

## The analysis of the patients taken to emergency service by 112 emergency healthcare services: a prospective clinic study

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### ABSTRACT

**Objectives.** The aim of this study was to analyze the cases transferred by 112 emergency healthcare services (EHS) according to the triage criteria of Turkish Ministry of Health. **Methods.** All of the patients brought to adult emergency service unit of our hospital between April 01, 2015 and May 01, 2015 by 112 EHS have been involved in this study. The triage tags of the patients have been determined according to the criteria specified in T.R. Ministry of Health's "Procedures and principles of emergency health services in inpatient healthcare facilities" dated October 16, 2009. The end of emergency service process has been classified as discharge, hospitalization in service, transfer to another healthcare center, and excitus. **Results.** A total of 1,101 patients have been involved in this study. The mean age was 45.6 years. The age range was 1-94 years. While 545 (49.50%) patients were female, 556 (50.49%) were male. The portion of Red area was 15.16% (n=167), that of Yellow 1 area 34.60% (n=381), that of Yellow 2 area 23.34% (n=279), and that of Green area 24.80% (n=274). The distribution of the patients by treatment results was as follows; discharge 86.46% (n=952), hospitalization in service 10.08% (n=111), hospitalization in intensive care 2.27% (n=25), transfer to another healthcare center 0.63% (n=7), excitus 0.5% (n=6). The total share of the 65 year-old or older cases was 23.88% (n=263). The distribution of the red area patients by triage was as the following; 47.30% (n=79) hospitalization in service, 10.7% (n=18) hospitalization in intensive care unit, 33.53% (n=56) discharge, 3.59% (n=6) exitus and 4.19% (n=7) transfer to another healthcare service. **Conclusions.** The inappropriate use of 112 EHS is very common. Majority of the patients taken into emergency service by 112 EHS does not require urgency. After the triage in the ambulance, the patients can be directly transferred to an appropriate field without creating a time and work load on emergency service. Moreover, after the triage in ambulance, the patients requiring the hospitalization may be transferred to the appropriate facility according to the available bed capacity.

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## Introduction

Emergency ambulance services are the important public health care service that helps individuals with surviving in life-threatening or emergency-service cases and allows them to be transferred to emergency services as soon as possible [1]. In our country, the pre-hospital emergency healthcare service (EHS) has been started in year 1980. Offered firstly since 1986 in certain metropolitan cities, this service has been provided by 112 Emergency Healthcare Services Directorate of the Ministry of Health via 112 EHS teams since year 1994 [2]. The number of patients transferred by ambulances has shown increase over the years. Even though not all of the calls are expected to be a life-threatening case, the frequent use of 112 EHS for non-urgent injuries or complaints makes it very difficult for urgent patients to make use of ambulances [3, 4]. For appropriate and efficient use of resources, it is important to carefully select the cases taken by ambulances and to transfer them to appropriate hospitals [2]. Otherwise, the patients requiring no serious treatment or examination are transferred to intensive hospitals and they also increase the actual intensity and the waste of resources [2]. Our aim in this study was to analyze the cases transferred via 112 EHS according to the triage criteria of the Ministry of Health. We will reveal if the patients transferred by 112 EHS to emergency services are in emergency class and if the use of 112 EHS and emergency services is efficient and appropriate. These data may also be used as base for transferring the patients to appropriate hospitals after the triage.

