



Did the COVID-19 Pandemic Affect the Emergency Service and Outpatient Clinic Applications of Pediatric Patients?

COVID-19 Pandemisi Çocuk Hastaların Acil Servis ve Poliklinik Başvurularını Etkiledi mi?

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Abstract

Introduction: In the Coronavirus disease-2019 (COVID-19) pandemic, hospital admission rates was observed same difference in due to masks, closure of schools, and curfews. In our study; we aimed to compare the pediatric health and diseases department applications, triage, diagnosis distribution and hospitalization rates during the pandemic period with those before the pandemic.

Methods: In this study, 240.440 patients who applied to Kütahya Health Sciences University Hospital Pediatrics Department between 11.03.2019 and 11.03.2021 were evaluated retrospectively. The patients were analyzed in two groups as pre-pandemic and pandemic period. Diagnosis distribution was evaluated in October-November-December. Chi-square test was used to compare categorical variables, and multiple comparisons were analyzed using Bonferroni-corrected Z-test. Significance level was accepted as $p<0.050$. Ethics committee approval was obtained for the study.

Results: Pediatrics department visits decreased by 68.5% during the pandemic period ($p<0.001$). During the pandemic period, while the rate of application to pediatric clinic, endocrinology and neonatal intensive care units increased and the rate of admission to pediatric emergency, allergy and cardiology departments decreased ($p<0.001$). While the diagnoses of respiratory tract infections, nausea-vomiting, cough, and fever were high before the pandemic. Gastroenteritis, urinary system infection, headache, constipation, urticaria, and neonatal hyperbilirubinemia were high in the pandemic period ($p<0.001$). Hospitalization rates during the pandemic period; it was determined that while the rates of pediatrics, allergy and cardiology hospitalizations decreased, the rate of hospitalization in emergency and neonatal intensive care units increased ($p<0.001$). No difference was found between mortality rates in pediatric and neonatal intensive care units ($p=1.00$). It was analyzed that while the green area application rate was higher before the pandemic, the yellow and red area application rate was higher during the pandemic period ($p<0.001$).

Öz

Giriş: Koronavirüs hastalığı-2019 (COVID-19) pandemisinde maske, okulların kapanması, sokağa çıkma kısıtlamaları nedeniyle hastaneye başvuru oranlarında değişiklik gözlenmiştir. Çalışmamızda; pandemi döneminde çocuk sağlığı ve hastalıkları bölüm başvurularının, triyaj, tanı dağılımları ve yatış oranlarının pandemi öncesi ile karşılaştırılması amaçlandı.

Yöntemler: 11.03.2019-11.03.2021 tarihleri arasında, Kütahya Sağlık Bilimleri Üniversite Hastanesi, Çocuk Sağlığı Bölümü'ne başvuran 240,440 hasta geriye dönük olarak değerlendirildi. Hastalar COVID-19 pandemi öncesi ve pandemi dönemi olmak üzere iki grupta incelendi. Tanı dağılımı Ekim-Kasım-Aralık ayları değerlendirildi. Kategorik değişkenlerin karşılaştırılmasında ki-kare testi, çoklu karşılaştırmalar Bonferroni düzeltilmeli Z-testi ile analiz edildi. Önem düzeyi $p<0,050$ olarak alındı. Çalışma için etik kurul onayı alındı.

Bulgular: Pandemi döneminde çocuk hastalıkları bölümüne yıllık başvuru %68,5 azaldığı saptandı ($p<0,001$). Pandemi döneminde çocuk sağlığı ve hastalıkları, endokrinoloji ve yenidoğan yoğun bakıma başvuru oranında artarken çocuk acil, alerji, kardioloji bölümlerine başvuru oranının azaldığı saptandı ($p<0,001$). Pandemi öncesi solunum yolu enfeksiyonları, bulantı-kusma, öksürük, ateş tanıları yüksek iken pandemi döneminde gastroenterit, üriner sistem enfeksiyonu, baş ağrısı, kabızlık, ürtiker, yenidoğan sarılığı yüksek sıklıkta olduğu görüldü ($p<0,001$). Pandemi döneminde yatış oranları; çocuk hastalıkları, alerji ve kardioloji yatış oranlarının azalırken acil servisten verilen ve yenidoğan yoğun bakım yatış oranının arttığı saptandı ($p<0,001$). Çocuk ve yenidoğan yoğun bakım yıllık mortalite oranları arasında istatistiksel olarak fark saptanmadı ($p=1,00$). Pandemi öncesi yeşil alan başvuru oranı daha yüksek iken pandemi döneminde sarı ve kırmızı alan başvuru oranının daha yüksek olduğu analiz edildi ($p<0,001$).

