



Evaluation of Patients Presenting to Pediatric Emergency Department using a Ground Ambulance

Çocuk Acil Servisine Kara Ambulansı ile Başvuran Hastaların Değerlendirilmesi

Ali Güngör¹, Damla Hanalioğlu², Necati Emrecan Türk¹, Arif İsmet Çatak¹

¹University of Health Sciences, Ankara Child Health and Diseases Hematology Oncology Training and Research Hospital, Department of Pediatrics, Ankara, Turkey

²Hacettepe University Faculty of Medicine, Department of Pediatric Emergency Medicine, Ankara, Turkey

Abstract

Introduction: Emergency departments are 24-hour open health services. Patients can register to the emergency departments by their own or via emergency ambulance services (EAS). In this study, we aimed to examine the characteristics of patients who were admitted to a pediatric emergency department via EAS and to evaluate clinical and laboratory data of the patients as well as their managements during hospital stay.

Methods: Patients brought to the emergency department via EAS between 1 June 2017 and 30 December 2017 were retrospectively analyzed. Data on demographic characteristic and presenting complaints of the patients and resources used were collected.

Results: A total of 1234 patients (631 males, 51.1%) were included in the study. The median age of the patients was 75 months (Interquartile range 24-162 months). The majority of patients (n=514, %42) were admitted to the emergency department between the hours 16.01 and 23.59. The most common complaints were convulsion in 231 patients (18.7%), fever in 139 (11.3%), abdominal pain in 129 (10.4%), and intoxication in 86 (6.97%). We noticed that patients used EAS for non-urgent complaints such as constipation, toothache, red eye, nasal discharge, leg pain, leg tenderness, sore throat, and skin rashes and eruptions. No laboratory tests were necessary for 207 patients (17.8%), and 690 patients (56%) did not require hospitalization.

Conclusion: There were various reasons for calling ambulances but it was found that families called ambulances for non-urgent complaints such as constipation, toothache, redness in eye and nasal discharge. For this reason, it is necessary to improve the public awareness of the role of ambulance services in order to minimize unnecessary use of ambulance transportation.

Keywords: Ambulance, child, emergency department

Öz

Giriş: Acil servisler yirmi dört saat kesintisiz sağlık hizmeti verilen merkezlerdir. Hastalar acil servislere kendi olanakları ile başvurabildikleri gibi acil ambulans hizmetini (AAH) kullanarak da başvurabilmektedirler. Bu çalışmada, AAH kullanarak çocuk acil servisine başvuran çocuk hastaların demografik özellikleri ile bu hastaların acil servise başvurularından sonra hastanemizde yapılan tetkik ve tedavilerin gözden geçirilmesi amaçlanmıştır.

Yöntemler: 1 Haziran 2017-30 Aralık 2017 tarihleri arasında, çocuk acil servisine AAH ile getirilen hastalar dosya kayıt sistemi üzerinden geriye dönük olarak belirlendi. Hastaların demografik özellikleri, başvuru şikayetleri ve acil servis başvurularından sonraki süreçleri değerlendirildi.

Bulgular: Bin iki yüz otuz dört hasta (erkek n=631, %51,1) çalışmaya dahil edildi ve hastaların yaş ortancası 75 aydı (çeyrek değer aralığı 24-162 ay). Hastaların en sık (n=514, %42) 16,01-23,59 saatleri arasında acil servise başvurduğu saptandı. En sık başvuru şikayetlerinin sırasıyla 231 hastada (%18,7) konvülsiyon, 139 (%11,3) hastada ateş, 129 (%10,4) hastada karın ağrısı, 86 (%6,97) hastada zehirlenmeler olduğu saptandı. Hastaların AAH kabızlık, diş ağrısı, gözde kızarıklık, burun akıntısı, bacak ağrısı, bacakta hassasiyet, boğaz ağrısı, vücutta kızarıklık gibi acil olmayan şikayetler için de kullandıkları saptandı. Hastaların 207'sinden (%17,8) hiçbir tetkik istenmemiştir ve 690 (%56) hastanın hastaneye yatışına gerek görülmemiştir.

Sonuç: Ambulans çağırılma şikayetleri değişiklik göstermekle birlikte kabızlık, diş ağrısı, gözde kızarıklık, burun akıntısı, boğaz ağrısı gibi tıbbi acil olmayan durumlarda ailelerin ambulans çağırıldığı saptandı. Bu nedenle ambulansların tıbbi gereksiz kullanımını en aza indirmek için halkın daha fazla bilgilendirilmesi gerekmektedir.

