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Assessing Patient Demographics and Emergency Response Adaptation in a Primary-Level State Hospital Following the 6 February Türkiye Earthquakes

6 Şubat Türkiye Depreminde Bir İkinci Basamak Devlet Hastanesindeki Hasta Demografisinin ve Acil Müdahale Uyumunun Değerlendirilmesi

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ABSTRACT

Aim: On 6 February 2023, a series of earthquakes with magnitudes of 7.8, 6.6, and 7.6 struck the south-eastern region of Türkiye within a span of 10 hours, starting from 04:00 am. These earthquakes resulted in a devastating loss of life, with casualties exceeding 50,000 across 10 provinces. The destruction caused by these earthquakes was widespread with the collapse of many buildings, including hospitals. This study aimed to assess the patient demographics and emergency response adaptation in a primary-level state hospital following the 6 February Türkiye earthquakes.

Material and Methods: The study was conducted at the Reyhanlı State Hospital, which remained largely unaffected by the earthquakes. The hospital faced challenges in providing medical care due to the loss of staff, damaged infrastructure, and limited resources. A volunteer orthopaedic surgery team, along with other medical professionals, provided treatment to the earthquake victims. The patient data was collected from the conventional record book of the operating room.

Results: From 6 to 12 February 2023, a total of 111 surgeries were performed at the hospital, with 92 (%83) being earthquake-related. Orthopaedic surgeons operated on most of the patients. The most common surgeries included fasciotomies, amputations, and fracture fixations. The surgeries were performed in a time-sensitive manner, with immediate life- and extremity-saving procedures prioritized. The hospital's infrastructure challenges and the lack of digital recording systems hampered the data collection process.

Conclusion: The study highlights challenges faced by a primary-level Hospital during the earthquakes. Our indings stress the importance of preparedness, infrastructure, and efficient patient records for effective emergency healthcare during natural disasters. Lessons learned can aid future plans for better emergency medical care in earthquake-prone regions.

Key Words: Earthquake, patient demographics, infrastructure challenges, medical records, emergency adaptation

ÖZET

Amaç: 6 Şubat 2023 tarihinde, 04:00'ten itibaren 7.8, 6.6 ve 7.6 büyüklüğünde bir dizi deprem, Türkiye'nin güneydoğu bölgesini 10 saat içerisinde etkiledi. Bu depremler, 10 ilde 50.000'i aşkın can kaybına neden olan yıkıcı bir tabloya yol açtı. Hastaneler de dahil olmak üzere birçok binanın çökmesiyle beraber bu depremlerin yol açtığı yıkım oldukça geniş kapsamlıydı. Bu çalışmada, 6 Şubat Türkiye depremi sonrasında ikinci basamak bir devlet hastanesinde hasta demografik özellikleri ve acil müdahale uyumunun değerlendirilmesi amaçlandı.

Gereç ve Yöntem: Çalışma depremden ağır düzeyde etkilenmeyen Reyhanlı Devlet Hastanesi'nde gerçekleştirildi. Hastane, personel kaybı, hasarlı altyapı ve sınırlı kaynaklar nedeniyle sağlık hizmeti sunumunda zorluklarla karşı karşıya kaldı. Gönüllü bir ortopedi ekibi, diğer branş hekimleriyle birlikte depremzedelerin tedavisinde görev aldı. Hasta verileri ameliyathanenin kayıt defterinden elde edildi.

Bulgular: 6-12 Şubat 2023 tarihleri arasında ilgili hastanede 92'si (%83) depremle ilgili olmak üzere toplam 111 ameliyat gerçekleştirildi. Hastaların çoğu ortopedistler tarafından ameliyat edildi. En sık uygulanan cerrahi işlemler fasyotomiler, amputasyonlar ve kırık tespitlerinden oluşmaktaydı. Ameliyatlar hızlı bir şekilde, acil hayat ve ekstremite kurtarma prosedürlerine öncelik verilerek gerçekleştirildi. Hastanenin altyapı zorlukları ve dijital kayıt sistemlerinin olmayışı veri toplama işlemlerini zorlaştırdı.

Sonuç: Çalışmamız, depremler sırasında birinci düzey bir hastanede karşılaşılan zorlukları ortaya koymuştur. Bulgularımız, doğal afetler sırasında etkili ve verimli acil sağlık hizmeti için hazırlıklı olmanın, altyapının ve tıbbi kayıtların önemini vurgulamaktadır. Elde edilen veriler, deprem riski taşıyan bölgelerdeki acil tıbbi hizmetlerin iyileştirilmesi için gelecekteki planlara yardımcı olabilir.

