

THE PATTERN OF PAEDIATRIC EMERGENCIES VISITS BEFORE AND DURING THE COVID-19 PANDEMIC: A CHILDREN WELFARE TEACHING HOSPITAL EXPERIENCE

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ABSTRACT

Background: The COVID-19 pandemic has had a profound effect on healthcare worldwide, including changes in the frequency and nature of pediatric emergency department visits. Objective: The aim of this study was to evaluate the influence of the COVID-19 pandemic on the patterns of pediatric emergency department visits at the Children Welfare Teaching Hospital within the Medical City Complex, by comparing the periods before and during the pandemic. **Method:** The study employed a descriptive cross-sectional design, analyzing the records of the emergency department at the Children Welfare Teaching Hospital in Baghdad. The study periods included March 1, 2019 to February 29, 2020 (pre-pandemic) and March 1, 2020 to February 28, 2021 (during the pandemic). **Result:** Our results showed a significant reduction of 40% in pediatric emergency visits during the initial year of the COVID-19 pandemic in contrast to the equivalent period before the pandemic. Emergency visits related to ophthalmological and dermatological conditions were particularly impacted, with a decline of 83% and 65% respectively. In contrast, visits due to liver disease and urinary tract disease showed the smallest changes, with reductions of just 7% and 12% respectively. The age groups less than 1 year and greater than 6 years were the most impacted in terms of visit decline. Post pandemic, the proportion of patients discharged home saw an increase. **Conclusion:** The COVID-19 pandemic has led to a significant decrease in pediatric emergency department visits. This decline was most notable in visits related to less severe conditions. It is critical for health officials to closely monitor these trends in pediatric emergency department visits during the pandemic. Interventions may need to be implemented to ensure that children have access to emergency care when it is needed.

KEYWORDS: Iraq, COVID-19, Paediatric, emergency.

INTRODUCTION

Epidemics strain health systems due to an acute surge in the demand for healthcare services.^[1,2] Managing such crises necessitates complex coordination involving various entities and disciplines.^[3] Since its declaration as a pandemic by the WHO in March 2020, COVID-19 has rapidly spread, causing significant global impact.^[4] Public health responses, including social distancing and stay-at-home policies, aimed to "flatten the curve".^[5] However, the pandemic disrupted health systems, overwhelming services and impacting logistics and supplies.^[6] The significant alterations in clinical practice posed a formidable challenge.^[7] COVID-19 affected individuals globally, not only due to its spread and

mortality but also because of the changes it necessitated in daily routines, economic impact, and the reconfiguration of social structures and health systems.^[8] The emergency department (ED) serves as a vital access point to health services for many children, often providing care when other services are overburdened.^[9] In suboptimal healthcare environments, emergency care often represents the weakest element of the health system.^[10] The decline in ED visits after the pandemic declaration raised concerns about individuals delaying or avoiding necessary care.^[5] The pediatric ED accounts for about 20-25% of pediatric consultations in western countries,^[11] with an estimated 10-20% of children needing referral to the next level hospital.^[12] In the US, 24% of children <5 years and 14% of those 6-17 years

had at least one ED visit in 2015.^[13] Efforts to improve initial emergency management of severely ill children have been substantial in developed countries, whereas the initial triage of sick children in developing countries is often deficient.^[14] Following the declaration of COVID-19 as a national emergency, ED visits in the US declined by 42%.^[15] In Iraq, the COVID-19 pandemic disrupted non-communicable disease services, mainly due to outpatient services closure, staff reassignment to pandemic-related duties, and a decrease in outpatient volume.^[16] The pandemic has significantly impacted hospital-level health services, especially emergency and acute care.^[17] With the surge in patient numbers, emergency services worldwide have struggled.^[18] Notably, a decline in pediatric ED attendance has been observed since the pandemic's onset.^[19] Delayed healthcare access, particularly for children with serious or chronic conditions, has concerning implications, potentially leading to rapid health deterioration and even fatal outcomes.^[20] Understanding the COVID-19 impact on medical services over time can provide valuable insight for health system leaders and public health authorities, helping identify patient groups at risk of acute medical illness undertreatment.^[21] **Aim of the study:** To identify the impact of COVID-19 on the pattern of visits to the emergency rooms in the Children Welfare Teaching Hospital before and during the COVID-19 pandemic.

