ORIGINAL ARTICLE

Emergency department management after the 2020 Aegean Sea - Izmir earthquake

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ABSTRACT

BACKGROUND: This article aims to provide an up-to-date resource on disaster management by reporting about the destructive features of the earthquake that occurred on October 30, 2020, and about the hospital and emergency service organization during a pandemic.

METHODS: This study was carried out with a multicentered, cross-sectional retrospective design on the victims of the 2020 Aegean Sea - Izmir earthquake. Local ethics committee approval was obtained. The data obtained by obtaining permission from two hospitals and ambulance services (transport data) located in the region where earthquake-related destruction was most prominent were evaluated. Patient data including demographic data, time of arrival to the emergency department, duration of stay under the debris, triage codes (green: not urgent, slightly injured; yellow: may be delayed, injured; red: critically injured; and black: dead), type of injuries, duration of stay in the emergency department, crush syndrome, rhabdomyolysis, need for invasive procedures (e.g., surgery and dialysis), intensive care admission, hospital admission, and discharge were evaluated.

RESULTS: In total, 313 patients (60.4% females) were included in the study according to the inclusion criteria. The mean age of the participants was 38.0±21.0 years, with the youngest being a 6-month-old baby and the oldest a 91-year-old individual. Approximately 41.5% of the earthquake victims presented to the emergency department within the first 3 h of the earthquake, and patients with yellow triage code were the most common in the 1st h. Further, 35.2% of the patients who were rescued from under the debris were discharged alive. Four patients were discharged alive after being rescued from under the debris 24 h following the earthquake, of whom three were rescued after >48 h (longest duration, 91 h). Further, 32 (15.9%) patients who survived upon presentation to the emergency department had rhabdomyolysis, 4 (1.9%) underwent hemodialysis in the emergency department due to acute renal failure, and 8 (3.8%) underwent other emergency operations such as fasciotomy and amputation. In total, 122 patients died and 191 patients were discharged from the hospitals. Furthermore, 139 patients were discharged from the emergency department, 15 were admitted to the intensive care unit, 41 were hospitalized in the relevant clinics, and 112 were directly transferred to the morgue following preliminary evaluation.

CONCLUSION: Emergency services should be ready in terms of accurate registration, correct data entry, correct triage assignment, sufficient resources, adequate team, sufficient equipment, and adequate treatment areas for disasters such as earthquakes. Further, adequate disaster trainings should be provided, feasible disaster relief plans should be prepared, and regular exercises should be conducted.

Keywords: Disaster; earthquake; emergency department.

INTRODUCTION

Disasters are situations that occur outside human control and cause massive loss of life and property. Due to the 2020 Aegean Sea earthquake, which occurred at 14:51 on October 30, 2020, people residing within its impact area experienced a second disaster at a time when the coronavirus disease 2019 (COVID-19) pandemic was resulting in a disastrous situation

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for emergency services and hospitals. The 6.9-moment magnitude (Mw) earthquake occurred 16.5 km below the ground in the Aegean Sea, 23 km away from Turkey's İzmir/Seferihisar coast and lasted for approximately 16 s.[1,2] The earthquake, which caused 119 deaths, including 117 in Turkey, Izmir, and 2 in Greece, and 1053 injuries, was recorded as the deadliest earthquake that occurred in 2020.[2]

We aimed to evaluate the destructive characteristics of the earthquake in Izmir and the responses of emergency departments and other hospital divisions of the closest hospitals where the injured and dead patients were brought. This article aims to provide an up-to-date source on emergency medical services and disaster management, which have been developing rapidly in the last two decades, by carefully collecting and analyzing all data related to the earthquake regarding measures that should be undertaken for emergency department management for future earthquakes.

