ORİJİNAL ARAŞTIRMA ORIGINAL RESEARCH

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Use of Pediatric Observation Units: Experience from a Tertiary Care Training Hospital inTurkey

Çocuk Acil Gözlem Ünitelerinin Kullanımı: Türkiye'de Bir Üçüncü Basamak Eğitim Hastanesi Deneyimi

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ABSTRACT Objective: A pediatric observation unit may help to alleviate some of the stress caused by an increased number of patients. The aim of this study is to identify the intended functions as well as the clinical and operating characteristics of our observation unit, which is an alternative and important option to our inpatient and emergency services. **Material and Methods:** The hospital records of children aged between 0 months and 18 years who were admitted to our observation unit between January 2014 and December 2014 were reviewed. The patients' demographic and clinical characteristics, diagnosis at admission, the number of patients admitted to wards, the percentage of patients referred to other hospitals, and the length of observation were analyzed. **Results:** A total of 115.729 patients admitted to the emergency department in a year. Of these patients, 121 (0.10%) were admitted to a ward appropriate for their age and disease, while 7007 (6.05%) were admitted to the observation unit. Of the patients monitored in the observation unit, 2110 (30.11%) were eventually admitted to clinics appropriate for their age. 1559 (26.85%) of patients admitted to the observation unit had gastrointestinal system diseases; 1270 (18.12%) had nervous system diseases; 1265 (18.05%) had respiratory system diseases; and 1137 (16.24%) had infectious diseases. We found that 5970 of 7007 (85.20%) patients admitted to the observation unit stayed less than 24 hours, and 1037 (14.79%) patients stayed more than 24 hours. The mean length of stay for all patients admitted to the observation unit was 13 hours, 28 minutes (1,40 ± 34,4). **Conclusion:** Our observation unit has an important role in assessing and managing children with a variety of diseases. Also; our observation unit functions as a holding unit to provide short term care of overflow inpatients.

Keywords: Emergency service, hospital; pediatrics; observation

ÖZET Amaç: Çocuk gözlem üniteleri, artmış hasta sayısına bağlı olarak oluşan stres yükünü hafifletebilirler. Bu çalışmanın amacı, yataklı ve acil servisler için alternatif ve önemli bir seçenek olan çocuk gözlem ünitesinin işlevlerini tanımlamaktır. **Gereç ve Yöntemler:** Yaşları 0 ay- 18 yıl arasında değişen, Ocak- Aralık 2014 yılında acil servis gözlem ünitemize başvuran çocukların dosya ve istatistik verileri incelendi. Hastaların demografik, klinik özellikleri, başvurudaki tanıları, gözlem ünitesinde kalış süreleri ve servislere yatırılan ve diğer hastanelere sevk edilen hasta sayısı ve oranları değerlendirildi. **Bulgular:** Bir yılda 115,729 hasta acil servise başvurdu. Bu hastaların 121'i (%0,1) yaşlarına ve tanılarına uygun servislere yatırıldı. 7007' si (%6,05) ise gözlem ünitesinde izlendi. Gözlem ünitesinde izlenen hastalardan 2110'u (%30,11) yaşlarına uygun servislere yatırıldı. Acil gözlem biriminde izlenen hastaların 1559 (%26,85)'u gastrointestinal s'stem hastalıkları; 1270 (%18,12)'i sinir sistemi hastalıkları; 1265 (%18,05)'i solunum sistemi hastalıkları; ve 1137 (%16,25)'si infeksiyon hastalıklarına sahip idi. Acil gözlem biriminde izlenen 7007 hastanın 5970'inin (%85,20) 24 saatten kısa süre, 1037'sinin (%14,79) 24 saatten uzun süre kaldığını bulduk. Acil gözlem ünitesinde izlenen tüm hastaların ortalama kalış süresi 13 saat, 28 dakika (1,40 ± 34,41) idi. **Sonuç:** Acil gözlem ünitemizin çeşitli hastalıkları olan çocukların değerlendirilmesi ve yönetiminde önemli rolü vardır. Ayrıca; acil gözlem ünitemiz artmış yataklı servis hasta yükü için depolama ünitesi gibi işlev görmektedir.

