TURKISH JOURNAL OF EMERGENCY MEDICINE

Original Article

Access this article online

Quick Response Code:

Website: https://journals.lww.com/TJEM

DOI: 10.4103/tjem.tjem_231_25

Evaluation of patients who presented to the emergency department of a state hospital following the earthquakes centered in Kahramanmaraş/Pazarcık and Elbistan, Türkiye

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Abstract:

OBJECTIVE: This study aimed to analyze patients who presented to the emergency department of a state hospital following the devastating earthquakes of February 6, 2023, centered in Kahramanmaraş and to contribute updated evidence to the literature.

METHODS: In this retrospective study, data were collected on patients presenting to the emergency department between February 6 and 13, 2023. Variables included demographic characteristics, patterns of presentation, province of origin, time elapsed since the event, chief complaints, clinical findings, treatments administered in the emergency department and during hospitalization, and patient outcomes. Comparisons were made between traumatic and nontraumatic cases, as well as between patients who arrived walk-in and those transported by ambulance.

RESULTS: A total of 652 patients were evaluated. Of these, 58.6% were female, with a mean age of 30.87 ± 22.80 years. Most patients (84.2%) were discharged. The most frequent injury types were soft tissue injuries (31.7%), crush injuries (17.3%), and rhabdomyolysis (10.5%). Among patients admitted to the intensive care unit, 86.4% had traumatic injuries. Two-thirds (66.7%) of deceased patients were also traumatic cases. Ambulance transport was recorded in 24.8% of traumatic patients compared with 4.9% of nontraumatic patients. Notably, none of the traumatic patients transported by ambulance were discharged; 72.4% were hospitalized, 25% required intensive care, and 2.6% died.

CONCLUSION: Unlike previous studies that focused mainly on epicentral hospitals, this study provides novel insights by evaluating both traumatic and nontraumatic patient presentations in a nonepicentral, secondary-care hospital located far from the disaster zone. This perspective highlights the delayed but significant healthcare burden in peripheral hospitals, which has been largely overlooked in the literature.

Keywords:

Crush syndrome, earthquakes, Kahramanmaraş, patient transfer, rhabdomyolysis

Submitted: 27-06-2025
Revised: 16-10-2025
Accepted: 24-11-2025
Published: 03-04-2026

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Introduction

Natural disasters cause extensive damage worldwide, affecting numerous regions

How to cite this article: Alpaslan M, Baykan N, Ünlü F, Salt Ö, Koyuncu S. Evaluation of patients who presented to the emergency department of a state hospital following the earthquakes centered in Kahramanmaraş/Pazarcık and Elbistan, Türkiye. Turk J Emerg Med 2026;26:132-41.

Box-ED section

What is already known about this topic?

- Earthquakes cause large numbers of traumatic injuries, and most existing studies focus on early trauma care in epicentral hospitals. However, much less is known about the characteristics and timing of patients presenting to nonepicentral secondary-care hospitals.

What is the contradiction regarding this topic? Is it important for readers?

- Although disaster preparedness plans primarily target epicentral hospitals, the February 6, 2023, earthquakes showed that many patients also present to hospitals outside the disaster zone. This highlights an important gap: peripheral hospitals may also face substantial patient loads, emphasizing the need to include these centers in disaster planning.

How is this study structured?

- This retrospective study analyzed patients registered with the International Classification of Diseases code "X34: Earthquake Victim" in a nonepicentral secondary-care emergency department. Traumatic versus nontraumatic cases and ambulance versus walk-in presentations were compared, and logistic regression was used to identify the predictors of intensive care unit (ICU) admission and mortality.

What does this study tell us?

- In addition to trauma cases, a considerable number of nontraumatic patients presented to a peripheral hospital following the earthquakes. Ambulance arrivals were more severely ill, with higher ICU admission and mortality rates. These findings underscore that disaster preparedness must extend beyond epicentral centers and ensure that peripheral hospitals are equipped to manage both traumatic and nontraumatic cases.

and populations.[1] Such events disrupt daily life and routines, often exceeding the capacity of individuals and communities to repair the resulting damage with their own resources.[2] Among natural disasters, earthquakes are particularly destructive, exerting profound adverse effects on human life. In recent years, earthquakes have led to significant loss of life while also resulting in disabilities, missing persons, and displaced children.[3,4] Beyond fatalities and injuries, survivors who were forced to relocate or were unable to access healthcare services faced additional severe challenges.[5,6]

On February 6, 2023, two devastating earthquakes struck Türkiye. The first, with a magnitude of Mw 7.7, occurred at 4:17 a.m. local time in Pazarcık (Kahramanmaraş) at a depth of 8.6 km, followed by a second earthquake of Mw 7.6 at 1:24 p.m. in Elbistan (Kahramanmaraş) at a depth of 7 km.[7] The earthquakes were strongly felt across Kahramanmaraş, Hatay, Osmaniye, Adıyaman, Gaziantep, Şanlıurfa, Diyarbakır, Malatya, Adana, and neighboring provinces.[8]

Emergency departments are among the busiest and most critical hospital units during disasters. Physicians working in these settings must rapidly and accurately manage disaster planning, triage, diagnosis, and treatment. Predisaster planning is therefore crucial for minimizing morbidity and mortality. Moreover, systematic data collection, analysis, and evaluation after disasters play a vital role in preparedness for future emergencies.