## Methods

All of the patients taken to adult emergency service unit of our hospital between 01.04.2015 and 01.05.2015 by 112 EHS have been involved in this study. Firstly ethics committee permits was taken from Bursa Yuksek Ihtisas Training and Research Hospital Ethics Committee. The adult emergency service of our hospital accepts all of the trauma patients in any age group and >16 year-old patients having internal diseases (>16 year-old internal diseases and trauma patients and <16 year-old only trauma patients). As a routine, the patients taken into emergency service of our hospital by 112 EHS are examined in red area. This process has been continued routinely in our study. After taking our patients in red area, their examinations and treatments have been routinely continued. For the patients involved in this study, the 112 EHS ambulance registration forms and patient files prepared in emergency service have been examined, and the complaint, age, gender, final diagnosis, and triage area have been determined and then recorded into data form. The triage area determination of the patients has been accomplished according to the Republic of Turkey Ministry of Health's "Procedures and Principles of Emergency Healthcare Services in Inpatient Healthcare Facilities" dated 16.10.2009 (Table 1). As a difference, the red area wasn't divided into 1<sup>st</sup> and 2<sup>nd</sup> section, and shown as a single red area. The end of emergency service process has been classified as discharge, hospitalization in service, transfer to another healthcare center, and excitus.



**Figure 1.** Triage distribution percentage of the patients brought by 112 Emergency Health System

**Table 1.** Triage codes according to “Procedures and Principles of Emergency Health Services in Inpatient Healthcare Facilities-Turkey Ministry of Health” dated 16.10.2009

TRIAGE CODES	
<b>RED 1</b>	The cases threatening the life and requiring aggressive approach and simultaneous examination and treatment urgently. In these cases, the patient is taken into red area without immediately.
<b>RED 2</b>	The cases involving high life-threatening risk and requiring the diagnosis and treatment within 10 minutes.
<b>YELLOW 1</b>	The cases involving the possibility of threatening the life, loss of an organ and involving high morbidity rate.
<b>YELLOW 2</b>	The cases with medium and long-term symptoms and involving severity potential.
<b>GREEN</b>	The cases applying by themselves, being generally stable, and involving health problems that can be treated without hospitalization.

### Statistical Analysis

Study data has been analyzed with SPSS 22 software.

### Results

A total of 1,101 patients have been involved in this study. The mean age was 45.6 years. The age range was 1-94 years. While 545 (49.50%) patients were female, 556 (50.49%) were male. The portion of Red area was 15.16% (n=167), that of Yellow 1 area was 34.60% (n=381), that of Yellow 2 area was 25.34% (n=279), and that of Green area was 24.80% (n=274)

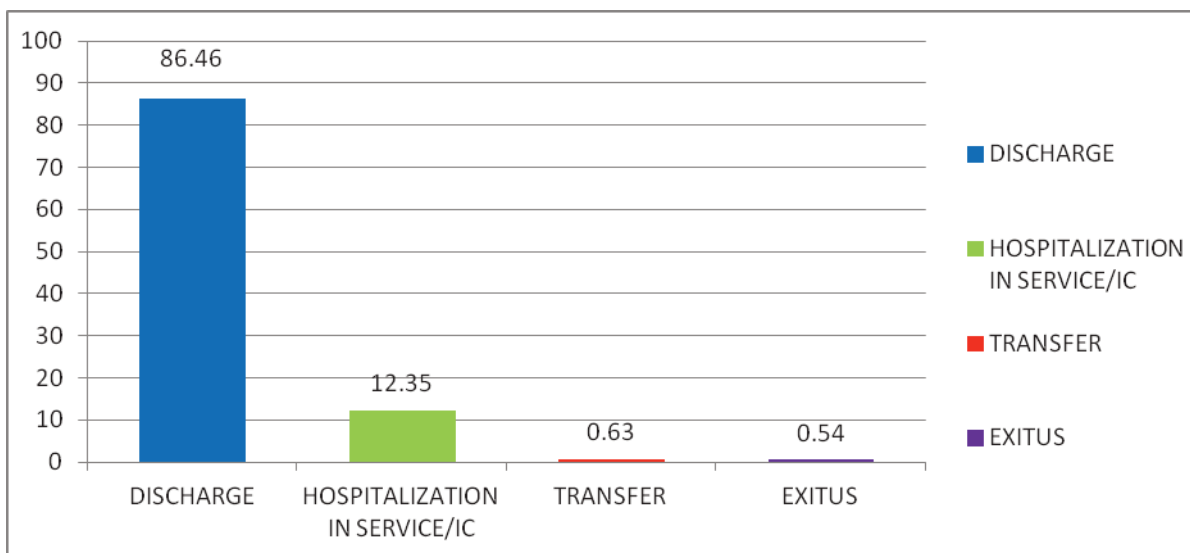
(Figure 1). The distribution of the patients by diagnosis was as follows; trauma 24.79% (n=273), neurological cases 16.25% (n=179) and gastrointestinal system diseases 10.99% (n=121) (Table 2).

