

# Do the patients referred to the emergency department really deserve an urgent medical intervention?

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## Abstract

**Aim:** In this study, it was aimed to evaluate the urgency of the patients considering their referral complaints indicated by 112 ambulance service crew and their anamnesis obtained in the emergency department (ED) as well. The evaluation was performed according to the World Health Organization (WHO) - 32 - Emergency Parameters (EP).

**Material and Methods:** This retrospective study was carried out examining the data of all patients brought to our hospital's ED by the 112-ambulance service between the dates January 05, 2017 and October 31, 2017. Qualitative and quantitative evaluations are based on the WHO-32-EP.

**Results:** Findings: The age of the emergency patients was found to be statistically higher than that of non-emergency patients ( $p=0.024$ ). It was observed that 171 patients evaluated according to their referral complaints were not in an urgent condition and that 109 patients evaluated according to their anamnesis obtained in the ED were not in an urgent condition as well. When the relationship between the complaints of the patients at the moment of the referral to the ED by 112 ambulance crew, and their anamnesis obtained in the ED, it was found that 24.6% ( $n=99$ ) of these patients were not in an urgent condition. Most of the complaints reported by 112 ambulance crew were not found in the WHO-32-EP ( $n=170$ ).

**Conclusion:** Awareness-raising training may be useful for 112 ambulance service crews that provide on-site emergency medical care so that they can make accurate decisions about diagnosis and perform accurate initial intervention as well.

**Keywords:** Emergency Referral; Emergency Medicine; WHO; 112 Emergency Service.

## INTRODUCTION

The emergency department (ED)s are the units where the necessary interventions are performed by prioritizing the cases using the triage method from the moment when the patients are referred and/or transferred, and where the patients are kept under the observation for a maximum of 48 hours, then they are discharged or hospitalized (1,2).

In these units, where the diagnosis and treatment of acute cases requiring the immediate intervention are performed, where the patients with the most complex and high-risk diseases are referred and where the most intensive patient groups due to work accidents and trauma are transferred, the main objective is to provide healthcare in a fast, accurate and quality manner. Therefore, the services provided in the EDs need to be well organized, run smoothly and be provided with good conditions. (3,4).

However, 112 emergency ambulance service and EDs are sometimes used in non-emergency cases, namely out of

their intended usage. Along with the population growth, the need for health care services is increasing, but the number of patients referred to the EDs is increasing day by day due to the reasons such as insufficient guidance of the patients in the primary health care service and/or inadequate number of the hospital beds and services (5-8). In many hospitals, despite of the renewal of the EDs and the increase in their capacity, there may be situations where these departments still cannot respond to the needs (9).

In addition, the number of the patients that must be examined, diagnosed and intervened in the EDs exceeds the normal number of patients that should be treated in the EDs due to the inappropriate transfers of patients. As a result, the workload of the healthcare personnel in the EDs increases and unnecessary interventions may result in an additional cost to the country's economy (10,11).

In this study, it was aimed to evaluate the urgency of the

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patients, regardless of their social insurance or other features, considering their referral complaints indicated by 112 ambulance crew and their anamnesis obtained in the ED as well. The evaluation was performed according to the World Health Organization (WHO) - 32 - Emergency Parameters (WHO-32-EP) (12) (Table 1).

**Table 1. WHO-32-EP**

Drowning in water	Myocardial infarction, arrhythmia, hypertension
Traffic accident	Decompression sickness
Terror, sabotage, gunshot, stabbing, fighting, etc.	Asthma attack, acute respiratory problem
Spine and lower extremity fractures	Acute psychotic situations
Suicide attempt	Any situation that causes loss of consciousness
Rape	Sudden paralysis
Falling from height	Severe general impairment
Serious work accident	High fever
Electric shock	Diabetic, uremic coma
Freezing, cold stroke	Dialysis patients along with the general impairment
Heat stroke	Acute abdomen
New-born comas	Started birth activity, (water discharge)
Severe burns	Acute massive bleeding
Severe eye injuries	Meningitis, encephalitis, brain abscess
Poisoning	Renal colic
Serious allergies, anaphylaxis	Migraine or vomiting, headache with loss of consciousness

The group of patients brought to the emergency department by 112 emergency ambulance service does not consist of the cases that require urgent intervention, which causes the patient intensity. Therefore, more effective treatment is not provided to the patients that really deserve emergency health services. In addition, due to this situation, the healthcare personnel in the emergency room cannot provide more effective treatment service to the emergency patients. Therefore, the secondary aim of this article is to focus on these problems.

