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Parental perception on pediatric ambulance calling

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ABSTRACT

Objective: In this study, it was aimed to analyze the complaints of patients at presentation to Pediatric Emergency Department (ED) via 112 ambulance and the relationship between complaints and age.

Patients and Methods: Patient demographics, clinical characteristics, ED presenting complaint, definitive diagnosis requiring hospitalization, month or season of the year at the time of presentation, nationality, age, type of arrival were collected. The reason for calling the ambulance were asked to the parents. The relationship between age and triage areas were evaluated.

Results: The most common complaints at presentation included abdominal pain, nause-vomiting, high fever and seizure. Most of the patients were categorized as yellow area patients among different triage areas. The frequency of 112 ambulance calls with complaints of fever was significantly higher in the 0-2 and 2-6 age groups ($p<0.001$). The complaints of abdominal pain and nausea-vomiting were significantly higher in the age group of >10 years ($p<0.001$). The frequency of 112 ambulance use was significantly higher among refugees when compared to local residents ($p<0.0001$).

Conclusion: It was found that fever in younger age groups and the abdominal pain and vomiting in older age groups alerted families to call an ambulance. Educating parents about the appropriate use of Emergency Medical Service would make the system more efficient.

Keywords: Pediatric emergency, Ambulance, Child, Emergency Medical Service (EMS)

1. INTRODUCTION

An emergency medical service (EMS) is a service providing out-of-hospital acute care and transport to definitive care, to patients with illnesses and injuries which the patient believes constitute a medical emergency. EMS encompasses many areas of emergency care, including the triage, evaluation, management, and transport of patients from the scene of an injury or illness to their arrival at an emergency care facility (the out-of-hospital or pre-hospital care), as well as the management within the emergency department (ED) [1,2].

In 1991, European Union combined pre-hospital EMS under a single call number, "112", in all member and candidate countries. Our country is one of the countries which implemented this rule. Patients can call 112 EMS and request an ambulance in critical situations and emergencies. In our country, it is a legal liability for 112 ambulances to attend when they are called [3].

Pediatric Emergency Department can admit patients in outpatient setting as well as those who call 112. Contrary to adults, it is thought that in the pediatric age group, the knowledge level of the families, panic about the disease, socio-economic status play an active role in calling an ambulance. The reason for calling an ambulance seems to be non-emergent situations in most cases [4,5]. The ambulances are occupied unnecessarily, resulting in delays in emergency situations that require immediate intervention. This leads to increased morbidity ve mortality rates.

In this study, it was aimed to reveal the demographic characteristics, distribution of the complaint, distribution of

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the diagnoses according to triage areas, and the relationship between diagnosis and age range in patients who called 112 ambulance. Additionally, to increase awareness about the use of 112 ambulance services was a secondary goal of this study. Also, we assessed the differences in 112 ambulance call frequencies between local residents and refugees.

2. PATIENTS and METHODS

Study Design

In this study, we retrospectively analysed pediatric patients younger than 18 years old who were admitted to the pediatric EMS of Kayseri City Hospital via 112 ambulances between January 1, 2019 and December 31, 2019. The study was approved by Kayseri City Hospital Ethics Committee (2020/06/90).

Study Setting and Population

This study was conducted in Kayseri, 15th largest city of Turkey with a population approaching to 1.5 million. There were two pediatric EMS in the city: The City Hospital and the University Hospital. Transportation of pediatric emergencies to the City Hospital is most commonly provided by 112 ambulance services as part of the Public Health Services organized by the Ministry of Health in Turkey. Anyone can use an ambulance service free of charge by calling 112 and can access to pre-hospital EMS by the dispatch operators at dispatch centers in Kayseri Provincial Health Directorate. The cases were selected among the patients younger than 18 years old who arrived to Kayseri City Hospital by an ambulance. Trauma patients were not included in the study. Trauma patients must apply to the Trauma Section in adult EMS. Since, the city hospitals demonstrate the general functionality and structure of the Health System in Turkey at the highest level, this data can be applied across the country. Also, it should be noted that refugee applications are only made to the city hospitals.

