ORIGINAL ARTICLE

WORKLOAD AND RESPONSE İN PREHOSPİTAL EMERGENCY HEALTH SERVİCES

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ABSTRACT

Introduction/Objective In emergencies, it is crucial to avert preventable losses, get information as soon as possible, reach the scene quickly, and provide intervention by equipped and trained personnel. This study was conducted to analyse prehospital Emergency Health Services cases. **Methods:** This retrospective study examined 75.280 cases of people who called the Kayseri Emergency Health Services by dialling 112. The collected data include demographic characteristics, the reason for calling, the person who called, the arrival time, the diagnosis, the ambulance exit result, the names of hospitals where the cases were referred, etc., all collected on a form. Descriptive statistical methods were used for data analysis.
Results: It was determined that the emergency calls were mostly made between 10 am and 4 pm, and 57.3% of the transfers were made to the Training and Research Hospital. Internal medicine problems were the main reason for calling. According to the ambulance exit results, 66.7% of the cases resulted in hospital transfers.
Conclusions: The number of people calling emergency health services is increasing daily. Most callers were male, and the demand was highest during the daytime. More than half of the cases did not qualify as an emergency based on the international emergency parameters defined by the World Health Organization (WHO).
Keywords: prehospital, emergency health services, workload, response

INTRODUCTION

Accidents, injuries, and various medical emergencies are commonly encountered in Turkey, as well as unusual accidents and disasters. This is why it is imperative to have adequate organisation and implementation of Emergency Health Services (EHS) at the level of the entire country [1]. Ambulances are an essential component of EHS. Especially in trauma cases, emergency medical aid and resuscitation, ambulances play a pivotal role in transporting the patients [2]. Ambulances should be medically equipped to enable transporting patients who require resuscitation and immobilisation, thus preventing morbidity and mortality of patients as a complication of inadequate transport. Transporting patients in vehicles without the necessary medical equipment may result in irreparable damage [3].

In emergencies, it is crucial to avert preventable losses, to get information early, to arrive at the scene in the shortest possible time, and to provide intervention by equipped and trained personnel. In life-threatening emergencies such as cardiac arrest, airway obstruction, severe bleeding, and serious head, chest and abdominal trauma, short response and intervention times for ambulances are crucial [4]. Adequate medical emergency response coupled with rapid communication and safe transport increases the patient's chance for survival, shortens the time to hospitalisation, and prevents permanent health problems. Many studies have shown that non-lingering at the scene, rapid medical intervention and the efficient use of time during transport lead to increased survival rates and improved treatment results [5,6]. For trauma patients, the first hour following the injury is crucial for survival, and it is called "the golden hour". Immobilisation and resuscitation during this hour can significantly reduce mortality [7].

As far as the regulation of prehospital EHS is concerned, notable differences may exist in different cities, regions and countries. To address this, we conducted this study to analyse prehospital EHS workload and response.

METHODOLOGY

The study was conducted retrospectively. We analysed 75.280 cases of people who dialled the 112 number and asked for help from the Kayseri EHS between 01.01.2013 and 31.12.2013. The study included cases involving central ambulance teams, district ambulance teams, private hospital ambulance teams, and air ambulance teams affiliated with Kayseri Provincial Directorate of Health Emergency and Branch Directorate of Disaster Health Services.

The demographic data of the 75.280 cases who had called the EHS by dialling 112 were evaluated using the program called "Armakom – 112 Emergency Command Center" in the Information Processing Center of Kayseri Provincial Directorate of Health, Branch Directorate of Emergency and Disaster Health Services.

The researcher filled out the forms prepared for the cases included in the study. For each case, the following

data were recorded on the form: the age and gender of the

was made, the person who called, the ambulance team that was dispatched, the arrival time for the ambulance, the preliminary diagnosis, the outcome of the prehospital treatment, the name of the hospital to which the patient was transported and the compliance with the International Emergency Parameters determined by the World Health Organization (WHO).

Data Analysis

The data obtained from the study were grouped and analysed using the "sort and filter" application of

patient, the time the call was made, the reason the call

the Microsoft 2007 Excel program. Descriptive statistics (number, percentage) were used to analyse data.