SUBJECTS AND METHOD

A Descriptive cross-sectional study was conducted through reviewing the registries of the ED in Children Welfare Teaching Hospital, the Medical City directorate of Health, Baghdad, Iraq during the period from 1st of March 2019 to 29th of Feb 2020 (before the pandemic) and the period from 1st of March 2020 to 28th of Feb 2021 (during the pandemic). The process of data collection was done during the period from 1st December 2021 to 28th of February 2022.

Following the approval of the College of Medicine, University of Baghdad, official approval was granted

from the Medical City Directorate of Health and the management of the chosen hospital.

The inclusion criteria included all patients admitted to the emergency department of the Children Welfare Teaching Hospital during the assigned period were included.

A form was developed to collect the relevant data from the registries and the clinical records of the patients admitted to the hospital during the assigned period. The form was developed after reviewing available registries and retrieve the following information: the age, gender, date of visit, suspected or confirmed diagnoses, as well as the outcome of the patients. The information for the period from 1st of March to 1st of October 2019 was collected from the hospital's paper records and admitted in an excel form, while the information for the remaining period was collected through the hospital's archived information via excel.

Microsoft Excel 2019 and Statistical Package for the Social Sciences (SPSS) 22 were used for data entry and analysis. The descriptive analysis focused on frequencies and percentages. Categorical data were presented as proportions and the z-test for the difference between two proportions was used to assess if the difference is statistically significant. A P-value of less than 0.05 was considered statistically significant.

RESULTS

The total number of paediatric emergency visits to Child Welfare Teaching Hospital before COVID-19 was 16,247, and 9,821 during the first year of the COVID-19 pandemic. Table 1 demonstrates the distribution of emergency visits during the two years by month of visits. There was a 39.6% decrease in paediatric emergency visits during the first year of the COVID-19 pandemic, compared to the period before the pandemic. The highest percent change was during June, followed by August, and the least was reported in February and March, as shown in table 3.1 and figure 3.1.

Table 3.1: Distribution of paediatric emergency visits before and during COVID-19 by months.

Months	Before COVID-19		During COVID-19		Total		Percent change	P-value
	N	%	N	%	N	%		
March	1091	6.72	950	9.67	2041	7.83	-12.9	0.001
April	1296	7.98	653	6.65	1949	7.48	-49.6	0.001
May	1211	7.45	686	6.99	1897	7.28	-43.4	0.165
June	1207	7.43	471	4.80	1678	6.44	-61.0	0.001
July	1010	6.22	547	5.57	1557	5.97	-45.8	0.031
August	1173	7.22	523	5.33	1696	6.51	-55.4	0.001
September	1142	7.03	862	8.78	2004	7.69	-24.5	0.001
October	1500	9.23	885	9.01	2385	9.15	-41.0	0.550
November	1641	10.10	936	9.53	2577	9.89	-43.0	0.135
December	1793	11.04	1022	10.41	2815	10.80	-43.0	0.112
January	2126	13.09	1254	12.77	3380	12.97	-41.0	0.456
February	1057	6.51	1032	10.51	2089	8.01	-2.4	0.001
Total	16247	100.0	9821	100.00	26068	100.0	-39.6	