Study Protocol

All patients' complaints and the International Classification of Diseases (ICD) codes were obtained from Kayseri City Hospital database for the study. Patients were evaluated in terms of demographic characteristics, month of admission, residency, nationality, the relationship between age and complaints, triage areas, type of Emergency Department (ED) arrival such as by 112 ambulance or private hospital ambulances. The patients were classified according to the national triage system [2]. In this triage system, while the black area represents deaths, the red area represents life-threatening cases that require synchronous, acute assessment and treatment with rapid action. While the yellow area represents potentially life-threatening cases with significant mortality and risk for organ loss, the green area represents cases with common health problems and stable general health status, which may be treated in an outpatient setting. The triage nurse performed the triage. The most common complaints (abdominal pain, nausea and vomiting, fever, seizure) of patients who arrived via ambulance were identified and analyzed separately. All other diagnoses were grouped together and evaluated as other complaints. The diagnoses in "other" group included constipation, conjunctivitis, iron deficiency anemia, common cold, ichthyosis, dysmenorrhea, sore throat, fatigue, myalgia, intestinal flatulence and routine pediatric control which do not require the use of an ambulance. The complaints were compared across age groups including 0-2 years, 2-6 years, 6-10 years, and >10 years. The association between the triage areas and the age groups, gender and seasonal difference was assessed. Intensive Care Unit and Surgery Service hospitalizations were examined. The differences in 112 EMS call frequencies between local residents and refugees were also evaluated.

Statistical Analysis

Data were analyzed using SPSS Statistics (IBM Corp., Armonk, New York, USA). Descriptive statistics were presented as count (n) and percent (%). The difference in 112 EMS call frequencies according to gender was determined using single sample binomial test; whereas the difference based on month and season of admission was determined using single sample Chi-square test. Fischer's exact test in RxC contingency tables was used to compare categorical variables among groups. When statistical significance was detected in Chi-square test, the intergroup difference was identified using two proportion Z test with Bonferroni correction. A p value<0.05 was considered as statistically significant.

3. RESULTS

It was found that the total number of pediatric ED admissions to Kayseri City Hospital was 296.850 per year. In the same period (January-December 2019), 3883 cases arrived in the pediatric ED by 112 ambulance (1.3%). In total, 30 patients without a diagnosis were excluded and 3853 patients were enrolled in the study.

Of the cases arrived by the ambulance 51.9% were boys, and 48.1% were girls. 98.9% of the patients arrived by 112 ambulance, while 0.9% arrived by private hospital ambulances. When the residency was considered, it was found that 96.6% of the patients were transferred from our province, followed by neighboring cities.

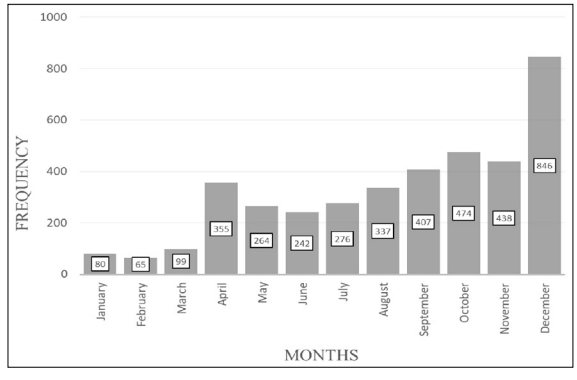

Figure 1. *Frequency of Patients According to Months*

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When 112 EMS call frequency was assessed in terms of season, the highest frequency was observed in winter (36.8%), while the lowest in spring (18.5%). Although, the presentations in winter was found to be relatively higher, it was observed that 846 patients (21.8%) presented only in December. When the distribution was assessed with respect to the months, the high number of the admissions was also detected in September, October, and November. The lowest 112 ambulance call frequency was found in February (1.7%; Figure 1).

The most common complaint for calling an ambulance was abdominal pain (11.7%); followed by nausea-vomiting (7.3%), fever (7.2%) and seizure (4.8%) (Table I).

Table I. *Distribution of main complaints for calling ambulance*

Complaints	*n*	%
Abdominal Pain	454	11.7
Nausea and Vomiting	284	7.3
Fever	278	7.2
Seizure	187	4.8
Others	2650	69.0
Total	3853	100

When compared according to age groups; the patients aged >10 years comprised the largest group (34.1%), followed by those aged 0-2 years (20.0%) and those aged 6-10 years (17.7%). There was a statistically significant association between age and complaints (Table II). The frequency of 112 ambulance call with a complaint of fever was significantly higher than other complaints in 0-2 and 2-6 age groups (p<0.001). The frequency of 112 ambulance call with a complaint of abdominal pain and nausea-vomiting was significantly higher than fever and the remaining complaints in >10 age group (p<0.001) (TableII).

Regarding the triage areas, admission to the yellow area was the most common admission type (40.28%); followed by green area (35.17%), red area (24.52) and black area (one case, 0.03%). The number of patients admitted to green area was significantly higher in winter compared to other seasons. Green area rates were comparable across spring, summer and autumn (Table III).

