

The Impact of COVID-19 Pandemic on the Burden and the Pattern of Hospitalization from COVID-19 Unrelated Illnesses among Children in Barbados – A Preliminary Report from an Ongoing Study

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Abstract

Aims: In this study, we aim to describe the impact of COVID-19 pandemic on the burden and pattern of hospitalization from the COVID-19-unrelated illnesses among children in Barbados. **Materials and Methods:** This is a population-based prospective clinical audit. It included children (Age <16 years) admitted for COVID-19-unrelated illnesses to the only tertiary care hospital in this country during the ongoing COVID-19 pandemic. This audit covers the period extending from April to July 2020. The audit data for the corresponding period in 2019 and 2018, which were also collected prospectively, was used as historical control. **Results:** There were a total of 178 pediatric medical admissions (PMAs) in this country from April to July 2020. This was a decline of 47.2% (95% confidence interval [CI] = 41.6%, 52.5%) compared to the 336 PMA during the corresponding period in 2019 and 2018. The decline in the number of admissions from asthma phenotypes, respiratory infections, and gastrointestinal infections accounted for 88.0% (95% CI – 78.6%, 94.8%) of the total decline in PMA during the pandemic-related lockdown period when compared with the corresponding period in 2019. The difference in the proportion of children who required transfer to the pediatric intensive care unit during the pandemic and the corresponding period in 2019 and 2018 was statistically not significant ($P = 0.8234$). **Conclusions:** A sharp decline in the admissions from asthma phenotypes and those from the respiratory tract and gastrointestinal tract infections resulted in a close to 50% decline in hospitalizations from COVID-19-unrelated illnesses among children in this population.

Keywords: Children, COVID-19 pandemic, hospitalization

INTRODUCTION

Globally, children are reported to be less often affected by the current COVID-19 pandemic when compared to the adult population.^[1] In addition, they are likely to have a less severe illness from COVID-19 infection when compared with adults.^[1-3] However, there are concerns that the routine health care of children may be seriously affected during this pandemic.^[4,5] There are reports of decline in the number of visits for routine medical care.^[6-8] In addition, there are reports

of delay in accessing medical services for serious acute illness from children.^[9,10] These concerns have been highlighted based on observations made in some of the severely affected countries during the early phases of this pandemic. The emerging picture of the effects of this pandemic on the overall health and medical care of children is still very unclear.

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Barbados, one of the island states in the Caribbean, is a popular tourist destination. It has an estimated population of 286,100 (2014 estimated), including 58,926 children under the age of 16 years. The COVID-19 pandemic reached this country relatively late, with its first few cases reported in the 3rd week of March 2020. The government of Barbados, fearing a rapid spread of COVID-19 due to the high volume of tourism-related international travel from Europe and North America, enforced a strict lockdown in the 4th week of March 2020. Borders were closed to all international travel. All daycare facilities for children, schools, and colleges were closed. Nonessential commercial facilities were shut and a strict 24 h curfew was enforced.^[11] The lockdown continued until the end of June 2020. These early and effective measures successfully limited the number of cases in this country to around 100 including 3 cases (all asymptomatic) among children.^[12] The country commenced a staggered reopening in June with a resumption of many nonessential services and commercial activities, as well as the reopening of schools for the purpose of facilitating examinations. All preschools and daycare facility remained shut. In July 2020, there was a further ease of business with the resumption of international travels and reopening of hotels and restaurants as well as the daycare facilities and preschools for children.

Throughout the lockdown, the well-planned management protocols provided a parallel health-care service for those infected and those suspected of being infected by COVID-19. The usual health-care services in Barbados remained open to the public for routine preventative and curative health care with all necessary WHO-recommended precautions for this pandemic in place. The Queen Elizabeth Hospital (QEH), the only tertiary care hospital, provides all of the inpatient care to children and adolescents in Barbados. The QEH was not used for care of COVID-19-infected persons and it remained open for inpatient health care of the public including children. In this study, we describe the impact of COVID-19 pandemic on the burden and pattern of hospitalization from the COVID-19-unrelated conditions among children in this country with two main objectives: (1) to quantify the impact of the COVID-19 pandemic on the burden of hospital admissions for COVID-19-unrelated conditions and (2) to describe the pattern of illnesses for which children are hospitalized during this pandemic.

