

ANALYSIS OF TRIAGE CODE AND DIAGNOSIS DISTRIBUTIONS OF PATIENTS ARRIVING VIA 112 EMERGENCY SERVICES

TRIAJE CODE AND DIAGNOSIS DISTRIBUTIONS

112 ARACILIĞI İLE GELEN HASTALARIN TRIAJ KOD VE TANI DAĞILIMLARININ İNCELENMESİ

TRIAJ KOD VE TANI DAĞILIMLARI

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ARTICLE INFO	ABSTRACT
Article Information Article Type: Research Article Received: 09.02.2026 Accepted: 01.06.2026 Published: 28.08.2026 Keywords: Emergency Medical Services, Triage, Diagnostic Distribu- tions, Unnecessary Use	Objective: The aim of this study was to evaluate the utilization patterns of 112 emergency medical services (EMS) by analyzing the demographic characteristics, triage codes, diagnostic distributions, and clinical outcomes of patients transported to a training and research hospital. Materials and Methods: This study retrospectively evaluated the medical records of patients who presented to the emergency department (ED) of İzmir Katip Celebi University (IKCU) Atatürk Training and Research Hospital via ambulance transport between January 1 and December 31, 2024. Relevant data were retrieved utilizing the hospital's electronic health record (EHR) system. Patients with incomplete, erroneous, or missing clinical data in their medical records were excluded from the analysis. Results: Among the 321 patients evaluated, 55.45% (n = 178) were male. Patients aged over 65 years accounted for 47.98% (n = 154) of the study population. In terms of clinical acuity, the yellow triage category represented the largest proportion, encompassing 51.09% (n = 164) of the cases. The most frequent primary etiology for admission was trauma (21.81%; n = 70), followed by cardiovascular and neurological conditions, respectively. Regarding patient disposition, nearly half of the patients (47.98%; n = 154) were successfully treated and discharged directly from the emergency department (ED) without requiring inpatient hospitalization. Conclusion: The 112 emergency medical services (EMS) system is frequently utilized for non-urgent clinical conditions in Türkiye. Interestingly, the rate of inappropriate ambulance utilization observed in our cohort was lower than those frequently reported in the existing literature. The vast majority of ambulance presentations and subsequent mortality cases in this sample stemmed from preventable health conditions. To mitigate the inappropriate utilization of EMS resources, various regulatory measures, policy reforms, and targeted public awareness campaigns could be considered.
MAKALE BİLGİLERİ	ÖZET
Makale Bilgisi Makale Türü: Araştırma Makalesi Geliş Tarihi: 09.02.2026 Kabul Tarihi: 01.06.2026 Yayın Tarihi: 28.08.2026 Anahtar Kelimeler: Acil Sağlık Hizmeti, Triaj, Tani Dağılımları, Gereksiz Kullanım	Amaç: Bu çalışmanın amacı bir eğitim araştırma hastanesine 112 aracılığı ile gelen hastaların demografik özelliklerini, triaj kod ve tani dağılımlarını ve sonuçlarını ortaya koyarak 112 acil sağlık hizmetinin kullanımını yorumlamaktır. Gereç ve Yöntemler: 1 Ocak-31 Aralık 2024 tarihleri arasında İKÇÜ Atatürk Eğitim Araştırma Hastanesi acil servisine ambulansla başvuran hastane bilgi sistemi üzerinden retrospektif olarak incelenmiştir. Eksik ya da yanlış doldurulmuş epikrizli hastalar araştırmaya dahil edilmemiştir. Bulgular: İncelenen 321 hastanın %55,45'i erkektir. Hastaların %47,98'i 65 yaş üzeridir. Triaj kod dağılımında %51,09'u ile sarı triaj kodu en büyük paya sahiptir. En sık geliş nedeni travmadır (%21,81; n=70). Travma sonrası sırasıyla kardiyovasküler ve nörolojik sistem nedenli geliş olmuştur. Hastaların %47,98'i yatış verilmeden tedavi sonrası taburcu edilmiştir. Sonuç: 112 acil sağlık sistemi ülkemizde sıklıkla gereksiz kullanılmaktadır. Araştırma bölgemizde gereksiz ambulans kullanımı incelenen literatüre göre daha az bulunmuştur. Ambulans kullanım ve mortalite sebeplerinin büyük çoğunluğu önlenabilir sağlık sorunlarından kaynaklanmaktadır. Gereksiz ambulans kullanımını önlemek için yaptırımlar düşünülebilir.