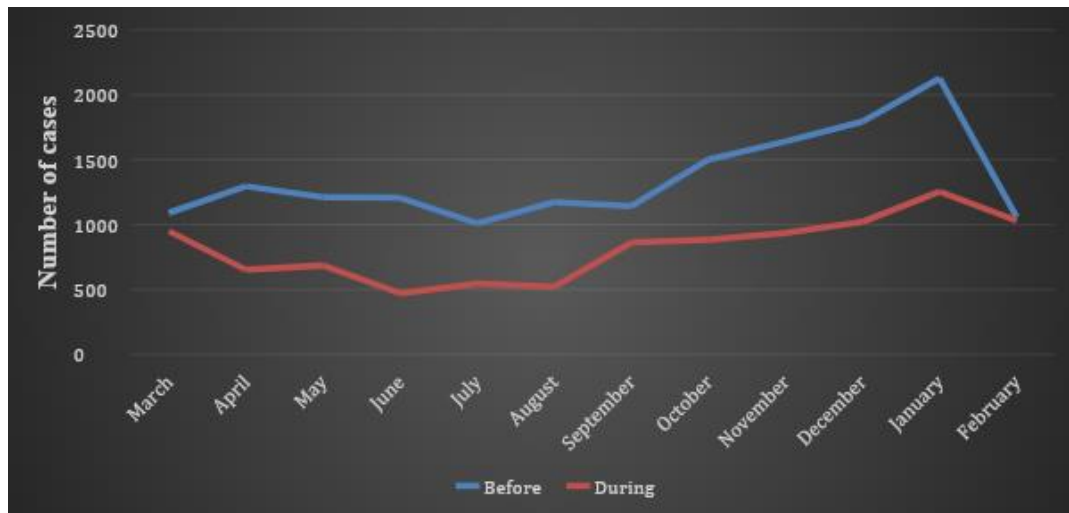


Figure 3.1: Monthly distribution of the paediatric emergency visits before and during the pandemic.

The visits of patients with all diseases decreased during the COVID-19 pandemic compared to the time before the pandemic. Ophthalmological and dermatological emergency visits were the most affected during the COVID-19 pandemic, with the highest percent change

(83% and 65%, respectively). At the same time, Asthma/allergic bronchitis, liver disease, and urinary tract disease visits were the least affected during the COVID-19 pandemic with percent change of 7% and 12%, respectively (Table 3.2).

Table 3.2: Distribution of paediatric emergency visits before and during the COVID-19 pandemic by disease categories.

Disease	Before COVID-19 N (%)	During COVID-19 N (%)	Total N (%)	Percent change
Asthma/ allergic bronchitis	106 (0.7)	97 (1.0)	203 (0.8)	-0.08
Congenital abnormalities	132 (0.8)	99 (1.0)	231 (0.9)	-0.25
Covid-19 suspension	0 (0.0)	29 (0.3)	29 (0.1)	
Dermatological emergencies	46 (0.3)	16 (0.2)	62 (0.2)	-0.65
Diabetes	783 (4.8)	544 (5.5)	1327(5.1)	-0.31
Disturbed level of consciousness	34 (0.2)	16 (0.2)	50 (0.2)	-0.53
Fever	1980 (12.2)	1017 (10.4)	2997(11.5)	-0.49
Gastroenteritis ± Dehydration	3141 (19.3)	2269 (23.1)	5410(20.8)	-0.28
Generalized fatigue	100 (0.6)	63 (0.6)	163 (0.6)	-0.37
Haematological disease	589 (3.6)	455 (4.6)	1044 (4.0)	-0.23
Jaundice	412 (2.5)	328 (3.3)	740 (2.8)	-0.20
Liver disease	97 (0.6)	104 (1.1)	201 (0.8)	0.07
Malignancy	280 (1.7)	205 (2.1)	485 (1.9)	-0.27
Musculoskeletal disease	65 (0.4)	25 (0.3)	90 (0.3)	-0.62
Neurological disease	1053 (6.5)	647 (6.6)	1700 (6.5)	-0.39
Ophthalmology emergencies	6 (0.03)	1 (0.006)	7 (0.04)	-0.83
Other conditions	517 (3.2)	291 (3.0)	808 (3.1)	-0.44
Poisoning	107 (0.7)	87 (0.9)	194 (0.7)	-0.19
Respiratory distress syndrome	112 (0.7)	47 (0.5)	159 (0.6)	-0.58
Respiratory tract infection	4014 (24.7)	1829 (18.6)	5843 (22.4)	-0.54
Surgical cause	42 (0.3)	34 (0.3)	76 (0.3)	-0.19
Trauma/Fall from height	63 (0.4)	35 (0.4)	98 90.40	-0.44
Unrecorded	1788 (11.0)	900 (9.2)	2688 (10.3)	-0.50
Urinary tract disease	780 (4.8)	683 (7.0)	1463 (5.6)	-0.12

