DOI: 10.4274/buchd.galenos.2021.82713
J Dr Behcet Uz Child Hosp 2022;12(1):81-90

Original Article

Evaluation of the Pediatric Neurology Consultations Requested from the Pediatric Emergency Service: A Single-Center Experience

Çocuk Acil Servisinden İstenen Çocuk Nörolojisi Konsültasyonlarının Değerlendirilmesi: Tek Merkez Deneyimi

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ABSTRACT

Objective: Pediatric neurology opinion is one of the most frequently requested consultations in emergency service practice. Symptoms and/or signs such as headache, altered consciousness, seizures, and focal neurological deficits are the most common consultation reasons. We aimed to retrospectively evaluate patients who were consulted with the pediatric neurology department in the pediatric emergency service.

Method: This is a descriptive cross-sectional study in which the consultation notes of patients who presented to the pediatric emergency service and required a consultation with the pediatric neurology department between June 2016 and November 2019 were analyzed retrospectively.

Results: The number of the consulted patients was 1,265. Sixteen patients left the hospital after their parents signed treatment and examination rejection form, 1,249 consultations were included. The most common reasons for consultation were seizure, routine follow-up of patients that receive home mechanical ventilator support, and headache. The rate of emergency neurological pathologies detected in brain computed tomography and magnetic resonance imaging was 1.7%. The most common electroencephalographic abnormality was focal epileptic discharges. Consultation rate requiring emergent intervention was 14.8% and status epilepticus, central nervous system infections, intracranial masses were the most common causes.

Conclusion: The most common reason for consultation was seizure. The rate of consultations requiring acute intervention was low. We think that the emergency service admissions of patients that need examination and treatment in the outpatient clinic may harm the routine functioning of the emergency service. Community education for the use of the emergency room only when necessary is essential.

Keywords: Consultation, emergency service, neurology, epilepsy pediatrics,

ÖZ

Amaç: Pediatrik nöroloji görüşü acil servis pratiğinde en sık istenen konsültasyonlardan biridir. Baş ağrısı, bilinç değişikliği, nöbetler ve fokal nörolojik defisitler gibi semptom ve/veya bulgular en yaygın konsültasyon nedenleridir. Bu çalışmada çocuk acil servisinde çocuk nörolojisi bölümüne konsülte edilen hastaları retrospektif olarak değerlendirmeyi amaçladık.

Yöntem: Haziran 2016-Kasım 2019 tarihleri arasında çocuk acil servisine başvuran ve çocuk nörolojisi kliniğine konsülte edilmesi gereken hastaların konsültasyon notlarının retrospektif olarak incelendiği tanımlayıcı kesitsel bir çalışmadır.

Bulgular: Konsültasyon yapılan hasta sayısı 1265'ti. On altı hasta, ebeveynleri tedavi ve muayene red formunu imzaladıktan sonra hastaneden ayrıldı, 1249 konsültasyon dahil edildi. En sık konsültasyon nedenleri nöbet, evde mekanik ventilatör desteği alan hastaların rutin takibi ve baş ağrısı idi. Beyin bilgisayarlı tomografisi ve manyetik rezonans görüntülemede tespit edilen acil nörolojik patoloji oranı %1,7'ydi. En yaygın elektroensefalografik anormallik fokal epileptik deşarjlardı. Acil müdahale gerektiren konsültasyon oranı %14,8 olup status epileptikus, merkezi sinir sistemi enfeksiyonları, kafa içi kitleler en sık nedenlerdi.

Sonuç: En sık konsültasyon nedeni nöbetti. Akut müdahale gerektiren konsültasyonların oranı düşüktü. Poliklinikte muayene ve tedavi gerektiren hastaların acil servise başvurularının acil servisin rutin işleyişine zarar verebileceğini düşünüyoruz. Acil servisin sadece gerektiğinde kullanımına yönelik toplum eğitimi esastır.

Anahtar kelimeler: Konsültasyon, acil servis, nöroloji, epilepsi pediatri

Received: 27.09.2021
Accepted: 16.12.2021

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Cite as: Günay Ç, Paketçi C, Sarıkaya Uzan G, Soydemir D, Karakaya Ö, Elitez D, Hız Kurul S, Yiş U. Evaluation of the Pediatric Neurology Consultations Requested from the Pediatric Emergency Service: A Single-Center Experience. J Dr Behcet Uz Child Hosp. 2022;12(1):81-90

This study was presented as a poster presentation at the "Sağlıklı Büyüyen Çocuk Kongresi-2020" congress on 18.12.2020.