MATERIALS AND METHODS

The present multicentered, cross-sectional, and retrospective study was conducted on the victims of the 2020 Aegean Sea - Izmir earthquake. Hospital and emergency department organization along with patient management reflexes were evaluated. All patients who were presented or brought to the emergency department after the earthquake were included. Rescuers who were injured during the search and rescue activities following the earthquake and other injuries and emergencies not related to the earthquake were excluded. The data obtained by obtaining permission from two hospitals and ambulance services (transport data) located in the region where earthquake-related destruction was most prominent were evaluated. The first center included in the study was an emergency department of a hospital with a capacity of approximately 2000 beds, with approximately 200,000 emergency patients per year. The second center was an emergency department of a 100-bed hospital with approximately 13,000 patients per year. Patient data including demographic data, time of arrival to the emergency department, duration of stay under the debris, triage codes (green: not urgent, slightly injured; yellow: may be delayed, injured; red: critically injured; and black: dead), type of injuries, duration of stay in the emergency department, crush syndrome, rhabdomyolysis, need for invasive procedures (e.g., surgery and dialysis), intensive care admission, hospital admission, and discharge were evaluated.

Local ethics committee approval (21-4T/39-01.04.21) was obtained. Throughout the study, the confidentiality of patient data was maintained and ethical principles of clinical studies were adhered to according to the Declaration of Helsinki.

Statistical Analysis

IBM SPSS Statistics 25.0 software was used for statistical analysis. Shapiro-Wilk (n<50) and Kolmogorov-Smirnov (n≥50) tests were used to examine normal distribution of the numerical variables. Numerical variables were presented as mean and standard deviation or median (minimum–maximum). Kruskal-Wallis test was used for non-normally distributed numerical variables. Bonferroni corrected Dunn's test was used for binary comparisons for significant results. Categorical variables were presented as numbers and percentages, and Chi-square test was performed for categorical variables. A significance level of 0.05 was considered for all hypotheses.

RESULTS

In total, 326 patients who were injured during the earthquake were evaluated; 13 individuals from the search and rescue and other volunteer aid teams presented to the emergency department with various injuries during rescue activities, but these patients were not included in the study as the injuries were post-earthquake. Consequently, 313 patients (60.4% female) were included in the study according to the inclusion criteria. The mean age of the participants was 38.0±21.0 years, with the youngest being a 6-month-old baby and the oldest a 91-year-old individual.

As a result of the earthquake, 215 (68.6%) individuals were taken to various centers via ambulances and many outpatients presented to such centers on their own. It was observed that 73.5% of the registered patients were transferred to the first center, 18.5% to the second center, and 8% to eight different centers in the same province.

Further, 41.5% (130) of the patients presented to the emergency department within the first 3 h. A review of the emergency medical service triage scores revealed that mostly patients with the yellow triage code presented during the 1st h and mostly patients with the black triage code were brought in after 24 h. A review of the patients rescued from under the debris revealed that 35.2% (66) of the patients were discharged alive, 55% (103) were entrapped for >24 h, and that the highest mortality rate was observed in the latter group (Table 1). Four patients were rescued from under the debris after 24 h, of whom three were rescued after >48 h (longest duration, 91 h). Upon evaluation according to injury types, it was found that the mortality rate was higher in compression/crushing injuries with open injuries compared to that in compression/crushing injuries without open injuries. The mortality rate of other types of injuries, such as injuries from falling down, crashes, or a falling object, while escaping from the earthquake, was much lower compared with that of other compression/crushing injuries (Table 2). According to the requests made for resources for diagnosis, computed tomography (CT) and laboratory examinations were more frequent during the 1st h (Table 3).

Rhabdomyolysis (indicated by serum creatine kinase [CK] level >5 times of the upper limit [>1000 U/L]) was observed in 15.9% (32) of the patients who survived upon presentation to

Table 1. Comparison of arrival time to the emergency department and triage classes

	Triage class				
	Red	Yellow	Green	Black	Total deaths/patient population
Arrival time to the emergency department, n (%)					
<3 h	20 (15.3)	88 (67.6)	18 (13.8)	4 (3.0)	12/130 (100)
3–6 h	3 (6.5)	29 (63.0)	9 (19.5)	5 (10.8)	5/46 (100)
6–24 h	7 (26.9)	8 (30.7)	5 (19.2)	6 (23.0)	7/26 (100)
>24 h	5 (4.5)	5 (4.5)	4 (3.6)	97 (87.3)	98/111 (100)
Total	35 (11.1)	130 (41.5)	36 (11.5)	112 (35.8)	122/313 (100)
Duration of stay under the debris, n (%)					
<3 h	11 (19.2)	40 (70.1)	0 (0)	6 (10.5)	12/57 (100)
3–6 h	2 (25.0)	3 (37.5)	0 (0)	3 (37.5)	3/8 (100)
6–24 h	7 (36.8)	6 (31.5)	0 (0)	6 (31.5)	7/19 (100)
>24 h	6 (5.8)	0 (0)	0 (0)	97 (94.1)	99/103 (100)
Not from under the debris	9 (7.1)	81 (64.2)	36 (28.5)	0 (0)	1/126 (100)
Total	35 (11.1)	130 (41.5)	36 (11.5)	112 (35.8)	122/313 (100)