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Introduction

Pre-hospital emergency medical services (EMS) are established to rapidly transport critically ill patients to well-equipped healthcare facilities and to initiate life-saving interventions during transit (1). In Türkiye, emergency medical services can be requested free of charge through 112, which serves as the unified emergency hotline integrated with other public safety answering points (2). Triage is the clinical process of prioritizing emergency department (ED) patients based on the urgency of their medical conditions. This system is crucial for mitigating mortality and morbidity, ensuring that limited healthcare resources are directed efficiently (3). In Türkiye, the national ED triage system is implemented across three color-coded categories:

- **Green Category (Non-Urgent):** Applied to patients who can be safely evaluated in the ED examination rooms and should receive medical intervention within two hours of arrival.
- **Yellow Category (Urgent):** Reserved for patients who require expedited evaluation in the ED examination rooms, with medical intervention recommended within one hour.
- **Red Category (Emergent):** Designated for critically unstable patients who must be immediately transferred to the resuscitation room for instantaneous intervention (4).

The primary mandate of the 112 EMS is to facilitate the rapid transfer of critically ill patients requiring immediate medical attention. In practice, however, these services are frequently utilized outside their intended scope. For instance, Cinar et al. reported that 68.77% of ambulance dispatches were perceived as inappropriate by active paramedics and emergency medical technicians working in 112 services, highlighting significant challenges regarding the appropriate utilization of this vital public resource (5).

To address these dynamics, the present study evaluated patients transported via 112 EMS to the ED of Izmir Katip Celebi University (IKCU) Ataturk Training and Research Hospital, a high-capacity, tertiary facility in the Aegean region of Türkiye. Patients were analyzed according to their triage classifications, primary diagnoses, and final clinical dispositions. Ultimately, this study aimed to assess the efficiency and appropriateness of 112 ambulance resource utilization by analyzing patient outcomes, including rates of hospital admission and discharge.

Materials and Methods

This study retrospectively evaluated patients who presented to the Emergency Department (ED) of Izmir Katip Celebi University (IKCU) Ataturk Training and Research Hospital via the 112 Emergency Medical Services (EMS) between January 1, 2024, and December 31, 2024. Data retrieval was conducted utilizing the hospital's electronic health record (EHR) database. The primary endpoint was to determine patient demographics, triage classifications, diagnostic distributions, and clinical outcomes within the sample. The secondary endpoints were to analyze the association between the primary reason for presentation and assigned triage categories, as well as the relationship between clinical outcomes and triage categories. The sole inclusion criterion was presentation to the ED via the 112 emergency ambulance system. Ultimately, a total of 321 patients met the inclusion criteria and were included in the study. Patients with incomplete or erroneously recorded clinical intake forms were excluded from the analysis.

When assigning triage categories, patients' overall clinical status, chief complaints, primary reasons for admission, and subsequent subspecialty consultations or hospitalizations were carefully evaluated. Patients who signed a treatment refusal form, left against medical

advice (LAMA), or refused initial medical examination were systematically assigned a green (non-urgent) triage category. Descriptive statistics were utilized to summarize triage distributions, the most frequent reasons for presentation, and patient outcomes.

IKCU Ataturk Training and Research Hospital is a major tertiary referral center. With an operational capacity of 1,040 beds, 115 intensive care beds, 39 operating suites, and 21 dialysis stations, the facility delivers healthcare services across 35 inpatient clinics and 47 outpatient departments. The hospital's affiliated facilities include the Hatay Annex Building, the Ismet Yorgancilar District Outpatient Clinic, the Suleyman Tastekin District Outpatient Clinic, the Narlidere District Outpatient Clinic, and the Balçova District Outpatient Clinic (6).