Anahtar Kelimeler: Deprem, hasta demografisi, altyapı sorunları, tıbbi kayıtlar, acil duruma uyum

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Introduction

Türkiye is located in a region prone to seismic activity, with a significant portion of its land lying over seismic zones. The devastating earthquake of 7.4 magnitude that struck the Marmara region on 17 August 1999 resulted in high losses of life, with over 17,000 fatalities and countless injuries. This earthquake, along with historical events such as the 1939 Great Erzincan Earthquake, played a pivotal role in shaping earthquake risk mitigation policies in Türkiye. Legislation such as Law No. 4623 was introduced to implement measures before and after quakes. In response to the 1999 earthquake, the National Earthquake Strategy and Action Plan was developed to prevent future casualties, particularly in Istanbul. Within this framework, the Disaster and Emergency Management Authority (AFAD) initiated a project in 2013 to revise seismic hazard maps and update the national seismic design code for buildings.[1] Furthermore, earthquake drills and simulations have been conducted to enhance community involvement and preparedness, inspired by previous successful drills in seismically active regions such as Mexico City.[2,3] Despite extensive efforts to prevent casualties caused by earthquakes, it remains impossible to guarantee zero losses. Therefore, it is crucial to create new action plans by evaluating data obtained from past earthquake experiences. In this regard, it is essential to record and analyse real-time data during and after earthquakes without allowing chaos. The significance of robust hospital medical recording systems and infrastructure becomes evident in the aftermath of an earthquake.[4] Accurate and reliable patient recording systems play critical roles in effective disaster response and management. These systems enable healthcare providers to maintain comprehensive medical records, including patient histories, diagnoses, treatments, and follow-up care. Access to complete and up-to-date patient records is vital for the continuity of care, coordination among healthcare teams, and timely decision-making in the chaotic aftermath of earthquakes. Efficient patient recording systems streamline the process of identifying and addressing patient needs, thereby improving overall healthcare delivery in challenging circumstances.[5]

On 6 February 2023, a series of earthquakes with magnitudes of 7.8, 6.6, and 7.6 struck the south-eastern region of Türkiye within a span of 10 hours, starting from 04:00 am. These earthquakes resulted in a devastating loss of life, with casualties exceeding 50,000 across 10 provinces. The destruction caused by these earthquakes was widespread with the collapse of many buildings, including hospitals. As a result, the remaining hospitals at all levels had to be utilized for immediate patient care until the transfer of patients to tertiary-care units became possible. Despite its close proximity (30 km) to the earthquake epicentre, the physical conditions of the Reyhanlı State Hospital remained generally unaffected. However, severe losses were observed among medical service providers as most of the staff, including doctors, nurses, other medical staff, and managers, resided in the vicinity of the epicentre, in Antakya/Hatay. In the aftermath of the earthquakes, the hospital received thousands of victims due to the lack of other operating hospitals nearby. These patients were transported from the wreckage by ambulances or volunteers using various means. Volunteer doctors, nurses, paramedics, and other medical personnel provided treatment to these patients in the hospital.

Volunteers who responded to the earthquakes found hospitals with damaged infrastructure and a lack of medical resources. Understanding the pivotal role of a hospital's infrastructure and its medical recording systems during and post-natural disasters is critical. Despite this significance, there is a scarcity of research focusing on the specific adversities hospitals face and the importance of robust medical recording systems in the aftermath of seismic events. This study aims to bridge this research gap by shedding light on the experiences encountered by an orthopedic surgery team upon their arrival at Reyhanlı State Hospital in the wake of the earthquakes. By delving into the demographic profiles of patients who underwent surgery, the spectrum of surgical procedures conducted, and an evaluation of the hospital's infrastructure concerning its medical records system, this research endeavors to offer valuable insights into the hospital's adaptability during emergencies. The insights gleaned from this study aspire to not only augment the current body of literature but also provide actionable recommendations for enhancing emergency healthcare and fortifying infrastructure resilience in regions susceptible to earthquakes

Materials And Method

Ethics committee approval was obtained from Umraniye Training and Research Hospital ethics Committee (ID: B.10.1.TKH.4.34.H.GP.0.01/119).

In the aftermath of the devastating earthquakes that struck the south-eastern region of Türkiye, the Reyhanlı State Hospital faced significant challenges in providing medical care. The first teams of doctors and nurses arrived at the hospital in the 16th hour following the quakes. The hospital's emergency department was understaffed, with only two intern doctors and no surgeon available. Additionally, the hospital's digital system, which relied on the internet, failed completely, resulting in the loss of X-rays and CT scans. As a result, patient images were recorded with mobile phones if available, or patients had to be sent for repeated X-rays or CT scans. Blood and laboratory testing was also hampered, with certain tests unavailable for the first 19 hours and results only obtainable in hard-copy format.

The entire hospital was in disarray as all staff members, including doctors, nurses, and other medical personnel, were themselves victims of the earthquakes. With the exception of a few intubated patients in the intensive care unit, all patients were discharged, leaving the wards empty. The orthopaedic surgery team that intervened consisted of 7 volunteering individuals, including 3 associate professors, 2 assistant professors, and 2 senior residents. The lack of surgeons at the institution meant that general surgeons and other specialists stepped in to support orthopaedic interventions, while plastic surgery residents dedicated themselves to suturing various injuries using local anaesthesia. Despite the hospital having 3 operating rooms, there were limited resources for urgent interventions, with a lack of both external fixators and service staff who could provide them.