Table 2. Comparison of injury type and triage class

			Injury type			
Triage class	n (%)	Alive/dead	Compression/ crushing (without open wounds) n (%)	Falls, crashes, injury while attempting to escape n (%)	Compression/ crushing (with open wounds) n (%)	Psychological traumas n (%)
Red	35 (11.1)	25/10	26 (15.9)	9 (7.4)	0 (0)	0 (0)
Yellow	130 (41.5)	130/0	47 (28.8)	78 (64.4)	4 (14.8)	1 (50)
Green	36 (11.5)	36/0	1 (0.6)	34 (28)	0 (0)	1 (50)
Black	112 (35.7)	0/112	89 (54.6)	0 (0)	23 (85.1)	0 (0)
Total	313 (100)	191/122	163 (100)	121 (100)	27 (100)	2 (100)
		Alive/Exitus	65/98	120/1	4/23	2/0

Table 3. Application of resources

Arrival time to the emergency department	Laboratory evaluation n (%)	X-ray n (%)	Computed tomography n (%)	Total n (%)
<3 h	59 (45.3)	38 (29.2)	60 (46.1)	130 (100)
3–6 h	6 (13.0)	12 (26.0)	9 (19.5)	46 (100)
6–24 h	12 (46.1)	2 (7.6)	13 (50)	26 (100)
>24 h	5 (4.5)	7 (6.3)	5 (4.5)	111 (100)
Total	82 (26.1)	59 (18.8)	87 (27.7)	313 (100)

the emergency department. In addition, four (1.9%) patients received hemodialysis at the emergency department due to acute renal failure (ARF), and eight (3.8%) underwent other emergency operations such as fasciotomy and amputation. The patients who underwent fasciotomy were those with a long period of being trapped in the wreckage. Lower extremity amputation was performed in one patient, lower extremity fasciotomy was performed in 6 patients, and upper extremity fasciotomy was performed in 1 patient. Three of the patients who underwent fasciotomy died.

A total of 122 patients died at the scene, before and after presenting to the hospital, and 191 patients were discharged from the hospitals. The mean duration of stay in the emergency department was 1.84±3.04 h. Further, 139 patients were discharged from the emergency department, 15 were admitted to intensive care unit, 41 were hospitalized in relevant clinics, and 112 were directly transferred to the morgue following preliminary evaluation. Moreover, six patients died in the emergency department and four died in the intensive care unit. When 10 patients who died were examined, nine were under the age of 65. Deaths were thought to be due to severe traumatic brain injury in 4 patients, open fractures of the lower extremities, multiple displaced fractures, arterial injuries, and crush syndrome and multi-organ failure in 4 patients, pelvis fracture and crush syndrome in one patient, and cervical dislocation in one patient.

More than 500 buildings were heavily damaged in the Izmir earthquake. Nevertheless, most deaths occurred upon the demolition of nine proximally located multi-storey buildings.

DISCUSSION

As the duration of stay under the debris increases in disasters such as earthquakes, saving the victims alive is considered a miracle. Although not based on extensive research, the "rule of four" states that a person can withstand stuffiness for up to 4 min, thirst for up to 4 days, and no food for up to 4 weeks and that the first 48 h are the golden hours, especially for the rescuers.[3] The severity of destruction was also not taken into account. In our study, although some patients were discharged alive upon being rescued from under the debris 91 h after the earthquake, the mortality rate (96.1%) of patients who were under the debris for >24 h was almost 4 times the mortality rate (26.1%) of patients who were under the debris for <24 h.

