

The Role of Health Literacy in the Effective Utilization of Emergency Medical Services: A Focus on 112 Emergency Health Services

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Abstract

Aim: The aim of this study is to evaluate the patients transported by ambulance to the emergency department (ED) of a large metropolitan hospital and to draw attention to the effect of health literacy on whether 112 emergency health services (112 EHS) is used effectively or not.

Materials and Methods: This study is a cross-sectional retrospective study conducted by scanning the data of patients admitted to the ED from January 1 to December 31, 2023. Patient records were analyzed for demographic characteristics, ED diagnoses, type of cases (forensic, emergency, etc.) nationality, services provided in the ED, and hospitalization status. Descriptive statistics were presented as frequency distributions for categorical variables. The chi-square (χ^2) test was used to compare categorical data, while the Mann-Whitney U test was applied for ordinal variables.

Results: During the study period, 36,235 patients were transported to the ED via ambulance. Among them, 52% were male and 48% were female. The mean age was 46 ± 24 years. Regarding the type of cases, 11.7% were forensic cases, 10.3% were traffic accidents, 1.7% were work-related injuries, 0.4% were natural disasters, and 0.8% were emergency conditions. Within one year, 3,182 patients (10.2%) had repeated ambulance admissions. Among forensic cases transported by ambulance, 1,303 patients (30%) required hospitalization. Furthermore, 61.2% of these patients were admitted to the toxicology intensive care unit.

Conclusion: Enhancing public health literacy is a crucial factor in ensuring the more effective use of 112 EHS. The increase in public education initiatives, training programs, and social media content on emergency medical services is essential to achieve this goal.

Keywords: 112 emergency health services, emergency departments, health literacy

Introduction

Prehospital emergency medical services (EMS) are units responsible for the rapid transportation of patients in need to healthcare facilities while also providing appropriate medical interventions during transit. In Türkiye, 112 emergency health services (112 EHS), which operate within the EMS framework, have made significant advancements in recent years (1).

The progress within 112 EHS is directly linked to the rapid increase in the number of ambulances and stations, improved accessibility for patients, timely transportation to hospitals, and the growing number of hospitals capable of meeting patient needs. Despite substantial improvements in resources, technical equipment, and

personnel support in recent years, the inappropriate or excessive use of 112 EHS has not been adequately addressed (2,3).

This issue can be attributed to insufficient health literacy among the population. Health literacy refers to an individual's ability to evaluate health information and use it to make informed health decisions. According to the World Health Organization, health literacy is defined as an individual's capacity to access, understand, and utilize health information and services effectively to enhance both personal and public health. Patients with low health literacy not only misuse hospitals and emergency departments (ED), but also utilize 112 ambulance services unnecessarily and inappropriately (4).



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In metropolitan areas, where there are numerous districts and neighborhoods, the demand for 112 EHS tends to be significantly higher. This study aims to evaluate patients transported by ambulance to the ED of a large metropolitan hospital and to assess whether 112 EHS is being utilized effectively.

Materials and Methods

This study is a cross-sectional, retrospective analysis. Administrative approval was obtained from the Konya Provincial Health Directorate, Konya City Hospital Committee (decision number: 34028104-799, date: 01.02.2024). Patients admitted to the ED of our hospital between January 1, 2023, and December 31, 2023, were identified using the hospital information management system. Patients admitted to the obstetrics and gynecology or pediatric EDs were excluded. The study included adult patients (age ≥ 18 years) admitted for medical or traumatic reasons and trauma patients under 18 years old who were admitted to the Adult ED.

Patient data were collected from medical records, including demographic characteristics (e.g., age, gender), ED diagnoses and ICD codes, case type (e.g., forensic or emergency cases) nationality, city of origin, services provided in the ED, and hospitalization status.

Statistical Analysis

The collected data were analyzed using statistical software. Descriptive statistics were used to present frequency data as numbers and percentages, while continuous numerical data were expressed as mean \pm standard deviation. The chi-square (χ^2) test was used for categorical variable comparisons, and the Mann-Whitney U test was applied for comparisons of ordinal data between two groups. Statistical significance was set at $p < 0.05$ for all tests.

Results

During the study period, 36,235 patients were transported to the ED by ambulance. Of these, 52% were male and 48% were female. The mean age of the patients was 46 ± 24 years, with a minimum age of 0 and a maximum of 112 years.

It was determined that 10% of patients were foreign nationals, with 8.1% being Syrian. Additionally, 11.8% of patients transported by ambulance came from outside the city, with most originating from the nearby province of Karaman, and 0.6% originated from Hatay.

Among patients transported by ambulance:

- 11.7% were forensic cases,
- 10.3% were traffic accident victims,

- 1.7% were work-related injury cases,
- 0.4% were classified as natural disaster-related cases,
- 0.8% were classified as emergency cases.

The top 10 ED diagnoses (n=39) are presented in Table 1.