Anahtar Kelimeler: Acil servis, hastane; pediatri; gözlem

In Turkey, some hospitals, especially those providing pediatric care, are facing difficulties, including limited inpatient bed capacity, prolonged waiting times at emergency units, and problems with quality and patient satisfaction. In addition to these, as a tertiary referral hospital, our hospital receives very high number referrals from surrounding cities and towns. Although the triage system is currently in use, a pediatric observation unit (OU) may help to alleviate some of the stress caused by the increased number of patients.

Due to the lack of a universally accepted definition for OU, there are many different OU models. However, a common definition of OU is that they are "separate areas that allow for observation of patients to determine whether admission is necessary".[1] In Turkey, OUs are defined as units that provide medical assessment and prompt treatment in a short and certain period of time. OUs aim to provide quick and short term follow-up of patients after diagnosis, to prevent unnecessary inpatient admissions, and to provide care and treatment for certain clinical situations, such as croup, bronchiolitis, febrile and afebrile convulsions, syncope, etc. Our hospital is a tertiary pediatric hospital in İzmir, which is the third largest city in Turkey, and on average, we serve 110.000 patients per year in the emergency department. For this reason, the importance of OUs is increasing; however, our OUs are facing the problem of having limited inpatient beds.

The aims of our current study are 1. to determine the intended functions of an observation unit as an alternative to clinic care and the emergency department, 2. to evaluate its working efficiency, 3. to determine diseases frequently treated in the pediatric observation unit, 4. to find ways to improve the efficiency of the observation unit.

MATERIAL AND METHODS

The Pediatric Emergency Department of our hospital is located on the ground floor, where patients are easily transported to the intensive care unit or other inpatient services without leaving the building. Our department consists of two emergency outpatient clinics, one triage room, and one OU. In our OU, there is one resuscitation room, one minor surgery room, one examination room for the management of life threatening conditions or for patients who are triaged (as red in chart), six beds for continuous monitoring, and 14 beds total. Diseases commonly treated in our OU include those involving respiratory distress, syncope, seizure, minor trauma, diabetic ketoacidosis, acute renal failure, poisonings and overdoses, electrolyte imbalances, dehydration and shock, infections, and unconsciousness. Patients who undergo lumbar puncture procedures are also admitted to the OU. Additionally, our OU is used as an alternative facility to monitor patients (advanced examinations and treatment) who require inpatient care when there are no available beds in the suitable clinic. The hospital records of children aged 0 months - 18 years who were admitted to our OU between January 2014 and December 2014 were retrospectively examined. We recorded the patients' demographic and clinical characteristics, diagnosis at admission, the number of patients admitted to clinics from the OU, the percentage of patients referred to other hospitals from the OU, and the length of stay in the OU. Data were evaluated with Microsoft Excel 2013 version. Statistical data use has been approved by the hospital management.

RESULTS

Between January 1st and December 31st, 2014, a total of 115.729 patients admitted to the emergency department. Of these patients, 121 (0.10%) were admitted to inpatient clinic appropriate for their age and disease, while 7007 (6.05%) were admitted to the observation unit. The patients admitted to the observation unit were between the ages of 0 and 18 years (median ± IOR; 30 ± 50 months). 3795 (54.17%) were male, and 3212 (45.83%) were female. Of the patients monitored in the OU, 2110 (30.11%) were eventually admitted to inpatient clinics appropriate for their age (Table 1).