## MATERIAL and METHODS

This research was carried out with the permission of TC. Maltepe University, Clinical Researches Ethic Committee, dated March 2, 2018 and numbered 2018.900.13.

### Eligibility criteria of the cases

As it is known, 112 ED is a type of healthcare service that provides emergency medical services in various health problems, traffic accidents, injuries, explosion, landslide, and similar situations. The patients brought to the emergency department by 112 ambulance service are directly taken to the yellow room, but the ones who are in critical condition are taken to the red room. The

emergency rooms are the aforementioned units where such emergency medical services are provided. In this research, the data included in the study were obtained from the cases brought by the 112-ambulance service between January 05, 2017 and October 31, 2017 to our department without considering their complaints, general health status, and / or socio-economic status.

However, the records of the patients, who are brought to the emergency department by 112 ambulance service, who are examined in the yellow room, and who do not need further medical examination and test, are not included in the study. In addition, the data of the cases who applied to our ED through special ambulances or their own vehicles were excluded from the study.

### Study design

The patients' medical reports and forms filled by 112 ambulance service crew were retrospectively procured from the hospital patient registry and operating system. The urgency of the patients was assessed according to the WHO-32-EP list, by examining the complaints of the patients, the records of the emergency physicians, and the International Classification of Diseases-10 (ICD-10).

### Statistical Analysis

The Number Cruncher Statistical System 2007 (NCSS) (Kaysville, Utah, USA) was used for the evaluation of the standardized data, and the data obtained from the computerized input. Descriptive statistics were presented as mean  $\pm$  standard deviation (SD), frequency (%) and median and interquartile range (minimum-maximum). The Shapiro-Wilk test, one of the normality tests, was used to check the compatibility of the normal distribution with the quantitative data. A two-sample independent t-test was used during the comparison of the two-different sample group and the quantitative variables with normal distribution. One-way analysis of variance test (ANOVA) was used to calculate the significance of the difference between three or more independent mean in a series with a normal distribution.

Thus, a cumulative comparison of the arithmetic mean of three or more groups alone could be performed. Independent analyses of qualitative, nominal and/or sequential, tabulated data were performed using Pearson Chi-square and Fisher-Freeman-Halton exact tests. All these analyses were performed at 95% confidence interval.

In evaluating the categorical items between the qualitative variables, "Cohen's kappa coefficient ( $\kappa$ )", which measures inter-rater agreement between the two independent raters, was used. It could also be considered that the agreement between the raters might be random. Thus, it was calculated which one of the raters could be stronger, considering the agreement proportionality between the two raters. Statistical significance was accepted as  $p < 0.05$ . It was evaluated between ( $\kappa$ ) -1 and ( $\kappa$ ) +1. The value closer to +1 indicated the perfect agreement between two raters, while the value closer to -1 indicated the perfect disagreement between two raters. If the value is 0, it

means that the agreement between the two observers is not different from the agreement which may depend on the chance (13).

## RESULTS

During the time-period of research, it was observed that 403 of 4495 patients who applied to our ED were brought by 112 ambulance service. The ages of the cases ranged from 1 to 98 years with a mean of  $60.86 \pm 21.27$  years, of whom 52.9% (n = 213) were females (Table 2).

		Min-Max	Mean $\pm$ SD
Age (Year)		1-98	60.86 $\pm$ 21.27
		Amount (n)	Frequency (%)
Age (Year)	0-35	61	15.1
	36-50	58	14.4
	51-65	91	22.6
	>65	193	47.9
Gender	Male	190	47.1
	Female	213	52.9

Of the cases, 15.1% (n = 61) were between the ages of 0-35, 14.4% (n = 58) between 36 and 50, 22.6% (n = 91) between 51 and 65, 47.9% (n = 193) were over 65 years.

It was observed that 171 patients evaluated according to their complaints were not in an urgent condition (Table 3) and that 109 patients evaluated according to their anamnesis obtained in the ED were not in an urgent condition (Table 4). The most common diagnosis made after taking anamnesis and performing examinations was hypertension (HT) (n = 44). Of the patients admitted to the ED, 58.3% were discharged (n = 235), 22.6% were hospitalized (n = 91), 14.1% (n = 57) refused treatment, 2.7% were referred to another hospital and 2.2% (n = 9) were died in the ED. It was noted that 6.2% of the patients were treated in the intensive care unit while the remaining patients were treated in the internal (10.6%) and surgical (5.7%) services.