RESULTS

In the study conducted to analyse the workload and response of the prehospital EHS in Kayseri province, 44.7% of the 75.280 callers were male, 42.5% were female, and 9.5% were evaluated as unknown gender since their identity information could not be obtained. 23.9% of the cases were older than 65 (**Figure 1**).
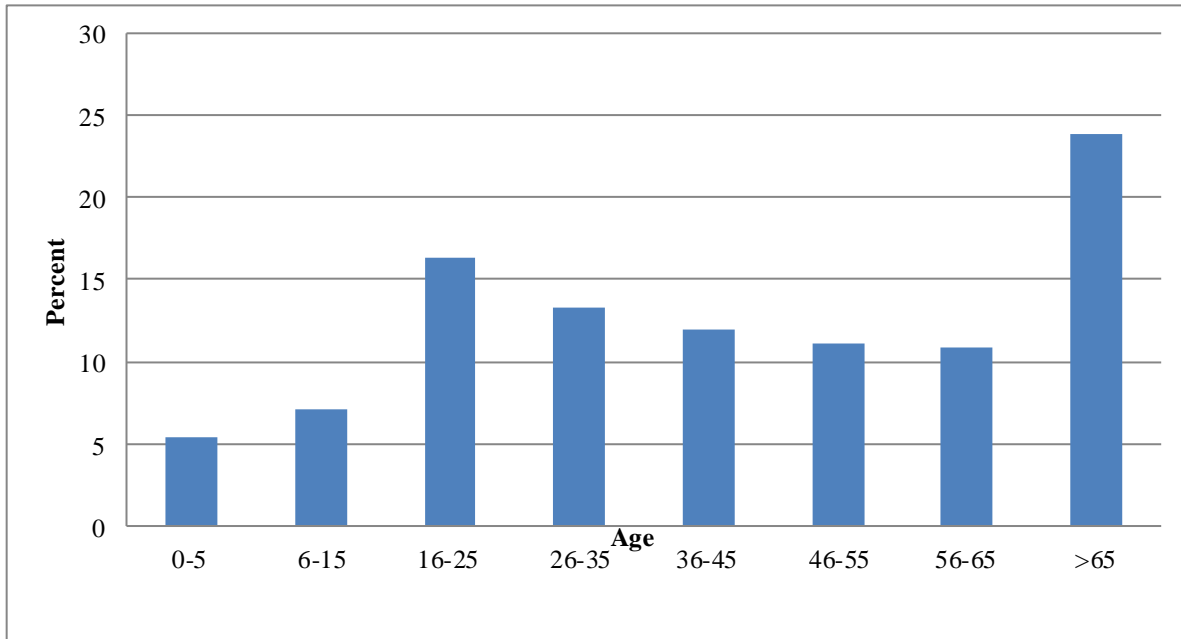

Figure 1. Distribution of 112 EHS cases based on their age groups (n = 75.280)

As for the calling times, 3983 (5.9%) calls were received between 1 pm and 2 pm, which makes it a time interval with the greatest number of calls. When calling times and gender were examined together, it turned out that men usually called between 2 pm and 3 pm (2003 calls), while women most commonly called between 11

am and 12 am (2025 calls). The time interval when the least number of patients called asking for help was between 5 am and 6 am (**Figure 2**).
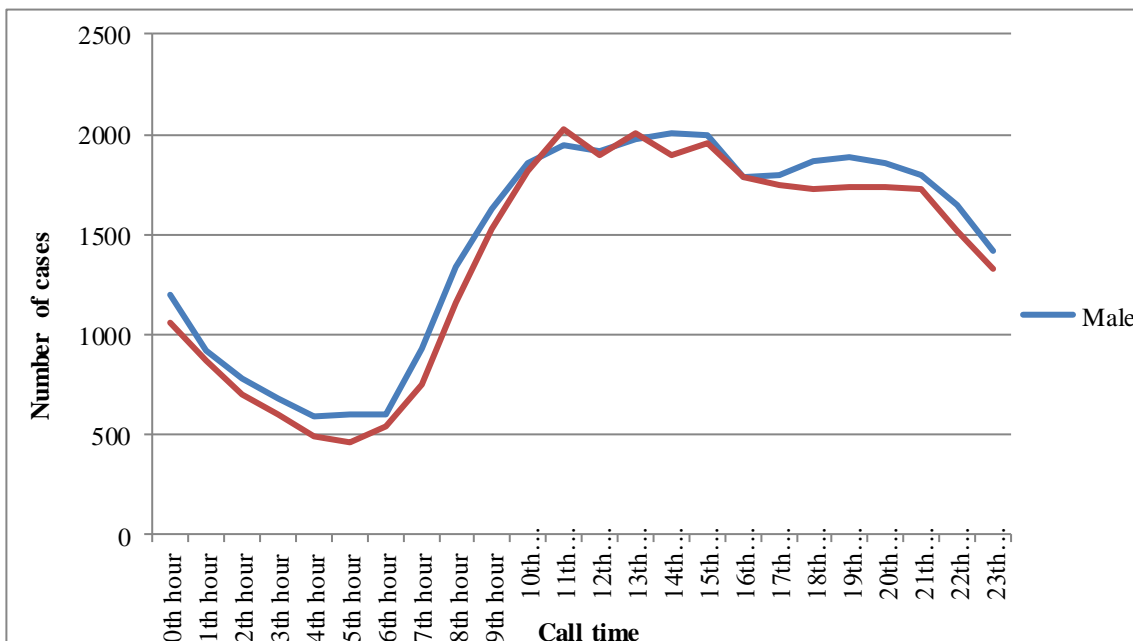