INTRODUCTION

Emergency service is the department providing continuous healthcare with a multidisciplinary approach for health problems occurring in case of sudden illness, accident, or injury [1]. Approximately 20-30% of the emergency patients are in the pediatric age group [2,3]. Pediatric patients with acute neurological emergencies often present to the emergency room with various combinations of symptoms/signs such as headache, physical signs of trauma, nausea, vomiting, altered consciousness, coma, or focal neurological deficits [4]. In Europe, neurological symptoms represent up to 15% of emergency visits [5-9] . For the pediatric age group, this rate was found to be 2.5% in France [10]. In Turkey, 0.7% of the pediatric patients presenting to the emergency department received a neurological diagnosis, and 4% of them were consulted with pediatric neurology department [11]. In this study, we aimed to evaluate the demographic, clinical, radiological and electrophysiological characteristics of the patients admitted to the pediatric emergency service of a tertiary hospital and required consultation from the pediatric neurology department.

MATERIALS and METHODS

This was a single-center retrospective cross-sectional study conducted in the pediatric neurology department of Dokuz Eylül University Faculty of Medicine in Turkey. The patients that applied to the pediatric emergency service, and required a consultation from the pediatric neurology department between June 2016 and November 2019 were included in the study. Patients who left the hospital after their parents rejected examination and treatment, and signed the rejection form were excluded. Age, gender, duration of consultation, date of consultation, complaints at the time of admission, pre-diagnoses, neuroimaging and electrophysiological studies, comorbidites, and secondary referral departments were evaluated within the consultation notes in the hospital operating system. Epilepsy and migraine were diagnosed according to the International League Against Epilepsy classification and International Headache Society criteria, respectively [12,13]. Conditions such as status epilepticus, intracranial mass presenting with neurological findings, central nervous system infections, drug intoxications, demyelinating diseases associated with an attack, status migrainosus, status dystonicus that would result in mortality and/or morbidity were defined as neurological emergencies. This study was approved by Dokuz Eylül University Faculty of Medicine Ethics Committee (approval number: 2021/10-11, date: 29.03.2021).

Statistical Analysis

Statistical analysis was performed using the IBM SPSS Statistics for Windows version 22.0 (IBM Corp., Armonk, NY, USA). The normality of distribution of numerical variables was evaluated using the Kolmogorov-Smirnov test. The numerical variables were expressed as median, minimum, maximum and categorical variables as numbers and percentages (%).

RESULTS

Demographic Features

Total number of 1265 pediatric neurology consultations were requested for the patients presenting to the pediatric emergency service of our hospital between June 2016 and November 2019. After exclusion of 16 patients whose parents refused treatment, 1,249 consultations belonging to 648 (52%) male, and 601 (48%) female patients were analyzed. The age of the patients ranged from 12 days to 17 years (median 5 months). Our study population consisted of 162 (13%) newborns (0-28 days old), 240 (19.2%) infants (28 days-2 years old), 612 (49%) children (2-12 years old), and 235 (18.8%) adolescents (12-17 years old). While 1,087 (87%) consultations were requested between 8:30 AM and 5:00 PM, the rest was requested between 5:00 PM and 08:30 AM. In case of seasonal distribution, 383 (30.7%) consultations were evaluated in autumn, 323 (25.9%) in summer, 274 (21.9%) in spring, and 269 (21.5%) in winter.

Indications for Applications

The evaluation of complaints at the time of admission indicated that the most common indications were seizures (n=854, 56.4%), follow-up (patients with home-type mechanical ventilator support that could not be examined in the outpatient clinic, patients presenting for tracheostomy tube replacement and other routine examinations) (n=121, 8%), and headache (n=71, 4.7%). Fever accompanying other findings were present in 97 (7.7%) cases (Figure 1).

Prediagnoses

Prediagnoses could be made in all of 1249 consultations. More than one prediagnosis was considered in 35 patients. The most common prediagnoses made by the physicians in the emergency department were epilepsy (n=889, 69%), febrile convulsion (n=86, 6.7%), and central nervous system infection (n=61, 4.7%) (Figure 2).