It was found remarkable that 42.2% of the patients evaluated according to WHO-32-EP were not in an urgent condition and that 170 patients were not included in any parameters (Table 5). When the relationship between the complaints of the patients at the moment of the referral to the ED by 112 ambulance service, and their anamnesis obtained in the ED, it was found that 24.6% (n = 99) of these patients were not in an urgent condition.

It was found that there was 0.563 level of (median) agreement between the referral complaint and the anamnesis ( $\kappa = 0.563$ ;  $p < 0.001$ ), and that 20.4% (n = 82) of patients' referral complaints and anamnesis were different. It was also observed that there was a nearly perfect agreement ( $\kappa = 0.985$ ;  $P < 0.001$ ) between the referral complaint and the final diagnosis and that 0.7% of

the patients (n = 3) had different referral complaints and final diagnosis (Table 6).

Table 3. Distribution of the patients according to the referral complaint, and the evaluation of the urgency

		(Amount) (n)	Frequency (%)
Referral complaint	Falling	53	13.2
	Dyspnea	35	8.7
	HT	31	7.7
	Nausea and vomiting	28	6.9
	Syncope	22	5.5
	Waist pain, knee pain, leg pain	20	5.0
	Dizziness	20	5.0
	Chest pain	17	4.2
	Arrest	16	4.0
	Fever	16	4.0
	Traffic accident	15	3.7
	Somnolence, loss of consciousness, loss of power	15	3.7
	Attack	14	3.5
	Weakness	12	3.0
	Abdominal pain	11	2.7
	General impairment	10	2.5
	Diarrhea	10	2.5
	Palpitation	8	2.0
	Intoxication	7	1.7
	Lower extremity injury	7	1.7
	Bleeding	5	1.2
	Shoulder fracture	5	1.2
	Panic attack	4	1.0
Conversion	3	0.7	
Unable to urinate	3	0.7	
Beating	2	0.5	
Anxiety disorder	2	0.5	
Cough	2	0.5	
Hyperglycemia	2	0.5	
Bradycardia	2	0.5	
Allergy	1	0.2	
Headache	1	0.2	
Electric shock	1	0.2	
Hypotension	1	0.2	
Falling from height	1	0.2	
Vertebra injury	1	0.2	
Evaluation of the case	Non-urgent	171	42.4
	Urgent	232	57.6

**Table 4. Data regarding anamnesis of the patients obtained in the emergency department**

		(Amount) (n)	Frequency (%)
<b>Hospital ED</b>	Unable to speak, loss of strength, syncope (loss of consciousness)	47	11.7
	Dyspnea	40	9.9
	Falling	32	7.9
	HT	31	7.7
	Chest pain	26	6.5
	Fever	19	4.7
	Dizziness	19	4.7
	General impairment	18	4.5
	Traffic accident	17	4.2
	Backache	17	4.2
	Lower extremity injury	15	3.7
	Arrest	15	3.7
	Abdominal pain	15	3.7
	Attack	12	3.0
	Palpitation	11	2.7
	Diarrhea	9	2.2
	Work accident	8	2.0
	Intoxication	8	2.0
	Nausea, vomiting	8	2.0
	Badness	8	2.0
	Falling from height	6	1.5
	Bleeding	5	1.2
	Headache, migraine	3	0.7
	Vertebra injury	3	0.7
	Acute abdomen	3	0.7
	Allergy	2	0.5
	Throat ache	2	0.5
	Beating	2	0.5
Hyperglycemia	1	0.2	
Bradycardia	1	0.2	
<b>Evaluation of the case</b>	Non-urgent	109	27
	Urgent	294	73

After evaluating the referral complaints of the patients in terms of age and gender through independent t-test and Pearson chi-square test, it was observed no statistically significant difference between the groups ( $P > 0.05$ ).

However, after obtaining the anamnesis in the ED, it was found that the age of the patients who were in an urgent condition according to WHO-32-EP was statistically significantly higher than the age of those in a non-urgent condition ( $P = 0.024$ ) (Table 7).

As a result of the dual assessment performed using Bonferroni correction, it was observed that the age of the hospitalized patients was statistically significantly higher

than the age of discharged patients ( $P < 0.001$ ). However, there was no statistically significant difference in age among the other groups ( $P > 0.05$ ). Following the dual assessment, it was observed that the discharge rate in the age group of 65 years and over was lower than that of 0-35 years, 36-50 years, and 51-65 years ( $P < 0.001$ ,  $P = 0.001$  and  $P = 0.022$ , respectively).