Among the “other conditions” category (mentioned in table 3.2), tonsillitis and foreign body swallowing were the most affected during the COVID-19 pandemic, with

a percent change of 92% for each. While, TB and SLE were the least affected during the COVID-19 pandemic, with a percent change of 0% (Table 3.3)

Table 3.3: Distribution of paediatric emergency visits for low frequency (other conditions) before and during the COVID-19 pandemic.

Disease	Before COVID-19 N (%)	During COVID-19 N (%)	Total N (%)	Percent change
Animal bite	63 (12.2)	21 (7.2)	84 (10.4)	-0.67
Bleeding (epistaxis, gum, or anal)	29 (5.6)	26 (8.9)	55 (6.8)	-0.10
Bone marrow failure	4 (0.8)	5 (1.7)	9 (1.1)	0.25
Constipation	9 (1.7)	4 (1.4)	13 (1.6)	-0.56
Dead on arrival	1 (0.2)	6 (2.1)	7 (0.9)	5.00
Decreased appetite	109 (21.1)	55 (18.9)	164(20.3)	-0.50
Difficult swallowing	3 (0.6)	2 (0.7)	5 (0.6)	-0.33
Ear pain	24 (4.6)	9 (3.1)	33 (4.1)	-0.63
Electric shock	4 (0.8)	1 (0.3)	5 (0.6)	-0.75
Endocrine disease	40 (7.7)	28 (9.6)	68 (8.4)	-0.30
Foreign body swallowing	13 (2.5)	1 (0.3)	14 (1.7)	-0.92
Headache	30 (5.8)	20 (6.9)	50 (6.2)	-0.33
Hypertension	0 (0.0)	2 (0.7)	2 (0.2)	
Hypocalcemia	33 (6.4)	11 (3.8)	44 (5.4)	-0.67
Hypotension	8 (1.5)	4 (1.4)	12 (1.5)	-0.50
Nutritional problem	64 (12.4)	54 (18.6)	118 (14.6)	-0.16
Road traffic accident	0 (0.0)	1 (0.3)	1 (0.1)	
Systemic lupus erythmatosis	22 (4.3)	22 (7.6)	44 (5.4)	0.00
Septicemia	37 (7.2)	10 (3.4)	47 (5.8)	-0.73
Splenomegaly	9 (1.7)	6 (2.1)	15 (1.8)	-0.33
Suicidal attempt	1 (0.2)	0 (0.0)	1 (0.1)	-1.00
Tuberculosis	2 (0.4)	2 (0.7)	4 (0.5)	0.00
Tonsillitis	12 (2.3)	1 (0.3)	13 (1.6)	-0.92

Regarding the acute complications of diabetes, the total number of visits had decreased from 783 before the COVID-19 pandemic to 544 during the COVID-19 pandemic. The highest percent change during the

COVID-19 pandemic was for hypoglycemia, as the visits of patients with hypoglycemia decreased by 45.2%. The differences were not statistically significant. (Table 3.4)

Table 3.4: Distribution of paediatric emergency visits for acute diabetic complications before and during the COVID-19 pandemic.

Acute diabetic complications	Before COVID-19	During COVID-19	Total N (%)	Percent change	P-value
	N (%)	N (%)			
Diabetic ketoacidosis	44 (5.6)	27 (5.0)	71 (5.3)	-38.6	0.633
Hyperglycemia	686 (87.6)	488 (89.7)	1174(88.5)	-28.8	0.239
Hypoglycemia	53 (6.8)	29 (5.3)	82 (6.2)	-45.2	0.264
Total	783	544	1327	-30.5	

The number of paediatric emergency visits for asthma had increased during the COVID-19 pandemic compared to the period before the pandemic with a percent change

of +3.4%. While the cases of allergic bronchitis decreased during the COVID-19 pandemic with a percent change of 22.9% (Table 3.5).