The distribution of the cases by the results of treatment was as follows; discharge 86.46% (n=952), hospitalization in service 10.08% (n=111), hospitalization in intensive care 2.27% (n=25), transfer to another healthcare center 0.63% (n=7), excitus 0.54% (n=6) (Figure 2). The total share of 65 year-old and older cases was found to be 23.88% (n=263).

Given the triage distribution of the patients; red

**Table 2.** Distribution of the patients by final diagnoses.

Final Diagnosis	Number	%
Trauma	273	24.78
Neurology	179	16.25
Gastrointestinal system	121	10.99
Respiratory system	84	7.62
Psychiatry	79	7.17
Cardiovascular system	75	6.81
Urology	75	6.81
Toxicology	57	5.17
General surgery	40	3.63
Others	118	10.71
Total	1,101	100



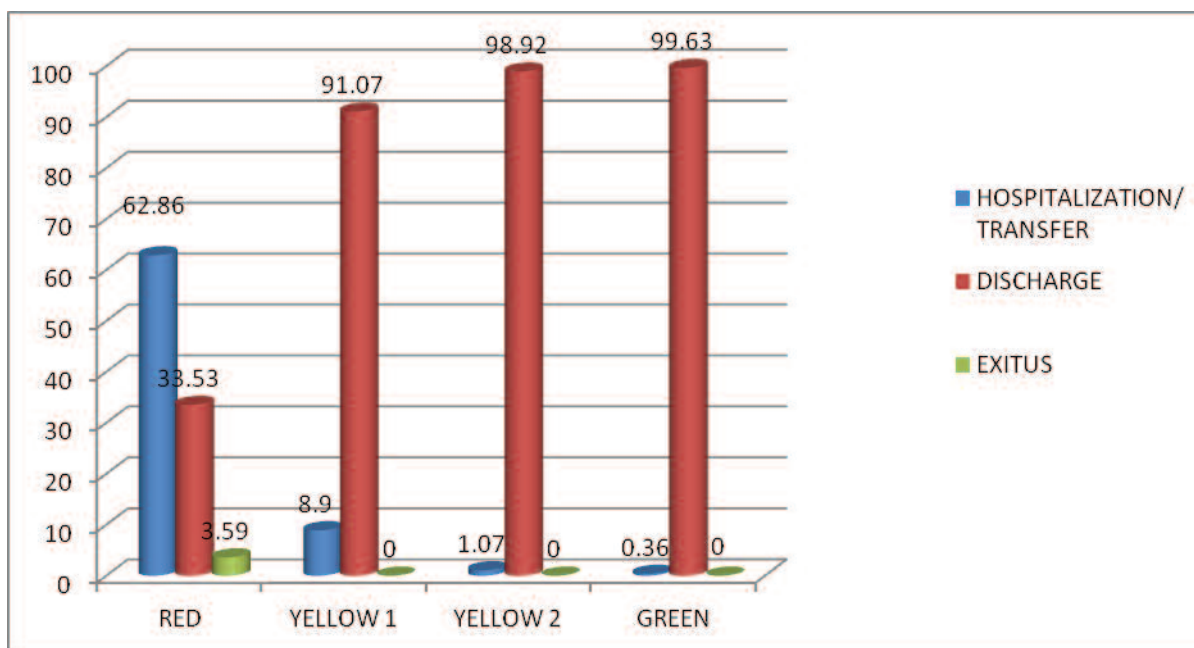
**Figure 2.** Percentage of the patients brought by 112 Emergency Health System

area patients have 47.30% (n=79) hospitalization in service, 10.7% (n=18) hospitalization in intensive care unit, 33.53% (n=56) discharge, 3.59% (n=6) excitus and 4.19% (n=7) transfer to another healthcare service (Figure 3).

