,577 patients. Of the patients with crush syndrome, 211 (53.60%) were on dialysis during their follow-up. Compartment syndrome developed in 215 (13.63%) patients. Fasciotomy was performed on 155 (9.82%) patients from the ED, and emergency amputation was performed on 33 (2.09%) patients. The most requested consultations were from the orthopedics (69%), internal medicine (32%), and plastic surgery (23%) departments (Table 1).

Of the patients, 35 (2.21%) had isolated head trauma, 98 (6.21%) had isolated spinal injuries, 69 (4.37%) had isolated chest trauma, 6 (0.36%) had isolated abdominal trauma, 357 (22.63%) had isolated extremity injuries, 23 (1.45%) had

isolated pelvic injuries, 185 (11.73%) had multiple traumas, and 503 (31.89%) had isolated soft tissue injuries. A total of 301 (19.08%) patients were admitted to the ED with non-traumatic symptoms.

Discussion

The findings reveal the significant impact of the earthquake on the healthcare system and the high number of patients who required medical attention. The hospitalization rate of patients transferred by ambulance was significantly higher than that of those who came to the ED on their own, indicating the severity of their conditions. This is consistent with previous studies that have found that ambulance transport is associated with a higher likelihood of hospitalization and increased severity of illness [2,3].

The high incidence of injuries and casualties during disasters underscores the need for proper disaster management and preparedness to minimize the adverse effects of such catastrophic events. Effective disaster management and preparedness require a well-coordinated response involving various stakeholders, including emergency medical teams,

healthcare providers, public health officials, and the community [4].

Previous studies have also shown that earthquakes can result in several injuries, including head trauma, spinal injuries, chest trauma, abdominal trauma, extremity injuries, pelvic injuries, compartment syndrome, and crush syndrome [5]. Our study adds to this body of knowledge and highlights the importance of emergency preparedness and response in minimizing the adverse effects of natural disasters.

The findings of this study agree with previous research on earthquake-related injuries, which have shown that crush syndrome and compartment syndrome are common complications of earthquakes, especially in urban areas where there are large numbers of people in buildings that may collapse [6]. This study also highlights the importance of preparedness measures in mitigating the effects of such disasters, including ensuring that healthcare facilities are equipped to handle large influxes of patients and that medical personnel are trained in managing earthquake-related injuries.

The high incidence of crush syndrome observed in this study is a well-known complication of earthquake-related injuries

		n	%
Sex	Female	858	54.40
	Male	719	45.59
Age	Mean (± SD)	42±12.63	
Transferred by ambulance		526	33.35
Transferred by on their own		1,051	66.64
Outcome	Hospitalized	770	48.82
	Discharged	783	49.65
	Refused treatment	27	1.71
Reasons for application	Isolated head trauma	35	2.21
	Isolated spinal injuries	98	6.21
	Isolated chest trauma	69	4.37
	Isolated abdominal trauma	6	0.36
	Isolated extremity injuries	357	22.63
	Isolated pelvic injuries	23	1.45
	Multiple traumas	185	11.73
	Isolated soft tissue injuries	503	31.89
	Non-traumatic symptoms	301	19.08
Consultations	Orthopedics	69%	
	Internal medicine	32%	
	Plastic surgery	23%	
Crush syndrome		393	24.92
Need for dialysis		211	53.60
Compartment syndrome		215	13.63
Fasciotomy		155	9.82
Emergency amputation		33	2.09
SD: Standard deviation			

[7]. The use of dialysis in more than half of the patients with crush syndrome is consistent with previous reports of high rates of renal failure in such patients [8,9]. The high rate of crush syndrome in our study population suggests the need for early recognition and treatment of this condition in disaster settings.

Similarly, compartment syndrome is a common complication of crush injuries and is associated with significant morbidity and mortality if not recognized and treated promptly [10]. In our study, compartment syndrome was also found in 13.6% of patients, and fasciotomy was performed in 9.8% of patients. These findings agree with previous studies that have reported high rates of compartment syndrome in earthquake disasters [8,9]. Early recognition and intervention are crucial for preventing the development of this potentially life-threatening condition.

Internal medicine and plastic surgery were also frequently consulted, likely reflecting the broad range of medical issues that arise in the aftermath of a major disaster. The most commonly requested consultations in our study were from orthopedics, internal medicine, and plastic surgery departments. The finding that orthopedics was the most requested consultation is not surprising given that fracture and musculoskeletal injuries are common after earthquakes [11]. This finding is consistent with other studies on earthquake disasters, which have identified orthopedic and surgical specialties as the most needed services in disaster settings [9,10]. The high demand for these specialties emphasizes the importance of disaster preparedness plans that include the allocation of adequate resources and personnel to meet the needs of these patients.

This study highlights the significant burden placed on the healthcare system by earthquakes and the importance of prompt recognition and treatment of complications such as crushes and compartment syndromes. It also underscores the critical role of ambulance transport in identifying and triaging patients with severe injuries. Future research should focus on developing strategies to improve the response to earthquakes and other natural disasters and mitigate their impact on public health.

Study Limitations

This study has several limitations. First, it is a single-center study, which may limit the generalizability of the findings to other settings. Second, the study only included patients who presented to the ED and may not have included patients who were treated elsewhere or who did not seek medical attention. Finally, this study only examined the immediate aftermath of the earthquake and did not assess the long-term impact on the healthcare system or the broader community.

Despite these limitations, the findings of this study provide valuable insights into the impact of earthquakes on the healthcare system and highlight the need for ongoing research to improve our understanding of earthquake-related injuries and their management.

Conclusion

The earthquake on February 6th, 2023, had a devastating impact on the people of Turkey. The EDs of hospitals were overwhelmed with patients, and healthcare professionals worked tirelessly to provide care to those in need. Our study provides valuable insights into the characteristics and management of earthquake victims in ED settings. The high rate of crush syndrome and compartment syndrome in our study population emphasizes the need for early recognition and intervention of these conditions. The high demand for orthopedic and surgical specialties highlights the importance of disaster preparedness plans that include the allocation of adequate resources and personnel. The findings of this study highlight the need for disaster preparedness and response planning to ensure that EDs are equipped to deal with large-scale disasters. It is important to learn from this experience and take steps to improve disaster response planning and emergency preparedness to minimize the impact of future disasters.

Ethics

Ethics Committee Approval: The study was conducted with the approval of E1-23-3355 dated 22.03.23 and numbered 3355 of the Number 1 Clinical Applications Ethics Committee of the Ankara Bilkent City Hospital.

Informed Consent: Retrospective study.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: N.G.K., Concept: N.G.K., Design: N.G.K., H.O., Data Collection or Processing: N.G.K., F.E.A., C.Ç., R.İ.M., Analysis or Interpretation: N.G.K., Literature Search: N.G.K., Writing: N.G.K.

Conflict of Interest: No conflicts of interest were declared by the authors.

Financial Disclosure: The authors declare that this study received no financial support.

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