There were higher patient admissions to the emergency department during the months of March, May, and January; and the highest number

TABLE 1: Distribution of patients who were evaluated in the emergency department and admitted to the observation unit and clinics by month

Month	Total admissions to emergency department n* (%)	Patients admitted to OU n (%)	Patients admitted to clinics from OU n (%)	Patients admitted to clinics from emergency department n	Patients referred to other centers from OU N
January	12.689 (10.96)	618 (4.87)	322 (52.10)	23	3
February	9.598 (8.29)	616 (6.41)	308 (50.00)	24	7
March	10.686 (9.23)	665 (6.22)	285 (42.85)	35	6
April	9.667 (8.35)	619 (6.40)	112 (18.09)	0	13
May	10.179 (8.79)	593 (5.82)	108 (18.21)	1	21
June	9.282 (8.02)	517 (5.56)	110 (21.27)	0	20
July	8.110 (7.07)	527 (6.49)	113 (21.44)	0	19
August	8.602 (7.43)	561 (6.52)	142 (25.31)	0	16
September	8.260 (7.13)	499 (6.04)	114 (22.84)	0	14
October	9.714 (8.39)	581 (5.98)	158 (27.19)	0	13
November	8.995 (7.77)	574 (6.38)	160 (27.87)	13	6
December	9.947 (8.59)	637 (6.40)	178 (27.94)	25	12
Total	115.729	7007 (6.05%)	2.110 (30.11%)	121 (0.10%)	149 (2.12%)

n*: number of the patients

was achieved in January (12.689 patients, 10.09%). Admissions declined during July, August, and September. However, when we evaluated the admissions to the OU, the lowest occurred in January (618, 4.87%), and the highest occurred in August (561, 6.52%). The highest number of admission to the inpatient clinics from the OU occurred during the winter season (January (322, 52.10%), February (308, 50.00%) and March (285, 42.85%) (Table 1). A total of 121 patients (0. 10%) were admitted to the clinics from the emergency department; 120 of these occurred during November, December, January, February and March, one occurred in May, and none were admitted during the summer and fall (Table 1).

When classified by disease type, 1559 (26.85%) of patients admitted to the OU had gastrointestinal system diseases (vomiting, abdominal pain (1249/1559), acute gastroenteritis (302/1559), or a surgical cause of abdominal pain (8/1559); 1270 (18.12%) had nervous system diseases (febrile/afebrile seizure, epilepsy (1185/1270), etc.; 1265 (18.05%) had respiratory system diseases (bronchiolitis (684/1265), bronchopneumonia (322/1265), asthma (90/1265), etc.; and 1137 (16.24%) had infectious diseases (fever, sepsis, upper respiratory tract infections, meningitis, etc.). When length of stay in the OU was evaluated, we found that 1587 (22.65%) of the patients stayed 0-4 hours; 2403 (34.30%) of them stayed 12-24 hours; and 1037 (14.79%) patients stayed more than 24 hours. The mean length of stay for all patients admitted to the OU was 13 hours, 28 minutes (1,40±34,41 hours, minutes).

The majority of the patients monitored in the OU for more than 24 hours had bronchopneumonia or bronchiolitis (359 (28.88%) patients), while the majority of patients monitored between 12 and 24 hours had abdominal pain, vomiting, and gastroenteritis (623 (25.95%) patients) (Figure 1). A total of 149 patients (2.12%) were referred from our OU to other centers for further examination and treatment; of these, 92 (61.74%) had trauma (fall from height, motor vehicle accident, etc.), 17 (11.40%) had surgical abdomen, 3 (2.01%) had intracranial tumor, 3 (2.01%) had foreign body in the respiratory tract, and 34 (22.81%) had chronic diseases. A total of 5 patients died in the OU, and the causes of death were as follows: sudden death (1 patient), cardiac arrest due to congenital cardiomyopathy (1 patient), end-stage renal failure (1 patient), premature birth and sepsis (1 patient), and