Anahtar Kelimeler: Ambulans, çocuk, acil servis

Address for Correspondence/Yazışma Adresi: Ali Güngör, University of Health Sciences, Ankara Child Health and Diseases Hematology Oncology Training and Research Hospital, Department of Pediatrics, Ankara, Turkey

E-mail: gungorali19@gmail.com **ORCID ID:** orcid.org/0000-0003-4139-3480

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Introduction

Emergency departments (ED) provide 24-hour healthcare services. Patients referred via emergency ambulance services (EAS) comprise a huge proportion among all types of referrals to an emergency department. The mission of EAS to treat illnesses and injuries requiring an urgent medical treatment, provide out-of-hospital treatment and transport the patients to definitive care. In our country, medical emergency transport services have been improved over years, however, additional strategies are warranted to prevent unnecessary use of these services.¹⁻³

The reasons of request for EAS may differ depending on the nature of the event, patient's age, health security status, previous experiences, accompanying chronic diseases and according to the geographical area.⁴⁻⁷ Certain proportion of patients brought to ED via EAS may use this service unnecessarily due to several reasons including, but not limited to wish to utilize free public services, the belief that they would be cared better if they come to the hospital with an ambulance, wish to use their private insurance and the idea that the patient is an emergency case according to the families' opinion.⁶⁻⁸

There are many studies in the literature regarding the use of ambulance service by adults, while there is not enough number of the studies investigating the use of EAS in children. In this study, we aimed to review demographic features, investigations and treatments performed in our hospital after admission of the patients who presented to our tertiary pediatric hospital using EAS.

Material and Methods

Patients brought to the ED at the University of Health Sciences Ankara Child Health and Diseases Hematology Oncology Training and Research Hospital, which is a tertiary pediatric hospital, with EAS between 1 June 2017 and 30 December 2017 were retrospectively identified from the patient files registry system. Patient age, gender, nationality, whether or not was a judicial case, whether the patient was referred to our hospital from an outer center, presenting complaints, and the time of presentation to the ED were recorded. Patients' ages were divided into 7 groups as newborn period, 1-36 months, 37-72 years, 73-108 months, 109-144 months, 145-180 months and 181-216 months. Times of admission to emergency department were divided into three groups as 24:00-08:00, 08:01-16:00, and 16:01-23:59. ED investigations and the clinics of hospitalization were examined. Pediatric sub-branches and pediatric surgery consultations were studied. Patients whose complete medical records could not be retrieved from the hospital registry

system were excluded from the study. In addition, patients admitted as inpatient in an outer center and transferred to our hospital by EAS were also excluded as they were directly taken to the relevant clinic.

The study was approved by the UHS Ankara Child Health and Diseases Hematology Oncology Training and Research Hospital Ethics Committee (09/07/2018-121).

Statistical Analysis

As the descriptive statistics; categorical variables are expressed as number (n) and percentage (%). Median and quartile range were used for the continuous variables. Chi-square and Fisher's exact tests were used in comparison of the qualitative data. The statistical significance was set at $p < 0.05$. The results were evaluated using 'Statistical Package for Social Sciences-SPSS 17' (Chicago, USA).

Results

A total of 78.045 patients presented to the pediatric ED of our hospital between 1 June 2017 and 30 December 2017, and 1.679 (2.15%) of these patients were brought to our hospital with an emergency ambulance. Since patients accepted to our inpatient wards from an outer center and patients whose complete medical records could not be reached from our registry system were excluded from the study, a total of 1.234 patients were included in this study. The median age of these 1234 patients was 75 months (quartile range: 24-161 months) and 631 (51.1%) of them were boys, 603 (48.9%) were girls. The highest rate of ambulance use was in 1-36 months by 32.8% (n=405), and the lowest in the newborn period by 2.6% (n=32) and in 109-144 months by 10.4% (n=128) (Figure 1).

