Evaluation of Compliance of Patients Admitted to Emergency Department By 112 Ambulances According to International 32 Emergency Parameters

Acil Servise 112 Ambulansı ile Getirilen Hastaların Uluslararası 32 Acil Durum Parametresine Uygunluğunun İncelenmesi

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ABSTRACT

Introduction: The inappropriate use of ambulances increases the workload of emergency services and adversely affects the economy.

Objective: We aimed to compare the compliance of the prediagnosis and the final diagnosis of cases brought to the emergency department by 112 ambulances with the World Health Organization (WHO) International 32 Emergency Parameter and investigate their possible inappropriate usage status.

Method: The compliance status of the prediagnosis and final diagnosis of the patients with the WHO International 32 Emergency Parameters were compared (n: 7521). Statistical analysis was conducted using MedCalc® Software and a value of 95% was used for confidence interval. This study is based on a specialization thesis.

Results: While the most frequent diagnosis group among the prediagnostically compliant ones was trauma (26.3%), the most frequent diagnosis group among the final diagnostically compliant ones was cardiovascular system diseases (20.1%). A significant difference was observed when comparing the compliance status with the indicators (McNemar Test, $p<0.05$).

Conclusion: In our study, in cases brought to the emergency department by 112 ambulances, the rate discrepancy of their final diagnoses was found to be higher compared to the prediagnosis group. This fact shows that even the cases that showed no compliance with the international parameters were referred to emergency departments via ambulance.

Keywords: Ambulance, Emergency Department, Urgency, 112.

ÖZET

Giriş: Ambulansların uygun olmayan şekilde kullanılması, acil servislerin iş yükünü artırır ve ekonomiyi olumsuz etkilemektedir.

Amaç: Acil servise ambulans ile getirilen vakaların ön ve son tanılarının, Dünya Sağlık Örgütü (DSÖ)'nün Uluslararası 32 Acil Durum Parametresi'ne olan uygunluklarını karşılaştırarak, olası uygunsuz kullanım durumunu araştırmak amaçlandı.

Yöntem: Hastaların ön ve son tanılarının, DSÖ'nün Uluslararası 32 Acil Durum Parametresi'ne uygunluk durumu karşılaştırıldı (n: 7521). İstatistiksel analizler için MedCalc programı ve güven aralığı ölçütü olarak %95 değeri kullanıldı. Çalışmamız, bir uzmanlık tezinden kaynaklanmaktadır.

Bulgular: Ön tanı uygunluğu saptananlarda en sık tanı grubu travma (%26.3) iken, son tanı uygunluğu saptanan grupta ise kardiyovasküler sistem hastalıkları (%20.1) idi. Parametrelere uygunluk durumu karşılaştırıldığında anlamlı fark saptandı (McNmar Test, $p<0.05$).

Sonuç: Çalışmamızda, ambulans ile acil servise getirilen vakaların son tanılarına göre uygunsuzluk oranları, ön tanılara göre daha yüksek saptandı. Bu durum, uluslararası parametrelere göre uygunluk taşımayan vakaların da, ambulans ile acil servislere nakledildiğini göstermektedir.

Anahtar Kelimeler: Aciliyet, Acil Servis, Ambulans, 112.

INTRODUCTION

Every day, tens, or even hundreds of patients are transferred to emergency departments via ambulances, and this situation contributes to the present crowdedness of emergency departments.

Using the emergency ambulance systems inappropriately is one of the modern health system's problems. Inappropriate usage of ambulances increases the workload of pre-hospital systems and of the emergency services and negatively influences the national economy. This improper usage is a very subjective, variable and retrospective assessment. There is no consensus on reliably determining patients with no

requirement to carry with ambulance in the literature, thus there are challenges in evaluating these circumstances (1). In this study, we retrospectively assessed the prediagnoses and final diagnoses of cases brought to our emergency department by 112 emergency medical services (EMS).

We aimed to compare the compliance of these diagnoses with the World Health Organization (WHO) International 32 Emergency Parameters and investigate their possible inappropriate usage status (2).

METHOD

Our study was conducted retrospectively in an adult emergency department of a tertiary training and research hospital with a mean monthly ambulance enter count of 2000. For this study, it was predicted to scan data of approximately 10000 cases, and since this number was reached in the first four months of 2016, the study period was accepted as 1st January – 30th April 2016. Data of all adult that were brought by ambulace from the scene of accident or another healthcare organization and all trauma cases aged under 18 years in this period were investigated (n: 9734). Patients information were achieved from the computer system and the ambulance referral forms. Non-traumatic pediatric cases, cases brought to the pediatric emergency service and the gynecology emergency department, cases with no prediagnosis by the 112 team and duplicate cases were excluded (n: 2213). The time of arrival, age, gender, laboratory test demand status, radiologic imaging demand status, consultation demand status and outcome status data of the patients were recorded (n: 7521). Of these cases, the compliance of their prediagnosis by 112 teams and their final diagnosis by the emergency department evaluation with the World Health Organization International 32 Emergency Parameters (Table 1) were analyzed and compared.