Studies have reported that international search and rescue teams made a significant contribution to the lives saved, but their arrival at the scene was late.[4] We suggest that the number of patients rescued in the 1st h after the earthquake is directly proportional to the professional search and rescue teams that reach the scene quickly and the number and equipment of the teams able to provide emergency medical care. Approximately 20,000 people died in the 7.4-Mw Marmara earthquake that occurred in Turkey in 1999.[5] Arama Kurtarma Derneği (Search and Rescue Association), which was founded by volunteers 3 years before the earthquake, worked with 150 volunteers and saved more than 200 people.[6] However, the numbers of national professional search and rescue teams, technical equipment, and emergency medical care services were not at today's level. An article on the role of international rescue teams in 14 earthquakes between 1985 and 2015 states that the highest number of live rescues performed by international teams was 0.85% (144) in the Marmara earthquake.[4] Nevertheless, we suggest that the mortality rate of the injured, who might have had a chance to survive if rescued in the 1st h, was increased due to the fact that the number of destroyed buildings was high and there was a scarcity of search and rescue teams and equipment. In the same study, it is suggested that investing in equipment and training of local teams in high-risk areas for earthquake can save more lives.[4] Ulusal Medikal Kurtarma Ekibi (National Medical Rescue Team) was founded in 2003 in Turkey, with an aim to undertake prompt medical intervention and rescue activities for victims via appropriate methods using their capabilities based on special training and equipment against disasters or extraordinary situations.[7] Further, Afet ve Acil Durum Yönetimi Başkanlığı (Disaster and Emergency Management Presidency) was founded in Turkey in 2009 based on the need to redefine the authorities and responsibilities of institutions that need to be coordinated during disasters with an aim to combine the authorities and coordination under the roof of a single institution.[8] In 2011, 604 people died in the 7.2-Mw earthquake in Van, Turkey.[9,10] The more experienced and prepared national search and rescue organizations and developing emergency medical care services, compared to those available during the Marmara earthquake, resulted in a significantly higher number of rescued patients. Another important advantage was that the earthquake zone in Van was more rural and thus the number of multi-storey buildings was limited. As of 2020, upon the news of the earthquake, hundreds of organized national search and rescue and emergency medical care teams from all over Turkey, primarily the closest units, came to the scene with ready technical equipment. Interestingly, the Izmir earthquake displayed its destructive effect on older high-rise buildings that were built on bad ground in the local area. The majority of dead people and survivors were rescued from nine proximally located buildings. It was very important that the hospitals included in the study, which were very close to these destroyed buildings during the earthquake, were not damaged and could continue their operation.

In addition, it is possible to say that the resources of the ambulance system are not exceeded in the intervention to the limited number of patients due to the limited demolition. The best example of this is mass causality,[11] while many of the patients who applied to the emergency services as walking wounded patients were included in the disaster medicine literature, while only 13% of the patients who applied to the emergency departments of our 2 hospitals in the first 3 h of the Izmir earthquake were walking. It was determined as wounded and most of these patients were transported by ambulance.

It was reported that during the 7.3-Mw earthquake that occurred in Kermanshah, Iran in 2017, with a death toll of 620, all health centers within a radius of 75 km from the earthquake epicenter were destroyed.[12] Such a situation would have a negative impact on the entire medical rescue chain. Such a situation is a current example that negatively affects the entire medical rescue chain and that the injured cannot be transported to health institutions with appropriate triage and methods.

Although most of the buildings destroyed during the 6.0-Mw Afyon Sultandağı earthquake that occurred in 2002 were single-storey buildings and the earthquake was not very destructive, there were still 39 deaths.[13] In the Izmir earthquake, the majority of destruction and deaths occurred after the collapse of nine proximally located multi-storey buildings built on bad ground. The common point in both earthquakes was that the structures were not durable. Therefore, any precaution to be taken to protect against earthquakes is more important than post-earthquake medical practices.