Results

Among the 321 patients included in the study, 55.45% ($n = 178$) were male and 44.45% ($n = 143$) were female (one patient had missing gender data). In terms of age distribution, 47.98% ($n = 154$) of the patients were older than 65 years, followed by 33.02% ($n = 106$) aged 40–65 years, 18.07% ($n = 58$) aged 18–40 years, and 0.93% ($n = 3$) aged 0–18 years (Table 1). Regarding clinical acuity, 34.27% ($n = 110$) of the patients were assigned to the red triage category, 51.09% ($n = 164$) to the yellow category, and 14.64% ($n = 47$) to the green category (Table 2).

Table 1. Demographic Characteristics of Patients

Gender	n	%
Male	178	55,45%
Female	143	44,55%
Grand Total	321	100,00%
Age Group	n	%
0-18	3	0,93%
18-40	58	18,07%
40-65	106	33,02%
65+	154	47,98%
Grand Total	321	100,00%

Table 2. Triage Code Distributions

Triage Code	n	%
Red	110	34,27%
Yellow	164	51,09%
Green	47	14,64%
Grand Total	321	100,00%

The primary etiologies for 112 EMS utilization were dominated by trauma (21.81%; $n = 70$), followed closely by cardiovascular conditions (19.31%; $n = 62$) and neurological disorders (14.95%; $n = 48$). Other reasons for admission included respiratory system conditions (14.64%; $n = 47$), gastrointestinal disorders (6.54%; $n = 21$), urogenital pathologies (4.36%; $n = 14$), psychiatric emergencies (4.05%; $n = 13$), endocrine disorders (2.18%; $n = 7$), acute poisonings (2.18%; $n = 7$), infectious diseases (1.87%; $n = 6$), rheumatological disorders (1.87%; $n = 6$), hematological or oncological conditions (1.87%; $n = 6$), and allergic reactions (0.93%; $n = 3$). Obstetric (pregnancy-related) and ophthalmic conditions each accounted for 0.31% ($n = 1$) of the cases. Additionally, a minor proportion of patients presented for unclassified reasons (1.25%; $n = 4$), and the primary reason for admission was undocumented for 1.56% ($n = 5$) of the cohort (Table 3).

Table 3. Reasons for Calling an Ambulance

Reason for Coming	n	%
Trauma	70	21,81%
Cardiovascular System	62	19,31%
Neurological System	48	14,95%
Respiratory System	47	14,64%
Gastrointestinal System	21	6,54%
Urogenital System	14	4,36%
Psychiatric	13	4,05%
Endocrinology	7	2,18%
Poisoning	7	2,18%
Infectious Diseases	6	1,87%
Rheumatological System	6	1,87%
Hematology and Oncology	6	1,87%
Unknown	5	1,56%
Other	4	1,25%
Allergy	3	0,93%
Pregnancy	1	0,31%
Ophthalmology	1	0,31%
Grand Total	321	100,00%

Regarding overall clinical outcomes, 47.98% ($n = 154$) of the patients were discharged directly from the ED following examination and necessary observation. Hospitalization in a general ward was required for 22.74% ($n = 73$) of the patients, while 18.69% ($n = 60$) were admitted to the intensive care unit (ICU). The in-hospital mortality rate was 8.72% ($n = 28$), and 1.87% ($n = 6$) of the patients either refused medical treatment or left against medical advice (LAMA) (Table 4).

Table 4. Patient Outcomes

Patient Outcome	n	%
No Hospitalization/Discharged	154	47,98%
Service Hospitalization	73	22,74%
Intensive Care Unit Admission	60	18,69%
Exitus	28	8,72%
Treatment Refused or Left Against Medical Advice	6	1,87%
Grand Total	321	100,00%

When evaluating the cross-tabulations between primary presentation reasons and assigned triage categories, the majority (50.0% or more) of patients presenting with cardiovascular, hematological, or oncological conditions were categorized under the red triage level. Conversely, no patients with allergies, obstetric concerns, acute poisonings, or unclassified/undocumented causes were assigned a red triage code (Table 5). In contrast, the majority (50.0% or more) of patients presenting with ophthalmic, endocrine, obstetric, infectious, hematological/oncological, neurological, psychiatric, respiratory, traumatic, urogenital, or toxicological (poisoning) conditions were categorized under the yellow triage level (Table 5). Finally, the majority (50.0% or more) of patients presenting with allergic reactions, rheumatological disorders, or other unclassified and undocumented causes were assigned to the green triage category (Table 5).