Despite the chaos and lack of digital registry systems, the medical professionals worked tirelessly in shifts to ensure continuous care and support for the earthquake victims. An orthopaedic surgeon and his assistant reorganized the emergency ward processes to use all staff effectively and ensure that patients in the emergency ward could be followed and appropriate interventions could be performed. During the earthquake response, general surgeons played a crucial role in interventions for critical cases in the red area and postoperative care for patients in the wards, particularly focusing on crush syndrome management. The only internist supervised the follow-up of metabolic disorders including crush syndrome. Meanwhile, an orthopaedic surgery resident was responsible for monitoring incisions, peripheral vascular status, and dressing changes. Additionally, the general surgeons willingly supported the emergency room by following preoperative patients for crush syndrome, working alongside senior orthopaedic surgeons. They also provided assistance in the resuscitation area for patients requiring urgent resuscitation. In a room adjacent to the orthopaedic team's intervention room, four plastic surgery residents worked tirelessly, offering their voluntary services to suture various types of injuries that could be managed with local anaesthesia.

Collaborating closely with the orthopaedic surgeons, two vascular surgeons and one general paediatric surgeon joined the emergency intervention room. They actively participated in fracture reduction, splinting, casting, stitching, and dressing changes. Additionally, they provided ongoing care for critical patients and assisted with the changing of fasciotomy dressings in the intensive care unit. The brain surgery team followed an 8-hour shift schedule, remaining available in the field whenever consultations were required for patients in need of their expertise.

Triage was performed in line with the recommendations of the Advanced Trauma Life Support Manual. Only patients who could be treated with the available resources were operated on, and only life- and extremity-saving surgeries were performed. Relatively shorter procedures were performed and patients needing time-consuming interventions or fracture fixation were transferred to other hospitals.[6]

Regarding emergency reception records, in the first 5 days after the quakes no types of records were obtained for any patients admitted to the emergency room, including conventional book-based records. Moreover, records related to the medical histories of patients operated on and followed in the wards were not available. The only available recording system was the conventional record book of the operating room, written in by operating surgeons and anaesthesiologists. All available records were obtained from this hard-copy conventional recording system. All data on the patients' ages, genders, injured sides, trauma mechanisms, surgery types, and surgery durations were obtained from this book. Only patients operated on by the orthopaedic surgery team were analysed further due to the limited availability of the records of earthquake-related cases.

Surgical interventions commenced at 11:00 am on February 6 following the arrival of the first orthopedic surgical team. Medical records for patients admitted to the Emergency Room were largely unavailable, and only the records for patients operated on by the initial team, which handed over duties to another team on February 12, 2013, were relatively appropriate for analysis. Surgeries conducted by the first surgical team between February 6, 2023, at 11:00 am and February 12, 2023, at 5:00 pm were included in the analysis. A total of 111 surgeries were performed in the operating rooms during this period.

Data were analyzed using SPSS software (ver. 22.0; IBM Corp., Armonk, NY, USA). The normality of the data distribution was evaluated by the Shapiro-Wilk test. Quantitative variables are expressed as mean ± standard deviation and minimum and maximum values. Qualitative variables are expressed as frequencies or ratios. P-values < 0.05 were considered to indicate statistical significance.

Results

From 11:00 am on 6 February 2023 to 17:00 pm on 12 February 2023, 111 surgeries were performed in the operating rooms. Of the 111 surgeries, 92 (%83) were earthquake-related and orthopaedic surgeons operated on most of the patients ($p<0.05$).

Brain surgery: Eight (%7) earthquake victims required brain surgery, including 2 operated on for lumbar frac-

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tures and stabilization with posterior instrumentation, 3 with subdural haematoma requiring decompression, 1 with a skull fracture, and 2 requiring a stitching procedure performed for the degloving of the scalp.

Thoracic surgery: For 1 (%0.9) patient, open coagulation of the left lung for unstable earthquake-related haemothorax was performed.

General surgery: Two laparotomy procedures for 2 patients with earthquake-related suspicious intra-abdominal bleeding were performed. Further surgical interventions were not necessary for these 2 patients. Two acute appendicitis patients, 1 acute abdomen patient, and 1 patient with a stab wound to the abdomen were also treated from among cases not related to the earthquakes (%5.4).

Gynaecology: Among surgeries not related to the earthquakes, 15 caesarean births were performed (%13.5).

Orthopaedic surgery: A total of 85 (%77) surgeries were performed by orthopaedic surgeons for a total of 81 patients. Of those 81 patients, 3 needed revision surgeries, with 1 patient requiring 2 revision surgeries. All revision surgeries were amputations. While 46 (%56.8) of patients undergoing orthopaedic surgery were male, 35 (%43.2) were female. The median age of these patients was 25 years (range: 1-81, IQR: 25.5). The vast majority were in the second or third decade of life (Table 1).