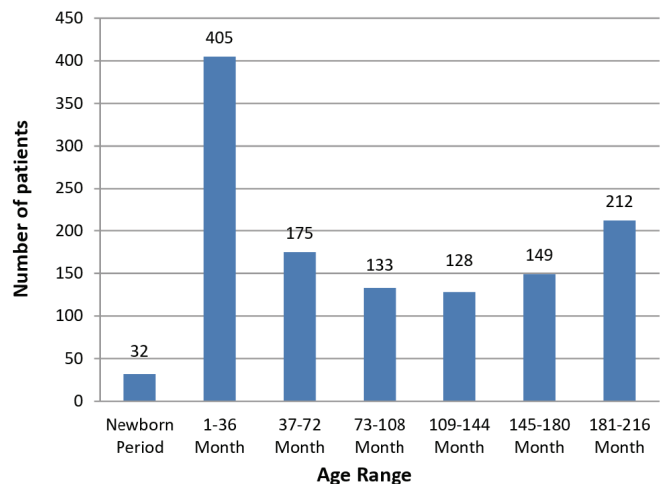


Figure 1. Age distribution and percentage of the patients who presented to our hospital EAS
EAS: Emergency ambulance services

Of the 1.234 patients who presented to the pediatric ED using EAS, 83.6% (n=1032) were Turkish citizens, 114 (9.2%) were Syrian, 68 (5.5%) were Iraqi, 13 (1.1%) were Afghan, and the remaining seven patients were from different countries. Of all patients, 237 (19.2%) were referred to our pediatric ED from another center, 997 (80.8%) were brought directly to our hospital with an ambulance.

Two hundred and eighty-two patients (23%) presented to the ED between 24:00 and 08:00, 438 patients (35%) between 08:01 and 16:00, and 514 patients (42%) between 16:01 and 23:59 (Figure 2). No significant difference was found in the time of presentation to the ED between the age groups (p=0.210).

One hundred seventeen (9.5%) of the patients who presented to the ED of our hospital were evaluated as judicial cases. The most common presenting complaints were convulsion (n=231; 18.7%), fever (n=139; 11.3%), abdominal pain (n=129; 10.4%), intoxications (n=86; 6.97%), and nausea/vomiting (n=71; 5.75%), respectively. The common presenting complaints are given in Figure 3. It was found that the patients used EAS for the complaints such as constipation, toothache, red eye, nasal discharge, leg pain, sore throat, and skin rashes and eruptions. The most common diagnoses included upper respiratory tract infection (n=185, 14.99%), afebrile convulsions and epilepsy (n=124, 10.04%), lower respiratory tract infection (n=111, 9%), acute gastroenteritis (n=108, 8.75%) and intoxications (n=86, 6.97%).

While ordered investigations were searched, it was observed that at least one of the followings was ordered in 1027 patients (83.2%): blood count, urinary analysis, direct X-ray radiography, ultrasonography (USG), cranial imaging or electrocardiography (ECG). It was found that full blood count or biochemical analysis were ordered in 870 patients (70.5%), direct radiography in 599 (48.5%), full urinalysis in 407 (33%), ECG in 212 (17.2%), cranial imaging in 47 (3.8%), and USG in 29 patients (2.4%). The investigations ordered are shown in

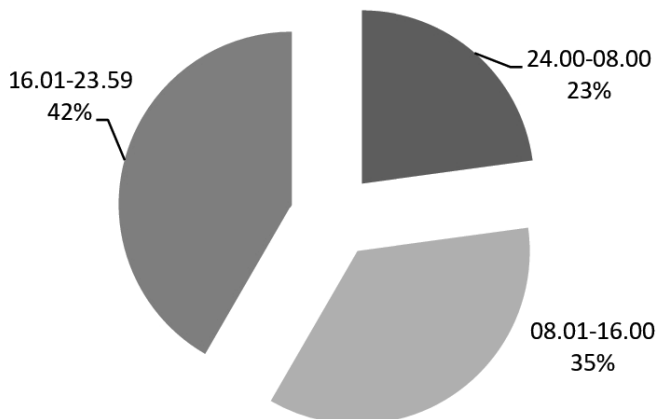


Figure 2. Distribution of ambulance usage of the patients according to hours

Figure 4. There was no need for further investigation in 207 patients (17.8%). 114 (55%) of the 207 patients were male and median age were 63 months (range=22-136 months). Of the patients, 43 (20.8%) were admitted to the pediatric ED between the hours 24.00 and 08.00, 76 (36.7%) between 08.01 and 16.00 and 88 (42.5%) between 16.01 and 23.59. There was no significant difference in gender, age groups and time of ED admission between patients who needed and who did not require investigation (p=0.214, p=0.162 and p=0.734, respectively)