Sonuç: Pandemi döneminde hastane başvuru oranları önemli ölçüde düşerken, maske ve okulların kapanması nedeniyle diğer solunum

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Conclusion: While the rates of admission in pediatric patients decreased significantly during the pandemic period, it was thought that other respiratory tract infections decreased due to the closure of masks and schools. In addition, measures and seasonal arrangements should be made to reduce the applications for green area in the pediatric emergency services.

Keywords: COVID-19, pandemic, pediatric emergency, triage, hospitalization rates, mortality

Introduction

Patients with non-urgent and mild complaints often prefer the emergency service because of the ease of access to the physician.¹⁻³ The fact that green area patients apply to the emergency service instead of applying to the primary health care services causes the density in the hospitals and the insufficient and poor quality delivery of care in the health system.³⁻⁵ This excessive workload causes patients to wait for a long time and delays in providing services to those with serious illnesses, resulting in dissatisfaction, increased patient treatment costs, and serious problems in terms of safety.³⁻⁷

With the declaration of the Coronavirus disease-2019 (COVID-19) pandemic on March 11, 2020 in the world and in our country, restrictions had to be made in the health system and social life. A decrease is observed in hospital admissions due to mask use, social distance rules, closure of schools, curfews in the country and fear of COVID-19 infection.⁸⁻¹⁰ In this study, it was aimed to evaluate the hospital admission rates, triage status, diagnosis distribution, hospitalization and mortality rates of pediatric patients during the pandemic period.

Materials and Methods

Cases admitted to the Department of Child Health and Diseases of the University of Health Sciences between 11.03.2019 and 11.03.2021 were analyzed with the cross-sectional observational study method. Patient information was scanned retrospectively from the hospital automation system, and data of 240,440 patients aged 0-18 years were recorded. All of the applications were analyzed in two groups as pre-pandemic COVID-19 (11.03.2019-11.03.2020) and pandemic period (11.03.2020-11.03.2021). Diagnostic distribution of emergency applications in October-November-December selected from the autumn and winter seasons was evaluated in two groups as pre-pandemic (01.10.2019-30.12.2019) and pandemic periods (01.10.2020-31.12.2020). The triage characteristics, admission times, medical diagnoses and the results of the

yolu enfeksiyonlarının azaldığı düşünüldü. Ayrıca acil servis yeşil alan başvurularının azaltılması için önlemler ve mevsimsel düzenlemelerin yapılması gerektiği düşünülmektedir.

Anahtar Kelimeler: COVID-19, pandemi, çocuk acil, triyaj, yatış oranları, mortalite

procedures (observation, hospitalization) of the children who applied to the emergency service during these periods were recorded. During the pandemic period, patients with fever, cough, and COVID-19 contact/positive diagnosis after triage were referred to the newly opened pediatric pandemic outpatient clinic. Our hospital is the only center providing tertiary care in our province. In our hospital, cases are coded according to the International Classification of Diseases-10 system. For the study, all patients who applied to our pediatric health and diseases departments (cardiology, endocrine, allergy, pediatric health and diseases, pandemic, emergency and pediatric services, pediatric and neonatal intensive care units) between the specified dates and who received inpatient treatment were included. As exclusion criteria from the study, those with missing data in the file and those who presented with trauma were excluded from the study. Our study was approved by the Kütahya Health Sciences University Non-Interventional Ethics Committee (E-41997688-050.99-10324) and the study was conducted in accordance with the Declaration of Helsinki.

Statistical Analysis

Data were analyzed with IBM SPSS V23. The chi-square test was used to compare categorical variables before and after the pandemic, and pairwise comparisons were evaluated with the Bonferroni correction Z-test. Analysis results were presented as frequency (percentage). Significance level was taken as $p < 0.05$.

Results

While the annual rate of application to the pediatric emergency and pediatric outpatient clinics per child before the COVID-19 pandemic was approximately 3 between March 2019 and March 2020, one application was detected during the pandemic period (minor branches were excluded). Considering the annual total patient applications, it was seen that the annual rate of admissions to the pediatric department during the pandemic period decreased by 68.5% from 182,779 to 57,661, compared to the pre-pandemic period (Table 1). Considering the distribution of outpatient clinic

applications, while 48.8% of the pre-pandemic applications were to emergency, 32.4% to pediatric health and diseases, and 19% to minor clinics, 38.5% of the applications were found to be to emergency, 34.1% to pediatric health and diseases, 5.5% to pandemic, and 21.9% to minor clinics during the pandemic period (Table 1, Figure 1). A statistically significant difference was found between pre-pandemic and pandemic periods in terms of the distribution of outpatient clinic admissions in the department of pediatric diseases ($p<0.05$). It was analyzed that the number of applications to pediatric health and diseases and endocrinology outpatient clinics and neonatal intensive care units increased and the number of applications to pediatric emergency, allergy and cardiology outpatient clinics decreased during the pandemic period ($p<0.05$) (Table 1).