Based on the single sample binomial test, the rate of 112 ambulance use was significantly higher among refugees compared to the residents (p<0.0001).

Definitive diagnosis requiring hospitalization in intensive care, pediatric surgery and other services were detected (Table IV).

Table II. *Comparison of main complaints in terms of age groups*

	Seizure		Fever		Nausea and Vomiting		Abdominal Pain		Other		Test Statistics*	
	n	(%)	*n*	(%)	*n*	(%)	*n*	(%)	*n*	(%)	χ^2	*P*
AGE GROUPS												
0-2 years	108	63.6^{ac}	141	50.7^{a}	88	31.0^{c}	29	6.3^{b}	899^{c}	33.9^{c}	325.189	<0.001
2-6 years	34	18.2^{ac}	70	25.2^{a}	45	15.8^{c}	39	8.6^{b}	389^{c}	14.7^{c}		
6-10 years	32	11.2^{a}	43	15.5^{a}	64	22.5^{b}	125	27.5^{b}	431^{a}	16.3		
> 10 years	13	7.0^{a}	24	8.6^{a}	87	30.6^{c}	261	57.5^{b}	931^{c}	35.1		
Total	187	100	278	100	284	100	454	100	2650	100		

**Chi-square test; a, b, c indicate differences in complaints among groups.. Complaint groups having the same letter are statistically comparable.*

Table III. *Comparison of demographic data according to triage areas*

	TRIAGE AREA						Test Statistics	
	Green		Yellow		Red			
	n	(%)	*n*	(%)	*n*	(%)	χ^2	*P*
Age Groups								
0-2 years	545	86.4^{a}	331	53.1^{a}	396	60.4^{abc}	343.291	<0.001
2-6 years	263	45.6^{a}	148	25.6^{a}	166	28.8^{bc}		
6-10 years	229	33.6^{b}	319	46.8^{b}	134	19.5^{ad}		
> 10 years	318	24.1^{c}	754	57.0^{c}	250	18.9^{d}		
Gender								
Boy	765	38.2^{a}	749	37.4^{a}	489	24.4^{ab}	19.807	<0.001
Girl	590	31.9^{b}	804	43.5^{b}	456	24.6^{ab}		
Season								
Winter	588	41.6^{a}	501	35.4^{a}	326	23.0^{a}	51.616	<0.001
Spring	214	30.0^{b}	295	41.2^{ab}	205	28.8^{b}		
Summer	262	30.9^{b}	363	42.9^{b}	222	26.2^{ab}		
Autumn	291	33.2^{b}	394	44.9^{b}	192	21.9^{a}		

**Chi-square test; a, b, c indicate differences in triage area for each group. Triage area groups with the same letter are statistically comparable.*

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Table IV. *Definitive diagnosis requiring hospitalization*

	n	%
Pediatric Intensive Care Unit Inpatient	211	23.0
Surgical Pathology	123	13.5
Service	580	63.5
Respiratory	151	16.5
Neurology	150	16.4
Hematology	35	3.8
Cardiology	35	3.8
Nephrology	5	0.5
Gastrointestinal	185	20.2
Newborn	28	3.1
Metabolic	4	0.4
Endocrine	6	0.7
Allergy	10	1.1
Infection	108	11.8
Intoxication	188	20.6
Psychiatric	4	0.6
Urogenital	5	0.5
Total	914	100

4. DISCUSSION

Misuse of EMS and EDs is a common problem in developing countries. In this study, the rate of patients admitted to pediatric ED by 112 ambulances was found as 1.3% annually.This rate was 5% and 7% in two different hospitals in the USA [6]. In a multicenter study from 9 hospitals in Turkey, it was reported that total number of children arriving to a pediatric ED by an ambulance was 2094 [7]. In our study, 3883 visits to a single center within a year indicated the workload of Kayseri City Hospital in the medical environment of Turkey.

Of the cases arriving with 112 ambulances, 51.9% were boys and 48.1% were girls. It is thought that this could be due to the value placed on boys by the patriarchal structure in our country. It is realized that in Turkey, girls have always been more disadvantageous than boys in many fields since their birth [8,9].

In the current study, when 112 ambulance call frequency was assessed in terms of seasonality, the highest frequency was observed in winter (36.8%), while the lowest in spring (18.5%). It is thought that severe climate conditions in winter increases the rate of EMS calls due to the challenges in transportation. Besides, another factor could be the higher incidence of upper respiratory tract disorders and fever during winter. In spring, the incidence of these disorders decrease and hence the rates of EMS calls decrease and admissions to outpatient settings increase [10,11].

