ORIGINAL RESEARCH

DOI: 10.4274/globecc.galenos.2025.07830
Glob Emerg Crit Care

Evaluation of Patients Visiting the Emergency Department by Ambulance; a Prospective Observational Study

Şeyhmus Işık, Hüseyin Yüzlü, Doğaç Niyazi Özüçelik

University of Health Sciences Türkiye, Bakırköy Dr. Sadi Konuk Training and Research Hospital, Clinic of Emergency Medicine, İstanbul, Türkiye

Abstract

Objective: The inappropriate utilization of ambulance services for non-emergent situations represents a global concern, negatively impacting response times, healthcare costs, and the workload of emergency medical services (EMS) personnel. This study aimed to assess the appropriateness of ambulance use by analyzing physical examination findings, hospitalization rates, and mortality outcomes among patients transported to the emergency department (ED) by ambulance.

Materials and Methods: This prospective study included patients aged 14 years and older who were transported to the ED of Bakırköy Dr. Sadi Konuk Training and Research Hospital by ambulance teams between September 1, 2015, and September 30, 2015. Exclusion criteria comprised children under 14 with non-traumatic complaints, pregnancy-related conditions, isolated trauma cases, and patients referred from other facilities. Data on demographic characteristics, clinical parameters, and patient outcomes were collected and subjected to statistical analysis.

Results: Among the 17,997 patients presenting to the ED, 4.4% were transported by ambulance, of whom 60.4% were male. The discharge rate was 67.3%, the intensive care unit admission rate was 12%, and the ward admission rate was 15.9%. A total of 48.3% of patients were categorized as critical based on ED triage systems. Despite this classification, the majority of patients exhibited normal vital signs and physical examination findings.

Conclusion: The findings of this study indicate that most patients transported to the ED by ambulance had normal vital signs and were subsequently discharged. Addressing the issue of ambulance misuse through targeted public education campaigns and enhanced access to primary care services is imperative to ensure the optimal utilization of EMS resources.

Keywords: Ambulance, emergency department, diagnosis, discharge, triage

Introduction

Emergency medical services (EMS) are essential for providing timely care to individuals facing life-threatening conditions. Ambulance systems, a critical component of EMS, are designed to ensure rapid response and transportation to appropriate healthcare facilities. However, the misuse of ambulance services for non-emergency situations has become a significant concern worldwide [1-3].

Inappropriate use of ambulance systems includes calls for minor ailments, transportation convenience, or non-urgent medical needs that could be addressed through primary care or outpatient services [4]. Such misuse leads to delayed response times for critical cases, unnecessary financial burdens on healthcare systems, and increased workload for EMS personnel, potentially resulting in burnout and decreased efficiency. Studies have shown that inappropriate ambulance use accounts for a substantial percentage of total ambulance use in various

Address for Correspondence: Şeyhmus Işık, MD, University of Health Sciences Türkiye, Bakırköy Dr. Sadi Konuk Training and Research Hospital, Clinic of Emergency Medicine, İstanbul, Türkiye
E-mail: drseyhmusisik@outlook.com **ORCID-ID:** orcid.org/0009-0005-7969-6147
Received: 15.01.2025 **Accepted:** 13.03.2025 **Epub:** 21.07.2025

Cite this article as: Işık Ş, Yüzlü H, Özüçelik DN. Evaluation of patients visiting the emergency department by ambulance; a prospective observational study. Glob Emerg Crit Care. [Epub Ahead of Print].

countries, including the United States (USA), Canada, Sweden, and England [5]. Understanding the factors contributing to this problem is essential for developing effective interventions. These factors may include lack of public awareness about appropriate EMS use, limited access to primary care services, and perceptions of ambulance services as a free or easily accessible resource. Research indicates that socioeconomic characteristics of users are related to ambulance misuse or overuse [5].

Despite numerous steps being taken to address this issue, there remains a significant need for scientific studies that shed light on the misuse of ambulance services. While EMS are rapidly advancing in our country, a review of the literature, reveals that the number of scientific studies on this topic is quite limited [5-8].

