The Impact of COVID-19 Lockdown on Pediatric Hospital Admissions in Turkey

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Abstract

Objective Health care utilization has declined significantly during the coronavirus disease 2019 (COVID-19) pandemic. We aimed to analyze the impact of COVID-19 lockdowns on pediatric admissions in a Turkish medical center.

Methods This retrospective study was conducted by analyzing the numbers and records, including diagnoses, of patients admitted to our pediatric department between March 11, 2020 (the day of the first confirmed COVID-19 case in Turkey) and June 11, 2020 and comparing it with the diagnoses and numbers for the same period in 2019. The most common reasons for admissions were investigated.

Results Totally, 89,607 patients were included. Patient visits reduced drastically by 63.11 to 36.89% during the lockdown period compared to the preceding year. In addition to the impact of COVID-19 lockdowns on the total volume of patients, we observed significant variations in the distribution of diagnoses among children. The percentage of respiratory, gastrointestinal, immunological, and ophthalmologic diseases and allergic reactions statistically decreased ($p < 0.001$). In contrast, the relative percentage of neonatal, urogenital, neurological, cardiovascular, hematological, and dermatological diseases significantly increased ($p < 0.001$) among emergency department (ED) admissions. Notably, the percentage of respiratory diseases among ED patients decreased by 66.81 to 33.19%.

Conclusion COVID-19 strongly affected health care utilization. The public must be educated about the safety of hospital environments, and families should be encouraged to visit hospitals in case of emergencies. Additionally, changes in public health advice may help alter health care consumption patterns.

Keywords
- COVID-19
- children
- public health
- health care utilization
- Turkey

Introduction

The international public health emergency created by coronavirus disease 2019 (COVID-19), which is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has generated an enormous burden for health care systems worldwide.[1] The World Health Organization declared this epidemic a "Public Health Emergency of International Concern" on January 30, 2020 and a pandemic on March 11, 2020.[2] Turkey reported its first official case of COVID-19 on March 11, 2020, after which the number of cases progressed rapidly. Since then, many stay-at-home orders have been enacted to slow down the spread of SARS-CoV-2. Additionally, the Turkish Ministry of Health recommended prioritizing urgent hospital visits and delaying elective cases to decrease the number of patients in the Turkish health care system. The Turkish government recommended a voluntary quarantine for all citizens and announced a curfew for those

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over the age of 65 years on March 21, 2020. Another curfew was later enacted for people younger than the age of 20 years. Schools and sports activities were closed, and numerous preventive precautions were implemented.[3] Consequently, there was a decrease in patient visits to emergency departments (EDs) and outpatient clinics. Although the precise cause of the decline is unknown, improvements in behavioral measures, environmental cleaning, and hand hygiene, plus the use of face masks and social distancing, may have reduced the spread of non-COVID-19 diseases. Additionally, fear of SARS-CoV-2 infection has been linked to a reluctance to visit hospitals.[4,5]

In this study, we aimed to assess how the COVID-19 pandemic affected the utilization patterns in emergency and outpatient service visits among children and to describe the changes in the number of patient applications in our medical center. We collected the service volume of outpatient and EDs in a public training and research hospital that functions as the maternity and children's diseases center in Istanbul, Turkey, for the first 3 months of the COVİD-19 pandemic in 2020 and the same period of the preceding year. To the best of our knowledge, no similar study on Turkish pediatric hospitals has been undertaken previously.

We conducted this study as a starting point for present and future research on COVID-19's long-term effects on health care.

Materials and Methods

We conducted this interrupted time-series study retrospectively by analyzing the numbers and diagnoses of patients who visited the ED and outpatient clinics at the pediatric department of the University of Health Sciences and the tertiary Zeynep Kamil Maternity and Children's Hospital in Istanbul, Turkey. Our 160-year-old training and research hospital offers free services to 0 to 18-year-old patients from various socioeconomic levels; both local citizens and patients from other cities are accepted. The ED is open to patients 24/7, and outpatient clinics are available for 8 hours during the day, Monday through Friday.