Our study fills an important gap in the literature by simultaneously evaluating both traumatic and nontraumatic presentations, as well as ambulance and walk-in admissions, in a secondary-care hospital located far from the epicenter, thereby providing a unique contribution regarding the delayed yet substantial patient burden observed in peripheral centers.

Methods

Study design, data collection, and analysis

This retrospective study was conducted in the emergency department of a secondary-level state hospital between February 6 and 13, 2023. Data were collected on patients who presented following the earthquakes. Information was retrieved from the hospital's electronic database system and patient records and transferred to a standardized study form. Patients were identified through the International Classification of Diseases (ICD) diagnosis code X34: Earthquake Victim.

The variables analyzed included demographic characteristics, patterns of presentation, province of origin, time from earthquake to hospital admission, chief complaints, clinical findings, treatments administered in the emergency department and during hospitalization, and patient walk-ins. Data were derived from admission records, diagnostic tests and imaging, treatment protocols, consultation notes, and discharge summaries.

Patients were categorized into two groups according to admission type: traumatic and nontraumatic. They were further classified as either walk-in or ambulance-transported, based on electronic database records. Comparisons were made between traumatic and nontraumatic groups and between walk-in and ambulance groups. Clinical characteristics of hospitalized patients were analyzed. Dependent variables were mortality and intensive care unit (ICU) admission;

independent variables included age, sex, trauma status, and transfer status.

Inclusion and exclusion criteria

Eligible patients included all individuals registered with the ICD code X34 who presented to the adult, pediatric, or gynecological emergency departments during the study period. Patients from earthquake-affected provinces were included regardless of whether they had been trapped under rubble. Routine emergency patients not classified as earthquake victims were excluded. Only patients transferred from outside the province were evaluated. No distinction was made between patients brought by ambulance and those transported directly from the disaster scene. Mortality outcomes of patients transferred to other centers were not assessed. Given the retrospective design, analyses were limited to admission diagnoses and treatments documented in the electronic database. Patients with insufficient data were excluded [Figure 1].

Ethics committee approval

Ethical approval for this study was obtained from the Nevsehir Hacı Bektas Veli University Ethics Committee on April 19, 2023, with approval number 2023/5.

Statistical analysis

Statistical analyses were performed using SPSS Statistics for Windows, Version 22.0 (Armonk, NY, USA: IBM Corp. Software), released by IBM Corp. in 2023. The normality of variables was assessed visually (histograms and probability plots) and analytically (Shapiro–Wilk test). In descriptive analyses, mean and standard deviation were used for continuous variables that followed a normal distribution, whereas median and interquartile range (25%–75%) were used for variables that did not follow a normal distribution. Student's *t*-test was used to compare continuous variables that followed a normal distribution, whereas Mann–Whitney *U*-test was used to compare variables that did not follow a normal distribution. For the analysis of cross-tables created to compare categorical variables, Pearson Chi-square and Pearson's exact Chi-square analyses were used. The level of statistical significance was defined as $P < 0.05$ within a 95% confidence interval (CI). Penalized logistic regression analysis was performed to evaluate the association between predictors and outcomes. An L2 penalization with bootstrap resampling was applied to obtain approximate estimates. Results were reported as odds ratios (OR) with 95% (CI). $P < 0.05$ was considered statistically significant.

The multivariable penalized logistic regression model included age, sex, trauma status (traumatic vs. nontraumatic), and transfer status (ambulance vs. walk-in) as independent variables. Multicollinearity was assessed using variance inflation factors, all of which were <2, indicating no concerning collinearity. Model fit was evaluated through bootstrap-based resampling performance and concordance statistics, demonstrating acceptable model stability and discrimination.

Results

A total of 652 patients were included in the study. Of these, 58.6% were female, with a mean age of 30.87 ± 22.80 years. The largest proportion of patients belonged to the 19–65-year age group (54.4%). Most patients

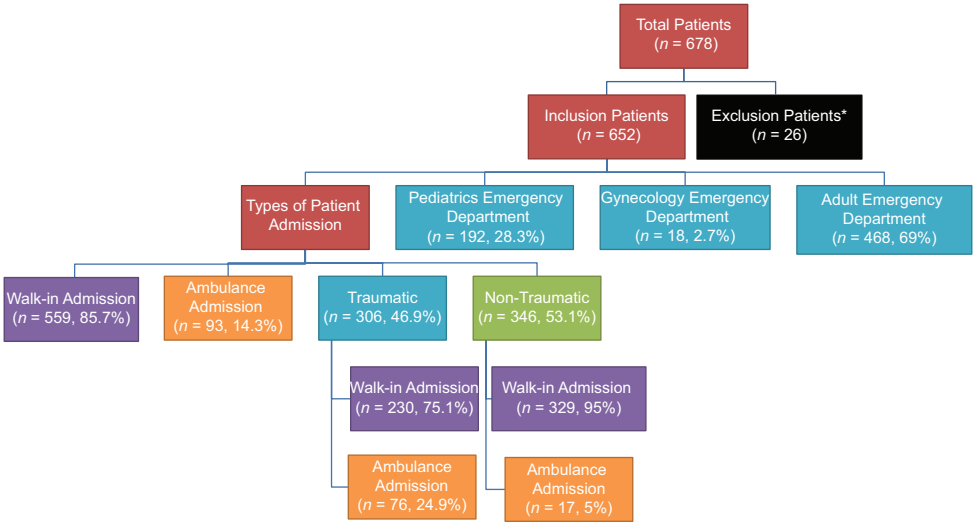

Figure 1: Patient inclusion and exclusion flowchart. *In the patient flow diagram, the total number of screened patients, the distribution of patients according to emergency department admission categories, the number of excluded patients (due to incomplete records or nonearthquake-related admissions), as well as the numbers of walk-in and ambulance arrivals and the counts of traumatic and nontraumatic cases are presented

(67%) presented to the hospital within 72 h of the event. The majority originated from the provinces of Kahramanmaraş (43.6%) and Hatay (28.2%). The most common reason for presentation was earthquake-related trauma (43.5%).

