



Admission Patterns in the Children's Emergency Room of Enugu State University Teaching Hospital, during the COVID-19 Pandemic

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Authors' contributions

The study was conceived by author NIK. The study design, methodology, and questionnaire design were done by authors NIK, AIN and NOC. Data collection was done by authors NIK and NOC. The data analysis and preparation of the results were done by author NIK. There was equal contribution to the discussion by authors NIK, AIN and NOC. All authors critically reviewed the final draft of the manuscript.

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ABSTRACT

Aims: This study aimed to compare the difference in admission rates and severity of illness in 2019 and during the peak time period of the global SARS-CoV-2 pandemic of 2020 in children presenting at the Children's emergency room (CHER) of Enugu State University Teaching Hospital, Enugu.

Study Design: This was a cross-sectional study.

Place and Duration of Study: Children's emergency room (CHER) of Enugu State University Teaching Hospital, Enugu, from June 1 to August 31, 2019 and 2020 were reviewed, respectively.

Methodology: The admission records of all the children that were admitted into CHER of Enugu State University Teaching Hospital (ESUTH), Enugu, over a three-month period from June 1 to

August 31, 2019 and 2020 respectively were reviewed.

Results: A total of 310 and 184 patients were seen during the study period for 2019 and 2020, respectively (40.6% decrease). A significant number of patients spent two days on admission in the children's emergency room in 2020 than in 2019 ($P < .001$). Emergency admissions were 3 times more in year 2020 than in year 2019 ($OR = 2.624$, $95\% \text{ C.I} = 1.797 - 3.833$, $P < .001$).

Conclusion: Although this study reported decreased emergency room admissions, there was an increase in the mortality rate and emergency presentations.

Keywords: Admission; children's emergency room; COVID-19; pandemic.

1. INTRODUCTION

Chinese authorities alerted the World Health Organization (WHO) on December 31, 2019, of pneumonia of unknown etiology cases detected in Wuhan City, Hubei Province of China, and by January 3, 2020, a total of 44 case patients had been identified [1] By January 7, 2020, they had identified a new type of coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), as the causative agent, and on January 30, 2020, the World Health Organization declared Coronavirus disease 2019 (COVID-19) to be a public health emergency of international concern [1,2]. On March 11, 2020, WHO declared the COVID-19 outbreak a global pandemic [2].

The first official case of COVID-19 in Nigeria was announced on February 27, 2020, when an Italian citizen in Lagos tested positive for the virus [3]. This occurred a week after Italy's first patient was admitted to the intensive care unit of his local hospital due to a deteriorating clinical condition from a COVID-19 infection [3,4]. A nationwide lockdown was thus announced in Nigeria on March 30, 2020 [5]. However, the unbearable economic consequences of the country's lockdown prompted the government to declare a phased and gradual easing of the lockdown on May 5, 2020. Subsequently, the reported cases of COVID-19 increased exponentially [5,6] and the first COVID-19 mortality was reported in Enugu, located in southeastern Nigeria on June 6, 2020 [7].

The initial epidemiology of the pandemic suggested that the burden of disease involved those in the older age groups [8] However, although paediatric patients with COVID-19 are mostly asymptomatic or present with mild disease, more complicated cases are now being seen [9]. While the body of knowledge around the virus and the disease it causes grows on a daily basis, with children accounting so far for 1%-5% of diagnosed COVID-19 cases, relatively

little is known about the course of COVID-19 in children and young people [10,11].

However, a trend of decreasing attendances at emergency departments (EDs) was noticed following the start of the pandemic, particularly among paediatric populations [10] This study thus aimed to compare the difference in admission rates and severity of illness in 2019 and during the peak time period of the global SARS-CoV-2 pandemic of 2020 and also the prevalence of covid-19 in children presenting at the Children's emergency room (CHER) of Enugu State University Teaching Hospital, Parklane, Enugu.

2. METHODOLOGY

This was a hospital-based qualitative study which adopted a cross-sectional research design and was conducted at the Children's emergency room (CHER) of Enugu State University Teaching Hospital, Enugu during the covid-19 pandemic using routinely collected data. Enugu State University Teaching Hospital is a major referral centre for the state, located at Enugu – the state capital is one of the two tertiary health facilities in the state. Referrals are seen from general hospitals, primary health centres, private and mission hospitals within and around the state.

The admission records of all the children admitted into the Children's emergency room (CHER) of Enugu State University Teaching Hospital over a three month period from June 1 to August 31, 2019 and 2020 respectively were reviewed. Data extracted from the records included age in years, sex, date of presentation, clinical diagnosis, Triage score, COVID-19 test result, duration of admission, outcome. All patients were assessed in the triage area using the South African Triage Scale (SAT) system [12] and an appropriate triage color assigned. The triage colors are interpreted as follows: red: emergency, orange: very urgent: yellow: urgent,

green: routine, and blue: deceased. All patients admitted during the period studied in 2020 were tested for SARS-CoV-2 at the Enugu State University Teaching Hospital COVID-19 Isolation Centre. The data obtained was analyzed using SPSS version 20.0 (Chicago IL), and results were presented in prose, tables and charts. Frequency and percentages were used to summarize categorical variables, while means and standard deviations were obtained for continuous variables. Comparison of categorical variables and tests of associations were done using Chi-square and Logistic regression analysis.