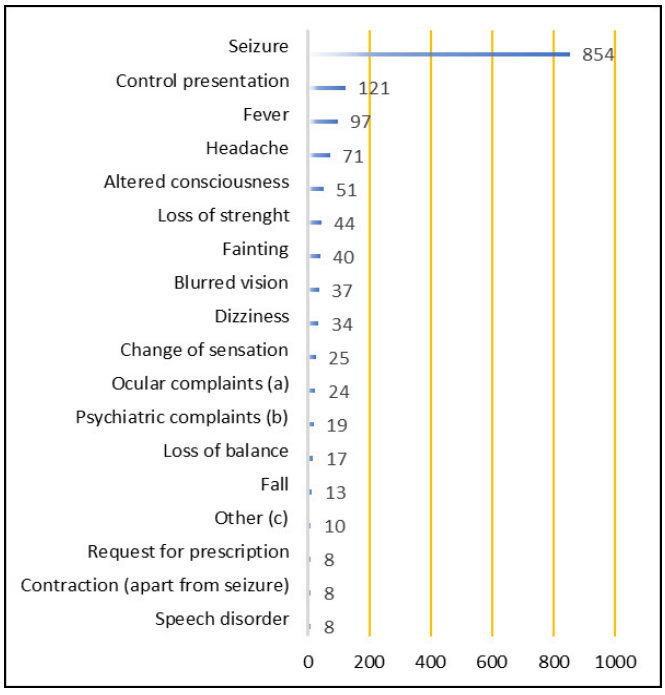

Figure 1. Distribution of the complaints. **(a)** Diplopia: 20, ptosis: 4; **(b)** behavioral disorder: 14, hallucination: 5; **(c)** facial asymmetry: 4, urinary incontinence: 2, hiccups: 2, sore throat: 1, request for evaluation after cardiac arrest: 1

After evaluation of the patients, the most common prediagnoses of the pediatric neurology department were epilepsy (n=254, 19.9%), non-neurological diseases (n=114, 8.9%), and non-epileptic paroxysmal events (n=73, 5.7%). Previous diagnosis of the epilepsy was also valid in 610 cases (49%). Among the patients presenting with seizures, 457 (36.5%) had a previous diagnosis of epilepsy. A total of 231 (18.5%) patients presented with their first afebrile seizure, including 41 (3.3%) patients with symptomatic seizures, and 190 (15.2%) cases with unprovoked seizures (Figure 3).

In our study, discrepancies between the prediagnoses made by emergency physicians and pediatric neurologists were easily noticed. Only 533 (41.2%) of 1,294 prediagnoses made by emergency physicians were the same as those of pediatric neurologists. The most significant diagnostic differences was in the most common prediagnosis of epilepsy (69% vs 19.9%). Only 28.5% of the patients consulted with a prediagnosis of epilepsy were actually diagnosed with this particular condition. While the majority of the remaining patients had no neurological diagnosis (n=70, 5.6%), the most common diagnoses were nonepileptic paroxysmal event (n=54, 4.3%), simple febrile convulsion (n=25, 2%), and complicated febrile convulsion (n=25, 2%-n=16, 1.3%). In addition, the patients presenting for routine follow-up (n=121, 8%) were also consulted with the prediagnosis of epilepsy. Febrile convulsion was another condition differing strikingly among the prediagnoses made by the physicians. Only 51.1% (n=44) of the patients with the prediagnoses of febrile seizures actually received this diagnosis. Diagnosis of neurological disease was not observed in 2.6% (n=32) of the patients consulted with a prediagnosis of febrile convulsion, while the most common diagnoses were simple febrile convulsion (n=34, 2.7%) and complex febrile convulsion and fever triggered seizure in ten cases each (0.8%).

Neurological Emergencies

In our study, diseases of the patients that would result in mortality and morbidity in the absence of emergency treatment or intervention were defined as neurological emergencies. Only 185 (14.8%) patients prediagnosed in the pediatric neurology department, had experienced neurological emergencies. Status epilepticus (n=96, 7.7%), central nervous system infection with neurological findings (n=26, 2%), and intracranial mass with neurological findings (n=12, 0.9%) were the most common neurological emergencies (Table 1).

Table 1. Neurological emergencies

Diagnosis	n	%
Status epilepticus	96	7.7
Central nervous system infection with neurological signs/symptoms	26	2
Intracranial masses with neurological signs/symptoms	12	0.9
Stroke/transient ischemic attack	11	0.9
Central nervous system demyelinating diseases	8	0.6
Febrile status	6	0.5
Drug intoxications with neurological signs/symptoms	5	0.4
Status migrainosus	5	0.4
Guillain-Barré syndrome	4	0.3
Pseudotumor cerebri syndrome	3	0.2
Transverse myelitis	2	0.2
Increased intracranial pressure syndrome due to other causes	2	0.2
Myelitis	2	0.2
Sinus venous thrombosis	1	0.1
Posterior reversible encephalopathy syndrome	1	0.1
Status dystonicus	1	0.1
Total	185	14.8