Table 3.5: Distribution of emergency visits for asthma and allergic bronchitis before and during the COVID-19 pandemic.

Disease	Before COVID-19 N (%)	During COVID-19 N (%)	Total N (%)	Percent change	P-value
allergic bronchitis	58 (54.7)	60 (61.9)	118 (58.1)	3.4	0.300
Asthma	48 (45.3)	37 (38.1)	85 (41.9)	-22.9	0.626
Total	106	97	203	-8.4	

The proportion of patients aged <1 year or >6 years significantly decreased during the pandemic (P= 0.001 and 0.004, respectively). In contrast, the proportion of

patients aged 1-6 significantly increased during the pandemic (P=0.001), as shown in Table 3.6.

Table 3.6: Paediatric emergency visits before and during the COVID-19 pandemic by age groups.

Outcome	Before COVID-19 N (%)	During COVID-19 N (%)	Total	Percent change	P-value
<1 year	6426 (39.6)	3671 (37.4)	10107(38.8)	-42.8	0.004
1-6 years	5227 (32.2)	3762 (38.3)	8989 (34.5)	-28.0	0.001
>6 years	4548 (28.0)	2372 (24.2)	6920 (26.5)	-47.8	0.001
Unrecorded	36 (0.2)	16 (0.2)	52 (0.2)	-55.5	1
Total	16247	9821	26061	-39.5	

There was a significant difference between the two periods (before and during the COVID-19 pandemic) regarding the gender of the patients who attended the paediatric emergency department. There was a

significantly higher proportion of males during the COVID-19 pandemic compared to the proportion before the COVID-19 pandemic (62% vs. 59.2%) (Table 3.7).

Table 3.7: The distribution of paediatric emergency visits before and during the COVID-19 pandemic by gender.

Outcome	Before COVID-19 N (%)	During COVID-19 N (%)	Total N (%)	P-value
Male	9623 (59.2)	6092 (62.0)	15715 (60.3)	0.001
Female	6624 (40.8)	3729 (38.0)	10353 (39.7)	
Total	16247	9821	26061	

The proportion of admission to the hospital significantly decreased during the COVID-19 pandemic compared to the proportion before the COVID-19 pandemic. In contrast, the proportion of discharge significantly

increased during the COVID-19 pandemic compared to the proportion before the COVID-19 pandemic. The proportion of death was the same in the two years (0.4%) (Table 3.8).

Table 3.8: The outcomes of the paediatric emergency cases before and during the COVID-19 pandemic.

Outcome	Before COVID-19 N (%)	During COVID-19 N (%)	Total N (%)	P-value
Admission	11235 (69.2)	6509 (66.3)	17744 (68.1)	0.001
Dead*	71 (0.4)	41 (0.4)	112 (0.4)	1.00
Discharge	3545 (21.8)	2707 (27.6)	6252 (24.0)	0.001
Discharge on their responsibility	1342 (8.3)	523 (5.3)	1865 (7.2)	0.001
Referral to another hospital	53 (0.3)	35 (0.4)	88 (0.3)	1.000
Total*	16246	9815	26061	

*Not included seven patients who were dead on arrival

DISCUSSION

The COVID-19 pandemic led to a sharp reduction in paediatric ED visits during the pandemic time. Compared to adults, paediatric ED visits fell further and remained below pre-pandemic levels. Certain disease visits were more impacted. Close examination of trends in paediatric ED visits during the COVID-19 pandemic should be a priority for physicians and public health officials. Interventions may be required to ensure that children receive access to timely emergency care when necessary.^[1]

The main finding of the current study was a 40% decrease in the total number of visits to the emergency paediatric units during the COVID-19 pandemic compared to the period before the COVID-19 pandemic. The same result was obtained in another study in the United Kingdom.^[22] In comparison, a study done in Turkey revealed that the number of consultations in

paediatric ED decreased during the pandemic period by 67.7% compared to the pre-pandemic period.^[23] The observed decline in paediatric ED visits was 43-75% during the period of lockdown in India.^[24] In the United States, William et al. concluded that the ED visits during the pandemic decreased by 56% to an average daily census of 67 patients, from an anticipated 152.^[25] The same findings were obtained in Italy as the total number of patient visits to the paediatric ED decreased due to COVID-19.^[26] It is obvious that the governmental regulations of limited social distancing including the lockdowns and the people concerns regarding attending the hospitals and the fear of contracting the disease from these health outlets were the main drivers for the observed reduction.