Within one year, 3.182 patients (10.2%) had recurrent ED visits via ambulance. The highest number of visits by a single individual was 27, observed in a patient diagnosed with chronic obstructive pulmonary disease (COPD) who presented with dyspnea. Among patients with recurrent visits, 48% (1.526) were male, and 52% (1.656) were female. A statistically significant association was observed between visit frequency (single vs. recurrent) and patient gender ($p < 0.001$, $\chi^2 = 26.67$).

The mean age of patients with recurrent ambulance visits was 56 ± 23 years, compared to 43 ± 24 years among those with a single ambulance visit. This difference was statistically significant ($p < 0.001$, $U = 31,775,345.5$). Among recurrent ambulance visits, the most frequently reported complaint was dyspnea, followed by chest pain and abdominal pain.

Additionally, among patients transported by ambulance:

- 43.37% (15,717) received consultation services in the ED,
- 78.71% (28,521) were monitored for outpatient emergency care,

Diagnosis	n	%
Traffic accident: examination and observation	3.653	10.08
Unspecified fall	2.752	7.59
Unspecified chest pain	2.616	7.22
Pregnancy-related conditions	1.933	5.33
Abdominal pain: other and unspecified	1.843	5.09
Dyspnea	1.833	5.06
Unspecified soft tissue disorders	1.539	4.25
Acute myocardial infarction	9.04	2.49
Exposure to drugs, pills, and biological agents: accidental poisoning	8.76	2.42
Nausea and vomiting	8.71	2.40
Dizziness (vertigo)	8.45	2.33
Syncope and fainting	8.10	2.24
Physical assault: examination and observation	7.73	2.13
Malaise and fatigue	7.06	1.95
Pain	5.98	1.65
Work accident: examination and observation	5.40	1.49
Myalgia	4.68	1.29
Headache	4.07	1.12

- 68.51% (24,828) received parenteral treatment,
- 11.27% (4,086) underwent observation,
- 22.56% (8,178) underwent electrocardiogram evaluation.

Further details regarding the services and examinations provided to ambulance-transported patients are summarized in Table 2.

Among forensic cases transported by ambulance, 1,303 patients (30%) required hospitalization. Of these, 55% were male, with a mean age of 31 ± 20 years. The most common diagnoses in this group are presented in Table 3. It was observed that:

- 61.2% were admitted to the toxicology intensive care unit,
- 11.9% to the burn center,
- 7% to the pediatric surgery department.

Services and imaging tests	n	%
Foreign body removal and abscess drainage	4.4	0.12
Burn debridement and dressing	1.46	0.40
Suturing	2.258	6.23
Splint application	8.972	24.76
Joint reduction	3.6	0.10
Bladder catheterization	3.751	10.35
Nasogastric tube placement	7.42	2.05
Gastric lavage	5.13	1.42
Non-invasive mechanical ventilation	3.67	1.01
Endotracheal intubation	4.03	1.11
CT imaging requested	15.953	44.03
MRI imaging requested	4.679	12.91
Direct radiography requested	15.020	41.45

CT: Computed tomography, MRI: Magnetic resonance imaging

Among emergency cases transported by ambulance, 12.42% required hospitalization. These patients had a mean age of 63 ± 20 years, with 47.2% being male and 52.8% female. The distribution of hospital admissions for this group was as follows:

- 19.9% were admitted to internal medicine intensive care units,
- 17.5% to general surgery departments,
- 13.8% to pulmonology departments,
- 7.7% to respiratory intensive care units,
- 6.8% to coronary intensive care units.

The most frequently observed ED diagnoses for these patients are also summarized in Table 3.

Discussion

Studies conducted in Türkiye indicate that men utilize 112 EHS at a higher rate than women. Menendi and Girişgin (5), reported that 60.9% of 112 EHS users were male, while Türkdoğan et al. (6) found this rate to be 55% in 2013. Consistent with these previous findings, our study showed that the male utilization rate was 52%.

In Türkiye, individuals aged 65 years and older have been observed to use ambulance services more frequently than other age groups. Ertan et al. (7) reported that the mean age of ambulance users was 47.97 years, while Menendi and Girişgin (5) found a similar mean age of 47.02 years. Likewise, in our study, the mean age of ambulance users was 46 years, aligning with the literature.