It was observed that in October-November-December, when pediatric patients were intense, the number of emergency department admissions decreased significantly during the pandemic period. All diagnosis distributions and rates in these months are detailed in Table 2. A statistically significant difference was found for the distribution of diagnoses between pre-pandemic and pandemic periods ($p<0.05$). It was determined that the diagnosis rates of respiratory tract infections, nausea-vomiting, cough and fever were higher before the pandemic and the diagnosis rates of gastroenteritis, urinary system infection, headache, constipation, urticaria, and neonatal jaundice were higher during the pandemic period ($p<0.05$) (Table 2).

Considering the hospitalization rates of the patients who applied to the department of pediatrics, a statistically significant difference was found between pre-pandemic and pandemic periods ($p<0.05$) (Table 3). While it was determined that the rates of hospitalization in pediatrics, allergy and cardiology services decreased during the pandemic period, it was found that the rates of hospitalization in the emergency department and in the neonatal intensive care unit increased

($p<0.05$) (Table 3). Similarly, it was observed that the rate of hospitalization in the pediatric intensive care unit increased during the pandemic period ($p=0.041$). Considering the annual mortality rates of intensive care units, the mortality rate of pediatric intensive care unit was 3.5% before the pandemic, while it was 3.4% during the pandemic period. On the other hand, the mortality rate of neonatal intensive care unit was 0.6% before and during the pandemic, which did not change with the pandemic. There was no statistical difference between the mortality rates of pediatric and neonatal intensive care units during the pandemic period ($p=1.0$).

A statistically significant difference was found in terms of the annual distribution of pediatric emergency triage characteristics between the pre-pandemic and pandemic periods ($p<0.05$). It was analyzed that while the rate of applications for green areas was higher before the pandemic, the rates of applications for yellow and red areas were higher during the pandemic period ($p<0.05$) (Table 4).

Discussion

When the triage distribution of pediatric emergency service admissions is examined, it is seen that most are for the green area. Green area applications consist of diseases that are not urgent or that can be treated in the outpatient clinic, and should be treated primarily in primary health care institutions.¹¹⁻¹⁵ In a study conducted in the Black Sea Region of our country, when the triage distribution of the patients was examined, it was found that 55.7% of them applied for green area, 43.9% for yellow area, and 0.4% for red area.¹⁶ In a study conducted in the pandemic period, it was observed that non-urgent green area applications to emergency services decreased and applications with emergencies for yellow areas increased.^{17,18} In our study, it was determined that applications for green area decreased and applications

Table 1. Number and % distribution of outpatient clinic applications to pediatric diseases department before and during the pandemic

Child health and diseases outpatient clinics	Pre-pandemic	Pandemic period	p
Child health and diseases	59212 (32.4) ^a	19688 (34.1) ^b	<0.05
Pediatric endocrinology	9028 (4.9) ^a	4608 (8) ^b	
Pediatric allergy	12126 (6.6) ^a	3440 (6) ^b	
Pediatric cardiology	10267 (5.6) ^a	2495 (4.3) ^b	
Newborn	3039 (1.7) ^a	2094 (3.6) ^b	
Pediatric emergency	89107 (48.8) ^a	22169 (38.4) ^b	
Pediatric pandemic	0 (0)	3167 (5.5) ^{**}	
Annual number of applications	182779 (100%)	57661 (100%)	

*Chi-square test, ^{a,b}: A statistically significant difference was found among those with different letters in each outpatient clinic, **Pairwise comparison was not made as it was 0 before the pandemic

Table 2. Diagnostic distribution of pediatric emergency service admissions in November-December-January before and during the pandemic