3. RESULTS AND DISCUSSION

3.1 Results

Table 1 shows the demographic characteristics of the patients. A total of 310 and 184 patients were seen during the study period for 2019 and

2020, respectively (40.6% decrease). There was a decrease in attendance across all the age groups for 2020, but this was not statistically significant ($P = .293$). The male-to-female ratio for 2019 was 1.2:1 and 1.5:1 for 2020. The mean ages of the patients were 4.85 ± 0.20 years in 2019 and 5.49 ± 0.12 years in 2020, and most of the patients were within the 1-5 years age group for the 2 years that were reviewed. A total number of 60 patients spent two days on admission in the children's emergency room in 2020 compared to 52 in 2019 ($P < .001$).

Fig. 1 is a bar chart illustrating the number of admissions over the study period for the 2 years. There was a comparatively sharp decrease in admission rates in 2020, with the greatest decrease in the month of June 2020 to 27 admissions compared to 81 in June 2019. Subsequently there was a gradual increase and by August admission rates for the 2 years were almost equal.

Table 1. Demographic characteristics of the subjects

	Year		P value
	2019 n (%)	2020 n (%)	
Sex			
Male	166 (53.5)	111 (60.3)	0.142
Female	144 (46.5)	73 (39.7)	
Age group			
<1yr	84 (27.1)	44 (23.9)	0.293
1 – 5yrs	122 (39.4)	66 (35.9)	
6 – 10yrs	44 (14.2)	38 (20.7)	
>10yrs	60 (19.4)	36 (19.6)	
Duration			
1	202 (65.2)	102 (55.4)	< 0.001
2	52 (16.8)	60 (32.6)	
≥3	56 (18.1)	22 (12.0)	

Chi-square test

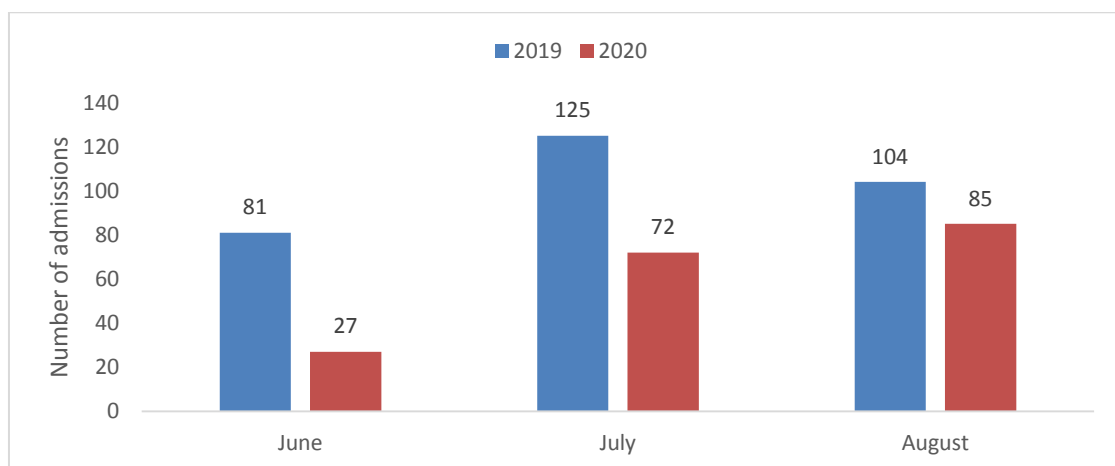


Fig. 1. Number of admissions

Table 2 shows that emergency admissions were 3 times more in year 2020 than in year 2019 (OR = 2.624, 95% C.I = 1.797 – 3.833, P < .001). Very urgent admissions were 2 times more in year 2019 than in year 2020 (OR = 1.987, 95% C.I = 1.243 – 3.175, P = .004). Similarly, urgent admissions were 2 times more in year 2019 than in year 2020 (OR = 1.794, 95% C.I = 1.138 – 2.830, P = .012). However, routine admissions were not significantly different between the years 2019 and 2020 (OR = 3.033, 95% C.I = 0.657 – 13.999, P = .155).

Table 3 shows that the admission outcome was significantly associated with the year of admission (P < .001). There were more deaths in 2020 (8.8%) compared to the year 2019 (3.5%). More children were admitted to the pediatric ward in 2019 (72.6%) than in 2020 (56.0%). At the same time, a lower percentage (15.2%) were discharged in 2019 than in 2020 (19.8%). There was only one positive SARS-CoV-2 PCR test from the 184 admissions during the study period (prevalence rate of 0.5%).