This study aimed to assess patient outcomes, including hospitalization, discharge, and mortality, among individuals transported to the emergency department (ED) by ambulance services. Additionally, we sought to evaluate the appropriateness of ambulance utilization in these cases.

Materials and Methods

Ethical Approval

This study was approved by the Bakırköy Dr. Sadi Konuk Training and Research Hospital Ethics Committee (approval number: 2015/14/21, date: 31.08.2015). All procedures were conducted in accordance with ethical guidelines and the principles of the Declaration of Helsinki.

Written informed consent was obtained from all patients included in the study. For patients who were unable to provide consent themselves (i.e., individuals under 18 years of age or those with clinically inadequate general condition), written consent was obtained from their legal guardians.

Study Population and Design

This prospective study included patients aged 14 years and older who were brought to the Emergency Medicine Clinic of Bakırköy Dr. Sadi Konuk Training and Research Hospital by ambulance teams between September 1, 2015, and September 30, 2015. Patients under the age of 14 brought in for non-traumatic complaints, patients presenting with pregnancy-related complaints, patients with isolated extremity trauma treated directly by the orthopedic department, and patients transferred from another facility with a prior diagnosis via transfer ambulance were excluded from the study. Patient information was obtained from transfer forms, ED records, discharge summaries, and the hospital information system database.

Data Collection

Data on patients brought in by ambulance, including name, age, date and time of arrival, reasons for emergency ambulance requests, physical examination findings, and vital signs recorded by the ambulance teams, were documented in the study form. Final diagnoses, discharge methods, and discharge date and time were retrieved from ED files and the hospital information system. Data were categorized and recorded in Microsoft Office Excel 2007 (Microsoft Co., New York, USA). Patient demographic information, including gender and age, was obtained from the hospital information system. Patient ages were analyzed in groups.

Pupil examination results were categorized as normal, miotic, mydriatic, non-reactive, anisocoric, or fixed and dilated. Glasgow Coma Scale (GCS) scores were recorded and grouped as mild (score 14-15), moderate (score 9-13), and severe (score 3-8). Skin findings were classified as normal, pale, cyanotic, moist, dry, or hyperemic. Mean arterial pressures were calculated with the formula [systolic + (2 × diastolic)]/3. Pulse rates were categorized as bradycardia (<60 bpm), normal (60-100 bpm), or tachycardia (>100 bpm). Respiratory rates were grouped as bradypnea (0-11 n/minute), normal (12-24 n/minute), or tachypnea (≥25 n/minute). Final diagnoses and discharge outcomes were obtained from the hospital information system and categorized as discharge, ward admission, intensive care admission, treatment refusal, unauthorized leave, or death.

Statistical Analysis

The data utilized in the study were analyzed using the SPSS 16.0 for Windows® statistical software package (IBM Inc., Chicago, IL, USA). The normality of the distribution of continuous variables was assessed using the one-sample Kolmogorov-Smirnov test; after which parametric and non-parametric tests were applied as appropriate. For comparisons between groups, the t-test and Mann-Whitney U test were used, while the Wilcoxon signed-rank test was applied for within-group comparisons. For categorical variables, Pearson's chi-square test, one-sample chi-square test, and Fisher's exact test were employed. Descriptive statistics included minimum and maximum values, arithmetic mean ± standard deviation for continuous variables, and frequencies and percentages for categorical data. A p-value of <0.05 was considered the threshold for statistical significance

Results

In our study covering September 2015, a total of 17,997 patients presented to our ED, of whom 793 were transported by EMS ambulances. The proportion of patients brought in by EMS to the total patient population was found to be 4.4%. Among the 793 patients included in the study, 60.4% (n=479) were male, and 39.6% (n=314) were female, resulting in a male-to-female ratio of 1.5:1 ($p<0.001$). The mean age of the patients was 53.9±23.16 years. The mean age of male patients was 49.24±22.75 years, while the mean age of female patients was 61.1±21.94 years. When assessing age groups, patients aged

18-65 years comprised 56.8% (n=451) of the presentations. It was observed that only 2.4% of the patients arrived by private healthcare emergency ambulances.