A previous study in Türkiye found that 94% of forensic cases reached hospitals by their own means, with only 6% utilizing 112 EHS (8). National data indicate that the primary reasons for ambulance calls are medical conditions (67.3%) and traffic

Diagnosis of forensic admission	n	%	Diagnosis of forensic admission	n	%
X44: Exposure to drugs, pills, and biological substances and accidental poisoning, other and unspecified	4.25	32.6	R10.4: Abdominal pain, other and unspecified	1.593	11.6
W19: Fall, unspecified	1.72	13.2	R06.0: Dyspnea	1.366	9.9
W26: Contact with knife, sword, or sharp object	6.4	4.9	R07.4: Chest pain, unspecified	6.01	4.4
T58: Toxic effects of carbon monoxide	5.2	4.0	W19: Fall, unspecified	5.54	4
Z04.5: Post-assault examination and observation	5.0	3.8	Z00.0: General medical examination	5.32	3.9
Y24: Other and unspecified firearm-related injury, unspecified occurrence,	4.9	3.8	R11: Nausea and vomiting	3.99	2.9
Z33: Pregnancy state	4.9	3.8	Z04: Other reasons for examination and observation	3.64	2.6
T62.0: Toxic effects of eating mushrooms	3.2	2.5	K21: Gastro-esophageal reflux disease	3.24	2.4
T32.1: Corrosions affecting 10-19% of the body surface area	3.1	2.4	R52: Pain, other unspecified	3.15	2.3

accidents (14.9%) (9). In our study, ambulance dispatches occurred due to traffic accidents (10.8%), falls (7.59%), and other medical conditions (81.61%), as shown in Table 1. Similarly, previous research has reported that ambulance calls were primarily due to medical emergencies (71%), traffic accidents (13%), and other injuries (9%) (10). In a study by Olia et al. (11) 17% of cases involved trauma, 46% were non-trauma medical cases, and 7.2% were inter-hospital transfers. These findings highlight that the majority of forensic patients transported by ambulance present with medical conditions rather than trauma.

Nationwide, trauma and cardiovascular diseases are frequently reported as leading causes of emergency calls. In our center, the high volume of trauma and chest pain cases transported by 112 EHS may be attributed to the hospital's status as both a trauma center and a coronary care center. Additionally, the presence of a toxicology intensive care unit (ICU) in our ED likely contributes to frequent referrals for suicide attempts and other toxicological emergencies.

Our study found that 10% of ED patients transported by ambulance were foreign nationals. This relatively high percentage corresponds to the increasing migrant population in Türkiye in recent years. Moreover, 11.8% of ambulance patients originated from outside the city, reflecting the hospital's status as a regional referral center with advanced equipment, specialized personnel, and comprehensive services.

Recurrent ambulance visits accounted for 10.2% (n=3.182), of all cases, with one individual making 27 visits due to COPD-related dyspnea. The literature supports the notion that comorbidities are a primary cause of recurrent ED visits (12).

Among ambulance-transported patients, 43.37% (n=15,717) received consultation services, highlighting the multidisciplinary nature of their medical needs. The literature indicates that 20-25% of all ED patients require consultations with other departments, a finding consistent with the 15% consultation rate observed in our ambulance cohort (13).

Among forensic cases transported by ambulance, 30% (n=1.303) required hospitalization, with the majority (61.2%) admitted to the toxicology ICU. The high rate of toxicology admissions can be attributed to several factors, including the prevalence of substance abuse among young individuals, overdose-related suicide attempts, and the continued use of coal and similar heating methods in the region's harsh climate (14-18).

Overall, 12.42% of patients transported for emergency reasons required hospitalization.

However, approximately 40% of ambulance calls were for non-emergency cases. This may be due to the free accessibility of 112

EHS, combined with public unawareness regarding appropriate service utilization (19).

The inappropriate and excessive use of 112 EHS for non-emergency cases can be linked to insufficient health literacy. Health literacy encompasses individual, social, and cognitive skills that influence one's ability to access, understand, and apply health-related information to protect or improve his or her well-being (20,21). Evidence suggests that patients with low health literacy levels tend to misuse EDs and 112 EHS (22).

Despite significant improvements in ambulance numbers, the number of EHS stations, and referral systems in recent years, the misuse and overuse of EHS continue. This suggests that public awareness regarding the appropriate use of 112 EHS has not yet reached the desired level.

Study Limitations

Since this is a single-center study, its findings cannot be generalized. Additionally, frequently used general and limited diagnostic codes in the hospital information system may not accurately reflect patients' actual diagnoses.

Conclusion

Enhancing public health literacy is essential for improving the efficiency of 112 EHS, ensuring equal access for all, reducing unnecessary patient burden on EDs and ambulance transfers, and minimizing healthcare expenditures.

Efforts should be made to increase public awareness through print, visual, and social media platforms. Furthermore, educational programs and courses aimed at raising awareness about the responsible and conscious use of 112 EHS should be organized in public education centers.

Ethics

Ethics Committee Approval: Administrative approval was obtained from the Konya Provincial Health Directorate, Konya City Hospital Committee (decision number: 34028104-799, date: 01.02.2024).

Informed Consent: This study is a cross-sectional, retrospective analysis.

Footnotes

Authorship Contributions

Surgical and Medical Practices: O.L.D., Concept: O.L.D., D.A., Design: O.L.D., D.A., Data Collection or Processing: O.L.D., Analysis or Interpretation: O.L.D., Literature Search: O.L.D., D.A., Writing: O.L.D., D.A.

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