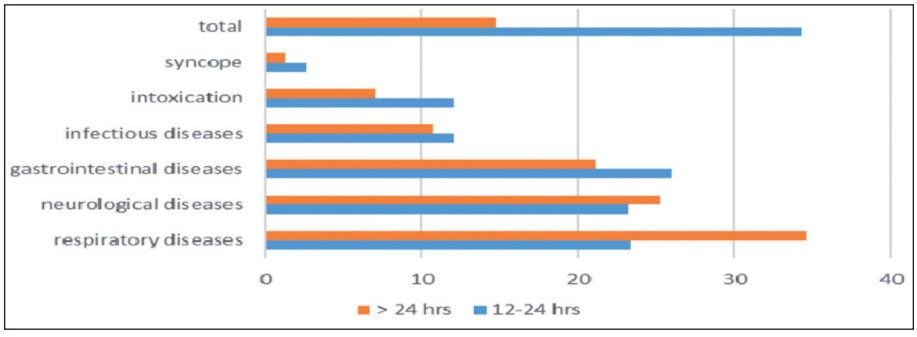

FIGURE 1: Diseases groups (%) according to the lenght of stay in the OU.

severe metabolic acidosis due to metabolic disease (1 patient).

DISCUSSION

Emergency department OUs can have a significant positive impact on healthcare service. It has been reported that clinical conditions are better assessed in OUs than in traditional emergency departments. OUs are facilities that provide short-term and rapid treatment, which may prevent unnecessary work-ups and hospitalization.[2-4]

A study by Leduc et al. revealed that the mean age of 686 cases admitted to a pediatric OU was 4.3 years, and the gender distribution was equal. In our current study, the mean age and gender distribution was similar.[5]

Another study reported that the mean age of patients who were monitored in the OU in a tertiary care hospital with extensive experience was 6 +/- 5.3 years, the admission rate to the OU was 4%, and the admission rate to the clinics was 7.3%.[2] In Turkey, based on data collected from a pediatric emergency department of a university hospital, the total number of patients examined in one year was 22.286, the admission rate to the OU was 2.4%, the admission rate to the pediatric clinics from the OU was 2.8%, and the admission rate directly to the clinics was 1.3%.[6] In our study, lower admission rate directly to the clinic (0.01%) may be due to the occupancy of inpatient beds. These patients given a decision of hospitalization were admitted to OU. Thus, our OU is having to provide inpatient care for that patients in need of hospitalization. In the literature, the overall admission rate to clinics from the OU varies between 15-25%, and re-evaluation of hospitalization criteria is advised if the rates are either above or below these reported rates.[7] As a tertiary care teaching hospital, the number of patients examined in our emergency department in one year was 115.729, with 7007 (6.09%) of these patients being admitted to the OU, and 121 (0.01%) admitted directly to clinics. In our hospital, the rate of admission to the clinics and intensive care unit from the OU was 30.11% (Table 1). When we evaluated the distribution of patients admitted to the emergency department according to seasons, we found that it was highest during the fall and winter months, and lowest during July and August. The main reason for this variation may be the increased prevelance of respiratory infection deseases in winter months. However, when the rate of admission to the OU from the emergency department was evaluated, we found that the rate was highest in July (6.49%) and August (6.52%), and lowest in January (4.87%), which is the month with the highest number of patient admissions to the emergency department. It is because due to the occupancy of inpatient beds in the winter months, our OU is having to provide inpatient care. Related literature reports that the rate of admission to clinics from OUs is between 15-25%, and advices that hospitalization criteria should be reviewed if the rate is either above or below this rates.[7] In our current study, the overall rate of admission to clinics from the OU was 30.10%. However, when we examined the seasonal distribution of this rate, we found that it does not exceed 25.00% during the spring and

summer seasons, but reaches 52.10% during winter, with the highest rate occurring in January. The high rates in the winter are due to the increased prevalence of respiratory tract diseases, particularly bronchiolitis and viral bronchopneumonia, during the winter months. Thus, the OU provides an alternative facility for patients requiring inpatient care, particularly during the fall and winter months. However, the increased number of patients hampers the effective and efficient functioning of the OU. Furthermore, as OU is considered to be an outpatient care facility, our hospital faces financial losses, as we cannot invoice the service as inpatient care.