Figure 2. Distribution graph of 112 EHS cases by gender and time intervals (n = 75.280)

Regarding the reasons for calling, 7.1% of the calls reported traffic accidents, 1.5% reported suicides, 0.8% work-related accidents, 77.6% problems from the scope of internal medicine, 0.1% of the calls were made because they followed protocol, 2.9% reported injuries, 9.4% reported other accidents, 0.3% were health measures, and 0.4% were fire-related incidents. When the preliminary diagnoses were analysed, 33.7% of the cases were trauma-related, 21.0% were classified as cardiovascular system (CVS) diseases, 14.2% were psychiatric diseases, 12.7% were respiratory system diseases, 3.9% fell into the obstetrics group, 3.8% were gastrointestinal system (GIS) diseases, 3.6% were neurological diseases, 3.1% were genitourinary system (GUS) diseases, 1.6% were infectious diseases, 2.1% were metabolic diseases, and 0.3% were neonatal diseases.

Regarding hospital transfer, 76.5% (57.583) of all cases were transferred to a hospital. Of these, 57.3% were transferred to the Emergency Department at the Training and Research Hospital (TRH), 22.4% were transferred to the Emergency Department at the Erciyes University Hospitals (ERU), 10.3% were transferred to the Emergency Departments at private hospitals, and 10.0% were transferred to the Emergency Departments of district hospitals (**Figure 3**).
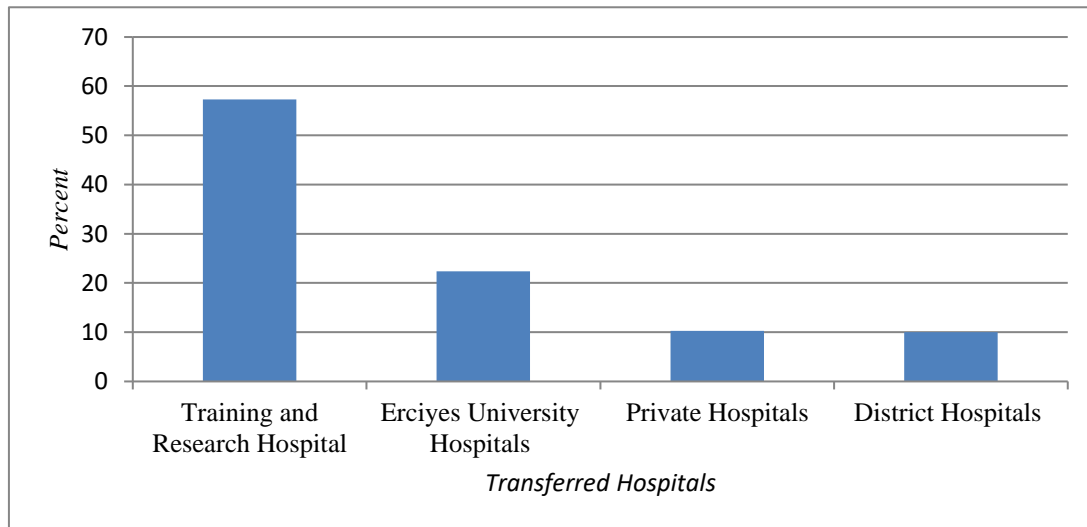

Figure 31. Distribution graph of 112 EHS cases according to the hospitals they were transferred to (n = 75.280)

We examined the ambulance exit results and concluded that 66.7% of all exits resulted in hospital transport and 15.0% in inter-hospital transport (**Table 1**).