According to the month distribution, June showed the highest decline in ED visits. In Turkey, April and May 2020 (during the COVID-19 pandemic) were the highest affected, while August, July, and June 2020 were the

least affected, respectively.^[23] The variation in the monthly distribution of paediatric ED visits between different countries is most probably related to the time of increased incidence of COVID-19 and the government measures, particularly the lockdown. The extreme high change in June coincides with the first wave of COVID-19 in the country and the high population concerns from the increased morbidity and mortality.

Regarding the diagnosis distribution, the visits due to liver disease, asthma/ allergic bronchitis, poisoning, and urinary tract disease were less affected by COVID-19 than dermatological and ophthalmological emergencies. In comparison, another study that was done in Turkey revealed that during the pandemic period, surgical diseases, home accidents, and poisoning were relatively more common than the rates of other diagnoses. All types of infections decreased, while the visits due to abdominal pain, seizures, and chest pain increased.^[27] In Germany, the pattern of diagnosis distribution was similar in both years (2019 and 2020). This was held even for critically ill patients. For example, during the four weeks they analysed in their study, they observed three seizures in 2019 and two in 2020.^[28] In Singapore, a significant decrease in infection-related presentations was likely attributed to the lockdown and showed that the relative proportion of trauma-related attendances had increased during the pandemic.^[9] The changes seen for different diagnoses could be affected by the urgency of the condition, degree of commitment to the lockdown, presence of closer health facilities, and other factors.

Regarding the age of the patients, the proportions of those aged <1 year or >6 years had significantly increased during the COVID-19 pandemic. In contrast, the proportion of patients aged 1-6 years significantly decreased during the COVID-19 pandemic. In comparison, in a study conducted in the United States revealed that the proportion of visits of patients with age <1 year had increased in contrast to the proportion of patients with ≥ 6 years, while the proportion of those aged 1-5 years did not change.^[25] The age group, 1-5 years in India, was the most significantly affected.^[24] The variations again may coincide with the types of diagnoses that were changed during the pandemic time in the countries.

The current study showed a significant difference in gender distribution between the two periods (before and after the COVID-19 pandemic) as the proportion of males increased compared to a decreased proportion of females. In Turkey, Ilknur *et al.* revealed no significant difference between pre and during the COVID-19 pandemic regarding the gender of the patients.^[23] At the same time, another study in Turkey revealed that the proportion of females visit to the paediatric ED had significantly increased in 2020 compared to the male proportion.^[27] There is no clear explanation for this variation, although the large included sample may drive the observed significant difference in the current study.

Regarding the outcome of the patients, the proportion of patients admitted to the hospital had significantly decreased compared to the proportion of discharged patients. The same findings were obtained in a study done in Turkey.^[23] At the same time, another study in Turkey revealed that the proportion of discharged homes had significantly decreased in 2020 compared to 2019.^[27] In Germany, the proportion of admission decreased considerably in 2020 compared to 2019.^[28] In contrast, a study done in the United States revealed that the proportion of admission had increased compared to discharge.^[25] This variation in the proportion of discharge and admission between different studies might be related to the adopted policy within the health system in general, the ability of each hospital to continue providing medical services to patients during the epidemic period, the pressure on available beds to serve the COVID cases, the policy of the hospitals to minimize the admission and other factors.