3.2 Discussion

There was a decrease in admission rates in 2020 in our study compared with the same period in 2019, with the greatest decrease in the month of June 2020, and this corresponded with the

month of the 1st COVID-19 death in Enugu. A similar trend was observed by Scaramuzza et al., who studied admissions data for children attending the Cremona and Novara paediatric emergency departments during the COVID-19 pandemic between 20 February 2020 and 30 March 2020 compared with the same period in 2019 [4] They reported a great decrease in admissions of 76% and 64% in Cremona and Novara, respectively, during the pandemic period. Other authors also reported decreased admission rates during the early months of the pandemic [10,13-16].

Initial public health enlightenment campaigns recommended avoiding unnecessary hospital visits in order not to overwhelm hospitals and to reduce transmission of the virus resulting in the reduction in admission rates [10,14,17]. Some patients may have sought other treatment alternatives or even avoided going to the hospital because of a fear of being exposed to COVID-19 in emergency departments [14,18,19]. It's also been suggested that decreased "risk inherent activities" such as team sports and road use which play a role in transmission of pathogenic organisms may have contributed to this decrease [13]. Whatever the factors may be, the overriding concern is that children in dire need of medical treatment may have been left at home [10,14,16,18].

Table 2. Comparative analysis of admission triage in 2019 and 2020

Triage	2019 n (%)	2020 n (%)	OR	95% C.I for OR	P value
Emergency (Red)	131 (42.3)	121 (65.8)	*2.624	1.797 – 3.833	< 0.001
Very urgent (Orange)	84 (27.1)	29 (15.8)	1.987	1.243 – 3.175	0.004
Urgent (Yellow)	85 (27.4)	32 (17.4)	1.794	1.138 – 2.830	0.012
Routine (green)	10 (3.2)	2 (1.1)	3.033	0.657 – 13.999	0.155
Total Admissions	310 (100.0)	184 (100.0)			

*OR calculated with year 2020 as predictor; Logistic regression analysis

Table 3. Comparison of admission outcomes for 2019 and 2020

Outcome	Year		P value
	2019 n (%)	2020 n (%)	
Paediatric ward	225 (72.6)	102 (56.0)	0.001
Discharge home	47 (15.2)	36 (19.8)	
Isolation unit	0 (0.0)	1 (0.5)	
Death	11 (3.5)	16 (8.8)	
DAMA*	14 (4.5)	7 (3.8)	
Theatre	12 (3.9)	11 (6.0)	
Transferred out	1 (0.3)	2 (1.1)	
Neuro-S ward**	0 (0.0)	4 (2.2)	
Burns unit	0 (0.0)	2 (1.1)	
Eye ward	0 (0.0)	1 (0.5)	

*Discharged against medical advice; **Neuro-Surgery ward, Chi-square test

A significantly greater number of patients spent two days on admission in the children's emergency room during the pandemic, probably due to the greater number of severe cases that needed more time for stabilization before transfer. Similarly, Rose et al. [13] noted that there was a trend towards longer lengths of stay of paediatric emergencies during the pandemic.

Emergency admissions (Red) were three times more in the year 2020 than in the year 2019. This was probably due to children being kept at home from parental fear of being exposed to COVID-19 in the hospital, then presenting only when symptoms got worse. Similarly, Jeffery et al. [14] reported a lower patient volume and higher acuity in the EDs of 5 US states during the early months of the pandemic. There may be need to include advise about recognition of danger signs in children to improve health seeking behavior during the pandemic [20].

Very urgent (orange) and urgent (yellow) admissions were 2 times more in year 2019 than in year 2020. This suggests there was better utilization of emergency services before the pandemic. The decrease in 2020 may reflect a misinterpretation of the advice to manage non serious cases at home. Thus public health enlightenment campaigns should emphasize to parents and caregivers the importance of still visiting the hospital during the pandemic for serious illnesses that cannot be managed at home [14].

There were more deaths in 2020, probably due to late presentation of severe illnesses and overwhelmed health care services. A similar pattern was reported by Cucinotta and Vanelli, who reported that health care systems were challenged by the pandemic [21].

The only patient with a positive SARS-CoV-2 PCR test was treated successfully at the Enugu State University Teaching Hospital COVID-19 Isolation Centre. Similarly, Rose et al. [13] reported that only a few children were admitted with a positive SARS-CoV-2 PCR test. The low prevalence of COVID-19 among children has been attributed to various reasons [22-29]. However, the most common reason is that children have fewer mature and functional viral receptors than adults [25].

There are limitations of this study that have to be acknowledged. Its retrospective nature is a limitation as the findings may not be

representative of the general population. Also, the factors accounting for reduced admissions could not be established.

4. CONCLUSION

Although this study reported decreased emergency room admissions during the peak time period of the global SARS-CoV-2 pandemic of 2020 compared to the same period in 2019, there was an increase in the mortality rate and emergency presentations (Triage color Red). Hopefully, these findings shall inform public health messaging strategies to improve health-seeking behavior and ensure the preparedness of our health care system in the event of a second wave of COVID-19.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT

It is not applicable.

ETHICAL APPROVAL

Ethical approval was obtained from the Ethics and Research Committee of the Enugu State University Teaching Hospital before the commencement of the study. (Ethical clearance number: ESUTHP/C-MAC/RA/034/VOL.1/290; Ethical clearance date: 24/08/2020)

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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