Table 1. Number and rates of ambulance exit results of 112 EHS cases for 2013

Case Result	n	%
Transfer to hospital	47205	66.7
Transfer between hospitals	10586	15.0
Rejected transfer	5587	7.9
Mission Cancellation	2905	4.1
Transport by Another Vehicle	1110	1.6
Onsite Intervention	967	1.3
EX left in place	893	1.2
False notice	591	1.0
Waiting at the scene	300	0.4
Other locations	233	0.3
EX is transferred to the Morgue	125	0.2
Transfer home	84	0.1
Transport for medical examination	18	0.1

The evaluation of arrival times in urban and rural areas revealed that ambulances reached their patients in 0-10 minutes in 68.9% of urban and 64.0% of rural regions (**Figure 4**).
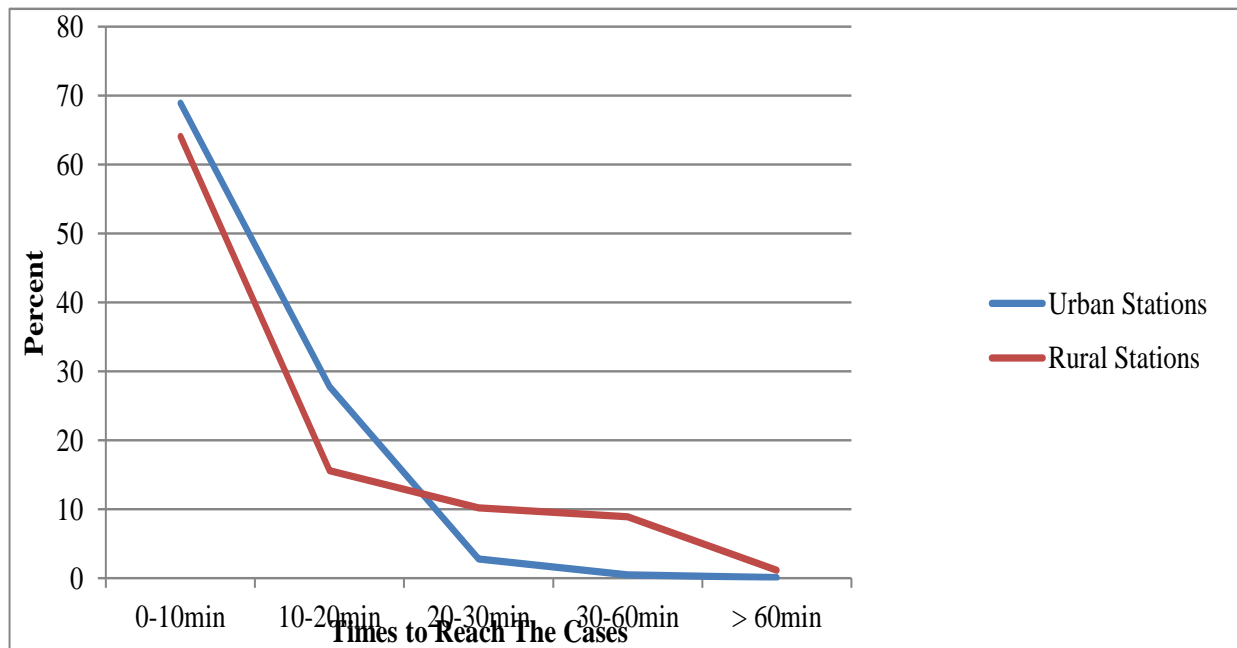
Figure 4. Time graph of 112 EHS stations in urban and rural regions   (n:75.280)

A helicopter ambulance was used in 0.2% (122) of the cases. When the arrival times of helicopter ambulances were evaluated, they were between 0-10 minutes for 25.4% of the cases, 10-20 minutes for 6.6%, 20-30 minutes for 13.9%, 30-60 minutes for 36.1%, and more than 60 minutes for 18.0%.