The most important challenges for emergency services in disaster situations such as earthquakes include correct identification, accurate data entry, correct triage assignment, sufficient resources, adequate team, sufficient equipment, and adequate treatment area. In disasters such as earthquakes, identification in the emergency department can become a very serious problem, especially as the number of seriously injured and dead patients who cannot be identified increases. Such problem occurred with anonymous dead patients, who were recovered from under the debris. Since the names of these patients were not available, the name of the collapsed building and the patient's appearance attributes were recorded, followed by identification by their relatives. To prevent confusion in entering patient IDs, sex was indicated and a number was assigned to each patient, and their attributes were recorded in the electronic file system. After that, the identified names and the file names were matched. Following the Marmara earthquake, there were difficulties in maintaining records of the injured patients who presented to the emergency department, especially in the 1st h of earthquake when the patient flow was high; the patient records were either incomplete or not maintained at all.[5] It is difficult to record the data of multiple patients simultaneously while ensuring the completeness of the data records. In our study, the problems related to multiple records and data entries were experienced to the minimum extent, thanks to the electronic patient file system, even in the center with the highest number of patients. Another problem was the necessity to assign an International Classification of Diseases (ICD) code distinctive from other emergency patients in order to examine the enrolled patients retrospectively. The code X34 (victim of earthquake) was assigned to all patients brought from the study centers in the beginning due to the earthquake in the first center. In this way, instant information and retrospective data evaluation were possible. While the codes related to injury were assigned at the second center, a distinctive ICD code such as X34 was not provided at the second center. Fortunately, there was no problem in retrospectively distinguishing earthquake patients as the referrals for other emergency room patients were few. In cases where there are mass applications such as disasters, we believe that it is important to include the ICD code related to the event, which is distinctive from other emergency applications, except for the ICD codes related to the injury.

Triage during disaster situations is different from normal triage. There is an ongoing debate on the various methods of triage and their accuracy at the time of disaster and there is no "gold standard" available in neither trauma nor disaster literature for deciding the correctness or appropriateness of mass casualty triage decisions.[14,15] A 5-category (red 1-2, yellow 1-2, and green) triage system is normally applied in Turkey. During the earthquake, the arrival of injured patients was managed using a triage classification according to a 4-color system (green, yellow, red, and black) based on our hospital's disaster plans.[16] Emergency department patient care areas were determined beforehand for these color triage codes, and patients were treated in relevant areas in accordance with the triage color. Studies have reported that the triage assignment done by a senior emergency medicine specialist is more accurate.[14] At the first center, the post-earthquake triage team included the most senior emergency medicine specialists, and no challenges were faced in terms of the accuracy of triage assignment. None of the patients assigned to the yellow and green triage codes were reassigned to the red triage area. The most senior emergency specialists evaluated each patient at entry and ensured that they were assigned to the appropriate area for the color code.

In this article, we have shared our experiences regarding emergency service triage system rather than field triage system. Similar to the practice in the Ashkenazi et al. article, we provided primary and secondary care for all patients by different medical teams in different areas of the emergency department after door triage.[17] In all of these examinations, we performed E-FAST with ultrasound in the first evaluation. These applications accelerated the patient diagnosis processes and shortened the hospitalization and operation time.

We observed that in the event of an earthquake (despite the density in the wards due to the pandemic), the monitoring of the pandemic patients in a separate area of the emergency department and the increase in the emergency service capacity due to the pandemic, and the decrease in the number of non-COVID-19 patients who applied to the emergency service are facilitating factors for creating free area for admission and acceptance of disaster victims who apply to the emergency service.

Emergency services should perform real-scale disaster drills at least once a year, with the participation of physicians, nurses and transport personnel, at the emergency service scale. And at these exercises there must be attended by other clinics and managers who may take part in the disaster.

Apart from this, emergency services should take into account the expected difficulties for different types of disasters, taking into account the hazard and vulnerability analysis made in the hospital, and manage the material and personnel resources with the planning of the surge capacity accordingly.

An operational and active communication network following an earthquake is very important. Telephone and internet signal disruptions experienced during the earthquakes in the past years were not experienced in this earthquake, thanks to the developing technological infrastructure. Applications such as Twitter, Facebook, Instagram, and WhatsApp enabled enhanced communication both from the scene and inside and outside the hospital. For example, in the first center, all physicians who were not on duty quickly came to the emergency department for support within approximately 20 min after the earthquake following the messages sent via WhatsApp groups.