An analysis of the characteristics of the cases revealed that 24.3% (n=193) were forensic cases. By analyzing patient admissions by 8-hour time periods, the busiest period was identified as the evening hours (16:01-00:00), accounting for 42.0% (n=333) of admissions. When evaluating the presenting complaints, vital signs, clinical conditions, and distribution of patients by their admission rooms, it was found that the proportion of critical patients taken to the T1 room was 48.1% (n=383) (Table 1).

We also examined the physical examination findings and vital signs of the patients, based on their clinical conditions, admitted to triage rooms. When evaluating pupil reactions, it was found that 95.1% of the patients (n=754) had normal reactions, 1.3% (n=10) were miotic, 2.0% (n=16) were mydriatic, 1.0% (n=8) were anisocoric, 0.4% (n=3) were non-reactive, and 0.3% (n=2) had fixed dilated pupils. Among the 793 patients with recorded skin findings in our ED, 84.7% (n=672) had normal findings, 5.9% (n=47) were pale, 3.9% (n=31) were moist, 0.3% (n=2) were hyperemic, 0.5% (n=4) were icteric, 2.0% (n=16) were cyanotic, and 2.6% (n=21) were dry (Table 2).

The GCS scores were categorized as mild (14-15), moderate (9-13), and severe (≤8), and a comparative analysis was conducted between the GCS values assessed by EMS teams and those determined in our ED. Among patients classified as having severe GCS scores in the ED, 75% (n=21) were also categorized as "severe" by the EMS teams, while 10.7% (n=3) were assessed as "moderate" and 14.3% (n=4) as "mild." For patients classified as having moderate GCS scores in the ED (n=35), 11.4% (n=4) were evaluated as "severe," 42.9% (n=15) as "moderate," and 45.7% (n=16) as "mild" by EMS teams. Of the 611 patients categorized as having mild GCS scores in the ED, 95.7% (n=585) were similarly classified as "mild" by EMS teams, while 4.3% (n=16) were categorized as "moderate." Notably, none of the patients classified as "mild" in the ED were assessed as "severe" by EMS teams. The observed discrepancies in GCS classifications between EMS teams and the ED were statistically significant ($p<0.001$, $\kappa=0.566$) (Table 3).

Table 1. Baseline characteristics of patients

Baseline characteristics	n (%)
Age (years)	
0-18 years	37 (4.8)
19-64 years	451 (56.8)
≥65 years	305 (38.4)
Ambulance agency	
Public emergency medical services	774 (97.6)
Private healthcare	19 (2.4)
Emergency department arrival time	
00.01-08:00	157 (19.8)
08:01-16:00	303 (38.2)
16:01: 24:00	333 (42.0)
Triage	
1	383 (48.3)
2	220 (27.7)
3	133 (16.8)
4	53 (6.7)
5	4 (0.5)

Table 2. Distribution of physical examination findings

Physical examination findings	n (%)
Pupillary reflexes	
Normal	754 (9.2)
Miotic	10 (1.3)
Mydriatic	16 (2.1)
Anisocoric	8 (1.2)
Non-reactive	3 (0.1)
Fixed dilated	2 (0.1)
Skin findings	
Normal	672 (84.7)
Pale	47 (5.9)
Moist	31 (3.9)
Hyperemic	2 (0.3)
Icteric	4 (0.5)
Cyanotic	16 (2.0)
Dry skin	21 (2.6)

Table 3. Comparison of the distribution of patients according to GCS according to EMS-ED