Upon evaluation of the person who dialled 112, the calls were made in 60.9% of the cases by the patients' relatives and in 19.9% of the cases by the patients themselves (**Figure 5**).
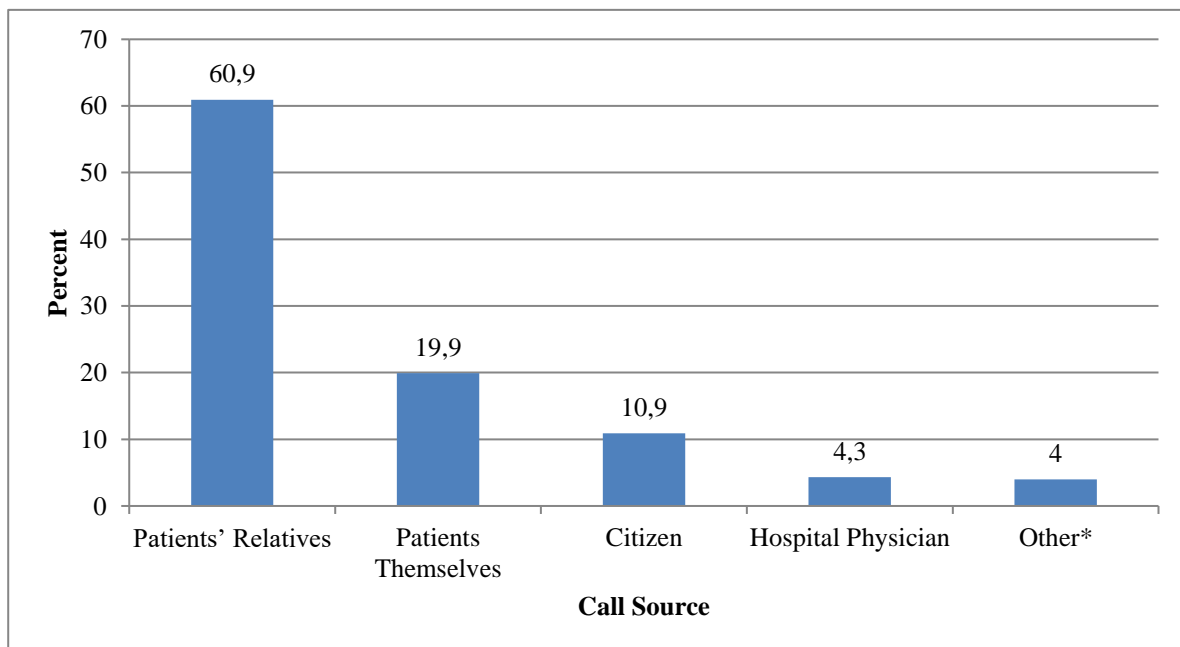

Figure 5. Ratio graph of 112 EHS call sources (n:75.280)

Other; assignment by governorship (134), police (1307), fire department (32), application to the point (709), unknown (430).

When the reasons for calling the 112 EHS in 2013 and their compatibility with 32 emergency parameters were examined, it was observed that 41.0% (30.942) had compatible reasons for calling, while 59.0% (44.339) had incompatible call reasons for calling (**Table 2**).

Table2. Table of compliance of cases for 2013 of 112 EHS to WHO international 32 emergency parameters