Radiological imaging was performed most frequently with X-rays (33.1%), while laboratory tests were obtained in 28.7% of patients. Symptomatic treatment was the most commonly administered intervention (42%). The majority of patients (84.2%) were discharged. General data of the study are given in Table 1.

When injury patterns were examined, the most frequent were soft tissue injuries (31.7%), crush injuries (17.3%), and rhabdomyolysis (10.5%). The orthopedic clinic received the highest number of consultations (26.7%), followed by internal medicine (23.7%). Surgical interventions were required in 34.6% of patients, and 16.3% underwent hemodialysis. Hospitalization was most frequently between 0 and 10 days (54.2%). The details of injury types, consultation rates, inpatient treatments, and length of stay are presented in Table 2. Pathological findings among hospitalized and deceased patients are shown in Figure 2. The most common findings in hospitalized patients were crush injuries (57.1%) and rhabdomyolysis (30.6%). Among deceased patients, two had crush injuries and rhabdomyolysis, while one died from intra-abdominal injuries.

Table 1 categorizes patients into traumatic and nontraumatic groups, with comparative *P* values presented. Traumatic patients most frequently presented between 49 and 72 h (71.5%), whereas nontraumatic patients most often presented after 72 h (65%). Of those discharged, 59.6% were nontraumatic. Among ICU admissions, 86.4% were traumatic, and two-thirds (66.7%) of deceased patients were traumatic cases.

Table 3 compares patients presenting as walk-ins versus those arriving by ambulance. Ambulance transport accounted for 14.2% of presentations, most commonly between 49 and 72 h (30.8%). In contrast, walk-in presentations comprised 85.7% and peaked after 72 h (93.5%). Traumatic presentations significantly increased between 49 and 72 h, whereas nontraumatic presentations predominated after 72 h ($P = 0.000$). Among traumatic cases, 24.8% arrived by ambulance compared with 4.9% of nontraumatic cases. The walk-in presentation rate was 75.2% in traumatic patients and 95.1% in nontraumatic patients. All discharged patients were walk-ins. Notably, 88.2% of hospitalized patients and 100% of ICU patients arrived by ambulance. Length of hospital stay was significantly longer in ambulance-transported patients ($P = 0.000$).

For traumatic patients presenting as walk-ins, the discharge rate was 96.5%, the hospitalization rate was 3.5%, and no deaths were recorded. In contrast, among traumatic patients transported by ambulance, no discharges occurred; 72.4% were hospitalized, 25% required ICU admission, and 2.6% died. A statistically significant difference in outcomes was

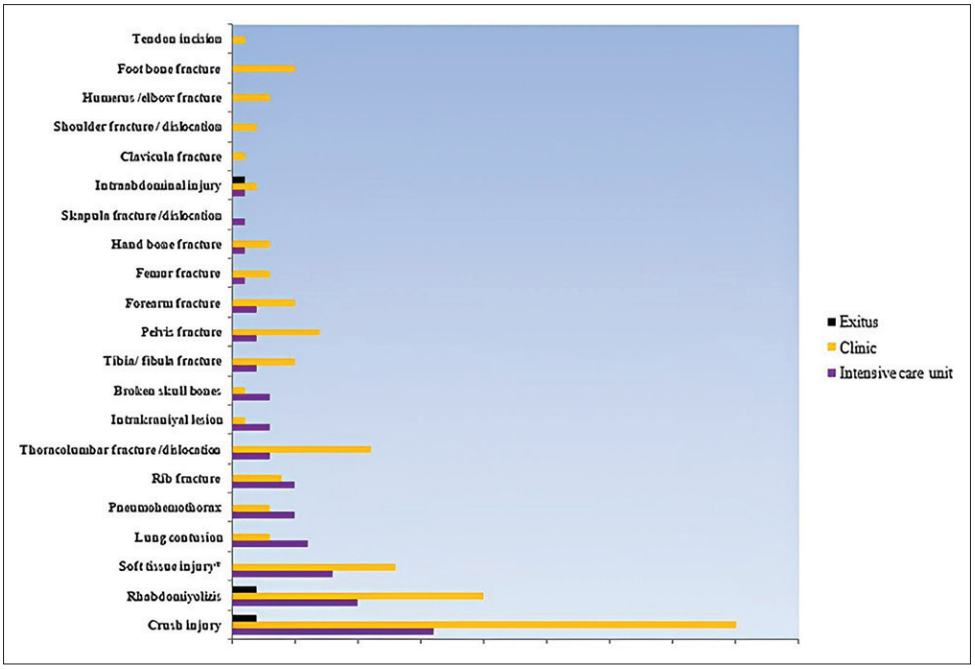

Figure 2: Distribution of pathological findings observed in patients admitted to intensive care unit and clinics and distribution of clinical findings observed in patients who died in hospital. *Burn, skin incision, edema, hematoma, tissue abrasion, etc