Poryo et al., determined that three most common causes for requesting an ambulance were related to the central nervous system (30.6%), respiratory system (14%) and trauma (13.2%) [12]. In this study, two of the three most common complaints were related to gastrointestinal system, including abdominal pain and nausea-vomiting (19%). It was thought that the rate of 112 EMS calls was higher in abdominal pain and nausea-vomiting since it is difficult to distinguish appendicitis from non-surgical abdominal pain such as gastroenteritis and viral syndromes in younger children [13]. In our study, fever was the third common complaint and it seems that the majority of cases with fever were related to upper respiratory tract infection. Febrile convulsions were typically seen in cases having fever exceeding 38°C among 6 months old – 5 years of age [14]. When the EMS calls for fever was assessed in terms of age, it was seen that EMS call rate was higher in age groups of 0-2 years, compared to the other age groups. Thus, it was thought that calling ambulance for fever could be associated with the fear of convulsion. It has been considered that ambulances were mostly called due to the diseases of infancy, diseases that worsen rapidly, and diseases that may have serious consequences quickly [15-17]. Similar to our study, in a study by Miller et al., it was found that ambulance use was higher in children aged<1 year than those aged 5-9 years [10].

When age groups were assessed, it was seen that the ambulance was called most commonly for patients aged>10 years (34%); followed by the age group 1-2 years (20%) and 6-10 years (17.7%) . The higher rate of EMS calls in 1-2 year age group than 6-10 year age group may be attributed to the fact that disease severity was higher in the younger age group, terrifying the parents [18,19]. A study which was conducted in the USA, reported that 59% of children under the age of 15 years went to a hospital via ambulance with higher-level of pediatric resources [20]. This result supports our results.

When patients were assessed according to triage areas, the higher rate of yellow (40.2%) and green areas (35.1%) compared to red areas was linked to the perception that it is easier and more simple to access healthcare in the emergency department in our community, thus leading to unnecessary use of EMS system. In this study, it was seen that 35.1% of patients were green area patients who could be treated in outpatient setting. Again, it was found that diagnoses in the yellow area could be managed in daycare outpatient clinics. The diagnoses in "other" group included constipation, conjunctivitis, iron deficiency anemia, common cold, ichthyosis, dysmenorrhea, sore throat, fatigue, myalgia, intestinal flatulence and routine pediatric control which do not require the use of an ambulance. This suggested that EDs are used as "evening outpatient clinic" after five o'clock p.m. in our country. The higher rate of patients admitted to green area may be attributed to increase in the incidence of upper respiratory tract infection in winter. In previous studies, it was shown that the workload increased in ED in seasons when respiratory virus peak was observed [21,22]. The lower rate of admission to ward and intensive care unit admission and the fact that majority of patients were treated in outpatient basis indicated unnecessary ambulance use. In a study by Saz et al., in support to our findings, unnecessary use of EMS reached up to 90% in Turkey [7].

According to the 2007 report released by International Organization for Migration immigrants constitute 3% of the global population [23]. The challenges in access to healthcare

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services in daycare outpatient clinics make refugees dependent to ED. In previous studies, it was shown that ED admissions increased among refugees due to the their language problems [24]. It was thought that higher frequency of EMS call among refugees may be attributed to the causes mentioned above. The lack of primary care and increased incidence of illness may account for this reliance on EMS transport [25]. Future studies are required to examine the demografic and socioeconomic factors that play a role in the increased EMS utilization rate among the refugees.

Limitations

The study has some limitations. Firstly, this study presents a single center experience. The long list of diagnostic codes entered into the system, and the multiple selections of the most appropriate diagnoses were some of the restrictions of this study. Due to the retrospective design of the study, patients with missing ICD codes were excluded. Also, trauma patients were not included in the study, which was another limiting factor.

Conclusion

It is well-known that the 112 ambulance system is an integral part of ED. It was found that the complaints of fever in younger age groups and the complaints of abdominal pain and vomiting in older age groups alerted families to call an ambulance. It is recommended that primary health care service providers, educational institutions, and audiovisual media should educate families and refugees for the appropriate use of ambulance.

Compliance with the Ethical Standards

Ethical Approval: The study was approved by Kayseri City Hospital Ethics Committee (2020/06/90).

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Conflict of Interest: The authors have no potential conflicts of interest to disclose

Author Contributions: FHE: Design of the study, participated in data collection, data analysis, data interpretation, literature search, generation of figures and writing the article, FT: Participated in data collection, data interpretation and literature search and drafting the article. Both authors read and approved the final version of the article.

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