Mild		Distribution of patients according to ED triage			Total
		Moderate	Severe		
Distribution of patients according to EMS triage	Mild	21 (75.0)	4 (11.4)	0	25 (3.7)
	Moderate	3 (10.7)	15 (42.9)	26 (4.3)	44 (6.5)
	Severe	4 (14.3)	16 (45.7)	585 (95.7)	605 (89.8)
Total		28 (4.2)	35 (5.2)	611 (90.6)	674 (100)

GCS: Glasgow Coma Scale, EMS: Emergency medical services, ED: Emergency department

The respiratory rates, mean arterial pressures, and pulse rates of patients brought to our ED by emergency ambulances were evaluated. The average respiratory rate of all patients was 19.47±5.51 breaths per minute, the average mean arterial pressure measured in the ED was 92.25±18.28 mmHg, and the average pulse rate was 87.06±19.74 beats per minute. It was found that 85.9% (n=681) of the patients had a respiratory rate between 12 and 20 breaths per minute. Additionally, 42.4% (n=381) were normotensive, and 72.2% (n=596) had a pulse rate within the normal range (Table 4).

Table 4. Distribution of patients based on vital parameters

Vital parameters	n (%)
Respiratory rate	
Bradipne (0-11)	12 (1.5)
Normal (12-20)	681 (85.9)
Takipne (≥20)	100 (12.6)
Mean arterial pressures	
Hypotensive	65 (8.2)
Normotensive	336 (42.4)
Slightly elevated	246 (31.0)
High	94 (11.9)
Very high	52 (6.5)
Pulsa rate (n/dk)	
No pulse	1 (0.1)
Bradycardic (<60 bpm)	42 (5.3)
Normal (60-100 bpm)	596 (75.2)
Tachycardic (>100 bpm)	154 (19.4)

Table 5. Distribution of patients based on emergency department outcomes

ED outcomes	n	%
Discharged	534	67.3
ICU admission	100	12.6
Exitus	8	1.0
DAMA from the ED	27	3.4
Inpatient admission	126	15.9
Internal medicine	31	3.9
Neurosurgery	6	0.8
Gastroenterology	11	1.4
Urology	4	0.5
Neurology	14	1.8
Orthopedics	25	3.2
Cardiovascular surgery	4	0.5
General surgery	21	2.6
Pulmonology	3	0.4
Thoracic surgery	1	0.1
Otolaryngology	1	0.1

DAMA: discharge against medical advice, ED: Emergency department, ICU: Intensive care unit

When we examined the wards to which patients brought to the ED by ambulances were admitted, it was observed that 67.3% (n=534) of the patients were discharged from the ED, 12.0% (n=95) were admitted to the intensive care unit (ICU), and 15.9% (n=126) were admitted to inpatient wards (Table 5).

Discussion

In our study, the proportion of patients presenting to the ED via ambulance was found to be 4.4%. In similar studies conducted in Türkiye, this rate was reported to range between 1.3% and 4.0% [9-11]. While our data align with national figures, studies conducted abroad have shown higher rates of ambulance usage. A 2003 study in the USA reported that 14% of 114 million ED visits were made by ambulance [3]. Similarly, Nawar et al. in a 2005 study, stated that 15.5% of ED visits were ambulance arrivals [12]. ED visits and the number of emergency surgical procedures performed in Türkiye are steadily increasing [13,14]. The lower rates observed in Türkiye compared to the USA and European countries might be attributed to non-emergency patients frequently using emergency services for free, unscheduled healthcare.

When examining the age distribution of patients brought in by ambulance, we found that the majority (56.8%) were in the 18-65 age group. Kıdak et al. [15] reported in their study that 26.7% of all ambulance transports involved patients aged 65 and older. Similarly, Nur et al. [16] found that 22.2% of emergency calls to the 112 ambulance service involved patients aged 65 and older. Yurteri et al. [17], in their study conducted in Bursa, reported that patients aged 60 and older constituted 48% of ambulance arrivals. Victor et al. [18], in a London-based study, stated that 40% of all ambulance calls were made by patients aged 60 and older. Our data align with the literature.