Table 1: Comparison of the general data of the study with the data of traumatic and nontraumatic patients

Data	Nontrauma, *n* (%)	Trauma, *n* (%)	Total*, *n* (%)	*P*	Statistical test
Gender					
Male	127 (47.1)	143 (52.9)	270 (41.4)	0.006	χ^2=6.729
Female	219 (57.4)	163 (42.6)	382 (58.6)		
Age (mean±SD)	21.35±17.80	28.54±16.42	30.87±22.80	0.000	*t*=–4.257, df (406)
Age range					
<18	179 (77.5)	52 (22.5)	231 (35.4)	0.000	χ^2=89.025
19–65	221 (62.5)	134 (37.5)	355 (54.4)		
>65	33 (50)	33 (50)	66 (10.2)		
Time of admission (hour)**					
0–24	0	12 (100)	12 (2)	0.000	χ^2=80.489
25–48	25 (34.2)	48 (65.8)	73 (11.1)		
49–72	37 (28.5)	93 (71.5)	130 (19.9)		
>72	284 (65)	153 (35)	437 (67)		
City of origin and distance to study center (km)***					
Kahramanmaraş (334)	172 (60.6)	112 (39.4)	284 (43.6)	0.000	χ^2=47.824
Hatay (483)	63 (34.2)	121 (65.8)	184 (28.2)		
Malatya (417)	47 (73.4)	17 (26.6)	64 (9.8)		
Adıyaman (454)	17 (50)	17 (50)	34 (5.2)		
Adana (282)	13 (59.1)	9 (40.9)	22 (3.4)		
Gaziantep (475)	17 (54.8)	14 (45.2)	31 (4.8)		
Şanlıurfa (617)	5 (83.3)	1 (16.7)	6 (0.9)		
Osmaniye (348)	7 (43.8)	9 (56.2)	16 (2.5)		
Kayseri (77)	4 (57.1)	3 (42.9)	7 (1.1)		
Another (-)	1 (25)	3 (75)	4 (0.5)		
Clinics/Symptoms/Application					
Exposure to trauma during an earthquake****	0	284 (100)	284 (43.5)	0.000	χ^2=652.000
Common cold	197 (100)	0	197 (30.2)		
Gastroenteritis	61 (100)	0	61 (9.4)		
Headache or dizziness	24 (100)	0	24 (3.6)		
Chest pain	16 (100)	0	16 (3.4)		
Depressive symptoms	15 (100)	0	15 (2.3)		
Shortness of breath	14 (100)	0	14 (2.1)		
Prescription request	12 (100)	0	12 (1.7)		
Inter-institutional patient transfer	0	9 (100)	9 (1.3)		
Follow-up after surgery	0	8 (100)	8 (1)		
Allergy	7 (100)	0	7 (1)		
Traffic accidents	0	5 (100)	5 (0.5)		
Type of examination*					
X ray	16 (7.4)	200 (92.6)	216 (33.1)	0.000	χ^2=270.387
Computerized tomography	22 (18.5)	97 (81.5)	119 (18.3)	0.000	χ^2=69.890
Ultrasound	1 (33.3)	2 (66.7)	3 (0.5)	0.603	χ^2=0.471
Laboratory	69 (36.9)	118 (63.1)	187 (28.7)	0.000	χ^2=27.524
Treatments in emergency department*					
Symptomatic treatment	158 (57.7)	116 (42.3)	274 (42)	0.027	χ^2=4.010
Fluid therapy	81 (46)	95 (54)	176 (27)	0.018	χ^2=4.804
Splint/plaster	0	59 (100)	59 (9)	0.000	χ^2=73.550
Wound care	0	55 (100)	55 (8.4)	0.000	χ^2=67.919
Bore reduction	0	20 (100)	20 (3.1)	0.000	χ^2=23.330
Tetanus vaccine	0	21 (100)	21 (3.2)	0.000	χ^2=24.535
Incision suture	0	9 (100)	9 (1.4)	0.001	χ^2=10.319
Intubation	1 (33.3)	2 (66.7)	3 (0.5)	0.603	χ^2=0.471
Cardiopulmonary resuscitation	1 (50)	1 (50)	2 (0.3)	0.931	χ^2=0.008
Results in the emergency department					

Contd...

Table 1: Contd...

Data	Nontrauma, *n* (%)	Trauma, *n* (%)	Total*, *n* (%)	*P*	Statistical test
Discharge	327 (59.6)	222 (40.4)	549 (84.2)	0.000	χ^2=62.147
Admission to the clinic	14 (18.4)	62 (81.6)	76 (11.7)		
Intensive care admission	3 (13.6)	19 (86.4)	22 (3.3)		
Referral to another center	1 (100)	0	1 (0.2)		
Treatment rejection	0	1 (100)	1 (0.2)		
Exitus	1 (33.7)	2 (66.7)	3 (0.4)		
Total	346 (53.1)	306 (46.9)	652 (100)		

*The percentages within the total number of patients are given according to the total number. Since more than one procedure can be performed on a patient, percentage rates are given according to the total number of patients, **This is the time between the time of the incident and the transfer of the patient to the center where the study was conducted, ***The distance of provinces from the center where the study was conducted is based on the kilometer value and was taken as the shortest road distance recommended by Google Maps, ****Consists of patients who were exposed to direct trauma such as falls, objects falling on them, tissue abrasions and cuts, and burns and who were rescued from under rubble during the earthquake

observed between walk-in and ambulance-transported patients (P = 0.000).