Table 1. Distribution of trauma patients among different decades of life

Decade	N (%)
0-5 years old	4 (4.9%)
6-10 years old	3 (3.7%)
11-20 years old	23 (28.4%)
21-30 years old	19 (23.5%)
31-40 years old	11 (13.6%)
41-50 years old	10 (12.3%)
51-60 years old	7 (8.6%)
61-70 years old	3 (3.7%)
71-80 years old	1 (1.2%)

The youngest patient was a 14-month-old child with compartment syndrome of the left forearm requiring fasciotomy admitted on the 4th day after the earthquakes. This patient had been taken to a bonesetter for left elbow pain due to the lack of health services in an urban area after extraction of the child from the rubble on the 3rd day. Relatives referred the family to the Hospital for increased pain. An examination revealed a forearm compartment with good peripheral vascular refill and total neurological dysfunction of the hand. X-rays revealed no bone pathology. A forearm volar fasciotomy was performed for this child (Figure 1). Near-to-full recovery had been achieved for this patient at the postoperative 3th month.

The most common reason for surgery was cruris compartment syndrome followed by foot compartment syndrome needing urgent fasciotomy. Details of the types of injuries are provided in Table 2.

Forty-four surgeries (%44.8) were performed on the 2nd day following the earthquakes and 21 (%24.7) were performed on the 3rd day (Figure 2).

Cruris fasciotomy (23, %27.1) was the most common surgery, followed by foot fasciotomy procedures (16, %18.8). Lower extremity amputations (12, %14.1) were more common than upper extremity amputations (4, %4.7). Only 13 (%15.3) patients underwent fracture fixations, reduction of the elbow or shoulder, or wound debridement. Details of the performed surgeries are provided in Table 3 and Supplementary Table 1.

Fasciotomies and amputations were performed on the 2nd and 3rd days following the earthquakes. Fracture, dislocation, and wound management procedures were generally performed on the 3rd and 4th days ($p=0.006$) (Supplementary Table 2).

The median surgery duration was 40 min (range: 10-160, IQR: 35). The durations of surgeries performed for amputations were significantly longer than those for fasciotomies ($p=0.001$; 87.1±30.8 (45-160) min vs. 40.5±23.5 (10-120) min, respectively) (Supplementary Table 3).

Moreover, the durations of lower extremity surgeries were significantly shorter than those of upper extremity fasciotomies (36.2±19.8 (10-120) min vs. 62.7±29.5 (30-120) min, respectively). In contrast, lower extremity amputation surgery durations were significantly longer than those of upper extremity amputation surgeries (94.1±30.5 (60-160) min vs. 66.2±23.9 (45-100) min, respectively) ($p=0.001$). More details are provided in Supplementary Table 4 and Figure 3.

Eighty-two (%96.3) surgeries were performed using endotracheal intubation and the remaining 3 surgeries were performed with spinal anaesthesia. All surgeries with spinal anaesthesia were performed on the 4th and 5th days for fracture fixation of lower extremities, including 2 femur fractures and 1 ankle fracture dislocation. Of these patients, only 6 (%7.4) were followed in the intensive care unit. One of those patients, with 3 extremity amputations, had disseminated intravascular coagulation and was transferred to another hospital by helicopter ambulance. One had haemo-pneumothorax due to lung injury and was operated on by the thoracic surgery team. Three had 3 or 4 compartment injuries necessitating intervention and 2 were elderly patients who underwent shoulder-level amputations.

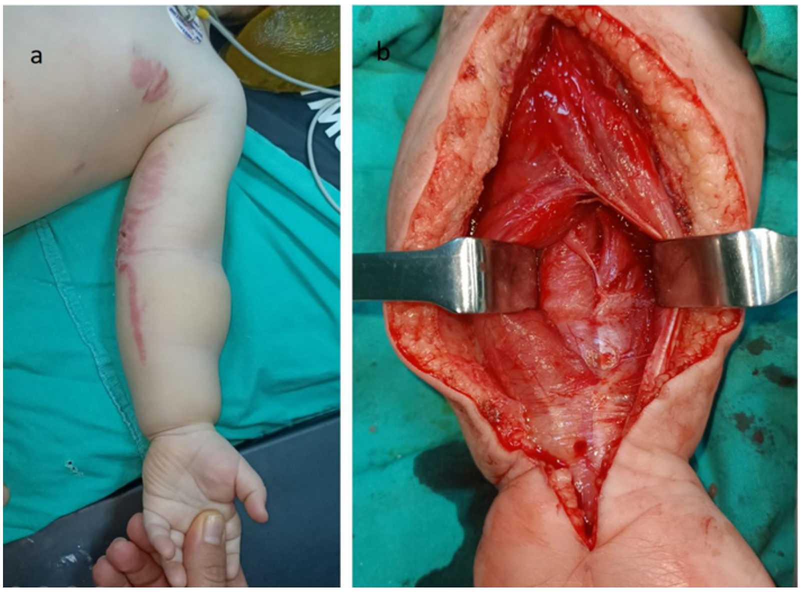

Figure 1. A 14-month-old girl with left forearm compartment syndrome and total neurological dysfunction of the hand. a) Ecchymosis of the skin due to inappropriate and tight stabilization by traditional methods. b) Forearm fasciotomy showing pallor of muscles with initiation of necrosis in the deep volar forearm compartment.