In our study, the average respiratory rate was 19.47±5.51 breaths per minute. Özüçelik et al. [19], in their study comparing Hospital Admission Triage System and Emergency Severity Index triage systems, calculated the average respiratory rate as 17.3±12.99. The mean arterial pressure in our study was 92.25±18.28 mmHg, while Özüçelik et al. [19] reported it as 86.8 mmHg. The average pulse rate in our study was 87.06±19.74 beats per minute, compared to 88.6±16.62 reported by Özüçelik et al. [19]. Evaluations in non-physician-staffed ambulances, as well as rapid on-site examinations, are prone to errors and changes in clinical findings during transport to the ED should be considered. Thus, vital signs and examinations performed by EMS teams should be conducted with greater precision. Moreover, patients should undergo detailed examinations upon arrival at the ED, and these should be repeated periodically. Additionally, derived severity scores can be utilized to assess patients' conditions [20,21].

In our study, 67.3% of the patients brought in by ambulance were discharged, 27.2% were admitted, and 1.0% died. Of those admitted, 44.2% were placed in ICUs, and 55.8% were admitted to inpatient wards. Önge et al. [22] reported that 74.9% of patients brought to the ED via ambulance were discharged after evaluation and treatment, while 24.1% were admitted; of these, 61.1% were placed in ICUs and 38.9% in inpatient wards. Similarly, Çelik et al. [11] reported that 87.2% of ambulance patients were discharged, 0.8% died, and 11.9% were admitted; of those admitted, 34.5% were placed in ICUs and 65.5% in inpatient wards. Kılıçaslan et al. [23] found that 86.2% of patients were discharged from the ED, 12.5% were admitted, 0.8% refused treatment, and 0.3% died.

Tanrıkulu et al. [24] reported admission rates of 42.3% to internal medicine wards, 47.5% to surgical wards, and 10.2% to ICUs. Among patients admitted to internal medicine wards, 33.2% were in cardiology, 19.5% in neurology, and 13% in general internal medicine. For surgical wards, 25.5% were in general surgery, 23.8% in orthopedics, and 16.2% in neurosurgery. Kılıçaslan et al. [23] reported that the departments with the highest admission rates were cardiology (21.0%), internal medicine (15.1%), and orthopedics (11.2%).

In our hospital, which employs a complaint-based five-level triage system (T1, T2, T3, T4, T5), 48.3% of patients brought in by ambulance were admitted to the T1 room, 27.7% to the T2 room, 16.8% to the T3 room, 6.7% to the T4 room, and 0.5% (n=4) to the T5 room. Aydın et al. [25], using a three-level triage system, reported that 16.5% of patients fell into the "critical" (T1) category, 21.2% into "urgent" (T2), and 62.3% into "non-urgent" (T3). Çevik et al. [26] classified 24.34% of ED patients into the green area, 75.20% into the yellow area, and 0.47% into the red area, based on urgency. A Danish study conducted in 2013 reported that, based on four months of data, 32.9% of emergency patients were in the green area (T4), 39.7% in the yellow area (T3), 26.9% in the orange area (T2), and 0.4% in the red area (T1) [27]. Kılıçaslan et al. [21] using a three-level triage system found that 10.4% of patients were in T1, 42.3% in T2, and 47.2% in T3. Esmailian et al. [28] in a study comparing five-level triage systems reported that 1.8% of patients were admitted to T1, 24.0% to T2, 68.1% to T3, 4.5% to T4, and 1.7% to T5. It has been reported that triage codes influence physicians' approach to patients in the ED [29]. We believe that the variation in data reported in the literature is due to the use of different triage systems, including two-level, three-level, four-level, and five-level systems.

Study Limitations

This study was conducted at a single center. Patients under the age of 14 with non-traumatic complaints, those with pregnancy-related complaints, and those with isolated extremity trauma directly admitted followed up in the orthopedics department were excluded from the study because they were admitted to different departments and their data were unavailable.