Unless it was deemed absolutely necessary, no assays were requested considering the limited resources such as imaging and laboratory, anticipating a large number of patient inflow at the same time. Unlike other imaging resources, no access problems were experienced with bed-side ultrasonography devices owing to the adequate numbers of such devices, their use by multiple patients, their use in trauma patients as a part of the examination, and the speed of the procedure.[18] In the 1st h, CT and laboratory were the most frequently used resources for coding. It was difficult to perform dozens of CT scans at the same time, and accordingly, the scans were performed in the order of urgency based on the appropriate triage. Those who were evaluated as having fractures according to physical examination without requesting certain X-rays received plaster-splints, and examinations such as radiography and joint tomography were delayed in patients without circulation problems. Many patients were referred to the polyclinic and discharged without radiography. The total number of incoming patients, the number of patients presenting to the emergency department, and the extent of the disaster could not be predicted during the 1st h. It was presumed that the first victims to present to the hospital might not be the most serious patients, who would ultimately require extensive medical assistance. The patients who arrived first mostly had extremity injuries as a result of jumping from height, falling down while escaping from the earthquake, crashes, or a falling object. Such patients had lower mortality rates compared with those of patients with compression/crushing injuries.

Along with other trauma findings, crush syndrome was also evaluated in terms of rhabdomyolysis in patients who were stuck under the debris for >1 h. It has been reported that 639 (1.5%) of 43,953 patients who were brought to reference hospitals during the Marmara earthquake had findings of renal failure, and 477 of these patients (74.6%) required hemodialysis.[19] Another study reported that the rate of ARF induced by traumatic rhabdomyolysis was estimated to be 2.7%.[20] In our study, this rate was 1.9%. Rhabdomyolysis should definitely be considered besides other traumatic pathologies in patients with multitrauma in cases of earthquakes.

A threshold level of five times the upper limit of normal serum CK or approximately 1000 U/L is diagnostic.[21] In our study, rhabdomyolysis was diagnosed in 15.9% (32) of the patients who were alive when they came to the emergency services, and the CK level was more than 5 times the upper limit (>1000 U/L). In a meta-analysis, it was reported that there is a significant relationship between serum CK level and the risk of ARF due to crush syndrome.[22] Most studies show that patients who develop acute kidney injury have a longer delay in receiving supportive treatment than patients who do not develop acute kidney injury.[23] In our study, hemodialysis was applied to 4 (1.9%) patients, these patients had CK values (>10,000U/L), but there was no significant difference between CK values when compared with other patients who were not on dialysis were found. It was observed that two of the patients remained under the wreckage for more than 24 h and two of them for a period of close to 24 h. Treatment of rhabdomyolysis includes emergency fasciotomy with initial IV fluid infusion of up to 1.5 L/hour and intravenous (IV) fluid rehydration with a target urine output of 300 mL/hour if the underlying cause is compartment syndrome. However, fluids can cause interstitial or pulmonary edema in anuric patients and should be used with caution. There is no randomized controlled trial evidence showing that sodium bicarbonate therapy provides additional benefit over aggressive fluid resuscitation alone in reducing acute kidney injury, need for dialysis, or death.[21]

In general, patients with a preliminary diagnosis of crush syndrome were given IV fluid and sodium bicarbonate for urine alkalization, and blood gas, urine output, kidney function tests and CK values were followed. In a retrospective analysis of 284 earthquake victim patients who died while in hospital, severe traumatic brain injury, multiple organ failure, old age (≥65 years), intensive care unit admission, crush syndrome, and heart/respiratory disease were determined as independent factors associated with death. severe traumatic brain injury was found to be the biggest risk factor for inpatient death.[24] In our study, except for age, other features were similar to the group of patients who died in the hospital.

The Izmir earthquake is not a typical disaster, in which the health system and emergency service capacity are exceeded, because of limited demolition. Being transported most patients to the emergency room by ambulance, being returned the emergency service to normal operation within the first 12 h, being taken to patients who need it to the surgery or intensive care unit without waiting, and being reached definitive treatment quickly, being not crowded the emergency room due to the pandemia makes it different. The absence of severe crushing and trauma findings, especially in pediatric patients rescued 24 h after the collapse, and the prevention of communication interruptions with WhatsApp and similar messaging programs are also important differences experienced in this disaster.

Conclusion

Prolonged time spent under the debris may reduce the likelihood of earthquake survivors being rescued alive. Although the prolongation of the time under the collapse reduces the probability of earthquake victims to be rescued alive, the survival of even those who remain under the collapse for a long time may constitute a recommendation in terms of keeping the duration of the rescue activities longer.