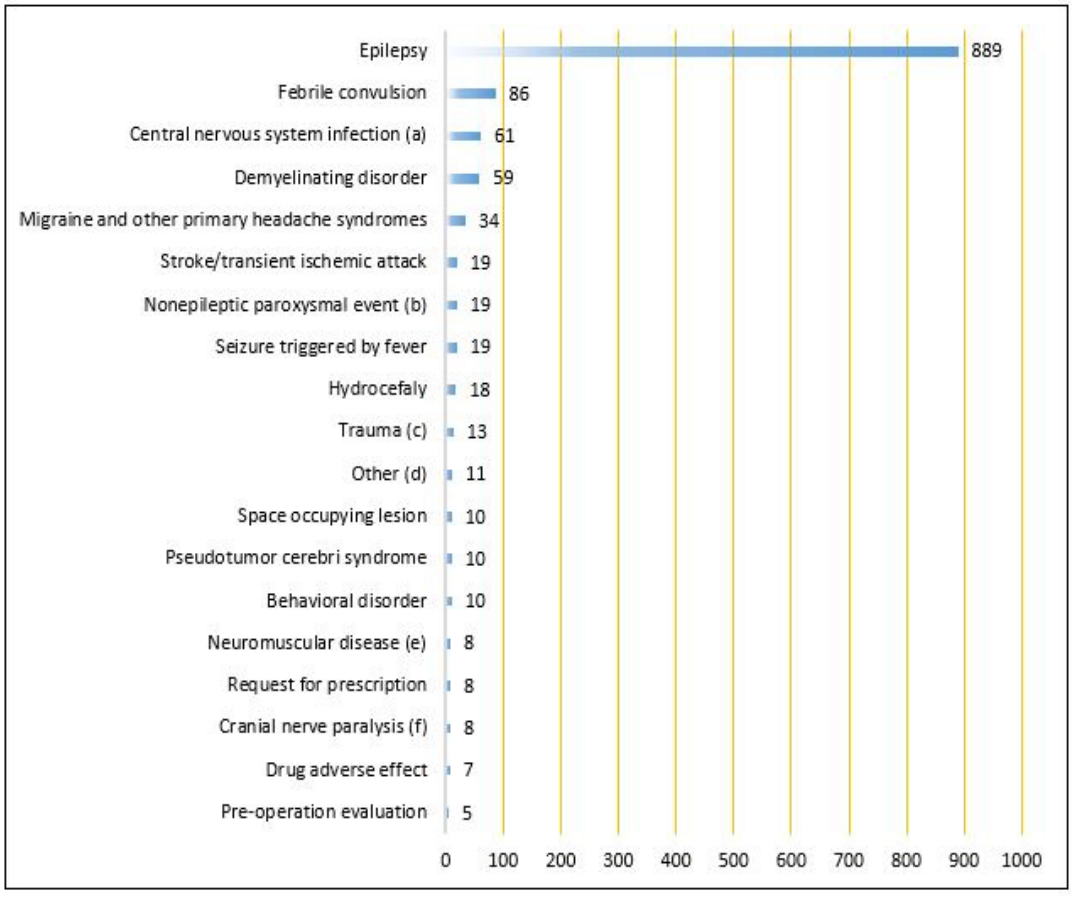

Figure 2. Prediagnoses of the physicians working in the pediatric emergency service

(a) Encephalitis: 44, cerebellitis: 10, meningitis: 7; **(b)** syncope: 14, movement disorder: 4, benign sleep myoclonus: 1; **(c)** head trauma: 12, other traumatic events: 1; **(d)** entrapment neuropathy: 4, leukodystrophy: 3, nistagmus: 1, strabismus: 1, intracranial hemorrhage: 1, intervertebral disc herniation: 1; **(e)** vMyasthenia gravis: 3, Spinal muscular atrophy: 2, Duchenne muscular dystrophy: 2, Charcot Marie Tooth disease: 1; **(f)** 7th cranial nerve paralysis: 4, 6th cranial nerve paralysis: 4

Neuroimaging

Brain computed tomography (CT) imaging was performed in 446 (35.7%) patients, and 372 (29.8%) of them were not pathologic. While nonspecific findings were observed in 53 (4.2%) patients, 21 (1.7%) patients required emergent intervention/treatment. Brain magnetic resonance imaging (MRI) was performed in 444 (35.5%) patients, including those with normal (n=336; 26.9%), and nonspecific findings (n=87; 6.9%). Only in 1.7% (n=21) of the patients a condition requiring emergent intervention or treatment was detected (Table 2).

Among the patients with a brain CT scan, 225 (18% of all consultations) were also evaluated with brain MRI. The results of the brain CT were normal in 198 (15.8%) of these patients. In 169 (13.5%) of the patients with normal brain CT results, brain MRI results were also within normal limits. Although 19 patients (1.5%) with normal brain CT imaging results had nonspecific MRI findings, 10 patients (0.8%) had a MRI finding requiring emergent intervention/treatment.