Diagnoses of patients admitted to OUs differ from country to country, and from center to center. A study from New Zealand reported the most frequent five diagnoses upon admission as respiratory tract infection, asthma, poisonings, gastroenteritis, and seizures;[8] in a training hospital in Australia, the top five diagnoses were asthma, poisonings, infections, seizures, and respiratory tract infections.[3] In Turkey, one university hospital from the capital city reports the most frequent diagnoses upon admission to the OU as trauma, poisonings, respiratory system diseases, nervous system diseases, and gastrointestinal system diseases, in decreasing order of frequency.[6] In our current study, the most frequent diagnoses were gastroenteritis, abdominal pain, and vomiting, followed by neurological diseases (febrile and afebrile seizures, etc.), respiratory system diseases (pneumonia, bronchiolitis, asthma, etc.), infectious diseases, and poisonings, in decreasing order of frequency. Differences in diagnoses upon admission between the aforementioned studies may be due to variations in each country's developmental stage, the efficiency of preventive health services, and the lack of standardized admission criteria.

One indicator of effective functioning in OUs is the length of stay. Related studies advise a maximum 24 hour length of stay in OUs.[9,10] Beattiy et al. reported that the average length of stay was 5.35 hours in their OU.[9] Lamireau et al. reported that 68% of children spent less than six hours in the OU.[11] In our current study, the average length of stay in the observation unit was 13 hours and 28 minutes, and 14.79% of the patients stayed more than 24 hours. Of the patients admitted to our OU, 67.68% were discharged upon completion of their treatment. Patients monitored for more than 24 hours in our OU most often had the diagnoses of pneumonia and bronchiolitis, febrile and afebrile seizures, abdominal pain, gastroenteritis, fever of unknown etiology, and poisonings, in decreasing order of frequency. However, the major reason that patients were monitored for more than 24 hours is because our OU functions as a "holding unit" when there are no empty beds in the clinic. The term "holding unit" or "overflow" unit are specific areas to provide short-term care of overflow inpatients.[12] Observation units are also used as holding units, particularly in regional hospitals where patient flow is high.[12] Because emergency observation care is regarded as an outpatient service, this situation bears an additional financial burden on the hospital. Therefore, we propose the creation of "holding units" within the emergency department that are independent from observation units. In these holding units, patients can be monitored for longer than 24 hours, but less than the duration of usual inpatient care, and therefore, the services can be invoiced.

Another reason for increased lengths of stay in our OU is that some patients have an observation time that ends at midnight; it is especially true that patients with neurological diseases are kept until morning for electroencephalography and cranial imaging studies and some patients are kept so that they can be evaluated by other departments as well. As a result, there are not enough beds for patients requiring emergency observation, and/or for patients that would be discharged following short-term treatment. This leads to a reduction in the efficiency of our OU. With regards to mortality rates in OUs, Cui-ping et al. reported a rate of 5.2/1000 cases in their observational study in a pediatric emergency department OU from a tertiary care hospital.[13] This rate was from a hospital in China, which is a developing country. The mortality rate in our OU is very low (0.7/1000 cases). Our low mortality rate is most likely due to the fact that we

use standardized diagnosis and treatment guidelines in critical patients, and we admit these critically ill patients to the Intensive Care Unit right after their first stabilization.

CONCLUSION

Our OU has an important role in assessing and managing children with a variety of diseases. Our OU functions as a holding unit to provide short term care of overflow inpatients. We believe that holding units can be a successful model for overcrowded emergencies. Further large scale prospective studies are needed to investigate the possible benefits of holding units and OUs to pediatric care and emergency healthcare, including financial yields.

Conflict of Interest

Authors declared no conflict of interest or financial support.

Author Contributions

İlker Günay, Özlem Bekem Soylu, Tanju Çelik supervised the design and contributed to screen the patients. Emel Ataş Berksoy supervised the design and execution of the study, performed the final data analyses, has primary responsibility for writing the manuscript, protocol development, and enrollment.

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