Diagnosis and symptoms at admission	Pre-pandemic	Pandemic period	p
Upper respiratory tract infection	21693 (44.8) ^a	3022 (33) ^b	
Otitis	730 (1.5)	61 (0.7)	
Tonsillitis	586 (1.2)	45 (0.5)	
Pharyngitis	232 (0.5)	18 (0.2)	
Sinusitis	160 (0.3)	8 (0.1)	
Undefined upper respiratory tract infection	19985 (41.3)	2890 (31.6)	
Nausea-vomiting	4000 (8.3) ^a	374 (4.1) ^b	
Stomachache	3780 (7.8) ^a	792 (8.7) ^b	
Cough	2725 (5.6) ^a	40 (0.4) ^b	
Acute gastroenteritis	2400 (5) ^a	784 (8.6) ^b	
Fever	2372 (4.9) ^a	180 (2) ^b	<0.05
Restlessness, agitation	589 (1.2) ^a	88 (1) ^b	
Urinary tract infection	577 (1.2) ^a	156 (1.7) ^b	
Lower respiratory tract infection	490 (1) ^a	38 (0.4) ^b	
Being bitten by mammals	499 (1) ^a	171 (1.9) ^b	
Headache	418 (0.9) ^a	108 (1.2) ^b	
Constipation	300 (0.6) ^a	99 (1.1) ^b	
Urticaria	287 (0.6) ^a	158 (1.7) ^b	
Neonatal jaundice	130 (0.3) ^a	127 (1.4) ^b	
Other diagnoses	8138 (16.8) ^a	1694 (18.5) ^b	
Pandemic outpatient clinic	0 (0)	1319 (14.4) ^{**}	
Total number of applications for 3 months	48398 (100)	9150 (100)	

*Chi-square test, ^{a,b}: A statistically significant difference was found among those with different letters in each case, **Pairwise comparison was not made as it was 0 before the pandemic

Table 3. Distribution of the annual number of patients hospitalized in pediatric health and diseases departments before and during the pandemic

Clinics of hospitalization	Pre-pandemic	Pandemic period	p
Child health and diseases	3918 (44) ^a	1232 (27.9) ^b	
Pediatric allergy	114 (1.3) ^a	17 (0.4) ^b	
Pediatric cardiology	35 (0.4) ^a	6 (0.1) ^b	
Pediatric emergency	2934 (33) ^a	1142 (25.9) ^b	<0.05
Pediatric intensive care	405 (4.5) ^a	236 (5.4) ^b	
Neonatal intensive care	1117 (12.5) ^a	1145 (26) ^b	
Pediatric pandemic	0 (0)	450 (10.2) ^{**}	
Pediatric endocrinology	381 (4.3) ^a	180 (4.1) ^a	>0.05
Total number of hospitalized patients	8904 (100%)	4408 (100%)	

*Chi-square test, ^{a,b}: A statistically significant difference was found among those with different letters in each case, **Pairwise comparison was not made as it was 0 before the pandemic

for yellow area increased during the pandemic, which is in line with the literature. The reason for this was thought to be due to the late admission of patients to the hospital,

Table 4. Triage distribution of pediatric emergency service admissions before and during the pandemic

Triage characteristics	Pre-pandemic	Pandemic period	p
• Green area	52175 (58.6) ^a	5362 (24.2) ^b	
• Yellow area	36550 (41) ^a	16435 (74.1) ^b	<0.05
• Red area	381 (0.4) ^a	372 (1.7) ^b	
Annual number of patients admitted to the emergency department	2934 (3.3)	1142 (5.2)	
Annual number of emergency service admissions	89106 (100)	22169 (100)	

*Chi-square test, ^{a,b}: A statistically significant difference was found among those with different letters in each case

the reduction of respiratory tract infections as a result of the use of masks, and the physicians' use of laboratory and radiological examinations recommended in the guideline