The defined study period was March 11, 2020 to June 11, 2020—the 3 months immediately following the first confirmed case of COVID-19 in Turkey. We determined the changes in the volume of patients and rates of various diagnoses after the COVID-19 pandemic began and compared the same 3-month period to the year before the onset of the pandemic. We collected the outpatient and emergency service volumes for both years. The general outpatient clinic was included in the study, but subspecialties and healthy child follow-up clinics were not. Thus, most of those patients appear to be "newcomers." The total number of patients, between 0 and 18 years, seen before the COVID-19 outbreak (March 11 to June 11, 2019) was 65,456; after the COVID-19 outbreak (March 11 to June 11, 2020), only 24,151 patients visited the hospital. Medical and demographic data were extracted from the hospital database. Every application was documented using electronic records, including the patients' age, sex, date, patient complaints, and diagnoses. The diagnoses were coded according to the International Classification of Diseases, Tenth Revision, and Clinical Modification (ICD-10-CM) and then categorized. The ICD R50–R69 codes classify general signs and symptoms such as headache, tiredness, unknown fever, pain not classified elsewhere, and edema not classified elsewhere.

Using the numbers obtained from the data released by the Ministry of Health in Turkey, we examined the relationship between the volume of patients who had requested a daily visit to the pediatric department and the increasing number of COVID-19 cases. We also analyzed the patient rates for the most common diseases requiring emergency or outpatient clinic visits before and during the pandemic study period.

This study was approved by the Ministry of Health of Turkey and the Ethics Committee of Zeynep Kamil Maternity and Children's Diseases Training and Research Hospital (approval number: 148; approval date: July 08, 2020).

Continuous variables are presented as mean ± standard deviation. Categorical variables were presented as n (%), and χ was used to compare the qualitative variables. They were analyzed using SPSS 21.0 program (SPSS Inc. Chicago, IL, United States); $p < 0.05$ was considered statistically significant. Additionally, Pearson's correlation was used for data normally distributed in continuous measurement variables.

Results

In the first 3 months of the COVID-19 outbreak (March 11 to June 11, 2020), the total number of patients who visited our pediatric department was 24,151 (12,774 to the ED; 11,377 to the outpatient clinic's four examination rooms), which was 36.89% of the 65,456 patient visits during the corresponding time frame in the preceding year (35,340 patients to the ED; 30,116 to the outpatient clinic). ►**Fig. 1** compares the visits to the ED in the period in 2020 with the corresponding period in 2019. ►**Fig. 2** similarly compares the visits to the outpatient clinic during both periods.

The mean daily number of patients who visited the hospital's pediatric department's outpatient and emergency clinics started to decrease following the report of the country's first case of COVID-19. The decrease in attendance accelerated following Turkey's lockdown announcement on April 1, 2020. The most rapid decline in visits occurred in April, as COVID-19 cases increased ($p < 0.01$). Although COVID-19 cases increased daily, patient visits started to rise again at the end of May and into June, when lockdown measurements were reduced. The correlation between the numbers of COVID-19 cases and number of patients admitted in March, April, May, and June was $r = -0.87389$, $p = 0.022854$, $r = -0.95669$, $p = 0.010749$, $r = 0.99955$, $p = 0.010749$, and $r = 0.93108$, $p = 0.0221494$, respectively (►**Fig. 3**).

A total of 89,607 patients (42,648 females and 46,959 males) were included in the present study. A comparison of the demographics showed that the age of the patients who visited the outpatient service was significantly less during the COVID-19 period (mean age = 2.75 ± 4.438 years) than at the same time the previous year (mean age = 4.43 ± 4.717