Table 2. Features of diagnosed injuries among the patients

Injury type	N (%)
Arm compartment syndrome, shoulder girdle compartment syndrome	1 (1.2%)
Arm crush injury	1 (1.2%)
Arm crush injury, shoulder girdle crush injury	1 (1.2%)
Closed fracture	8 (9.9%)
Cruris compartment syndrome	23 (28.4%)
Cruris compartment syndrome, closed fracture	1 (1.2%)
Cruris compartment syndrome, thigh compartment syndrome	2 (2.5%)
Cruris crush injury, foot compartment syndrome	2 (2.5%)
Cruris crush injury, thigh crush injury, hand crush injury	1 (1.2%)
Foot compartment syndrome	17 (21.0%)
Foot compartment syndrome, arm compartment syndrome	1 (1.2%)
Foot compartment syndrome, cruris compartment syndrome	3 (3.7%)
Foot crush injury	6 (7.4%)
Foot crush injury, cruris crush injury	1 (1.2%)
Foot crush injury, open fracture	1 (1.2%)
Forearm compartment syndrome	3 (3.7%)
Forearm compartment syndrome, arm compartment syndrome	1 (1.2%)
Hand compartment syndrome, forearm compartment syndrome	1 (1.2%)
Hand compartment syndrome, forearm compartment syndrome, arm compartment syndrome	1 (1.2%)
Hand crush injury	2 (2.5%)
Open fracture	2 (2.5%)
Shoulder girdle compartment syndrome	1 (1.2%)
Thigh crush injury, cruris crush injury	1 (1.2%)

"Compartment syndrome" refers to injuries needing fasciotomy and "crush injury" refers to injuries with severe loss of soft tissue and open fractures necessitating debridement, wound closure, or amputation.

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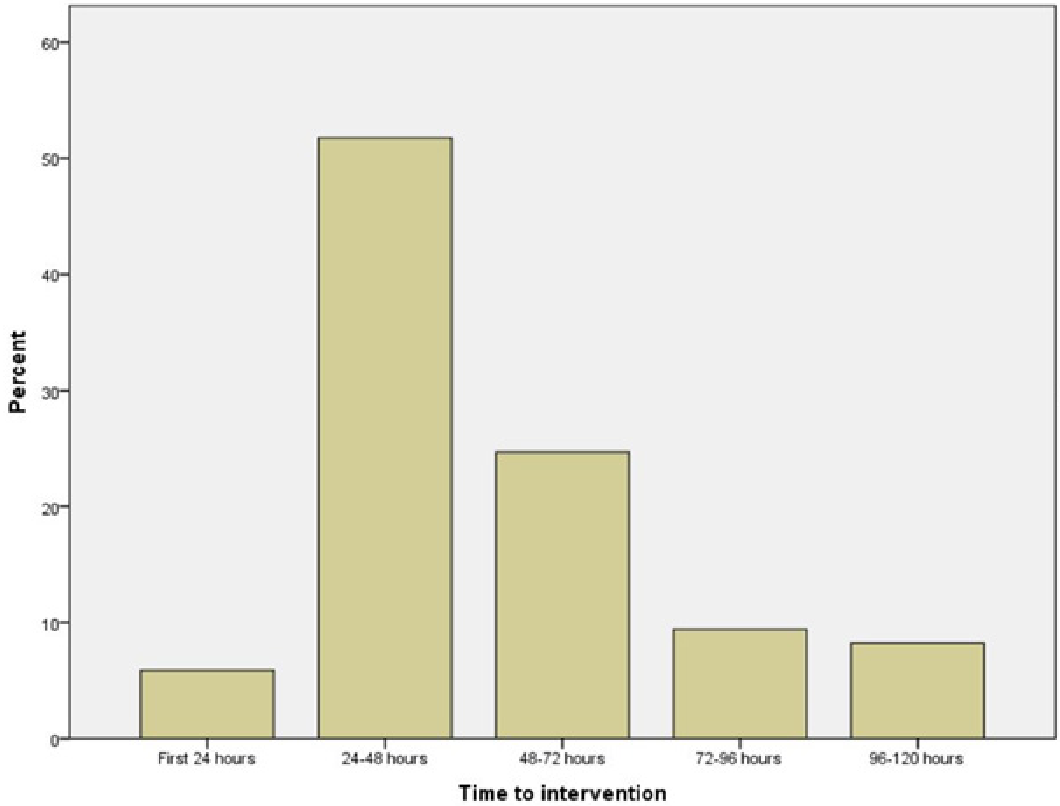

Figure 2. Graph depicting the density of surgeries on the first 5 days.