After ED admission via EAS, 6 patients had cardiopulmonary resuscitation, 14 had endotracheal intubation, 31 had antiepileptic treatment, 23 had activated charcoal treatment, 19 had gastric lavage, 22 received high-flow nasal cannula therapy, 8 received diabetic ketoacidosis treatment, 8 had deep tracheal aspiration and four had intramuscular adrenaline treatment. Hospitalization was needed in 544 (44%) patients,

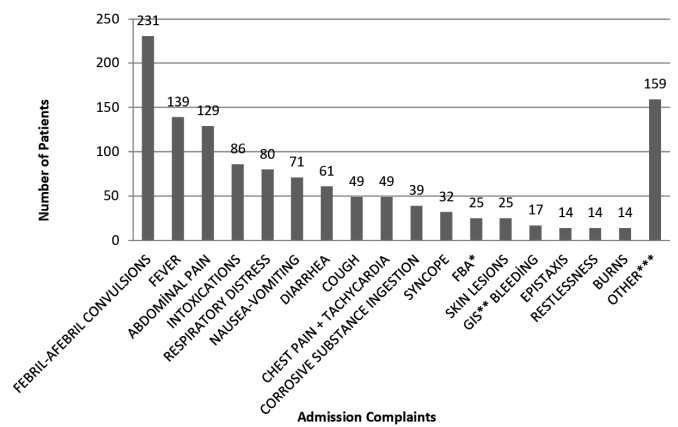


Figure 3. Distribution of the admission complaints of patients brought to the ED by EAS

FBA: Foreign body aspiration, GIS: Gastrointestinal system, Other***: Hyperglycemia, hypoglycemia, redness - discharge - itching in the eye, sore throat, ear ache, joint pain, insect bite, jaundice, pain or urination, falling, over water drinking, nasal discharge, foreign body in the nose, pain after circumcision, change of the nasogastric probe, distraction, tremor in hands, and toothache

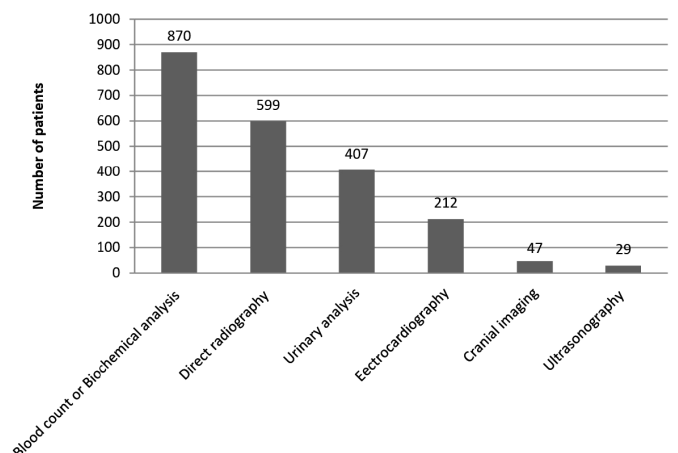


Figure 4. Investigations ordered in patients brought to the ED by 112 EAS
ED:Emergency department, EAS: Emergency ambulance services

while 690 patients (56%) required no hospitalization. The most commonly used ward of hospitalization was pediatric emergency department service with 323 (59.4%) patients. In addition, 49 (9%) patients were hospitalized in the ward for older children (between 2 and 18 years), 49 (9%) patients in the pediatric intensive care unit, 43 (7.9%) patients in the pediatric surgery clinic, and 31 (5.7%) patients in the ward for infants (between 1 and 24 month) (Table 1). Consultation was ordered in 427 patients (34.6%) with 302 patient from pediatric sub-branches, and 125 from pediatric surgery departments. The most commonly consulted departments were pediatric neurology (n=137), pediatric surgery (n=125), pediatric intensive care (n=49), pediatric infectious diseases (n=32), and pediatric hematology-oncology (n=22).

Discussion

Emergency ambulance service is making progress every day. Whereas there are a lot of studies involving adult patients regarding the use of ambulance service, the number of studies involving pediatric age group is limited.⁶ Our hospital is a tertiary pediatric hospital, affiliated to the ministry of health, and is a hospital including general pediatrics and all pediatrics sub-branches, and pediatric burn unit within the scope of pediatric surgery department. Therefore, in this study, we aimed to investigate pediatric patients who presented to our hospital using EAS.

The rate of EAS use may differ by gender. Clark et al.⁹ found that the rate of ambulance use was higher in boys than in girls. In addition, in a different study from the United States evaluating pediatric patients, no significant difference was found in EAS use between genders.¹⁰ In our study, 631 of the included patients were boys and 603 were girls, and no significant difference was found between genders.