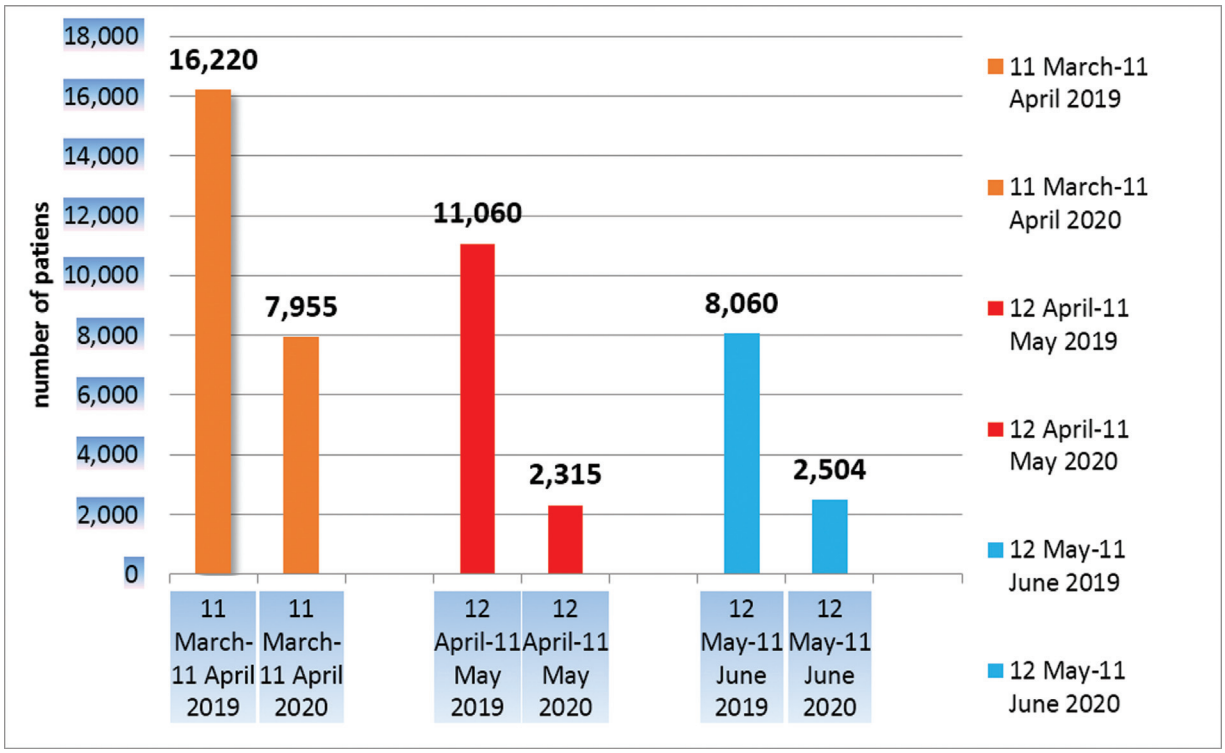

Fig. 1 Visits to pediatric emergency departments from March 11 through June 11, 2020, compared with the same period in 2019.

years) ($p < 0.01$). There was no statistical difference regarding gender ($p > 0.05$).

During the COVID-19 outbreak, respiratory system diseases (49.1%), gastrointestinal diseases (19%), and neonatal problems (9.9%) were the most common diseases seen in the pediatric ED. Statistically significant differences ($p < 0.01$) were found between the 2 years for patient diagnoses in EDs.

In addition to the general impacts of COVID-19 on the total volume of ED visits, there were significant variations in the distribution of children's diagnoses compared to the