The hospital's ethical committee approved the study. MedCalc Statistical Software version 12.7.7 was used for statistical analysis. When evaluating the study data, definitive statistical methods (mean, standard deviation, median, frequency, percentage) were used. Statistical significance level was set at 0.05 and a value of 95% was used for the confidence interval.

Table 1. 32 Emergencies Parameter by the World Health Organization (WHO) (2)

1	Drowning	17	Myocardial infarction, arrythmia, high blood pressure
2	Traffic accidents	18	Caisson disease
3	Terror, sabotage, gunshot, stabbing, fight, etc.	19	Asthma attack, lower respiratorial problem
4	Suicide attempt	20	Unconsciousness
5	Rape	21	Sudden strokes
6	Falling from height	22	Severe disturbances at general health status
7	Serious occupational accident	23	High fever
8	Electric shock	24	Diabetic, uremic coma
9	Freezing, frostbite	25	Dialysis patient associated with severe disturbances at general health status
10	Heat stroke	26	Acute abdomen
11	Severe burns	27	Acute massive bleeding
12	Severe eye injuries	28	Menengitis, encephalitis, brain abscess
13	Intoxication	29	Renal colic
14	Severe allergy, anaphylaxis	30	Migraine or vomiting, headaches associated with unconsciousness
15	Vertebra and lower extremity fractures	31	Acute psychotic disorders
16	Neonatal coma	32	Onset of labor (fluid leakage)

RESULTS

The mean age of the patients was 54.7±23.1 years. The patients' age ranged between 1 and 99 years. 3385 (45%) of the patients were male, 4136 (55%) of them were female.

While the prediagnosis by 112 teams showed 89.5% compliance with the 32 emergency parameters, the final diagnoses were found to 65.1% compliant (Table 2). When comparing these compliance statuses, a statistically significant difference was found (McNemar Test p<0.05) (Table 3).

Table 2. Compliance with Parameters of the Prediagnosis and Final Diagnosis Groups

Prediagnosis group	N	%	Final Diagnosis Group	N	%
Compliant	6732	89,5	Compliant	4897	65,1
Noncompliant	789	10,5	Noncompliant	2624	34,9
Total	7521	100,0	Total	7521	100,0

Table 3. Comparison of Compliance of Prediagnosis and Final Diagnosis of Patients with the International 32 Emergency Parameters

WHO Compliance Of Final Diagnosis		Noncompliant	Compliant	p
WHO Compliance Of Prediagnosis	Noncompliant %	558 (70.7)	231 (29.3)	<0.05*
	Compliant %	2066 (30.7)	4666 (69.3)	

* McNemar Test p

In the prediagnostically compliant group, the most common diagnosis was trauma with 26.3%. In non-trauma cases, the most common diagnosis group were cardioavascular diseases with 19.6%. The most common diagnosis in the group whose final diagnosis was compliant was cardiovascular diseases with 20.1%. In the prediagnostically noncompliant group, aside from the "others" option, the most common diagnosis was gastrointestinal (GIS) diseases (38.5%), while in the group whose final diagnosis were noncompliant, trauma was the most common diagnosis with 36% (Table 4).

Table 4. Distribution of Prediagnostically and Final Diagnostically Compliant Patients According to Diagnosis Group

Diagnosis Group	Prediagnostically Compliant, n (%)	Final Diagnostically Compliant, n (%)
Respiratory system diseases	1102 (16.4)	867 (17.7)
Cardiovascular system diseases	1316 (19.6)	985 (20.1)
Gastrointestinal system diseases	313 (4.7)	155 (3.2)
Neurological diseases	728 (0.8)	566 (11.6)
Urinary system diseases	75 (1.1)	67 (1.4)
Infectious diseases	204 (3.0)	66 (1.3)
Metabolic and Endocrine diseases	163 (2.4)	238 (4.9)
Trauma	1768 (26.3)	800 (16.3)
Intoxications	389 (5.8)	346 (7.1)
Gynecologic and Obstetric diseases	2 (0.1)	5 (0.1)
Psychiatric diseases	475 (7.0)	479 (9.7)
Others	197 (2.9)	323 (6.6)
TOTAL	**6732 (100.0)**	**4897 (100.0)**

When comparing the prediagnostically and the final-diagnostically compliant group according to age, the 0-17 years group achieved the highest compliance at 97.5%. In the same age group, the compliance of the final diagnoses reached 52%. While the prediagnostical compliance status in the 18-64 years group was 90%, this rate was 61.3% in the final diagnoses. The compliance status of prediagnoses and final diagnoses for the 65 years and above group was 87.9% and 71.6%, respectively.

While the median age in the prediagnostically compliant group was 57 years, this value was 62 in the noncompliant group. The median age of the final diagnostically compliant cases was 61 years, while this value was 50 in the noncompliant ones. A significant difference was found in prediagnosis and final

diagnosis groups in age distribution according to compliance with the parameters (Mann-Whitney U test, $p<0.05$).

In the prediagnosis group, 89% of women were compliant, while this rate reached 90% in men. In the final diagnosis group, 65.3% of women were compliant, while this ratio was 64.9% in men.