Electrophysiological Studies

Electroencephalographic (EEG) study was performed in 696 (55.7%), and yielded normal results in 330 (26.4%) patients. Focal and generalized epileptic discharges were seen in 194 (15.5%) and 111 (8.9%) patients, respectively, and background rhythm abnormalities were observed in 61 (4.9%) cases. Seventeen patients who underwent electromyographic examinations had acute sensorimotor axonal polyneuropathy (n=3), acute motor axonal polyneuropathy (n=2), demyelinating polyneuropathy (n=1), mixed-type polyneuropathy (n=1), and entrapment neuropathy (n=1).

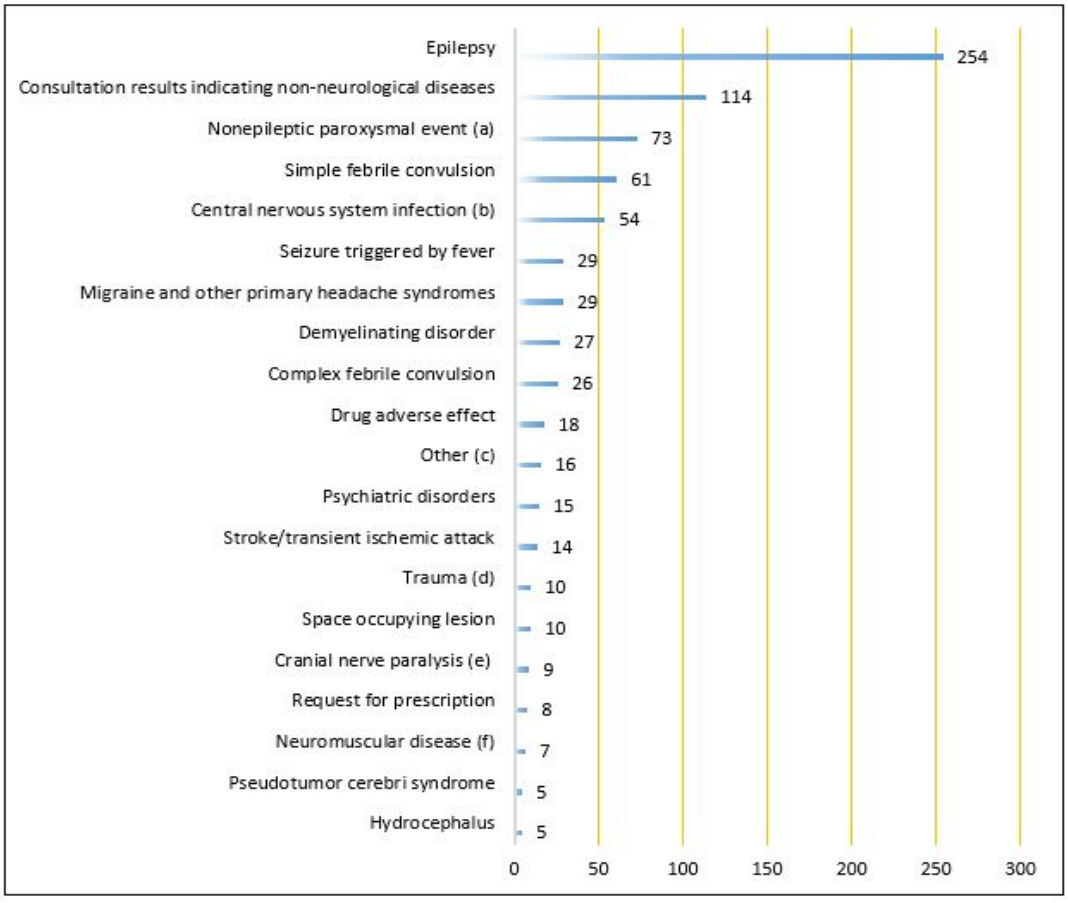

Figure 3. Prediagnoses of the pediatric neurology department

(a) Syncope: 47, breath-holding spells: 14, movement disorder: 7, benign sleep myoclonus: 3, apnea: 2; **(b)** encephalitis: 37, cerebellitis: 10, menengitis: 6, subdural empyema: 1; **(c)** entrapment neuropathy: 4, thrombosis: 2, vitamin B12 deficiency: 2, optic disc drusen: 1, intervertebral disc herniation: 1, leukodystrophy: 1, intracranial hemorrhage: 1, substance abuse: 1, metabolic myopathy: 1, strabismus: 1, autonomic dysfunction: 1; **(d)** head trauma: 9, other trauma: 1; **(e)** isolated 6th cranial nerve paralysis: 4, 7th cranial nerve paralysis: 4, isolated 3rd cranial nerve paralysis: 1; **(f)** duchenne muscular dystrophy: 2, other types of muscular dystrophy: 2, myasthenia gravis: 1, spinal muscular atrophy: 1, charcot marie tooth disease: 1