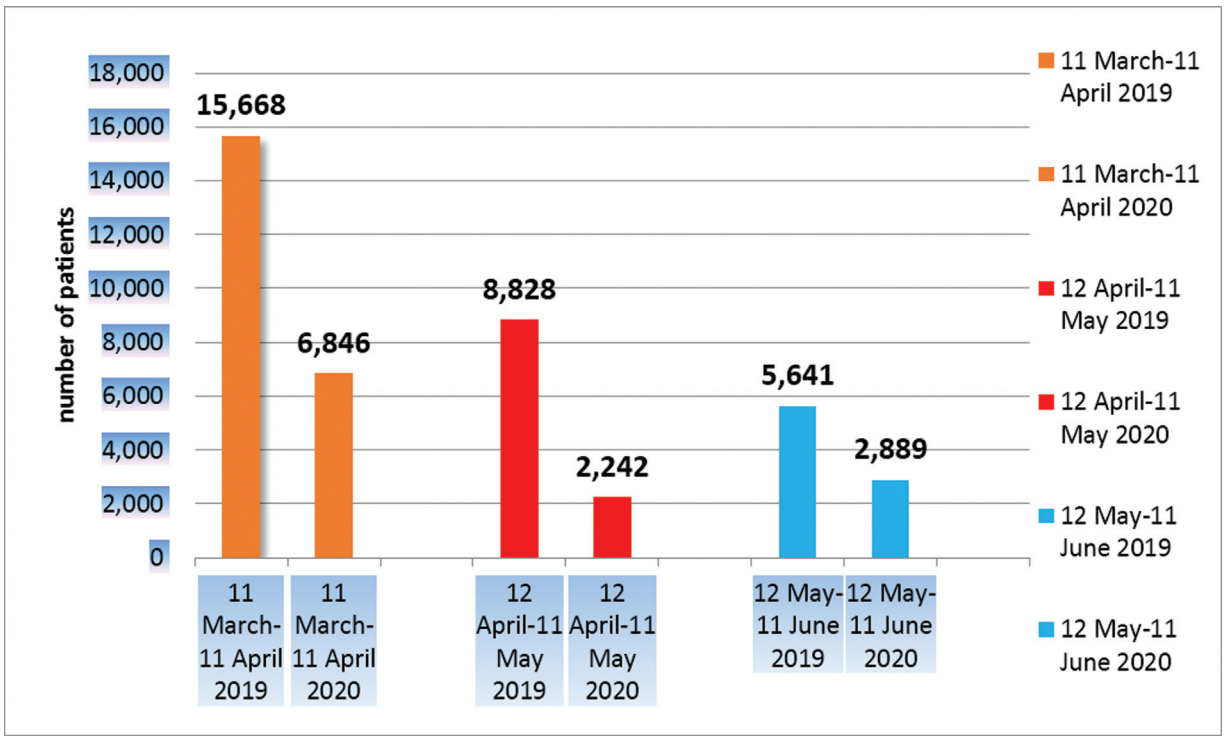

Fig. 2 Visits to pediatric outpatient clinics from March 11 through June 11, 2020, compared with the same period in 2019.