Hence, the 1st h after a devastating disaster like an earthquake are extremely important for search and rescue activities and emergency medicine services. In retrospect, Turkey and its environs are a geographic region where earthquakes have occurred frequently, and similar earthquakes will occur in the future. Therefore, all data related to actual earthquakes should be collected and analyzed in detail. Emergency services should be ready for correct identification, correct data entry, correct triage assignment, sufficient resources, adequate team, sufficient equipment, and adequate treatment areas for disasters such as earthquakes. Accordingly, adequate training on disasters should be provided, applicable disaster relief plans should be prepared, and regular exercises should be conducted. Finally, the increase in medical capacity (surge capacity) must be done in accordance with the risk and hazard/vulnerability analysis of the region and the hospital, and the increase in emergency service capacity must be determined in detail together with the hospital.

Ethics Committee Approval: This study was approved by the Ege University Faculty of Medicine Ethics Committee (Date: 01.04.2021, Decision No: 21-4T/39).

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ORİJİNAL ÇALIŞMA - *ÖZ*

2020 Ege Denizi - İzmir depremi sonrası acil servis yönetimi

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AMAÇ: 30 Ekim 2020'de meydana gelen depremin yıkıcı özellikleri ile hem hastane öncesi hem de pandemi yoğunluğu yaşayan hastane ve acil servis organizasyonu hakkında bildirim yaparak afet yönetimi konusunda güncel bir kaynak sağlamak için bu çalışma yapıldı.
GEREÇ VE YÖNTEM: Bu çalışma çok merkezli, kesitsel geriye dönük olarak 2020 Ege Denizi - İzmir depreminden etkilenen olgular üzerinde gerçekleşti. Deprem bölgesinde yer alan iki hastane ile ambulans servisi verileri değerlendirildi.
BULGULAR: Çalışmaya dahil edilme kriterlerine uygun 313 (%60.4'ü kadın) hasta alındı. En küçüğü altı aylık bebek, en büyüğü 91 yaşında olmak üzere çalışmaya katılanların yaş ortalaması 38.0±21.0 olarak saptandı. Depremden etkilenenlerin %41.5'inin ilk üç saat içinde acil servislere geldiği ve ilk saatlerde en fazla sarı triyaj kodlu hastaların olduğu saptandı. Göçük altından kurtarılan hastalar değerlendirildiğinde %35.2'si sağ olarak taburcu edildi. Göçük altından 24 saat sonra sağ kurtarılarak taburcu edilen toplam dört hasta (üçü 48 saatten fazla olmak üzere- en uzun göçük altında kalma süresi 91 saat) vardı. Acil servislere geldiğinde sağ olan hastaların 32'sinde (%15.9) rabdomiyoliz olduğu, dört (%1.9) hastaya akut böbrek yetersizliğine bağlı acil serviste hemodiyaliz yapıldığı, sekiz (%3.8) hastaya fasyotomi ve amputasyon gibi diğer acil operasyonlara alındığı saptandı. Olay yerinde, hastane öncesi ve hastane sonrası toplam 122 hastanın öldüğü 191 hastanın da hastanelerden taburcu edildiği saptandı. Acil servisten 139 hasta taburcu olduğu, 15 hastanın yoğun bakım yatışı, 41 hastaya servis yatışı verildiği 112 hastanın ilk değerlendirme sonrası doğrudan morglara alındığı saptandı. İzmir depreminde 500'den fazla bina ağır hasar aldı ancak ölümlerin çoğunluğu birbirine çok yakın lokalizasyonda olan çok katlı dokuz binanın yıkılması sonrası olduğu saptandı.
TARTIŞMA: Deprem gibi yıkıcı bir felaketin ardından yaşanılan ilk saatler, hem arama-kurtarma hem de acil tıp sistemi için çok önemlidir. Acil servisler deprem gibi afet durumları için doğru kayıt, doğru veri girişi, doğru triyaj, yeterli kaynak, yeterli ekip, yeterli ekipman sayısı ile yeterli tedavi alanları konusunda hazır olmalı, afet konusunda yeterli eğitim verilmeli, uygulanabilir afet yardım planları hazırlanmalı ve düzenli tatbikatlar yapılmalıdır.
Anahtar sözcükler: Acil servis; afet; deprem.

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