Table 2. Results of neuroimaging requiring emergent intervention or treatment

	Brain computed tomography (n)	Brain magnetic resonance imaging (n)
Space occupying lesions	9	3
Central nervous system infection	-	7
Demyelinating attack	-	6
Fracture	5	-
Stroke	3	3
Herniation	2	-
Sinus venous thrombosis	1	1
Intracranial hemorrhage	1	-
Myelitis	-	1
Total	21	21

Hospitalizations and Secondary Consultations

A total of 750 (60%) patients were hospitalized including those hospitalized in the pediatric health and diseases service (n=504; 40.3%), in the pediatric intensive care unit (n=16; 1.3%), and cases followed up in the pediatric emergency service (n=230; 18.4%). The most common conditions in patients hospitalized in the intensive care unit were status epilepticus (n=8) and central nervous system infection (n=3).

Most frequently consultations were requested with the recommendation of the pediatric neurology department from pediatric cardiology (n=170; 13.6%), pediatric metabolic diseases and nutrition (n=82, 6.5%), and pediatric infectious diseases (n=62, 4.9%) (Table 3).

DISCUSSION

To the best of researcher's knowledge, pediatric neurology consultations requested by pediatric emergency departments in Turkey have not been specifically investigated so far. A single-center study conducted in France evaluated pediatric neurological conditions in patients presenting to the emergency service within a six-month period and neurological conditions were reported with a rate of 2.5%. They also reported that 1.5% of all their cases (approximately 38/month) requested a pediatric neurology consultation [10]. In a single-center study in Turkey in which all presentations to pediatric emergency service and all consultations were investigated in a one-year period, the rate of pediatric neurology consultations was reported as 1.4% (approximately 29/month) [11]. The pediatric neurology consultation rate in our study (30.4/month) was similar to the literature.

In our study, the most common indications for admission were seizure (56.4%), follow-up (8%), headache (4.7%), and change in consciousness (3.3%). García-Peñas and Muñoz-Orduña (5) aimed to determine the incidence of pediatric neurological emergencies and reported that acute paroxysmal events (48%), headache (41%), and gait disturbance (5%) were the most common indications for consultation. Albertini et al. (10) reported that the most common indications for consultation were seizure (approximately 40%) and headache (approximately 4%).

In our study, the number of patients with epileptic seizures (n=889) was greater than the number of patients (n=854) presenting with the complaint of seizure. When the prediagnoses of the emergency service physicians made for patients presenting with seizures, fainting, and altered consciousness were evaluated, the rates of prediagnoses of epileptic seizure, febrile convulsion, and fever-induced seizure were 69%, 6.7%, and 1.5%, respectively. However, the rates of prediagnoses made in the pediatric neurology department for these complaints were quite different i.e. epileptic seizure (19.9%), simple febrile seizure (4.7%), fever-induced seizure (2.2%), and complex febrile convulsion (2%).

In this study, the prediagnoses made by emergency physicians were accurate in only 41.2% of the cases. This discrepancy was most common for the prediagnosis of epilepsy. Indeed, only 28.5% of the patients considered to have epileptic seizures by pediatric emergency physicians were regarded as having epileptic seizures by the pediatric neurology department. Most of the patients with this particular prediagnosis resulted in a non-neurological disease, and among the neurological conditions, most frequently non-epileptic paroxysmal

Table 3. Consultations recommended by the pediatric neurology department

	n	%		n	%
Pediatric cardiology	170	13.6	Pediatric genetic diseases	18	1.4
Pediatric metabolic diseases and nutrition	82	6.5	Otolaryngology	15	1.2
Pediatric infectious diseases	62	4.9	Pediatric immunology and allergy diseases	7	0.6
Brain, spinal cord and neural system surgery	51	4.1	Orthopedics and traumatology	5	0.4
Child and adolescent mental health and diseases	49	4	Pediatric endocrinology	5	0.4
Ophthalmology	34	2.7	Pediatric nephrology	4	0.3
Pediatric oncology	22	1.7	Dermatology	2	0.2
Pediatric hematology	21	1.7	Pediatric rheumatology	2	0.2
Physical medicine and rehabilitation	20	1.6	Anesthesia and reanimation	2	0.2
Pediatric gastroenterology, hepatology and nutrition	18	1.4	Medical pharmacology	1	0.1

events such as syncope, breath-holding spells, benign sleep myoclonus, febrile seizures, fever-induced seizures, and other symptomatic seizures were detected. Even by excluding patients on home-ventilator support who were consulted for routine follow-up, this considerable divergence may be caused by the lack of recognition of nonepileptic paroxysmal events, the lack of knowledge of the exact literature equivalent of the term epilepsy, or the inability to fully determine the etiologies that might classify the seizures of patients as "symptomatic", as in febrile seizures.