**Discussion**

The rate of ambulance use is affected from many factors such as age, gender, socioeconomic status,

severity of disease, geographical factors, and social security [3, 5, 6]. The inappropriate use increases the workload and economic costs of both pre-hospital and in-hospital emergency service [7]. The high population density in metropolitans, the irregular urbanization, and the traffic problems increase the importance of appropriate use of EHS [7]. In our study, it has been seen that 50.49% of the cases were male, while 49.51% were female. Considering the cases, it is seen that the portion of the male patients transferred by 112 EHS was 63% in 1996, 61.1% in 2001, 58.1% in 2008,



**Figure 3.** Results of the patients by triage areas

58.1% in 2010 and 53.5% in 2013 [2-4, 8, 9]. The portion of male patients has been found to be 50.49% in our study. The increasing activity of women in social life in course of time, the increase in the number of female drivers, and making 112 EHS wider decreased the domination of the number of male patients using 112 EHS.

The appropriate use of 112 EHS by the patients is of significant importance for the ones really needing this service to be able to make use of it. The use of ambulance in northern Europe countries is about 0.77-0.110% annually [10]. In a study carried out in Adana city, the same value has been found to be 0.54% [2]. Our percentage of ambulance service use is still lower than the European standards. But, the inappropriate usage, however, increases the risk of medical-legal problems, besides the interruptions in services. It also limits the time that can be allocated to really emergency patients [11]. In study of Morris *et al.* [12], it has been seen that 51.7% of the patients transferred by ambulance were inappropriate and 10.2% were suspicious. In the study of Gardner *et al.* [13], the rate of inappropriate use of ambulance service has been found to be 61.9%. In another study, where the ambulance calls in London have been analyzed, the rate of inappropriate use has been found to be 53.7% [14]. It has been reported that 40-50% of the total ambulance use in Canada, USA, Sweden, and England was inappropriate [15]. In a similar study carried out by Yaylaci *et al.* [7] in a private hospital, the patients taken by ambulance have been examined and the rate of inappropriate use has been found to be 37.7%. This rate found by Yaylaci *et al.* [7] is lower than the values in literature, and they have attributed this result to that the hospital has been newly opened and the use of ambulance hasn't become prevalent. In our study, among the patients brought by 112 EHS to our emergency service, in accordance with the declaration of the Republic of Turkey Ministry of Health, the triage results are as follows; Red area of 15.16%, Yellow 1 area of 34.60%, Yellow 2 area of 23.34% and Green area of 24.80%. While only 15.16% of the cases were in position requiring red area triage, it has been observed that 1 out of 4 patients brought by 112 EHS has been triaged to green zone that doesn't require urgency. Considering that the green and yellow 2 areas contain the patients that don't medically require the ambulance service, it can be seen that the rate of inappropriate use of ambulance is 48.14%. According to the data of Disease Control and Prevention Center (2005), the rate of real emergency patients has been

reported to be 5.5% [16]. The distribution of the patients by treatment results was as follows; discharge of 86.46% (n=952), hospitalization in service of 10.08% (n=111), hospitalization in intensive care of 2.27% (n=25), transfer to another healthcare center of 0.63% (n=7), excitus of 0.5% (n=6). As it can be seen, 86.46% of the cases have been discharged from the emergency service, even though they have been brought to the hospital by an ambulance. According to Snooks *et al.* [17], the high rate of discharge among the patients brought by ambulance has been reported to be one of the criteria for inappropriate use of ambulances. In a study of Yurteri *et al.* [8], the rate of discharge from emergency service has been found to be 30.2%. The same value has been found to be a rate of 53.6% by Atilla *et al.* [5], 74.9% by Ongel *et al.* [2], and 81.7% by Karakus *et al.* [18]. Even though only the patients transferred by 112 EHS have been involved, a higher value (86.46%) has been found in our study. The fact that our results were higher than those of other studies has been attributed to the absence of any low-level hospital in neighborhood (despite that our hospital is a 3rd step one) and the factors such as high population density in region and low socio-cultural status. These results are significant findings indicating the inappropriate use of 112 EHS transfers. Free- and easy-to-achieve service of EHS and unconsciousness of the public increase the inappropriate use. The data, which indicate the inappropriate use of EHS and emergency services in our country, also reveal that the consciousness level of our society about this issue should be improved.