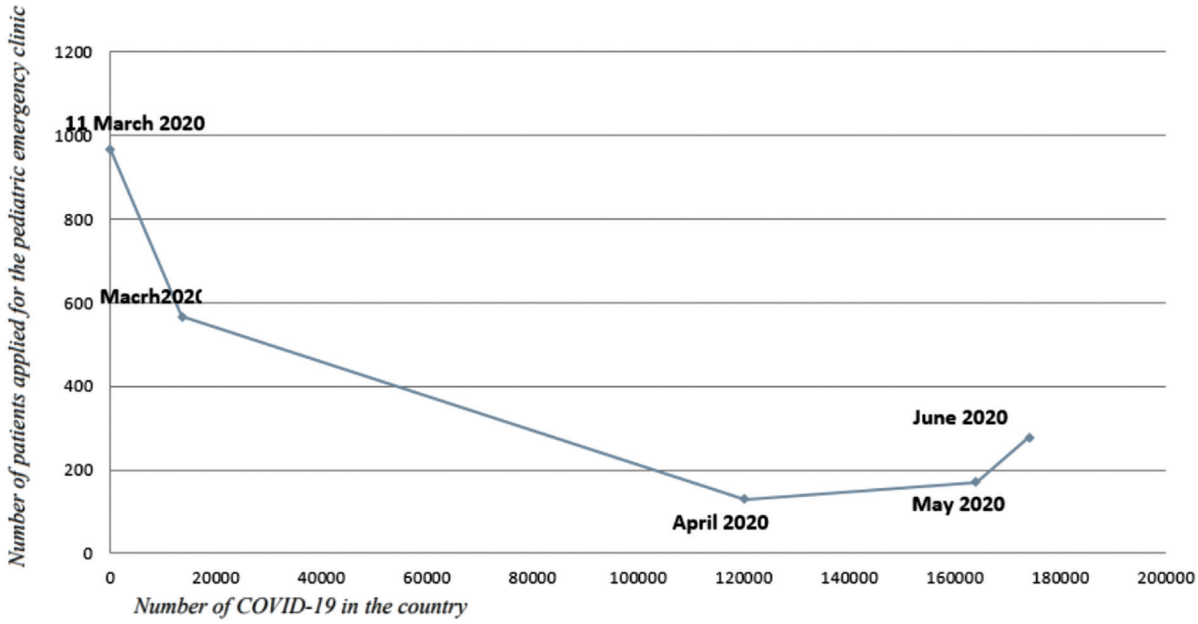

Fig. 3 Changes in the number of request for pediatric clinic visits as the number of COVID-19 cases in the country (Turkey) increased. COVID-19, coronavirus disease 2019.

prior year. Specifically, we found statistically significant decreases ($p < 0.001$) in cases of respiratory and gastrointestinal system diseases caused by transmissible infections and in allergic, immunological, and ophthalmological diseases. In contrast, we observed relatively significant increases ($p < 0.001$) in percentages of neonatal, urogenital, neurological, cardiovascular, hematological, and dermatological diseases (►**Table 1**).

Neonatal problems (42.4%), respiratory system diseases (13.1%), and general symptoms (10.8%) were observed in the outpatient clinics during the COVID-19 period, and there were statistically significant differences ($p < 0.01$) between the 2 years in terms of the diagnoses of the patients who visited the outpatient clinics. According to the distribution of the diseases, only neonatal problems and general signs and symptoms increased ($p < 0.01$) (►**Table 2**).

When considering hospitalization in both periods, 619 patients were hospitalized in total: 376 (60.74%) of the hospitalizations occurred before the pandemic and 243 (39.26%) occurred within the COVID-19 pandemic period. The total hospitalization rate dropped by 35.37%, but the maximum decrease was seen in the second month of the lockdown when it dropped by 53.12% compared with the same period of 2019. Analysis showed that the top three reasons for hospitalization in the study period before COVID-19 were respiratory system diseases (60%), gastrointestinal system diseases (9.57%), and urogenital system diseases (3.72%). Those diseases comprised 44.85, 10.28, and 9.46%, respectively, of all analyzed hospitalizations during the pandemic. However, among both study periods, the second month of the pandemic had the fewest recorded hospitalized patients, but urogenital diseases were the most common cause (25.42% of all hospitalizations).

The percentage of pediatric intensive care unit patients dropped by 15.38% during the pandemic compared with the same time last year. Although respiratory system diseases were the most common reason for intensive care hospitalization (79.48%), they dropped by 64.51% during the pandemic, and neurological diseases increased to 30.30%.

In the first trimester of the pandemic, COVID-19 patients comprised 0.8% of the ED admissions. Our COVID-19 patients had a milder clinic course, and 11.1% were asymptomatic. The most common clinical findings were acute upper respiratory tract infections (59.2%) and pneumonia (29.6%). The hospitalization rate of COVID-19 patients was 6.06%; the length of stay ranged from 4 to 13 days (median 5). Finally, there were no cases of death between the study periods.

Discussion

At the time of the writing of this paper, the COVID-19 pandemic has impacted the health sector globally. Our study data indicate a significant reduction in the total number of visits to the pediatric department of the university hospital during the first 3 months of the pandemic in Turkey. Pediatric patient visits to EDs drastically reduced during the lockdown period compared to the preceding year, dropping by 63.85% in 2020 to 36.15% of the total for 2019; the decrease has been attributed to the curfew for children in Turkey. Similarly, other studies have also shown a significant reduction in emergency visits during the initial weeks of the pandemic.[6,7] Talarico et al observed a reduction of approximately 70% in both visits to Italian pediatric EDs and the number of hospitalizations.[8] Erlichman et al reported a decrease in pediatric ED visits.[9] This decrease in the number of visits to the pediatric department contrasts with the increased number of patient visits during the influenza epidemic[10,11] and could be attributed to the well-characterized cause and knowledge of the symptoms of influenza, which, unlike

Table 1 The distribution of diseases in pediatric emergency department before and during the COVID-19