Table 5. Reasons for Visit and Urgency

Reason for Visit	Red		Yellow		Green		n total
	n	%	n	%	n	%	
Allergy		0,00%	1	33,33%	2	66,67%	3
Unknown		0,00%		0,00%	5	100,00%	5
Other		0,00%	2	50,00%	2	50,00%	4
Endocrinology	2	28,57%	4	57,14%	1	14,29%	7
Infectious Disease	1	16,67%	3	50,00%	2	33,33%	6
Gastrointestinal System	4	19,05%	10	47,62%	7	33,33%	21
Pregnancy		0,00%	1	100,00%		0,00%	1
Ophthalmology		0,00%	1	100,00%		0,00%	1
Hematology and Oncology	3	50,00%	3	50,00%		0,00%	6
Cardiovascular System	47	75,81%	10	16,13%	5	8,06%	62
Neurological System	21	43,75%	25	52,08%	2	4,17%	48
Psychiatric		0,00%	13	100,00%		0,00%	13
Rheumatological System	1	16,67%	2	33,33%	3	50,00%	6
Respiratory System	14	29,79%	28	59,57%	5	10,64%	47
Trauma	14	20,00%	47	67,14%	9	12,86%	70
Urogenital System	3	21,43%	8	57,14%	3	21,43%	14
Poisoning		0,00%	6	85,71%	1	14,29%	7
Grand Total	110	34,27%	164	51,09%	47	14,64%	321

Analyzing outcomes by triage levels revealed that among patients assigned to the red category, 54.55% ($n = 60$) were admitted to the ICU, 19.09% ($n = 21$) were hospitalized in the general ward, and 25.45% ($n = 28$) died, whereas only 0.91% ($n = 1$) were directly discharged. None of the patients in the red triage category refused treatment or left the ED. For the yellow triage category, 30.49% ($n = 50$) of the patients were admitted to the general ward, and the remaining 69.51% ($n = 114$) were discharged. No deaths, treatment refusals, or LAMA cases were observed among patients in the yellow triage category (Table 6). Among those assigned to the green triage category, 4.26% ($n = 2$) required admission to inpatient services, while 82.98% ($n = 39$) were discharged. Additionally, 12.77% ($n = 6$) of the green-coded patients either refused treatment or left the ED without notifying the medical staff. There were no mortalities within the green triage category (Table 6).

Table 6. Relationship Between Triage Codes and Outcomes

Patient Outcomes	Red		Yellow		Green		n Total	% Total
	n	%	n	%	n	%		
Exitus	28	25,45%		0,00%		0,00%	28	8,72%
Service Hospitalization	21	19,09%	50	30,49%	2	4,26%	73	22,74%
Treatment Refused or Left Against Medical Advice		0,00%		0,00%	6	12,77%	6	1,87%
No Hospitalization/ Discharged	1	0,91%	114	69,51%	39	82,98%	154	47,98%
Intensive Care Unit Admission	60	54,55%		0,00%		0,00%	60	18,69%
Grand Total	110	100,00%	164	100,00%	47	100,00%	321	100,00%

Discussion

Although healthcare services in Türkiye have evolved substantially, the inappropriate utilization of emergency resources poses a significant barrier to systemic development and restricts access for patients in critical need. Emergency medical services (EMS), which represent a cornerstone of emergency care, are inherently resource-intensive, costly, and susceptible to non-urgent utilization. According to the Budget Expenditure Activity Classification Table published by the Strategy Development Department of the Turkish Ministry of Health, a staggering TRY 1,062,381,591.39 was allocated to Emergency Medical Services in March 2025 alone (7). To optimize healthcare delivery and effectively manage these finite resources, characterizing the clinical appropriateness of EMS utilization is of paramount importance. Consequently, this study sought to evaluate the appropriateness of 112 EMS utilization by examining the demographic profiles, triage classifications, primary dispatch etiologies, and clinical outcomes of 321 patients transported to IKCU Ataturk Training and Research Hospital—one of the largest tertiary facilities in Izmir and the broader Aegean region—during the year 2024.