International 32 Emergency Parameters of the World Health Organization (ICD codes)	n	%
Falling from a hight (W1-W19)	4747	15.3
Myocardial infarction, arrhythmia, hypertension (I21,22,I47,48,49,R00,I10,I15,R03)	3727	12.1
Acute abdomen (R10)	3082	10.0
High fever (R50)	2109	6.8
Any situation that causes unconsciousness (R55)	1979	6.4
Traffic accident (V1-V89)	1941	6.3
Terror, sabotage, shooting, stabbing, fighting, etc. (Z65.4, W32,33,34, X72,73,74, X93,94,95, Y22-24, W50-51, W25, X78, X99, Y28,	1842	6.0
Commencement of labour (Membrane rupture) O01-99	1821	5.9
Sudden strokes (I60-67)	1588	5.1
Asthma attack, acute respiratory problem (J44, J45)	1503	4.9
Suicide attempt (x60-x84)	940	3.0
Acute massive bleeding (K25,26,27,28,29,R0.4,I85,N92,020,R58)	930	3.0
Migraine or vomiting, headaches with loss of consciousness (G43,44,023, R51)	880	2.8
Renal colic (N23)	816	2.6
Poisoning (A05,F10-19,T36-65,Y08-18,Y91)	678	2.2
Diabetic, Uremic coma (E10,11,12,13,14)	466	1.5
Acute psychotic cases (F23, F31,32,33,18,19,20)	461	1.5
Severe allergy, anaphylaxis (L50, T78)	321	1.0
Dialysis patient with general condition disorder (N17,18)	260	0.8
Spine and Lower extremity fractures (S12,13,S22,S32,33,S71-99)	205	0.7
Severe burns (T20-31, T95)	182	0.6
Neonatal coma (P00-24)	124	0.4
Freezing, Cold stroke (P80.0, t95, t33-35)	92	0.3
Serious eye injuries (H44,S05,T15,)	76	0.3
Drowning (T71,T75.1,V90-93-94,W16,W65,66,67,68,69,70,73,74,X71Y21)	65	0.2
Electric shock (T75.4,w27,w29, w85-87)	47	0.2
Meningitis, encephalitis, brain abscess (A86,87,G01-03,A83,84,85,G04-05,G07)	46	0.2
Heat stroke (T67)	13	0.1
Decompression (Diver) disease (T70,70,3)	1	0.0
Rape (Z04.4)	0	0.0
Serious work accident (Z04.2)	0	0.0
Severe general condition disorder	0	0.0

DISCUSSION

Prehospital Health Services provide the most demanding services in as short a time as possible, anytime and anywhere, to patients with various injuries and health problems [8]. This study showed that the male gender (9-12) and the age group of 65 years and higher are dominant beneficiaries of the EHS, which is the same result as in many other studies in the literature [13-15]. Age is a key factor in the demand for emergency medical help. Emergencies such as hypertension, coronary artery disease (CAD), chronic obstructive pulmonary disease (COPD), neurovascular disease and trauma that require ambulance assistance are seen more commonly as patients get older [16].

This shows that, as the patients age, their need for prehospital medical aid increases as a result of a rising number of age-related chronic diseases. Therefore, when planning the EHS, the effects of a continuously ageing population should be considered.

The study determined that calls were received primarily during the daytime and evening hours, while the number of calls decreased significantly after midnight, which is compatible with the results of other studies in the literature [15,17]. The fewer accidents and injuries during the night and fewer calls after midnight are most likely due to people not being at work but at home relaxing or sleeping.

In our study, 76.5% (57.583) of the patients were transferred to the hospital. Most (57.3%) were transferred to the Training and Research Hospital (TRH) Emergency Department, a public hospital affiliated with the Ministry of Health. It is possible that TRH received the majority of transfers because it is a conglomerate of multiple hospitals (Maternity Hospital, Children's Hospital, Chest Diseases Hospital) and has a rapid hospitalisation procedure in place when patients are admitted from the Emergency Department.

Regarding reasons for calling, the analysis concluded that medical reasons take the first place with 77,6% of all calls. Medical reasons also take the first place, with 72% of the calls in the study by Ayten & Serinker [15]. Our study results were compatible with the literature. One of the reasons for this could be that people think they will be seen and processed faster if they use emergency health services and ambulances instead of waiting in line in the outpatient clinic. Another reason could be the free and effortless transport to the hospital by ambulance.

Among the prehospital diagnoses, trauma cases were found to be the most extensive patient group (33.7%). They were followed by CVS diseases and psychiatric diseases, respectively. The study results were compatible with the literature results [15,18-20].

In this study, 76.5% of the patients were transferred to the hospital. In the 3-year studies conducted by Ayten & Serinker [15], patients were primarily transferred to the hospital. More hospital transfers may have been needed because Ambulance and Emergency Care Technicians (AECT) and Emergency Medical Technicians (EMT) worked in the ambulances instead of doctors. The inability of AECTs and EMTs to diagnose and treat patients at the scene may have led to the need for more hospital transfers. Another reason could have been the unnecessary use of ambulances, as people consider them free and quickly accessible vehicles.