The 112 EHS units are the units consisting of healthcare professionals. For this reason, besides transporting the patient, also the fast transfer of patient to the appropriate hospital is an important criterion for EHS. Otherwise, the recurrent transfers of the patients between the hospitals would be necessary and this leads to loss of time, interruptions in treatment, and decrease in general patient satisfaction. In our study, while the percentage of hospitalization in service and intensive care unit among red area patients were 47.30% and 10.7%, respectively, the hospitalization was 8.9% in Yellow 1 and lower than 1% in Yellow 2 and Green areas. In a study carried out in Istanbul, it has been determined that 84.9% of the patients requiring hospitalization have been transferred to other hospitals [18]. In same study, it has also been found that 45.3% of the patients planned to hospitalize in service have been transferred to other hospitals due to the lack of appropriate bed capacity. At this point, we

strongly believe that, by considering the hospitalization rates, the personnel working in 112 EHS should perform the triage of the patient during the transportation by asking the available bed capacity before transferring to the hospital.

Among the emergency case pre-diagnoses in Turkey, first 2 ranks belong to trauma (25.7%) and cardiovascular system diseases (19.5%) [19]. In study of Oktay *et al.* [17], first 3 ranks belonged to trauma (33.1%), cardiovascular system diseases (18.5%), and neurological diseases (14.2%). In study of Zenginol *et al.* [6] in year 2008, first 3 ranks belonged to trauma (29.80%), cardiovascular system (16.14%) and neurological cases (9.50%). In study of Ongel *et al.* [2], the same ranks were found to belong to trauma of 28.4%, neurological cases of 16.4%, and cardiovascular system diseases of 14.2%. In our study, the distribution of the patients by their final diagnoses in emergency service was as follows; trauma (24.78%), neurological cases (16.25%) and gastrointestinal system-related diseases (10.99%). Our results seem to be in harmony with literature information. The reason for cardiovascular system cases to be at lower ranks in our study is thought to be that there is a cardiovascular branch hospital near our hospital and those cases are generally transferred to that hospital.

In study of Kidak *et al.* [1], where they examined the use of 112 EHS, they have reported the rate of applications from individuals older than 65 years to be 26.7%. In study of Nur *et al.* [20], the percentage of the individuals older than 65 years among the cases transported by 112 in Sivas in year 2006 has been reported to be 21.9%. In our study, the percentage of >65 year-old cases transported by ambulance has been found to be 23.88%. These results show similarity with other studies. One out of 4 cases transported by 112 EHS ambulance is 65 year-old or older. Considering the increase in mean age of population, we believe that the use of 112 EHS will be higher in future. For this reason, it would be better to make the 112 EHS ambulances and healthcare teams ready for the patients in this age group.

## Conclusions

In our country, the 112 EHS has become easier-to-use since it has been established. But the inappropriate use of ambulance service is still at significant level. A significant portion of the patients taken to emergency

service by the 112 EHS has no urgency. By making the triage of patients in ambulance, they can be directly taken to the appropriate area without leading to time and labor load in emergency service. Moreover, by triaging during the transportation in ambulance, the patients requiring hospitalization can be transferred in accordance with the available bed capacity of the hospital. It is obvious that the >65 year-old population's use of the 112 EHS will increase along with the growth in this population. In this parallel, the 112 EHS should be organized and the required equipment and the training of teams would be important for the service quality.

## Conflict of interest

The authors disclosed no conflict of interest during the preparation or publication of this manuscript.

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