Albertini et al. [10] reported that 30% of the patients presenting to the emergency department were diagnosed with epilepsy. While patients with simple febrile seizures were not consulted, 42.8% of the patients with seizures were consulted in whom 86.6% had epileptic seizures. The reason of the lower rate of the epilepsy compared to the literature may be due to the consultations of the febrile seizures in our study. Another striking prediagnosis discrepancy was in febrile convulsions reported with a rate of 51.1%. Despite high frequency of the febrile convulsions in general pediatric practice, the discrepancy in the prediagnosis of this situation may be due to a lack of recognition of "febrile reactions" that can be observed with fever but not related to seizures, or a lack of familiarity with the concept of fever-triggered seizure.

In our study, 4.7% of the patients presented with headache, and 56.3% of them had at least one accompanying complaint. The most common accompanying findings were dizziness (0.9%), sensory changes (0.6%), and loss of strength (0.6%). In the literature, the incidence of headache varies according to age as 3-8%, 19.5, and 37-51.5% in children at 3, 5, and 7 years of age, respectively. Based on this frequency, appropriate management is essential in the emergency department [14-16]. The vast majority of headaches presenting to the pediatric emergency department have been reported to be primary, and benign headaches [17]. The most frequent causes of nontraumatic headache encountered in the pediatric emergency department include primary headaches (21.8-66.3%), potentially harmless secondary headaches (35.4-63.2%), and less frequently, potentially life-threatening secondary headaches (2-15.3%) [18]. Primary headache was observed in 40.8% of our patients, while secondary causes were seen in 59.2% of them. A small percentage (25.3%) of patients required urgent treatment/intervention due to headache which constituted 1.4% of all presentations. The most common neurological emergencies in which headache is the reason for presentation were status migrainosus (0.4% among all patients, and 7% among patients with headache), central nervous system infection (0.2% of all patients, and 3.5% of patients with headache), and demyelinating disease (0.1% of all applications, and 1.7% of the patients with headache).

Assessment and diagnosis of the headaches in pediatric patients can be difficult for physicians, therefore neuroimaging is often required as a part of the evaluation process [19]. CT is almost always the first neuroimaging method preferred in the emergency room in patients with suspected secondary headache due to its rapid turnover and easy accessibility. Although brain MRI provides superior quality images, the disadvantages of this particular technique are its higher procedural cost and requirement for sedation or anesthesia in young children [19,20]. Studies of the use of neuroimaging in the emergency department have shown that only 1.2% of neurologically normal patients have pathological findings that lead to a significant change in disease management [21]. Neuroimaging techniques should be spared for children with a suspicious clinical history, abnormal neurological examination findings or other symptoms of intracranial space-occupying lesions [22]. Changes in mood or personality over days or weeks, headache with severe vomiting, especially early in the morning, worsening of pain with cough or Valsalva maneuver, altered consciousness, papilledema, focal neurologic deficit or meningismus, seizures or fever, high-risk population (patients with sickle cell anemia, malignancy, recent head trauma, ventricular-peritoneal shunt, others), pain waking the child or occurring at the time of waking, change of the character of the headache in patients with primary headache, poor general condition, increased head circumference, cranial nerve palsies, abnormal ocular movements, squints, pathologic pupillary responses, visual field defects, ataxia, gait abnormalities, impaired coordination, sudden onset of headache (first or worst ever), increase in severity or characteristics of the headache, occipital headache (relative red flag), age <5 years (relative red flag) are the red flags that are the basis of existing guidelines and recommendations regarding the use of neuroimaging [18]. Tsze et al. [22] found at least one red flag in 87.9% of patients in their study, including headache present upon/soon after waking (39.7%), headache waking from sleep (34.8%), or headaches increasing in severity, frequency, and duration (46.3, 40 and 33.1%, respectively). They also reported the prevalence (1%) of emergent intracranial abnormalities. Abnormal neurological examination findings, severe vomiting especially early in the morning,