Our country hosts a lot of number of refugees because of the civil wars in the neighboring countries. The refugees benefit from free healthcare services in our country.¹¹ EAS is among the commonly used services by refugees. In our study,

202 patients (16.4%) were not Turkish Republic citizens, and among these, 114 (9.2%) were Syrian, 68 (5.5%) Iraqi, and 13 (1.1%) Afghan. In our study, the rate of 16.4% may indicate the high number of refugees living in our country, free healthcare services delivered to refugees, and the fact that no problem is encountered in admission of refugee patients in hospitals affiliated to the ministry of health.

The use of ambulance may differ according to hours during day. In a study from Ankara evaluating the use of EAS by pediatric patients, the most frequent ambulance demand was between 08:00 and 24:00.⁶ In other studies from our country including adult patients, Dundar et al.¹² found that the highest number of ambulance rides was between 16:00 and 24:00, and Kidak et al.¹³ found this time between 18:00 and 20:00. The highest rate of ambulance use is usually between 24:00 and 08:00.^{6,14,15} Consistent with the literature, in our study, the most common time of ambulance use was between 16:01 and 23:59 by 42% (n=514). The least common time of ambulance use was between 24:00 and 08:00. The most common use of ambulance at evening hours may be attributed to parents' difficulty in getting permission from their workplace to leave early and to that caregivers do not wish to take children to hospital with an ambulance without parents, and school age children are at school during day.

The use of EAS is common in judicial cases. In a study conducted in a university hospital in pediatric age group, 42.1% of EAS users were evaluated as judicial cases.⁶ In our study, 9.5% of the patients were judicial cases. Our lower rate of judicial cases may be related to that our pediatric ED do not accept trauma cases primarily.

Inappropriate use of EAS gives rise to an important problem in healthcare services. In foreign studies investigating ambulance calls, half of the calls were found to be unnecessary.^{16,17} In another study from Cleveland evaluating the use of ambulance in pediatric age group, 61% of the patients were found to use ambulance service inappropriately.¹⁸ In a study evaluating the use of EAS by pediatric age group, the use of ambulance in non-emergency cases was found to be very low (5.9%) according to three-tier triage system.⁶ Snooks et al.¹⁹ reported that high discharge rate from ED was one of the criteria of inappropriate use of emergency ambulance. In our study, 207 (17.8%) of 1234 patients were examined in the ED and discharged home without any investigation, hospitalization was not deemed necessary in 690 patients (56%), and among the presenting complaints, there were sore throat, cough, redness, nasal discharge, red eye, and joint pain suggesting that EAS was used inappropriately.

Our study has some limitations. It reflects the data of a single center, is a retrospective study, provides data including only the last 6 month of the year, and do not reflect conditions

Table 1. Distribution of the wards where the patients were hospitalized

Place of admission	n	%
Emergency department observation area	323	59.4
Adolescent ward	49	9
Pediatric intensive care unit	49	9
Pediatric surgery ward	43	7.9
Infant ward	31	5.7
Infectious diseases ward	28	5.1
Newborn intensive care unit	12	2.2
Hematology-oncology ward	9	1.7
Total	544	100

such as traffic accidents where ambulances are commonly used because the center has no trauma center. However, since the number of studies evaluating the use of EAS in pediatric age groups is limited and this study included a high number of patients, we believe that it will contribute to the literature.

Conclusion

EAS is commonly used for pediatric patients' referral to pediatric EDs. The reasons for ambulance request are variable. Further multicenter studies are needed in order to evaluate the use of ambulance by pediatric patients. It is of importance to increase public awareness of the role of ambulance services in order to minimize unnecessary use.

Ethics

Ethics Committee Approval: The study was approved by the UHS Ankara Child Health and Diseases Hematology Oncology Training and Research Hospital Ethics Committee (09/07/2018-121).

Informed Consent: Since our study was a retrospective study, informed consent was not obtained from the patients.

Peer-review: Internally and externally peer-reviewed.

Authorship Contributions

Concept: A.G., D.H., N.E.T., A.İ.Ç., Design: A.G., D.H., N.E.T., A.İ.Ç., Data Collection or Processing: N.E.T., A.İ.Ç., Analysis or Interpretation: A.G., D.H., N.E.T., A.İ.Ç., Literature Search: A.G., D.H., Writing: A.G., A.İ.Ç.

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

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