To the best of our knowledge, this was the first study in Iraq to assess the impact of the COVID-19 pandemic on the pattern of paediatric emergency visits during the pandemic time compared to the same period before this pandemic. Still, the study has a number of limitations including:

1. The files of the Ed attendees were not correctly archived; some were in paper form, others were on the computer, and others were missing.
2. The ICD-10 was not used for the final classification of the disease or condition.
3. The employees in charge of the data entry were not health or medically oriented. This ends with poor-quality medical records. Many records lack the essential variables, and not infrequently, the diagnosis was written by the inexperienced employee.

CONCLUSIONS

There was a 40% decline in paediatric ED visits during the COVID-19 pandemic due to the impact of the COVID-19 pandemic. The visits due to diseases of mild severity were the most affected, like dermatological and ophthalmological emergencies. The most affected age group in decline was those <1 and >6 years. The proportion of males was higher than females in ED visits during the COVID-19 pandemic. Compared to the period before the COVID-19 pandemic, the proportion of patients who were discharged home had increased during the pandemic.

REFERENCES

1. Pines JM, Zocchi MS, Black BS, Carlson JN, Celedon P, Moghtaderi A, *et al.* Characterizing pediatric emergency department visits during the COVID-19 pandemic. *The American Journal of Emergency Medicine*, 2021; 41: 201-4.
2. Barasa EW, Ouma PO, Okiro EA. Assessing the hospital surge capacity of the Kenyan health system