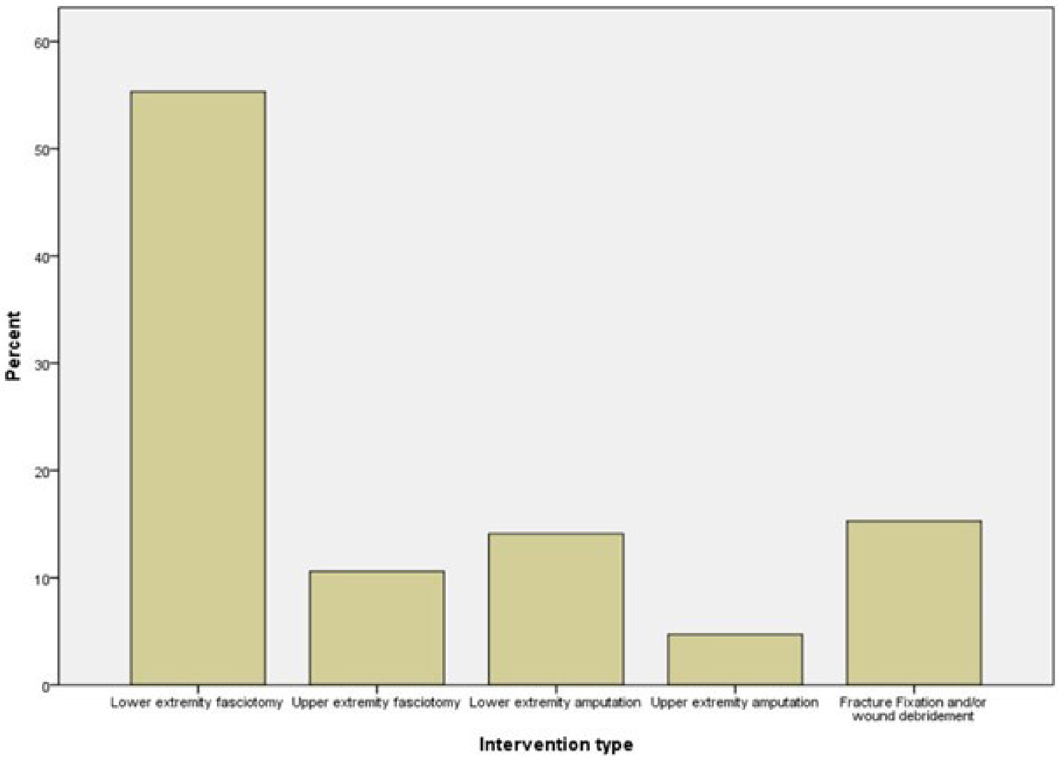

Figure 3. Graph depicting the types of interventions.

Table 3. Distribution of performed surgeries

Surgery	N (%)
Lower extremity fasciotomy	47 (55.3%)
Upper extremity fasciotomy	9 (10.6%)
Lower extremity amputation	12 (14.1%)
Upper extremity amputation	4 (4.7%)
Fracture fixation, dislocation stabilization, and/or wound debridement	13 (15.3%)

Supplementary Table 1. Details of the performed surgeries

Surgery	N %	
Above-the-knee amputation	3	3.5%
Wrist-level amputation	1	1.2%
Ankle-level amputation	2	2.4%
Arm fasciotomy, shoulder girdle fasciotomy	2	2.4%
Below-the-knee amputation	3	3.5%
Below-the-knee amputation, above-the-knee amputation	2	2.4%
Cruris fasciotomy	23	27.%
Cruris fasciotomy, fracture fixation	1	1.2%
Cruris fasciotomy, thigh fasciotomy	2	2.4%
Debridement	5	5.9%
Foot fasciotomy	16	18.8%
Foot fasciotomy, arm fasciotomy	1	1.2%
Foot fasciotomy, cruris fasciotomy	3	3.5%
Foot fasciotomy, debridement	1	1.2%
Forearm fasciotomy	3	3.5%
Forearm fasciotomy, arm fasciotomy	1	1.2%
Fracture fixation	8	9.4%
Hand fasciotomy, forearm fasciotomy	1	1.2%
Hand fasciotomy, forearm fasciotomy, arm fasciotomy	1	1.2%
Hand fasciotomy, forearm fasciotomy, arm fasciotomy, above-the-knee amputation	1	1.2%
Hand-level amputation	2	2.4%
Hip disarticulation amputation	1	1.2%
Shoulder disarticulation amputation	2	2.4%
Total	85	100.0

Supplementary Table 2. Timing of surgeries

Day of intervention	Fasciotomy (N=56)	Amputation (N=16)	Fracture and wound surgery (N=13)	Total
First 24 hours	3 (5.4%)	2 (12.5%)	0 (0%)	5 (5.9%)
24-48 hours	36 (64.3%)	7 (43.8%)	1 (7.7%)	44 (51.8%)
48-72 hours	10 (17.9%)	6 (37.5%)	5 (38.5%)	21 (24.7%)
72-96 hours	2 (3.6%)	1 (6.3%)	5 (38.5%)	8 (9.4%)
96-120 hours	5 (8.9%)	0 (0%)	2 (15.4%)	7 (8.2%)

Percentages are within columns.

Supplementary Table 3. Durations of surgeries (minutes)

Surgery type	Mean±SD (minimum-maximum)	p
Fasciotomy	40.5±23.5 (10-120)	0.001
Amputation	87.1±30.8 (45-160)	
Fracture fixation, dislocation stabilization, and/or wound debridement	44.2±27.3 (10-110)	

Supplementary Table 4. Duration of surgeries for different extremities (minutes).