Regression analysis was performed on the data of deceased patients. According to the results, age was not found to have a significant effect on mortality (OR = 0.98, 95% CI: 0.72–1.01, P = 0.798). Similarly, gender was not significantly associated with mortality (OR = 0.68, 95% CI: 0.32–1.79, P = 0.387). Trauma was also not statistically significant in the model (OR = 1.00, 95% CI: 1.00–1.00, P = 0.958). In contrast, the transfer variable showed a strong and statistically significant association with mortality. Patients who presented by ambulance had approximately 5.3 times higher risk of mortality compared to those who were not transferred (OR = 5.32, 95% CI: 2.05–12.14, P = 0.001).

Regression analysis of patients admitted to ICU was performed, and the results indicated that age was not significantly associated with ICU admission (OR = 1.02, 95% CI: 0.99–1.04, P = 0.177). Gender was also not significant (OR = 0.81, 95% CI: 0.37–1.72, P = 0.582). The trauma variable (traumatic/nontraumatic) did not show statistical significance in the model (OR = 1.00, 95% CI: 1.00–1.00, P = 0.704). In contrast, transfer was strongly and significantly associated with ICU admission. Patients who presented by ambulance had nearly 35 times higher risk of ICU admission compared to those without transfer (OR = 35.28, 95% CI: 21.95–51.39, P = 0.000).

On the other hand, one patient developed pulmonary embolism due to prolonged immobility in a car after the earthquake. Two of the deceased patients died in the emergency department, and one died in the ICU. All three deceased patients were being treated for crush syndrome. Among hospitalized patients, one patient had arterial embolism, one had deep vein thrombosis, and one had a ruptured aortic aneurysm. A patient with thoracolumbar fractures developed paraplegia during their hospital stay.

Discussion

Throughout history, the first line of assistance for disaster victims has typically been provided by neighboring communities.[7,8] Following the earthquake in Türkiye on February 6, 2023, injured individuals were transferred to various provinces via ground and air ambulances. Transfers were made not only to nearby provinces such as Mersin and Diyarbakır but also to major metropolitan hospitals in Ankara, Istanbul, and Izmir through air ambulance services.[8] These referral centers thus functioned as pivotal nodes in the emergency response system, managing trauma-related emergencies.[9-12] The large-scale transfer of patients to central cities underscores both the widespread impact of earthquakes and the need for more comprehensive mass-casualty evacuation and treatment strategies.[13]

Patterns of hospital admissions after earthquakes differ in terms of timing, reasons for presentation, and distribution of workload. Eyler *et al*. observed that patient admissions peaked during the first 24 h after the October 30, 2020, İzmir earthquake, while Dursun *et al*. reported a similar trend following the October 23, 2011, Van earthquake.[14,15] Conversely, Asfuroğlu *et al*., analyzing admissions within the first 10 days of the February 6, 2023, Kahramanmaraş earthquake, reported the highest patient influx between 24 and 72 h.[16] In our study, however, most admissions occurred after 72 h. Unlike epicentral studies, this delay likely reflects the distance of our center from the epicenter (334 km), transportation disruptions, and organized referral chains. These findings highlight the importance of incorporating delayed yet substantial patient waves into disaster preparedness for hospitals in peripheral regions.

While earthquakes cause immediate fatalities, survivors trapped under rubble may succumb days or weeks later due to dehydration, hypothermia, hyperthermia, crush syndrome, infection, or sepsis.[17] Notably, the distribution of nontraumatic presentations alongside traumatic cases merits attention. However, previous reports emphasize traumatic injuries such as crush syndrome, extremity fractures, and rhabdomyolysis as predominant.[14,18,19] In our cohort, 53% of admissions were nontraumatic, including upper respiratory tract infections, gastroenteritis, and exacerbations of chronic

Table 2: Analysis of the types of injuries seen in patients, emergency department consultations, and hospital stay and treatment of inpatients

Data	Number of patients (*n*)	Ratio (%)*
Consequences of injury		
Soft tissue injury**	97	31.7
Crush injury	50	17.3
Rhabdomyolysis	32	10.5
Thoracolumbar fracture/dislocation	18	6.1
Foot bone fracture	17	6.1
Rib fracture	11	3.9
Forearm fracture	11	3.9
Broken skull bones	3	1.1
Intracranial lesion	4	1.2
Cervical fracture/dislocation	2	0.6
Lung contusion	9	2.5
Pneumohemothorax	8	2.4
Intra-abdominal injury	4	1.2
Clavicle fracture	1	0.3
Scapula fracture/dislocation	2	0.6
Shoulder fracture/dislocation	6	1.8
Humerus/elbow fracture	4	1.2
Hand bone fracture	5	1.2
Pelvis fracture	9	2.5
Femur fracture	4	1.2
Tibia/fibula fracture	8	2.4
Tendon injury	1	0.3
Consultation clinics		
Orthopedics	43	26.7
Internal medicine	38	23.7
Thoracic surgery	14	8.8
Brain and nerve surgery	23	14.3
Pediatrics	18	11.1
General surgery	2	1.2
Urology	1	0.6
Infection medicine	6	3.7
Cardiology	2	1.2
Chest disease medicine	9	5.6
Gynecology	2	1.2
Cardiac surgery	3	1.9
Results in the emergency department		
Discharge	549	84.2
Admission to the clinic	76	11.7
Intensive care admission	22	3.3
Referral to another center	1	0.2
Treatment rejection	1	0.2
Exitus	3	0.4
Treatments in hospital*		
Treatment in intensive care and follow-up	22	22.4
Hemodialysis	16	16.3
Surgical operation	34	34.6
Treatment in clinic and follow-up	55	56.1
In hospital stay time (day)*		
0–10	53	54.2
11–20	18	18.3
21–30	10	10.2
>30	17	17.3