Conclusion

In our study, it was determined that the vast majority of patients presenting to the ED via ambulance had normal physical examinations and vital signs. Additionally, most of these patients were discharged from the ED.

Ethics

Ethics Committee Approval: This study was approved by the Bakırköy Dr. Sadi Konuk Training and Research Hospital Ethics Committee (approval number: 2015/14/21, date: 31.08.2015). All procedures were conducted in accordance with ethical guidelines and the principles of the Declaration of Helsinki.

Informed Consent: Written informed consent was obtained from all patients included in the study. For patients who were unable to provide consent themselves (i.e., individuals under 18 years of age or those with clinically inadequate general condition), written consent was obtained from their legal guardians.

Footnotes

Authorship Contributions

Surgical and Medical Practices: Ş.I., H.Y., Concept: Ş.I., D.N.Ö., Design: Ş.I., D.N.Ö., Data Collection or Processing: Ş.I., H.Y., Analysis or Interpretation: Ş.I., D.N.Ö., Literature Search: Ş.I., H.Y., Writing: Ş.I., H.Y., D.N.Ö.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

References

1. Palazzo FF, Warner OJ, Harron M, Sadana A. Misuse of the London ambulance service: How much and why? J Accid Emerg Med. 1998;15:368-70.
2. Camasso-Richardson K, Wilde JA, Petrack EM. Medically unnecessary pediatric ambulance transports: a medical taxi service? Acad Emerg Med. 1997;4:1137-41.
3. Brown E, Sindelar J. The emergent problem of ambulance misuse. Ann Emerg Med. 1993;22:646-50.
4. Peacock PJ, Peacock JL, Victor CR, Chazot C. Changes in the emergency workload of the London Ambulance Service between 1989 and 1999. Emerg Med J. 2005;22:56-9.
5. Kawakami C, Ohshige K, Kubota K, Tochikubo O. Influence of socioeconomic factors on medically unnecessary ambulance calls. BMC Health Serv Res. 2007;7:120.
6. Armağan E, Akköse Ş, Çebişci H, Engindeniz Z, Tokyay R . Hastaneler arası sevklerde kurallara uyuluyor mu? Ulus Travma Derg. 2001;7:13-6.