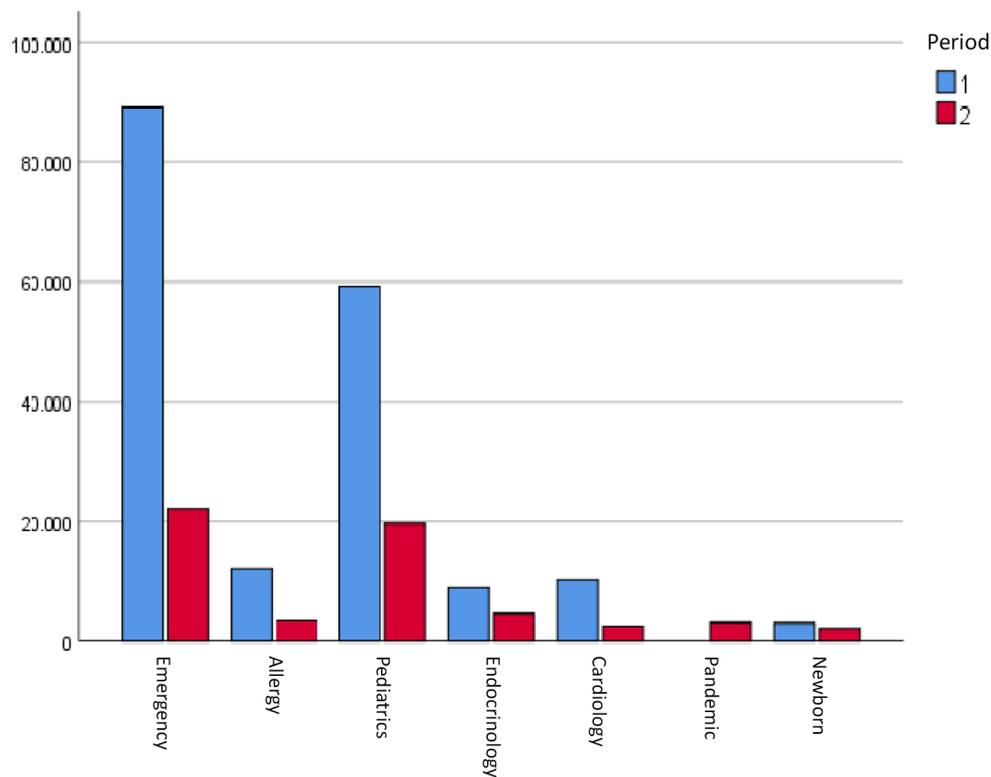


Figure 1. Annual numbers of admissions to pediatric diseases department before and during the pandemic. Period 1: Pre-pandemic, Period 2: Pandemic period

of the Ministry of Health for the differential diagnosis of COVID-19 and other respiratory diseases.¹⁹⁻²²

In a study conducted in Italy, evaluating pediatric emergency service admissions and hospitalization rates, it was reported that emergency service applications decreased by 69% during the pandemic period and the hospitalization rate increased from 9.5% to 15.9%.¹⁰ In our study, it was observed that annual admissions to the emergency department decreased during the pandemic period, but the rates of hospitalization from the emergency department increased, which is consistent with the literature.

Considering the hospitalization rates from the pediatric emergency department before the pandemic, the hospitalization rates reported by two different universities were 4.1% and 5.1%.^{23,24} In our study, it was observed that the rate of hospitalization from the emergency room was 3.3% before the pandemic, and increased to 5.2% during the pandemic period. The reason for this was thought to be due to applications at the advanced stage of the disease and the increase in yellow area applications.

Considering the diagnosis distribution made during the pandemic period, in the publication reported from Europe, it was stated that there were differences in the diagnosis

distributions before and after the pandemic, as in our study, and that respiratory tract infections in particular decreased.^{10,17-22} In our study, it was determined that there was a decrease in respiratory tract infections during the pandemic period, which was consistent with the literature.

Considering the rates of hospitalization in intensive care units during the pandemic period, a study conducted in Italy reported that although the number of hospitalizations in the pediatric intensive care unit decreased numerically, no significant difference was found in the total percentage distribution.¹⁸ In our study, although the number of hospitalizations in the pediatric intensive care unit decreased numerically during the pandemic period, the number of hospitalizations in the neonatal intensive care unit was found to be similar. However, it was found that the rates of hospitalization in neonatal and pediatric intensive care units increased statistically during the pandemic period. The reason for this was thought to be due to late admission to the hospital, as well as the increase in applications for yellow and red areas.

Study Limitations

Due to the scarcity of similar studies in our country, more detailed epidemiological data are needed. In addition, the fact that the data were not presented by analyzing the periods of

full closure and the periods when the schools were closed is one of the most important limitations of our study.

Conclusion

It was observed that the hospital admissions and hospitalization rates of children decreased due to restrictions, mask use and fear of the disease during the pandemic period. This study is one of the comprehensive studies evaluating the impact of the COVID-19 pandemic on hospital admissions in our country. We believe that this study will contribute to our country's health system policies and preventive public health services while obtaining information about patient density. In addition, with this study, it was pointed out that excessive green area applications to the emergency services before the pandemic could cause a negative workload problem, and the importance of primary health care units was emphasized.

Ethics

Ethics Committee Approval: Our study was approved by the Kütahya Health Sciences University Non-Interventional Ethics Committee (E-41997688-050.99-10324) and the study was conducted in accordance with the Declaration of Helsinki.

Informed Consent: Retrospective study.

Peer-review: Internally and externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: D.G., Concept: D.G., R.Ö., Design: D.G., Data Collection or Processing: D.G., Analysis or Interpretation: D.G., R.Ö., Literature Search: D.G., Writing: D.G., R.Ö.

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