- in the face of the COVID-19 pandemic. *PLoS One*, 2020; 15(7): e0236308.
3. Liu Y, Lee JM, Lee C. The challenges and opportunities of a global health crisis: the management and business implications of COVID-19 from an Asian perspective. *Asian Business & Management*, 2020; 19(3): 277-97.
 4. Boserup B, McKenney M, Elkbuli A. The impact of the COVID-19 pandemic on emergency department visits and patient safety in the United States. *The American Journal of Emergency Medicine*, 2020; 38(9): 1732-6.
 5. Kwok ESH, Clapham G, Calder-Sprackman S. The Impact of COVID-19 Pandemic on Emergency Department Visits at a Canadian Academic Tertiary Care Center. *West J Emerg Med*, 2021; 22(4): 851-9.
 6. Khetrupal S, Bhatia R. Impact of COVID-19 pandemic on health system & Sustainable Development Goal 3. *Indian J Med Res.*, 2020; 151(5): 395-9.
 7. Zhang H, Guo L-W, Gao Y-Y, Yao H, Xie Z-K, Zhang W-X. The Impact of the COVID-19 Pandemic on Pediatric Clinical Practice in Wenzhou, China: A Retrospective Study. *Frontiers in Pediatrics*, 2020; 8.
 8. Gonçalves-Pinho M, Mota P, Ribeiro J, Macedo S, Freitas A. The Impact of COVID-19 Pandemic on Psychiatric Emergency Department Visits – A Descriptive Study. *Psychiatric Quarterly*, 2021; 92(2): 621-31.
 9. Chong S-L, Soo JSL, Allen JC, Ganapathy S, Lee KP, Tyebally A, et al. Impact of COVID-19 on pediatric emergencies and hospitalizations in Singapore. *BMC Pediatrics*, 2020; 20(1): 562.
 10. Ghali HH, Al-Shafiei MA, Al-Musawi HM. Pediatric emergency department; resource exhaustion and burden of work in a resource-constrained region. *Journal of the Faculty of Medicine Baghdad*, 2020; 62(4): 110-6.
 11. Cozzi G, Zanchi C, Giangreco M, Rabach I, Calligaris L, Giorgi R, et al. The impact of the COVID-19 lockdown in Italy on a pediatric emergency setting. *Acta Paediatrica (Oslo, Norway: 1992)*, 2020.
 12. Cheema B, Stephen C, Westwood A. Paediatric triage in South Africa. *South African Journal of Child Health*, 2013; 7(2): 43-5.
 13. Riva B, Clavenna A, Cartabia M, Bortolotti A, Fortino I, Merlino L, et al. Emergency department use by paediatric patients in Lombardy Region, Italy: a population study. *BMJ Paediatr Open*, 2018; 2(1): e000247-e.
 14. Gove S, Tamburlini G, Molyneux E, Whitesell P, Campbell H. Development and technical basis of simplified guidelines for emergency triage assessment and treatment in developing countries. WHO Integrated Management of Childhood Illness (IMCI) Referral Care Project. *Archives of disease in childhood*, 2000; 81: 473-7.
 15. Adjemian J, Hartnett KP, Kite-Powell A, DeVies J, Azondekon R, Radhakrishnan L, et al. Update: COVID-19 pandemic-associated changes in emergency department visits—United States, December 2020–January 2021. *Morbidity and Mortality Weekly Report*, 2021; 70(15): 552.
 16. Hlaiwah M, Lami F. Impact of COVID-19 on the Noncommunicable Disease Programs Provided in the Primary Health Care Centers in Al-Rusafa Directorate of Health, *iproc*, 2022; 8(1): e36449.
 17. Negrini S, Grabljevec K, Boldrini P, Kiekens C, Moslavac S, Zampolini M, et al. Up to 2.2 million people experiencing disability suffer collateral damage each day of COVID-19 lockdown in Europe. *European journal of physical and rehabilitation medicine*, 2020; 56(3): 361-5.
 18. Kaya A, İşler Dalgıç A. Evaluating workload and manpower planning among pediatric emergency department nurses in Turkey during COVID-19: A cross-sectional, multicenter study. *Journal of Pediatric Nursing*, 2022.
 19. Ferrero F, Ossorio MF, Torres FA, Debaisi G. Impact of the COVID-19 pandemic in the paediatric emergency department attendances in Argentina. *Archives of Disease in Childhood*, 2021; 106(2): e5-e.
 20. McDonnell T, Nicholson E, Conlon C, Barrett M, Cummins F, Hensey C, et al. Assessing the Impact of COVID-19 Public Health Stages on Paediatric Emergency Attendance. *International Journal of Environmental Research and Public Health*, 2020; 17(18): 6719.
 21. Birkmeyer JD, Barnato A, Birkmeyer N, Bessler R, Skinner J. The impact of the COVID-19 pandemic on hospital admissions in the United States: study examines trends in US hospital admissions during the COVID-19 pandemic. *Health Affairs*, 2020; 39(11): 2010-7.
 22. Isba R, Edge R, Auerbach M, Cicero MX, Jenner R, Setzer E, et al. COVID-19: Transatlantic Declines in Pediatric Emergency Admissions. *Pediatr Emerg Care*, 2020; 36(11): 551-3.
 23. Fidancı İ, Taşar MA, Akıntuğ B, Fidancı İ, Bulut İ. The impact of the COVID-19 pandemic on paediatric emergency service. *International Journal of Clinical Practice*, 2021; 75(9): e14398.
 24. Sodani R, Gupta S, Kumar V. Impact of COVID-19 pandemic on use of pediatric emergency health services in a tertiary care pediatric hospital in North India. *medRxiv*, 2021.
 25. Sokoloff WC, Krief WI, Giusto KA, Mohaimin T, Murphy-Hockett C, Rucker J, et al. Pediatric emergency department utilization during the COVID-19 pandemic in New York City. *The American Journal of Emergency Medicine*, 2021; 45: 100-4.
 26. Liguoro I, Pilotto C, Vergine M, Pusiol A, Vidal E, Cogo P. The impact of COVID-19 on a tertiary care pediatric emergency department. *European Journal of Pediatrics*, 2021; 180(5): 1497-504.

27. Tuygun N, Karacan CD, Göktuğ A, Çağlar AA, Tekeli A, Bodur İ, et al. Evaluation of changes in pediatric emergency department utilization during COVID-19 pandemic. *Archives de Pédiatrie*, 2021; 28(8): 677-82.
28. Dopfer C, Wetzke M, Zychlinsky Scharff A, Mueller F, Dressler F, Baumann U, et al. COVID-19 related reduction in pediatric emergency healthcare utilization – a concerning trend. *BMC Pediatrics*, 2020; 20(1): 427.