**Table 5. Distribution of the referral complaints according to WHO-32-EP**

		(Amount) (n)	Frequency (%)
<b>Urgent diagnosis according to WHO</b>	Do not exist	170	42.2
	Any situation that causes loss of consciousness	60	14.9
	Myocardial infarction, arrhythmia, HT	56	13.9
	Asthma attack, acute respiratory problem	35	8.7
	Traffic accident	16	4.0
	High fever	16	4.0
	Severe general impairment	13	3.2
	Sudden paralysis	8	2.0
	Spine and lower ext. fractures	7	1.7
	Poisoning	5	1.2
	Acute massive bleeding	5	1.2
	Terror, sabotage, gunshot, stabbing, fighting	2	0.5
	Suicide attempt	2	0.5
	Diabetic, uremic coma	2	0.5
	Falling from height	1	0.2
	Serious work accident	1	0.2
	Electric shock	1	0.2
	Allergy, anaphylaxis	1	0.2
	Acute abdomen	1	0.2
	Migraine, headache with vomiting	1	0.2

**Table 6. Findings related to the evaluation of agreement level through Cohen Cappa between referral complaint/patient anamnesis, and between final diagnosis/urgent diagnosis according to WHO**

		Referral Complaint		Cohen kappa, p
		Non-urgent	Urgent	
<b>Hospital anamnesis</b>	Non-urgent	99 (24.6)	10 (2.5)	0.563, <0.001**
	Urgent	72 (17.9)	222 (55.1)	
<b>Final diagnosis</b>	Non-urgent	109 (27.0)	32 (7.9)	0.511, <0.001**
	Urgent	62 (15.4)	200 (49.6)	
<b>WHO</b>	Non-urgent	169 (41.9)	1 (0.2)	0.985, 0.001**
	Urgent	2 (0.5)	231 (57.3)	

**\*\*p<0.01**

Table 7. Assessment of the relationship amongst age, gender, and results obtained from the emergency department

		Result					P
		Discharged	Hospitalized	Denied treatment	Referral to another hospital	Ex	
		Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	
<b>Age</b>		56.06±21.62	71.76±15.18	62.49±20.88	55.55±26.99	72.22±16.44	<sup>c</sup> <0.001**
		n (%)	n (%)	n (%)	n (%)		P
<b>Age groups</b>	0-35	48 (78.7)	3 (4.9)	6 (9.8)	3 (4.9)	1 (1.6)	<sup>d</sup> <0.001**
	36-50	42 (72.4)	6 (10.3)	9 (15.5)	1 (1.7)	0	
	51-65	59 (64.8)	17 (18.7)	12 (13.2)	1 (1.1)	2 (2.2)	
	>65	86 (44.6)	65 (33.7)	30 (15.5)	6 (3.1)	6 (3.1)	
<b>Gender</b>	Male	109 (57.4)	44 (23.2)	26 (13.7)	5 (2.6)	6 (3.2)	<sup>b</sup> 0.818
	Female	126 (59.2)	47 (22.1)	31 (14.6)	6 (2.8)	3 (1.4)	

<sup>b</sup>Pearson Chi-square test <sup>c</sup>One-way analysis of variance <sup>d</sup>Fisher-Freeman-Halton exact test \*\*P<0.01

## DISCUSSION

Amongst the researches performed in the field of pre-hospital emergency medical services and hospitals' EDs, it has been observed that the researches regarding the use EDs' characteristics and reported urgency situation compatibility have gained popularity recently. The emergency medical services start with emergency aid and rescue and continue with ambulance services, accident services, and rehabilitation services. The conditions requiring medical intervention within the first 24 hours, and the conditions in which the immediate loss of life and/or damage to the health integrity is deemed to occur if medical intervention is not carried out or if the patient is transferred to another health facility, are accepted as the urgent conditions (8,11).

However, the inappropriate referral to the EDs causes extreme patient density and thus, emergency units cannot struggle with this extreme workload. As a result, waiting times are prolonged, the treatment of the patients with a serious illness is delayed, patient dissatisfaction increases and all these reasons cause a general confusion and inadequacy in the EDs (8,11).

One of this inappropriateness is that the patients transferred to the ED by 112 ambulance service are not in an urgent condition (8). Therefore, in this study, it was aimed to evaluate whether the patients brought to the ED by 112 ambulance service really have an emergency status after evaluating the anamnesis of the patients obtained in the ED according to the WHO-32-EP. Yaylacı et al. indicated in a study that the urgency was not different according to the gender. The mean age of the patients deemed to be urgent was 54.31 ± 23.74 years and the mean age of the non-urgent patients was significantly higher than 38.07 ± 22.77 years (P = 0.001). The number of the patients over 65 years was high (14). Similarly, the number of males and advanced aged patients are higher

amongst the cases brought to the ED by the ambulance in the studies performed by Atilla et al. and Koçkanat (12,15).