Regarding the demographic breakdown of our cohort, 55.45% of the participants were male. The vast majority of patients (47.98%) were older than 65 years, whereas the smallest subgroup (0.93%) comprised pediatric patients aged 0–18 years. These demographic distributions are highly consistent with established domestic literature (8,9,10,11,12,13). The disproportionately high rate of EMS utilization among the geriatric population may be attributed to a higher prevalence of complex comorbidities in this age group, coupled with the fact that acute clinical deteriorations in elderly patients often carry a high risk of rapid mortality, prompting families and caregivers to seek ambulance

transport as a safer and more reliable route to emergency care.

In our study, the three most frequent primary etiologies for admission were trauma (21.81%), cardiovascular conditions (19.31%), and neurological disorders (14.95%). These results parallel the findings documented by Kurtoğlu (8) and Kocaoglu et al. (12). However, slight variations exist in other domestic cohorts; for example, Kapci et al. reported trauma, cardiovascular, and psychiatric emergencies as their top three etiologies (9), while Bozatli et al. identified neurological, cardiological, and internal medicine causes (10), and Yuksel et al. highlighted trauma, unclassified causes, and cardiological reasons (13).

The high prevalence of traumatic injuries observed both in our study and across the literature may stem from a general disregard for occupational safety measures, interpersonal violence, and a lack of public safety awareness. In the context of our study, this is further exacerbated by urban risk factors, including the dense traffic volume of Izmir as a major metropolitan area and accidents associated with concentrated regional industrial activities. Given the substantial role that cardiovascular diseases and trauma play in driving emergency healthcare utilization, strengthening primary preventive healthcare services is essential. To reduce trauma-related admissions, regulatory inspections regarding traffic safety and occupational health should be intensified, while community-based mental health initiatives should be expanded to address the root causes of interpersonal violence.

Regarding clinical acuity, 51.09% of the patients in our sample received a yellow triage category, 34.27% were assigned a red category, and 14.64% were classified under the green category. In agreement with our findings, the majority of studies in the literature report a predominance of yellow triage classifications,

though the overall distribution of triage codes varies widely. For instance, Kurtoglu et al. reported 80.0% yellow, 5.7% green, and 4.5% red cases (8); Kocaoglu et al. observed 92.0% yellow, 6.9% red, and 0.7% green cases (12); Yuksel et al. noted 62.1% yellow, 19.8% green, and 19.1% red cases (13); and Bucak et al. reported 59.1% yellow, 32.9% green, and 8.0% red cases (14). Conversely, Akyaka et al. reported a vastly different distribution, with 6.7% of patients classified as very urgent, 24.0% as urgent, and 69.3% as non-urgent (15).

Notably, our cohort demonstrated a lower rate of yellow triage codes (51.09%) and a remarkably higher rate of red triage codes (34.27%) compared to the literature. This heterogeneity is highly reflective of our hospital's standing as a major tertiary referral center in the Izmir region, which routinely receives highly complex, unstable cases. While the overwhelming predominance of yellow and green codes in other studies suggests that emergency departments are frequently utilized as substitutes for outpatient clinics, our findings demonstrate that the 112 EMS system in our region is more appropriately leveraged for critically ill patients requiring high-acuity interventions.

In emergency medicine literature, ambulance utilization for patients classified under non-urgent (green) triage categories is widely considered inappropriate, as these individuals do not require acute pre-hospital intervention and are clinically capable of presenting to healthcare facilities independently (16). Under this definition, the rate of inappropriate ambulance utilization in our study was 14.64%, which is lower than the rates reported in the comparative literature. Nonetheless, emergency departments in Türkiye continue to operate far beyond their intended capacity due to patients with minor ailments bypassing primary care facilities. This inappropriate utilization highlights a societal gap in understanding the scope and

purpose of emergency medicine. To address this, targeted public education campaigns on the proper use of primary care should be implemented, alongside dynamic feedback and quality control mechanisms within the EMS dispatch centers. Additionally, health policy reforms—such as implementing structured, modest co-payments for patients classified under non-urgent triage categories—could serve as an effective deterrent to reduce overcrowding in emergency departments.