*The rates for traumatic injuries are based on 306 patients with traumatic injuries, the consultation rates are based on 161 patients who underwent consultation, and the treatment types and length of hospital stay are based on 98 patients who were admitted to the hospital. Since more than one procedure can be performed on a patient, percentage rates are given according to 98 patients, **Burn, skin incision, edema, hematoma, tissue abrasion, etc.

illnesses. Similarly, Naghii and Nola noted that chronic diseases, infections, and psychosocial problems are common in the aftermath of disasters.[20,21] These findings stress the necessity for secondary hospitals to prepare not only for trauma care but also for medical and psychosocial support.

Extremity injuries have consistently been reported as the most frequent trauma among earthquake survivors. Sarı *et al*. identified extremity trauma as the leading injury type after the February 6 earthquakes.[18] Following the Van earthquake, fractures were documented in 144 of 285 patients with musculoskeletal injuries, with 81 requiring surgery – most involving the lower extremities.[19] Similarly, in the İzmir earthquake, soft tissue trauma and lower limb fractures predominated.[14] In the Gujarat earthquake, 51% of patients sustained orthopedic injuries.[22] Our findings align with this body of evidence.

A considerable proportion of our trauma patients developed rhabdomyolysis, with 84.6% requiring hemodialysis. Previous research underscores that crush syndrome and rhabdomyolysis are among the most common earthquake-related complications and that timely dialysis reduces mortality.[4,19] Our findings support the inclusion of dialysis preparedness as a core component of disaster planning. Key measures include expanding dialysis capacity in regional hospitals, stockpiling essential supplies, and establishing referral protocols in advance. Given the potential mortality benefit, early diagnosis and treatment should be coordinated through collaboration among disaster teams, clinicians, and emergency physicians.[19]

Access to care after disasters occurs either through patients arriving independently or via ambulance transport.[23] In our study, ambulance-transported patients had higher rates of intensive care admission (25%) and mortality (2.6%) compared to those who arrived independently. This suggests that the prehospital triage system was largely effective in identifying critically ill patients, though further refinement of triage criteria remains necessary. Abu-Zidan *et al*. similarly emphasized that appropriate prehospital management of crush injuries reduces mortality.[23] Restricting long-distance transfers to patients requiring advanced care may therefore improve referral efficiency and optimize resource utilization in regional hospitals.

Most existing studies have concentrated on epicentral hospitals.[14-16,18,19] In contrast, our findings demonstrate that both traumatic and nontraumatic cases impose a significant burden on a secondary hospital located far from the epicenter. This underscores the need for national disaster management plans to extend beyond

Table 3: Comparison of data from patients who applied to the emergency department as walk-in and arrived by ambulance with general data

Data	Admission type		Total*, *n* (%)	*P*	Statistical test
	Walk-in, *n* (%)	Ambulance, *n* (%)			
Gender					
Male	223 (82.6)	47 (17.4)	270 (41.4)	0.068	χ^2=3.724
Female	336 (88)	46 (12)	382 (58.6)		
Age (mean±SD)	23.87±16.75	34.68±26.70	30.87±22.80	0.002	*t*=−4.178, df (462)
Age range					
<18	207 (89.6)	24 (10.4)	231 (35.4)	0.000	χ^2=16.781
19–65	306 (86.2)	49 (13.8)	355 (54.4)		
>65	46 (69.7)	20 (30.3)	66 (10.2)		
Time of admission (hour)**					
0–24	9 (75)	3 (25)	12 (2)	0.000	χ^2=67.188
25–48	51 (69.9)	22 (30.1)	73 (11.1)		
49–72	90 (69.2)	40 (30.8)	130 (19.9)		
>72	409 (93.5)	28 (6.5)	437 (67)		
City of origin and distance to study center (km)***					
Kahramanmaraş (334)	247 (87)	37 (13)	284 (43.6)	0.056	χ^2=16.580
Hatay (483)	150 (81.5)	34 (18.5)	184 (28.2)		
Malatya (417)	61 (95.3)	3 (4.7)	64 (9.8)		
Adıyaman (454)	32 (94.1)	2 (5.9)	34 (5.2)		
Adana (282)	16 (72.7)	6 (27.3)	22 (3.4)		
Gaziantep (475)	25 (80.6)	6 (19.4)	31 (4.8)		
Şanlıurfa (617)	6 (100)	0	6 (0.9)		
Osmaniye (348)	13 (81.3)	3 (18.7)	16 (2.5)		
Kayseri (77)	5 (71.4)	2 (28.6)	7 (1.1)		
Another (-)	4 (100)	0	4 (0.5)		
Patient classification					
Trauma	230 (75.2)	76 (24.8)	306 (46.9)	0.000	χ^2=52.708
Nontrauma	329 (95.1)	17 (4.9)	346 (53.1)		
Clinics/Symptoms/Application					
Exposure to trauma during an earthquake****	223 (78.5)	61 (21.5)	284 (43.4)	0.000	χ^2=207.324
Common cold	194 (98.5)	3 (1.5)	197 (30.1)		
Gastroenteritis	55 (90.2)	6 (9.8)	61 (9.3)		
Headache or dizziness	24 (100)	0 (100)	24 (3.6)		
Chest pain	15 (93.8)	1 (6.2)	16 (3.4)		
Depressive symptoms	15 (100)	0	15 (2.2)		
Shortness of breath	7 (50)	7 (50)	14 (2)		
Prescription request	12 (100)	0	12 (1.7)		
Inter-institutional patient transfer	2 (22.2)	7 (77.8)	9 (1.3)		
Follow-up after surgery	1 (12.5)	7 (87.5)	8 (1.1)		
Allergy	7 (100)	0	7 (1.1)		
Traffic accidents	4 (80)	1 (20)	5 (0.8)		
Results in the emergency department					
Discharge	549 (100)	0	549 (84.2)	0.000	χ^2=587.121
Admission to the clinic	9 (11.8)	67 (88.2)	76 (11.7)		
Intensive care admission	0	22 (100)	22 (3.3)		
Referral to another center	0	1 (100)	1 (0.2)		
Treatment rejection	1 (100)	0	1 (0.2)		
Exitus	0	3 (100)	3 (0.4)		
Treatments in hospital*					
Treatment in intensive care and follow-up	0	22 (100)	22 (22.4)	0.000	χ^2=162.770
Hemodialysis	1 (7.7)	12 (92.3)	13 (13.3)	0.000	χ^2=66.065
Surgical operation	1 (2.9)	33 (97.1)	34 (34.6)	0.000	χ^2=201.070
Treatment in clinic and follow-up	5 (9.1)	50 (90.9)	55 (56.1)	0.000	χ^2=288.541
In hospital stay time (days)*					