7. Yaylacı S, Cimili Öztürk T, Çelik Yılmazer S. Acil servise ambulansla başvuran hastaların aciliyetinin retrospektif değerlendirilmesi. Acıbadem Üniversitesi Sağlık Bilimleri Dergisi. 2013;4:64-7.
8. Aksoy F, Ergun A. Ambulance in emergency medicine. Ulus Travma Dergisi. 2002;8:160-3.
9. Zenginol M, Al B, Genç S, Deveci İ, Yarbil P, Arı Yılmaz D, ve ark. Gaziantep İili 112 acil ambulanslarının 3 yıllık çalışma sonuçları. Akadem acil tıp derg JAEM 2011: 27-32.
10. Atilla ÖD, Oray D, Akın Ş, Acar K, Bilge A. Acil servisten bakış: ambulansla getirilen hastalar ve sevk onamları. Türkiye Acil Tıp Dergisi. 2010;10:175-80.
11. Çelik GK, Karakayalı O, Temrel TA, Arık YE, İçme F, Sener A. 112 ile acil servise getirilen vakaların değerlendirilmesi. Turk Med J. 2012;6:73-6.
12. Nawar EW, Niska RW, Xu J. National Hospital Ambulatory Medical Care Survey: 2005 emergency department summary. Adv Data. 2007:1-32.
13. Beştemir A, Aydın H. Yıllık 300 milyon hasta muayenesi; Türkiye'de 2. ve 3. basamak kamu sağlık tesisleri acil servis ve poliklinik hizmetlerinin değerlendirilmesi. Sakarya Tıp Dergisi. 2022;12:496-502.
14. Beştemir A, Aydın H, Tuncar A. The Impact of the COVID-19 Pandemic on emergency surgical operations in state hospitals in Turkey: a retrospective and descriptive study. Eurasian J Emerg Med. 2023;22:34-40.
15. Kıdak L, Keskinoğlu P, Sofuoğlu T, Ölmezoğlu Z. İzmir ilinde 112 acil ambulans hizmetlerinin kullanımının değerlendirilmesi. Genel Tıp Derg. 2009;19:113-9.
16. Nur N, Demir ÖF, Çetinkaya S, Tirek N. Yaşlılar tarafından kullanılan 112 acil sağlık hizmetlerinin değerlendirilmesi. Turkish Journal of Geriatrics. 2008;11:7-11.
17. Yurteri H, Saran A, Özgün İ. Hızır acil servis ambulansları ile alınan vakaların değerlendirilmesi. Ulusal Travma Derg. 1996;2:204-7.
18. Victor CR, Peacock JL, Chazot C, Walsh S, Holmes D. Who calls 999 and why? a survey of the emergency workload of the London Ambulance Service. J Accid Emerg Med. 1999;16:174-8.
19. Ozüçelik DN, Kunt MM, Karaca MA, Erbil B, Sivri B, Sahin A, et al. A model of complaint based for overcrowding emergency department: Five-Level Hacettepe Emergency Triage System. Ulus Travma Acil Cerrahi Derg. 2013;19:205-14.
20. Aydın H, Doğan H, Erdoğan MÖ. Comparison of COVID-GRAM, 4C Mortality, qSOFA, SIRS, NEWS, and MEWS in Predicting Mortality in COVID-19. Med J Bakirkoy. 2023;19:111-8.
21. Aydın H, Doğanay F, Erdoğan M, Doğan H, Beştemir A, Tuncar A. Comparison of CCI, BISAP and APACHE II scoring systems to predict severe disease in patients with mild acute pancreatitis: a retrospective observational study. CMJ. December 2022;44:460-9.
22. Önge T, Satar S, Kozacı N, Açıkalın A, Köseoğlu Z, Gülen M, et al. 112 ile Acil Tıp Servisine Getirilen Erişkin Hastaların Analizi. AEM 2013;12:150-4.
23. Kılıçaslan İ, Bozan H, Oktay C, Göksu E. Türkiye'de acil servise başvuran hastaların demografik özellikleri. Türkiye Acil Tıp Derg. 2005;5:5-13.
24. Tanrıkulu CŞ, Tanrıkulu Y, Karaman S. Acil servis başvurularının ve acil servisten yatırılan hastaların gözden geçirilmesi: bir eğitim hastanesinin kesitsel analizi. J Clin Anal Med. 2014;5:128-32.
25. Aydın T, Aydın ŞA, Köksal Ö, Özdemir F, Kulaç S, Bulut M. Uludağ Üniversitesi Tıp Fakültesi Hastanesi Acil Servisine başvuran hastaların özelliklerinin ve acil servis çalışmalarının değerlendirilmesi. Academic emergency medicine: official journal of the Society for Academic Emergency Medicine. 2010;9(4):163-8.
26. Çevik C, Tekir Ö. Acil servis başvurularının tani kodları, triyaj ve sosyo-demografik açıdan değerlendirilmesi. Balikesir Saglik Bil Derg. 2014;3:102-7.
27. Plesner LL, Iversen AK, Langkjær S, Nielsen TL, Østervig R, Warming PE, et al. The formation and design of the TRIAGE study--baseline data on 6005 consecutive patients admitted to hospital from the emergency department. Scand J Trauma Resusc Emerg Med. 2015;23:106.
28. Esmailian M, Zamani M, Azadi F, Ghasemi F. Inter-rater agreement of emergency nurses and physicians in Emergency Severity Index (ESI) triage. Emerg (Tehran). 2014;2:158-61.
29. Aydin H, Dogan H. Effect of triage on physicians' clinical decision: a prospective, observational, single-center and cross-sectional study. Journal of Acute Disease. 2021;10:227-32.