Injured extremity surgery	Mean±SD (minimum-maximum)	p
Lower extremity fasciotomy	36.2±19.8 (10-120)	0.001
Upper extremity fasciotomy	62.7±29.5 (30-120)	
Lower extremity amputation	94.1±30.5 (60-160)	
Upper extremity amputation	66.2±23.9 (45-100)	
Fracture fixation, dislocation stabilization, and/or wound debridement	44.2±27.3 (10-110)	

Bilateral involvement needing surgical intervention was seen in 9 (%10.6) cases. Lower extremities were the most common site (65, %76.5) and both lower and upper extremities were involved in 3 (%3.5) cases. While 63 (%74.1) surgeries were performed for injuries in a single compartment, 1 (%1.2) patient underwent surgery for 4 compartments in the same session (Supplementary Table 5).

Thirty-nine (%45.9) of the patients were refugees under temporary protection.

No patients died during these treatments in the Reyhanlı State Hospital. All patients were followed for only 16-24 hours and then evacuated to advanced facilities.

Discussion

Recent extensive geophysical studies on stress transfer related to the 1999 Kocaeli earthquake have indicated the heightened likelihood of a major earthquake in the vicinity of Istanbul, with the probability of an earthquake of 7 Mw in the next 30 years being approximately %70.[7] While preparing for a major earthquake in Istanbul, Türkiye experienced huge quakes in the south-east of the country. This tragedy has shown us the importance of being prepared for mass casualties in any part of the country as we are living in a seismically active zone. In light of these scientific predictions, we must be better prepared for significant

Supplementary Table 5. Demographics of the patients.

Origin	N (%)
Local	46 (54.1%)
Refugee	39 (45.9%)
Injured site	
Right	32 (37.6%)
Left	44 (51.8%)
Bilateral	9 (10.%)
Injured extremity	
Lower limb	65 (76.5%)
Upper limb	17 (20.0%)
Upper and lower limbs	3 (3.5%)
Injured compartments	
One compartment	63 (74.1%)
Two compartments	17 (20.0%)
Three compartments	4 (4.7%)
Four compartments	1 (1.2%)

earthquake disasters on a nationwide scale. The present study aimed to analyse the demographic characteristics of and surgical interventions performed for individuals who required surgery following the earthquakes in Kahramanmaraş, Türkiye, on 6 February 2023. We believe that sharing the inevitable challenges that we encountered in the wake of those earthquakes with the medical community will be helpful in planning responses to future disasters. Our observations may shed light on several key points, as discussed in detail below.[8]

Chaotic disorganization may be a natural result after disasters like earthquakes, but for modern facilities, it is not acceptable. During the influx of large numbers of patients, standard hospital documentation often proves to be insufficient.[9] To enhance efficiency, it has been recommended that casualty cards and prearranged requests for laboratory tests, X-rays, and other diagnostic procedures be utilized.[10] Additionally, hospitals should proactively equip themselves with the necessary resources to operate independently for a minimum of 72 hours following a disaster.[11] Our initial observations revealed a shortage of medical personnel and a disorganized hospital environment. The absence of surgeons and limited emergency staff hindered the ability to provide timely surgical interventions and comprehensive patient care as no operations had been performed in the first 16 hours. The damaged infrastructure further exacerbated the challenges faced by healthcare providers, affecting the availability of essential equipment, supplies, and support services. Of course, earthquakes may also damage the hospitals themselves. After an earthquake, a disaster plan must quickly be activated due to the forthcoming influx of patients. Medical service staffing and resources must be redistributed to available hospitals and the departments anticipated to have the largest demand, including emergency departments.[4]

In many cases, initial interventions for earthquake victims are carried out at tertiary-level hospitals located on the outskirts of earthquake-affected regions.[12] This is primarily due to the ease of transporting volunteers and medical equipment to these facilities, which helps ensure that healthcare service providers are not overwhelmed. Moreover, it is common for hospitals in the earthquake-affected areas to suffer severe damage. However, providing care to victims at a first-level hospital located at the epicenter of the disaster presents unique challenges. The dependence on internet-based digital systems for medical record-keeping proved to be a significant disadvantage in our experience. The failure of the hospital's digital system resulted in the loss of valuable patient data, including X-rays and CT scans. This loss of information hindered accurate diagnosis, treatment planning, and follow-up care. The reliance on printed hard copies for test results and the use of mobile phones for image storage indicate that ad hoc measures may be taken to address system failures, but they are not sustainable or reliable in the long run.[13] Nie et al. reported 2283 earthquake-related admissions to their advanced university hospital during the first 2 weeks following an earthquake in Sichuan, China, in 2008.[4] They reported that all medical records were initially based on handwritten records and only 0.1% to 0.2% of the medical records were lost. This suggests that despite such approaches being old-fashioned, all emergency departments should be trained and ready to convert to conventional record-keeping methods during mass casualty situations.