Contd...

Table 3: Contd...

Data	Admission type		Total*, *n* (%)	*P*	Statistical test
	Walk-in, *n* (%)	Ambulance, *n* (%)			
0–10	7 (13.2)	46 (86.8)	53 (54.2)	0.000	χ^2=546.517
11–20	1 (5.4)	17 (94.6)	18 (18.3)		
21–30	0	10 (100)	10 (10.2)		
>30	0	17 (100)	17 (17.3)		

*The percentages within the total number of patients are given according to the total number. The rates are based on 98 patients who were admitted to the hospital. Since more than one procedure can be performed on a patient, percentage rates are given according 98 patients, **This is the time between the time of the incident and the transfer of the patient to the center where the study was conducted, ***The distance of provinces from the center where the study was conducted is based on the kilometer value and was taken as the shortest road distance recommended by Google Maps, ****Consists of patients who were exposed to direct trauma such as falls, objects falling on them, tissue abrasions and cuts, and burns and who were rescued from under rubble during the earthquake

epicentral areas and incorporate secondary and tertiary hospitals in surrounding provinces.[13,24]

Previous studies examining earthquake-related hospital admissions have primarily focused on epicentral settings, where the immediate surge of trauma cases is most prominent. Studies by Eyler *et al*., Asfuroğlu *et al*., and Sarı *et al*. provide valuable insights into early presentations within disaster zones; however, they offer limited information regarding patient patterns in nonepicentral hospitals.[14,16,18] Unlike these epicentral analyses, our study addresses a critical gap by evaluating both traumatic and nontraumatic admissions, as well as walk-in and ambulance presentations, in a secondary-care hospital located far from the epicenter. This perspective adds a novel dimension to the literature by highlighting the delayed but substantial patient influx experienced by peripheral centers.

Based on our findings, several practical recommendations can be made for disaster preparedness in nonepicentral regions. First, dialysis capacity should be expanded or preplanned through regional coordination, given the high incidence of crush syndrome and rhabdomyolysis among transferred patients. Second, inter-provincial transfer protocols should be optimized to ensure that only patients requiring advanced care are transported long distances, thereby reducing delays and resource strain. Third, triage systems should be refined to better distinguish high-risk patients in peripheral settings, especially among those arriving by ambulance who demonstrated markedly higher ICU admission and mortality rates.

Conclusions

Previous studies on earthquake-related health care have predominantly focused on hospitals located in or near the epicenter, where the immediate burden of trauma cases is most pronounced. However, little is known about the patient profiles and healthcare demands in nonepicentral hospitals, which also play a critical role in disaster response. Our study addresses this gap by providing a comprehensive analysis of both traumatic and nontraumatic cases, ambulance and walk-in admissions, and their outcomes in a secondary-care hospital located 334 km away from the epicenter. By directly comparing our findings with reports from epicentral centers, this study highlights the delayed yet significant influx of patients to peripheral hospitals and underscores the importance of preparedness not only in epicentral regions but also in more distant healthcare facilities.

Limitations of the study

This study has several limitations. First, its single-center, retrospective design limits generalizability to all earthquake-affected regions. Second, data collection under disaster conditions may have been incomplete or inconsistent, introducing potential bias. Third, we could not evaluate postdischarge outcomes, such as long-term disability or mortality, due to a lack of follow-up data. Finally, the study only reflects patients who were able to access health care; individuals who never reached medical facilities were excluded, potentially underestimating overall morbidity and mortality. These limitations should be considered when interpreting the findings.

Author contributions statement

MA, NB, and FÜ: conceptualization, methodology, investigation, resources, data curation, and writing – original draft. ÖS and SK: conceptualization, methodology, investigation, resources, data curation, review and editing, and supervision. All authors approved the last version of the manuscript.