The outcome according to compliance of prediagnosis and final diagnosis was also investigated in our study. Accordingly, it was seen that the discharge rate and the number of cases that refused therapy or left without permission was higher in the group whose prediagnosis by ambulance staff were compliant to the parameters and that – according to their final diagnosis in the emergency department – noncompliant patients had a higher discharge rate and no exitus has been detected in this group.

DISCUSSION

Inappropriate usage of emergency ambulance systems and the intensivity of EDs negatively influences patient satisfaction, service quality and the national economy (1,3-5). The increased demand for ambulance may delay the arrival of life-threatening cases with ambulance, resulting in potentially undesirable mortality and morbidity. Studies found that 11-52% of calls for emergency ambulances are nonserious problems (6,7). Brown et al. reported that up to 40-50% of the total ambulance usage in USA, Canada, Sweden and England was noncompliant (8). Morris et al. found that the emergency status of the ambulance cases was with 51.7% inappropriate and 10.2% were questionable (9). Gardner determined that 61.9% of the cases were unsuitable. Palazzo et al. evaluated ambulance calls in London and identified a noncompliance rate of 53.7% (11).

In the literature, the definition of noncompliant usage is based on different criteria with different triage scales being generally used in determining the criteria (11-14). In our study, thus, we used the International 32 Emergency Parameter by WHO. In one study, the urgency of patients brought by 112 ambulances were compared with the parameters, and 37.7% of the patients didn't show compliance and were assessed as non-urgent requests (2). The noncompliance rates were lower in our study. When investigating the prediagnoses of patients brought by ambulance staff, we identified a noncompliance rate of 10.5%, while this rate was 34.9% in the final diagnoses made in the emergency department. When these compliance rates were compared, a statistically significant difference was found (McNemar Test $p < 0.05$). Therefore, we observed that the ambulance staff brought 89.5% of the 7521 patients with a prediagnosis compliant to the international parameters, while only 65.1% were compliant in the final diagnosis. Hence, according to this fact, we consider that the ambulance staff considering triage before the arrival at the hospital may choose the most critical diagnosis at that time and unnecessarily prediagnose the patient as "urgent" in order to stay on the safe side.

In our study, there was also a significant difference between age groups according to compliance of prediagnoses with the international parameters (Mann-Whitney U $p<0.05$). The median age of the cases that were brought by ambulance and did not show compliance with the parameters was found to be higher. In the study by Yaylacı et al., the mean age of the compliant and noncompliant cases was found as 54.31±23.74 years and 38.07±22.77 years, respectively, and the mean age of the noncompliant ones has been found to be significantly high. In our study, the mean age of final diagnostically compliant group was found 56.8±22.7 years, while this value was 50.8±23.1 in the noncompliant group. The mean ages of the compliant and noncompliant cases have been found to be higher in our study. Considering that the mean age of the noncompliant group was higher, patient referral rates may have increased as the number and age of patients brought by ambulance staffs increased. It must be noted that the high number of patients included to this study may have influenced the results.

When investigating the outcomes of our patients, it was found the rates of discharge and therapy denial were higher in the prediagnostically compliant group. In contrast, it was seen that the discharge rates of patients with a noncompliant final diagnosis were higher and in this group, no exitus was observed. In the study by Yaylacı et al., the hospitalization rates of emergency cases were significantly high (2). The fact that the discharge and therapy refusal or unpermitted leave rates are high in the group with compliant prediagnosis supports our consideration that these cases actually may not be urgent. Even in the literature, high discharge rates are seen as one of the inappropriate ambulance usage criteria (15).

Kawakami et al. reported in their study that 60% of total ambulance calls were discharged at the ED (16). In a study in our country, the discharge rate was 82.7% (17).

When assessing the mortality rates in our study, it was seen that the cases noncompliant with the WHO parameters had a lower mortality rate. This fact contributes our consideration that this group was not urgent.

In our study, there were high therapy refusal and unpermitted leave rates for noncompliant cases in both groups. Many studies reported that the most common reason for patients leaving after application without getting examined was the long waiting period and that this patient group was usually considered as "partially urgent" and "not urgent" (18-21). We concluded that the high therapy refusal or unpermitted leave rates in our study showed that these cases were not urgent.

Our single center study was conducted in a tertiary hospital. We suggest that conducting a multicenter study including all secondary and tertiary hospitals will increase the value of the results.

CONCLUSIONS

In our study, the discrepancy rates of cases brought to the emergency department by 112 ambulances according to final diagnoses was very high. This fact shows that even the cases that showed no compliance with the international parameters were referred to emergency departments via ambulance. In order to prevent inappropriate usage of 112 emergency health care and emergency departments by our citizens, adding modules about emergent medical situations to the primary and secondary school curriculums and organizing public educations may make a contribution. In our country, large-scale researches aimed at decreasing redundant usage of ambulances and health policy developments according to their results are necessary. In service training are essential for 112 staff to identify emergent cases more feasibly and accurately and to make appropriate triage decisions.

DESCRIPTIONS

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