The absence of a functioning medical recording system compromises patient safety and the continuity of care. Without access to complete and up-to-date medical records, healthcare providers face challenges in understanding a patient's medical history, allergies, medications, and previous treatments. This lack of information increases the risk of medical errors, adverse events, and delayed or inappropriate treatments.[13] During our initial 2 days in the Reyhanlı Sate Hospital, all accessible personnel were dedicated to patient transport and prompt conveyance of survey results from laboratories to doctors. The circumstances potentially impeded the accurate registration of patients at the emergency department's registry desk. This highlights the need for a significantly larger workforce compared to normal operations when manual processes are in place.[14] The major advantage in our experience was the hospital's quick and prompt evacuation of patients to other advanced hospitals postoperatively. This prevented inappropriate postoperative care and also alleviated the workload of the limited staff.[15]

In the face of limited resources and personnel, effective collaboration and resource management become crucial. The formation of voluntary teams and coordination between different specialties such as orthopaedics, general surgery, plastic surgery, and anaesthesia demonstrate the importance of interdisciplinary collaboration and the sharing of responsibilities. Such collaborations help optimize patient care, ensuring that medical professionals can provide timely interventions, manage postoperative complications, and address critical patient needs. Under exceptional circumstances, routine care can be upheld with only a select few key participants stepping forward and taking on coordinating roles.[16] According to Nie et al., senior emergency physicians demonstrate greater accuracy in diagnosing patients during triage evaluations, while junior emergency physicians and residents tend to over-triage.[4] On the other hand, specialty surgeons were found to be more prone to under-triage. As a result, Nie et al. proposed a triage model where junior emergency doctors and residents handle initial triage, senior emer-

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gency surgeons take charge of final triage decisions and advanced triage, and specialty surgeons focus on providing specialized treatment for specific pathologies. However, in our case, an emergency physician was not available. Therefore, a senior orthopaedist took responsibility together with a senior general surgeon and performed the triage. In our experience, this collaboration worked very effectively.

The study findings regarding patient demographics and surgical procedures align closely with observations made during the 1999 earthquake in Türkiye's Marmara region.[17] Most patients were young adults, primarily men, requiring orthopedic surgeries (%77), a trend consistent with previous earthquake-related trauma reports.[17] Notably, an infant's case with left forearm compartment syndrome underscored the vulnerability of infants post-earthquakes due to delayed proper medical attention. Timely access to medical services remains crucial to prevent misguided interventions. Surgical interventions included various trauma types, with lower extremity injuries being the most prevalent (%36.2), followed by upper extremity, head, spinal, chest, and abdominal injuries.[17] Brain and thoracic surgeries were performed for specific cases, while general surgeries addressed a range of conditions, including obstetric care.[18,19]

The surgeries' temporal distribution revealed a surge in procedures on the 2nd and 3rd days post-earthquake, indicating healthcare professionals' immediate response to meet urgent surgical needs. Notably, fasciotomies and amputations were performed primarily in the initial days to mitigate complications from compartment syndrome.[20] Differences in surgical durations were noted: amputation surgeries generally took longer than fasciotomies, and lower extremity surgeries were briefer than upper extremity fasciotomies. Most surgeries employed endotracheal intubation (%96.3) for fast anesthesia, optimizing operating room turnover.[21] Nearly half of the patients undergoing surgery were displaced refugees, emphasizing the unique healthcare needs of displaced populations during natural disasters.[22]

Limitations: There are several limitations of this study. First, the study focused on surgeries performed by orthopaedic surgeons due to the lack of available data for other surgical specialties. Consequently, the analysis might not provide a comprehensive overview of all surgical interventions performed following the earthquakes. Second, the study did not extensively explore the long-term outcomes and complications associated with these surgeries. Future research could delve into these aspects to better understand the impact of initial surgical interventions on the overall recovery and rehabilitation of earthquake survivors.

Conclusion: The experiences described here demonstrate the essential role of hospital infrastructure and functional medical recording systems in facilitating efficient and effective healthcare delivery during and after earthquakes. Robust infrastructure, including operating rooms, equipment, and staffing, is vital for prompt surgical interventions and patient management. Additionally, reliable and accessible medical recording systems play a critical role in maintaining accurate patient information, ensuring patient safety, and supporting the continuity of care. These observations highlight the need for disaster-prepared healthcare facilities with resilient infrastructure and comprehensive medical recording systems to enhance post-earthquake response and ensure optimal patient outcomes. Fast postoperative transfers to advanced facilities may have prevented catastrophic problems during follow-ups, but we had no chance of evaluating the demographics of patients admitted to the emergency room who did not need surgical interventions. The results of this study provide valuable insights into the demographics of patients undergoing surgical interventions following the earthquakes and the types of surgical interventions. This study underscores the significance of orthopaedic surgeries for earthquake-related injuries and the importance of prompt medical attention and early interventions, particularly in cases of compartment syndrome. Understanding the demographic profiles and surgical needs of affected individuals can aid healthcare providers and policymakers in developing targeted disaster response plans and resource allocation strategies to effectively manage such crises in the future.

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