	Before COVID-19 $n = 35,043$ (%)	During COVİD-19 $n = 12,774$ (%)	*p*-Value
Respiratory system diseases	18,908 (53.1)	6,276 (49.1)	<0.001
Gastrointestinal system diseases	8,292 (23.3)	2,432 (19)	<0.001
Neonatal problems	1,429 (4)	1,169 (9.9)	<0.001
Otorhinolaryngological diseases	1,175 (3.3)	515 (3.2)	0.7
Allergic and immunological diseases Urogenital diseases	1,169 (3.3) 1,028 (2.9)	268 (2.1) 570 (4.5)	<0.001 <0.001
Neurological diseases	484 (1.4)	339 (2.7)	<0.001
Cardiovascular diseases	456 (1.3)	307 (2.4)	<0.001
Ophthalmological diseases	428 (1.2)	84 (0.7)	<0.001
Dermatological diseases	424 (1.2)	387 (3)	<0.001
Exanthematous diseases	373 (1)	29 (0.2)	<0.001
Musculoskeletal disorders	364 (1)	95 (0.7)	0.005
Intoxication and trauma	197 (0.6)	64 (0.5)	0.4
Endocrinological diseases	112 (0.3)	38 (0.3)	0.7
Hematological diseases	71 (0.2)	67 (0.5)	<0.001
Rheumatological disorders	66 (0.2)	10 (0.1)	0.009
Nutrition and metabolism disorders	26 (0.1)	4 (0)	0.1
Child psychiatric disorders	18 (0.1)	9 (0.1)	0.4
Surgical diseases	12 (0)	9 (0.1)	0.08
General sign and symptoms	7 (0)	2 (0)	1
Genetic disorders	4 (0)	1 (0)	1
COVID-19	0 (0)	99 (0.8)	<0.001

Abbreviation: COVID-19, coronavirus disease 2019.

COVID-19, emerged as a new infection caused by a virus that was not well understood. Turkey saw exponential growth in COVID-19 cases in March 2020, and the Turkish government imposed a stay-at-home policy.

The results suggest that the restrictive policy and preventive measures, including restricting international travel and public transportation, implementing distance education, and improving hand hygiene in the community, may be responsible for reducing some patient visits.[12] The Ministry of Health in Turkey designated some public hospitals to admit COVID-19 patients. This regulation has a positive effect on controlling the pandemic and reminds society of the necessity of preventive medicine. On March 12, 2020, the Turkish government declared the closure of all schools.[3] Schools are significant vectors for infectious disease transmission; therefore, the closing of schools has reduced non-COVID-19 respiratory and gastrointestinal tract infections and accidental traumas among children.[13] Improved social hygiene in society may also have had similar effects. However, as children may become sick from occasional infections and chronic conditions, this factor cannot explain the sharp decline in-patient visits. It is, therefore, surmised that COVID-19 created an environment of fear in society. Mantica et al emphasize that national lockdowns created an environment of strong emotions within communities—especially fear. The survey conducted by Kadambari et al showed that 37% of parents delayed seeking any medical attention as they avoided visiting their family doctor. Additionally, 10% delayed attending hospital because of COVID-19 fears. This delay may have been exacerbated by the rapid local and international spread affecting vast numbers of people and hospital staff,[14,15] some of whom eventually required intensive care. Ahorsu et al suggest fear of COVID-19 is positively associated with hospital anxiety.[16] Additionally, continuous exposure to news of worldwide infection rates of the pandemic and deaths may have escalated people's fear, as distress about the risk of getting infected increases fear among the population.[17] In that case, a reduction in noninfectious diagnosis would be conceivable.