Analyzing patient dispositions revealed that 47.98% of the transported patients were discharged directly from the ED, 22.74% were admitted to general inpatient wards, and 18.69% required intensive care unit (ICU) admission. Our in-hospital mortality rate was 8.72%, while 1.87% of the patients refused treatment or left against medical advice (LAMA). In contrast, Kurtoglu et al. reported a discharge rate of 87.2%, with 11.9% hospitalized and a mortality rate of only 0.77% (8). Similarly, Kapci et al. observed that 73.33% of their patients were discharged, 24.23% were hospitalized, and 0.20% died (9), while Menendi et al. reported 58.0% discharged, 40.6% hospitalized, and 1.4% deceased (11). Yuksel et al. also reported a high discharge rate of 81.5% (13).

Our significantly lower rate of direct discharges, combined with substantially higher hospitalization rates, further validates our hospital's role as a tertiary care center designed for complex case management. In particular, the high rate of ICU admissions (18.69%) demonstrates that the 112 emergency command center performed highly effective field triage, accurately routing critically ill patients who genuinely required advanced life support to our tertiary center. Consequently, the higher mortality rate observed in our sample, compared to the referenced literature, is directly linked to the clinical severity of our cohort; nearly half of our patients (47.98%) were geriatric, and a

substantial portion presented with red-coded emergencies requiring critical care. Finally, the large proportion of cardiovascular emergencies among these red-coded cases indicates that primary care management of chronic risk factors (such as hypertension and diabetes) in the community remains suboptimal. Mitigating cardiovascular mortality and morbidity requires a dual approach: high-acuity interventions in the ED, coupled with more stringent, preventative management of chronic diseases at the primary healthcare level.

Conclusion

In conclusion, this study demonstrates that patients presenting to our tertiary center via the 112 EMS system exhibit a higher hospitalization rate and a lower rate of inappropriate utilization, contrasting with the general trends documented in the literature. The higher-than-average proportion of patients assigned to the high-acuity red triage category confirms that current EMS utilization in this region is primarily driven by high-priority, critically ill patient populations. Nevertheless, systemic and structural modifications are warranted to optimize the overall efficacy and long-term sustainability of pre-hospital emergency care. Given that patients in the yellow triage category represented over half of all presentations, they constitute the primary driver of the emergency department's clinical workload. To address this, refining the dispatch algorithms within 112 call centers to be more selective—particularly for non-traumatic medical complaints—is highly recommended, alongside strengthening the medico-legal frameworks for 'treat-and-release' or 'on-site intervention and discharge' protocols. Furthermore, because trauma emerged as the leading etiology for ambulance transportation, prioritizing continuous, evidence-based trauma management training for pre-hospital EMS personnel remains essential. Ultimately, maximizing the efficiency of the 112 EMS system is contingent upon imple-

menting community-focused health initiatives targeting preventable clinical conditions and enhancing the accessibility and effectiveness of after-hours primary care services. While the relatively low rate of inappropriate EMS use observed in our study is encouraging, establishing dynamic feedback and monitoring mechanisms for non-emergency calls is crucial to mitigate systemic vulnerabilities and prevent potential misuse.

Limitations

Several limitations should be acknowledged when interpreting the findings of this study. First, the research was conducted retrospectively over a single-year period at a single tertiary academic center, which may restrict the direct generalizability of our results to other healthcare settings or regional EMS networks. Second, some cases in our dataset presented with missing or incomplete electronic health record entries, particularly regarding the standardized clinical intake forms. Third, the primary reasons for ED admission were retrieved as aggregated, system-level classifications, which precluded a more granular analysis of specific, individualized chief complaints. Fourth, our database lacked detailed information regarding patients' final, definitive clinical diagnoses following inpatient admission, as well as their precise emergency department length of stay (ED-LOS). Finally, due to the descriptive nature of our data, we were unable to conduct outcome-driven clinical analyses that deeply investigate the direct relationship between the clinical appropriateness of EMS utilization and long-term patient outcomes, such as longitudinal improvements in health status or direct, attributable impacts on survival rates. Consequently, these structural constraints limited our capacity to formulate more specific, application-oriented policy recommendations designed to optimize pre-hospital clinical decision support systems and national triage protocols.

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