The transportation times were between 0-10 minutes in 68.9% of the urban and 64.0% of the rural territories in this study. In the study by Balaban [21], the transportation time was between 0-5 minutes in 40.0% and 6-10 minutes in 40.6% of the central locations. The short transportation times are due to the integration of technological developments (radio, telephone, Global Positioning System - GPS) into emergency equipment, providing ambulances that are comfortable, fast and suitable for all kinds of field conditions and ensuring that healthcare professionals know how to use the equipment more effectively through in-service training. Longer transportation times in rural conditions result from long distances between the ambulance and the patient when the call is received, as well as the road conditions, field conditions, and the people's inability to provide a correct address. The absence or inadequacy of road signs and location/direction signs on district and village roads may cause additional delays in finding the address and reaching the patient.

A helicopter ambulance was used in this study's cases in 0.2% (122). The transportation times in helicopter ambulances were 30-60 minutes in 36.1% of the cases. The primary reason for longer transportation times was the distance. Other reasons included waiting to receive flight permission, not finding suitable ground for the helicopter ambulance to land on, and not having a heliport in every hospital building, which resulted in multiple transportation steps such as collecting the patient by land ambulance, then transferring them to the air ambulance and then back again to a land ambulance before reaching the hospital.

The study found that 41.0% of the received calls complied with the International Emergency parameters determined by WHO, while 59.0% did not. A study conducted by Yildiz [22] to evaluate the urgency of patients who arrived at the Emergency Department by ambulance found that 62.3% complied with the International 32 Emergency Parameters determined by WHO. The difference between the results of this study and the literature could be the result of incomplete data entry by the emergency teams.

CONCLUSION AND RECOMMENDATIONS

The data concerning patients transferred by ambulance in this study were similar to those of other studies conducted in Turkey. The majority of the patients transferred by ambulances were non-emergency cases. The limitations of this study are the incomplete data entry during first contact with the patient and the inability to reach these people again. Therefore, in-service training should be organised for pre-hospital emergency healthcare professionals on how to fill out case reports and record the collected data in the system regularly and thoroughly.

ETHICAL CONSIDERATION

This study was carried out with ethical approval from the Clinical Trials Ethics Committee and institutional permission from Erciyes University Faculty of Medicine, Department of Emergency Medicine and Kayseri Provincial Health Directorate, Branch Directorate of Emergency and Disaster Health Services.

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ORIGINALNI RAD

OBIM POSLA I REAKCIJA PREHOSPITALNIH HITNIH MEDICINSKIH SLUŽBI

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SAŽETAK

Uvod/Cilj U hitnim slučajevima je veoma važno sprečiti gubitke koji se mogu prevenirati, kao i rano dobiti informaciju, brzo stići na lice mesta i obezbediti intervenciju obučenog osoblja sa adekvatnom opremom. Cilj ove studije je analiza slučajeva Hitne medicinske službe u prehospitalnim uslovima.

Metodologija U ovoj retrospektivnoj studiji ispitano je 75.280 poziva upućenih Službi hitne medicinske pomoći u gradu Kajseri pozivom na broj 112. Podaci su sakupljeni uz pomoć upitnika i sadrže demografske podatke pacijenata, razlog upućivanja poziva, identitet pozivaoca, vreme stizanja na lice mesta, dijagnozu, rezultat izlaska ekipe na teren, imena bolnica u koje su pacijenti preveženi itd. Za analizu podataka korišćene su deskriptivne statističke metode.

Rezultati Utvrđeno je da su hitni pozivi uglavnom upućivani u periodu od 10:00 do 16:00 časova i da je 57,3% pacijenata prevezeno u Bolnicu za obuku i istraživanje. Najčešći razlozi pozivanja bili su iz oblasti interne medicine. Prema rezultatima izlazaka ekipa Hitne pomoći, pacijenti su u 66,7% slučajeva prevezeni u bolnicu.

Zaključak Broj pacijenata koji pozivaju telefon hitne medicinske pomoći se svakodnevno uvećava. Utvrđeno je da su najviše poziva uputili pripadnici muškog pola i da je potreba bila veća u dnevnim časovima. U ovoj studiji, više od polovine poziva nije zadovoljilo kriterijume hitnosti definisane međunarodnim parametrima za vanredne situacije, koje je odredila Svetska zdravstvena organizacija (SZO).

Ključne reči: prehospitalno, hitna medicinska služba, obim posla, reakcija