Additionally, considering the other causes of fewer admissions during the COVID-19 pandemic, patients from remote cities may have failed to reach our hospital because of public transport restrictions. As our hospital did not offer telemedicine services, those patients may have sought care at other medical centers or online. Additionally, EDs are often described as overwhelmed by a high volume of nonurgent admissions in nonpandemic times[18]; thus, parents may have felt less stressed about nonurgent issues. Also, as most of the parents were working from home, parents may have received less feedback from teachers, grandparents, and caregiver workers; the reduced feedback may have contributed to decreased ED visits.[19]

Table 2 The distribution of diseases in pediatric outpatient clinics before and during the COVID-19

	Before COVID-19 $n = 30,413$	During COVİD-19 $n = 11,377$	*p*-Value
Respiratory system diseases	6,854 (22.5)	1,486 (13.1)	<0.001
Neonatal problems	4,992 (16.4)	4,821 (42.4)	<0.001
Endocrinological diseases	3,851 (12.7)	870 (7.6)	<0.001
Hematological diseases	3,265 (10.7)	812 (7.1)	<0.001
General sign and symptoms	2,836 (9.3)	1,227 (10.8)	<0.001
Gastrointestinal system diseases	2,280 (7.5)	577 (5.1)	<0.001
Urogenital diseases	1,643 (5.4)	440 (3.9)	<0.001
Allergic and immunological diseases	1,117 (3.7)	203 (1.8)	<0.001
Dermatological diseases	818 (2.7)	211 (1.9)	<0.001
Neurological diseases	661 (2.2)	208 (1.8)	0.02
Otorhinolaryngological diseases	489 (1.6)	82 (0.7)	<0.001
Cardiovascular diseases	389 (1.3)	98 (0.9)	<0.001
Child psychiatric disorders	228 (0.7)	27 (0.2)	<0.001
Ophthalmological diseases	221 (0.7)	50 (0.4)	0.001
Nutrition and metabolism disorders	204 (0.7)	38 (0.3)	<0.001
Musculoskeletal disorders	155 (0.5)	53 (0.5)	0.5
Genetic disorders	129 (0.4)	26 (0.2)	0.003
Rheumatological disorders	93 (0.3)	16 (0.1)	0.003
Surgical diseases	85 (0.3)	41 (0.4)	0.1
Exanthematous diseases	84 (0.3)	12 (0.1)	0.001
Intoxication and trauma	19 (0.1)	9 (0.1)	0.5
COVID-19	0 (0)	70 (0.6)	<0.001

Abbreviation: COVID-19, coronavirus disease 2019.

Although respiratory system diseases were the most common disease in both periods considered in this study, there was a significant decrease in ED visits for such ailments during the COVID-19 period. Personal protective equipment usage, increased hygiene measures, and the stay-at-home policy[20,21] are likely causal factors for the decline. Although the total number of patients decreased when the fear of COVID-19 grew following its rapid spread, the number of patients admitted for neonatal problems and percentages of those with cardiological and hematological diseases were relatively higher than before the pandemic period, possibly suggesting that parents used the ED for situations they considered "severe."

One limitation of our study was that it was a single-center study conducted during a limited period. Also, the center where the study was conducted was not a pandemic hospital. Furthermore, although we thought that parents avoided seeking medical services because they feared contracting the COVID-19, we did not explore this assumption as a part of this study. Additionally, the retrospective design of this study did not allow for the comparison of the levels of disease severity.

The COVID-19 pandemic has had severe effects on many aspects of health care, including the numbers of, and reasons for, hospital visits. This study is the first in Turkey to investigate the frequency and nature of ED and outpatient pediatric visits during this pandemic. International attention has primarily concentrated on COVID-19's direct impacts on adults; however, it is essential not to overlook the severe pediatric health consequences resulting from people's fear of COVID-19. The data herein raise the question, "Where are these patients? Have some patients not received the necessary treatment during the COVID-19 pandemic?" Therefore, the long-term effects of fewer pediatric hospital visits must be further explored to prevent future problems. Moreover, the public must be educated about the safety of hospital environments and measures to decrease the risks of contracting COVID-19.

Authors' Contributions

All authors were involved in the critical revision of the manuscript. Ö.E. and E.S. made a substantial contribution to the study design, literature review, and drafting the manuscript; Ö.E., E.S., and N.U.K. were responsible for literature review, drafting, and revising the manuscript. R. G.S. analyzed clinical data and drafted the manuscript. All authors approved the final version of the manuscript.

Conflict of Interest

None declared.

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