extreme pain and positional symptoms were found to be the required indications for emergency neuroimaging. Considering these results, unnecessary neuroimaging was thought to be commonly performed because of the high prevalence of nonspecific red flag findings [22]. In our study, although neuroimaging techniques were performed frequently in patients with headache, conditions requiring emergency intervention/treatment were rare, similar to the literature. Among patients consulted for headache, 59.1% of them were evaluated with brain CT, and 19.1% of these patients had pathologic findings. The most common abnormalities were space-occupying lesions (0.1%), white matter changes (0.1%), and arachnoid cyst (0.1%). In patients presenting with headache and underwent brain CT, an abnormality requiring emergent treatment/intervention (sinus venous thrombosis and space-occupying lesion) was seen in only 0.1% of them. The sensitivity and specificity of neurologic examination in detecting brain CT pathology in cases evaluated in the pediatric emergency department were reported at the rates of 87% and 94%, respectively [23]. To support this result, in our study abnormal neurological examination findings existed in all patients with emergency abnormality detected by brain CT. More than half (64.7%) of the patients consulted for headache were evaluated with brain MRI, and 28.3% of them had abnormal results with the most common pathologies being space-occupying lesions (2%), subdural effusion (1%), and demyelinating disease (1%). In only 0.6% of these patients, an abnormality requiring emergent treatment/intervention (demyelinating disease, subdural effusion, sinus vein thrombosis, space-occupying lesion, central nervous system infection) was detected.

In our study, EEGs were normal in approximately half of the patients. The most common abnormal findings were focal epileptic discharges. EEG study was most frequently requested for patients with suspicion of epileptic seizures. The vast majority of these patients had a previous diagnosis of epilepsy and presented with seizure recurrence, and EEG was performed for a treatment revision. EEGs were performed for other indications such as clarification of the first afebrile seizure or altered consciousness, and for differential diagnosis process in non-epileptic paroxysmal events. Various studies have reported that the use of EEG in the pediatric emergency department may be beneficial [24-28]. A study of 32 pediatric emergent electroencephalograms obtained for different indications such as altered mental status, paroxysmal movement (including seizure clusters) and prolonged febrile or afebrile seizures demonstrated that the EEG results influenced the treatment decision in 94% of the patients [25]. In another study with 70 pediatric emergent EEGs obtained for the suspicion of ongoing seizures or status epilepticus, 44% of total EEGs were normal and 59.1% of the patients were discharged from the emergency department mainly based on the EEG results thus preventing hospital admissions [27]. To determine the feasibility and clinical utility of point-of-care electroencephalograms (pocEEGs) for children admitted to the pediatric emergency departments with acute nontraumatic central nervous system disorders, 36 patients with acute seizures or altered mental status were analyzed and the treatment had been modified due to pocEEG results in 10 children in whom six presented with non-convulsive status epilepticus [28].

In this study, a significant increase in emergency department crowding (EDC) was observed due to the patients that did not have neurological disease (8.9%), who were admitted for routine follow-ups (8%), or for prescriptions (0.6%). In the literature, EDC was stated to be able to lead to many negative consequences such as delay in the treatment of life-threatening conditions, increased mortality and low patient satisfaction [29-33]. In our study, 14.8% of the patients presented with a neurological condition required emergency treatment/intervention, with a rate higher than 1.6% reported by Albertini et al. [10] Their low rate was explained by the fact that many cases in their center were taken directly to the intensive care unit without visiting the emergency department. Despite the higher rate of neurological emergencies in our study, many patients did not need urgent evaluation, possibly due to the difficulty of emergency service physicians encountered in distinguishing neurological conditions. Education of physicians working with large patient populations such as emergency services on neurological emergencies will contribute to improving this rate. Another reason may be the defensive medicine approach, which has become recently widespread among the physicians in whom more extensive questionnaire studies on this topic are needed.

CONCLUSION

The most common indications for consultation in the pediatric emergency service were seizures, routine follow-ups of patients receiving home-ventilator support, and headache. A small percentage (14.8%) of consultations required acute interventions. The most common conditions requiring acute intervention were status epilepticus, central nervous system infection,

and intracranial mass. In only 1.7% of the patients, both brain CT and MRI demonstrated emergency neurological abnormalities suggesting the overuse of the neuroimaging techniques. Preventing inappropriate use of emergency services will contribute to the delivery of a more qualified service within a shorter time for emergency patients, and reduce unnecessary health expenses, as well as workload of emergency service workers and consultant physicians.

Ethics

Ethics Committee Approval: This study was approved by Dokuz Eylül University Faculty of Medicine Ethics Committee (approval no: 2021/10-11, date: 29.03.2021).

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

Peer-review: Externally and internally peer-reviewed.

Author Contributions

Surgical and Medical Practices: Ç.G., C.P., G.S.U., D.S., Ö.K., D.E., S.H.K., U.Y., Concept: Ç.G., C.P., G.S.U., D.S., Ö.K., D.E., S.H.K., U.Y., Data Collection and/or Processing: Ç.G., C.P., G.S.U., D.S., Ö.K., D.E., S.H.K., U.Y., Analysis and/or Interpretation: Ç.G., C.P., G.S.U., D.S., Ö.K., D.E., S.H.K., U.Y., Literature Search: Ç.G., C.P., U.Y., Writing: Ç.G.

Conflict of Interest: The authors have no conflict of interest to declare.

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

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