Conflicts of interest

None declared.

Ethical approval

Permission for the study was obtained from the Ethics Committee of Nevsehir Hacı Bektas Veli University (Date: 19.04.2023; no: 2023/5).

Funding

None.

References

1. Gülec Balbay E. Earthquake and lungs. Duzce Med J 2023;25:1-5.
2. Altun F. Economic and social impacts of disasters: An assessment of the example of turkey. Turk J Soc Work 2018;2:1-15.
3. D'Aloisio F, Vittorini P, Giuliani AR, Scatigna M, Del Papa J, Muselli M, *et al*. Hospitalization rates for respiratory diseases after L'Aquila earthquake. Int J Environ Res Public Health 2019;16:2109.
4. Bartels SA, VanRooyen MJ. Medical complications associated with earthquakes. Lancet 2012;379:748-57.
5. Robinson B, Alatas MF, Robertson A, Steer H. Natural disasters and the lung. Respirology 2011;16:386-95.

6. Kokai M, Fujii S, Shinfuku N, Edwards G. Natural disaster and mental health in Asia. Psychiatry Clin Neurosci 2004;58:110-6.
7. Yilmaz S. Transportation model utilized in the first week following the Kahramanmaraş earthquakes in Turkey – Transport health centers. Scand J Trauma Resusc Emerg Med 2023;31:40.
8. Yılmaz S, Karakayali O, Yilmaz S, Çetin M, Eroglu SE, Dikme O, *et al.* Emergency medicine association of turkey disaster committee summary of field observations of february 6th kahramanmaraş earthquakes. Prehosp Disaster Med 2023;38:415-8.
9. Yilmaz S. Strategic implementation of transportation networks following the February 6th Kahramanmaraş Earthquake: An observational analysis. Scand J Trauma Resusc Emerg Med 2023;31:66.
10. Buyurgan ÇS, Bozkurt Babuş S, Yarkaç A, Köse A, Usluer HO, Ayrık C, *et al*. Demographic and clinical characteristics of earthquake victims presented to the emergency department with and without crush injury upon the 2023 Kahramanmaraş (Turkey) earthquake. Prehosp Disaster Med 2023;38:707-15.
11. Özel M, Altintaş M, Tatliparmak AC, Yilmaz S, Ak R. The role of mangled extremity severity score in amputation triage in a transport health facility with catastrophic earthquake admissions. Injury 2023;54:111003.
12. Yılmaz S, Cetinkaya R, Ozel M, Tatliparmak AC, Ak R. Enhancing triage and management in earthquake-related injuries: The SAFE-QUAKE scoring system for predicting dialysis requirements. Prehosp Disaster Med 2023;38:716-24.
13. Gürü S, Zaman S, Karamercan MA. Emergency response and clinical insights from a non-epicenter hospital during the 2023 Turkey-syria earthquake: A retrospective analysis. Med Sci Monit 2023;29:e941226.
14. Eyler Y, Kılıc TY, Atilla OD, Berksoy E. Analysis of patients presenting to the emergency medicine clinics of tepecik training and research hospital, health sciences university, following the October 30, 2020 Izmir Earthquake. Anatol J Gen Med Res 2022;32:372-7.
15. Dursun R, Görmeli CA, Görmeli G. Evaluation of the patients in Van Training and research hospital following the 2011 van earthquake in turkey. Ulus Travma Acil Cerrahi Derg 2012;18:260-4.
16. Asfuroğlu ZM, Gökosmanoğulları SF, Colak M, Yilmaz C, Eskandari MM. The first 10 days after the february 6, 2023 earthquake disaster: Experience of an orthopedic clinic on the border of the disaster zone. Turk J Trauma Emerg Surg 2023;29:1191-8.
17. Ali I, Mir AA, Jabeen R, Ahmad M, Fazili A, Kaul RU, *et al.* Morbidity pattern and impact of rehabilitative services in Earth quake victims of kashmir, India. Int J Health Sci (Qassim) 2010;4:59-67.
18. Sarı H, Özel M, Akkoç MF, Şen A. First-week analysis after the turkey earthquakes: Demographic and clinical outcomes of victims. Prehosp Disaster Med 2023;38:294-300.
19. Gormeli G, Gormeli CA, Guner S, Ceylan MF, Dursun R. The Clinical profile of musculoskeletal injuries associated with the 2011 van earthquake in turkey. Joint Dis Surg 2012;23:68-71.
20. Naghii MR. Public health impact and medical consequences of earthquakes. Rev Panam Salud Publica 2005;18:216-21.
21. Nola IA. Earthquakes and the irenvironmental, medical and public health impacts. Salud Publica Me×2018;60:16-22.
22. Phalkey R, Reinhardt JD, Marx M. Injury epidemiology after the 2001 Gujarat earthquake in India: A retrospective analysis of injuries treated at a rural hospital in the Kutch district immediately after the disaster. Glob Health Action 2011;4:7196.
23. Abu-Zidan FM, Idris K, Cevik AA. Prehospital management of earthquake crush injuries: A collective review. Turk J Emerg Med 2023;23:199-210.
24. Yilmaz S, Tatliparmak AC, Karakayali O, Turk M, Uras N, Ipek M, *et al.* February 6(th), Kahramanmaraş earthquakes and the disaster management algorithm of adult emergency medicine in Turkey: An experience review. Turk J Emerg Med 2024;24:80-9.