In our study, the number of female patients (n = 213) brought to the ED by ambulance was higher and there was no statistically significant difference observed in the urgency of patients according to their gender (P> 0.05) after examining the anamnesis obtained in the ED. Similarly, it was observed that the ages of the emergency patients, according to the anamnesis were statistically significantly higher than the age of non-emergency patients (P=0.024). However, no statistically significant difference was found between the age groups of the patients (P> 0.05). Like other studies, the number of patients over 65 years referred to the ED was significantly high (47.9%).

Ertan and his colleagues indicated in their study that three most common preliminary diagnoses were an abdominal and pelvic pain, stroke and digestive system diseases, respectively (8). In a study performed in İzmir in 2009, the first three preliminary diagnoses made by the ambulance crew were cardiovascular disease, respiratory disease, and traumas (16). In our study, falling (traumas), shortness of breath (respiratory disease) and HT (cardiovascular disease) were three preliminary diagnoses respectively. We think that this situation is stemming from the fact that our hospital is in the status of the 3rd step healthcare unit and that thanks to its location in Istanbul, it is a close and appropriate healthcare unit.

In a study performed by Atilla et al., 53.6% of the patients admitted to the ED were followed up in this department and discharged, 40% of the patients were hospitalized, and 3.5% of the patients rejected the treatment or left the ED without permission (15). In a study performed by Kurtoğlu Çelik et al., the discharge rate was found to be 87.2%, while the hospitalization rate was 7.75% (17). In our study, we found that the discharge rate was 58.3%, hospitalization

rate was 22.6% and 14.1% of the patients rejected the hospitalization and treatment. One of the reasons for this situation is that our hospital is a foundation university hospital and all the patients think that they must pay additional fee although they have been informed in detail about this issue. Another reason is that the patients want to go to the hospital where they have been followed up and treated before. We think that the high discharge rate is associated with the inappropriate use rate of the ambulances.

The inappropriate referrals to the EDs were rather higher in the previous studies since the preliminary diagnoses made by the 112 ambulance service crew were not based on any international parameters, including WHO-32-EP, but they were only based on the patient's dominant complaints. In this study, the preliminary diagnosis of 170 patients made by ambulance service crew was not within the scope of WHO-32-EP. When the relationship between the complaints of the patients at the moment of the referral to the ED by 112 ambulance service crew, and their anamnesis obtained in the ED, it was found that 24.6% (n = 99) of these patients were not in an urgent condition. In addition, it was found that 17.9% of the cases' referral complaints were not considered as urgent.

The fact that the study had the retrospective design was the limitation of this study. In the light of the data obtained from this study, it was observed no statistically significant difference between the groups after evaluating the referral complaints of the patients in terms of age and sex. However, it was found that the age of the patients who were in an urgent condition, according to WHO-32-EP was significantly higher than the age of those in a non-urgent condition (P = 0.024). 55.1% of the patients' complaints at the moment of the referral to the ED and their anamnesis obtained in the ED displayed the urgency of these patients. It was observed a moderate level agreement between the referral complaint and patient anamnesis ( $\kappa = 0.563$ ), between the referral complaint and the final diagnosis ( $\kappa = 0.511$ ). These results were reported to be statistically significant (P<0.001). It was remarkable that 23.3% of the patients' referral complaints and their final diagnoses were different from each other, while 41.9% of these patients' referral complaints, and their diagnosis according to the WHO-32-EP were not urgent. It was also observed that there was a nearly perfect agreement ( $\kappa = 0.985$ ) between the referral complaint and the final diagnosis and this result was found to be statistically significant (P <0.001).

## CONCLUSION

The patients' transfer to the EDs according to their urgency is of vital importance by the 112 Emergency Ambulance Services. For this purpose, the healthcare professionals working in this department must be well trained. It is necessary to employ more educated personnel and use equipped vehicles to ensure the efficiency of these units and to carry out the services effectively. More importantly, the effective participation of all personnel, working in the 112-emergency unit, to the in-service training programs

guiding by the emergency medical specialist should be provided. We also suggest that this problem may be solved not only by updating the knowledge of the healthcare personnel but also by informing the people about the appropriate use of EDs and 112 ambulance system.

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