MATERIALS AND METHODS

This is a population-based prospective clinical audit of children (Age <16 years) admitted for COVID-19-unrelated illnesses to the QEH during the ongoing COVID-19 pandemic. This study forms part of an ongoing clinical audit of hospitalization among children for respiratory illnesses being undertaken since 2017. The QEH is the only tertiary care hospital in Barbados where children are admitted for any medical condition that necessitates inpatient care. Pediatrics division at the QEH has general pediatric unit, adolescent unit, neonatal unit for neonates who require admission

after discharge from their postnatal care after delivery, and pediatric intensive care unit and children admitted primarily for medical conditions in all these units were included for this study. All COVID-19-unrelated Pediatric Medical Admissions (PMAs) at the QEH were included in the audit. Pediatrics at QEH also has a dedicated neonatal care unit for care (including intensive care) of babies who are sick after their delivery at the QEH where over 90% of all deliveries in Barbados take place. Admissions to the neonatal intensive care unit were excluded from this audit. In addition, children admitted primarily for surgical conditions were excluded from this audit. This audit covers the period extending from April to July 2020. The audit data for the corresponding period in 2019 and 2018, which were also collected prospectively as a routine practice, was used as historical control.

Pediatric admissions were prospectively tracked using the admission register to collect data on the number of admissions, source (where the patient came from) of admission, age, and gender of the admitted children. This is routinely done for the departmental audit. Inpatient records were used to extract the data on the date of admission and discharge, the discharge outcome in terms of death or discharge, the primary diagnosis at discharge, and children who required intensive care. For the purpose of this study, data were extracted for the period extending from April to July 2020. Similar data were also extracted for the corresponding period in 2019 for historical comparison. The International Classification of Diseases IX revision was used to assign the discharge diagnosis based on the clinical presentations, course of the illness, and the results from the laboratory investigations. Each patient was treated at the discretion of the treating physicians on the team headed by a consultant pediatrician.

Measured outcomes included PMAs for COVID-19-unrelated conditions; reasons for PMA (the primary discharge diagnosis); number of PMA's requiring intensive care – those admitted to the pediatric intensive care; and mortality rate for PMA if any. Measured outcomes during the pandemic were compared with the corresponding period in 2019 and 2018.

All data were entered into a Microsoft Access database on the day of data collection by a research assistant who was given 1-day training in the data entry technique. The database itself was also anonymized with an assigned enrollment number as the only identifier and was password protected. All data pertaining to the enrollment itself were stored in a password secured Microsoft Access database where the child was identified by their initials followed by the date of birth and only the principal investigator had access to this data set. Microsoft Excel was used for basic data analysis and generation of tables and graphs. Statistical analyses were performed using the Vassar Statistical Package. Categorical variables were reported as frequency counts and proportions with 95% confidence interval (CI) (continuity correction). They were compared using the Chi-square test and Student's

t-test. Strength of association was analyzed using odds Ratio. $P < 0.05$ was accepted as statistically significant.

Ethics statement

This study report forms part of an ongoing audit of pediatric admission and has ethical approval from the Institutional Review Board at the QEH (REF 2018-01-17).

RESULTS

There were a total of 178 COVID-19-unrelated PMAs to the QEH from April to July 2020. This was a decline of 47.2% (95% CI = 41.6%, 52.5%) compared to the 336 PMA during the corresponding period in 2019. The monthly number of PMA during the months of January to July in the years 2018, 2019, and 2020 is shown in Figure 1. The mean monthly PMA during April to July 2020 declined to 44.5 ± 18.7 from 80.0 ± 21.5 during the corresponding period in 2019 and this decline was significant ($P = 0.0045$). The decline in the mean monthly admissions during the study period when compared with the corresponding period in 2018 (80.8 ± 15.3) was also statistically significant ($P = 0.0031$).

The demography of the children admitted to the QEH during the study period and the corresponding period in 2019 is shown in Table 1. The demography of hospitalized children during the pandemic was characterized by a higher proportion of children older than 5 years (43.5%) and females (55.9%) during the pandemic in 2020 when compared to the corresponding figures (33.1%) and (43.9%) during the same months in 2019. These differences were statistically not significant ($P = 0.0265$). Smaller proportion of children who were 5 years or younger were admitted during the pandemic. The decline (64.2%; 95% CI 59.6%, 69.3%) in the PMA was steepest in the 1–5 year age group.

Overall, the accident and emergency at the QEH was the source of referral in 55.1% (95% CI = 47.4%, 62.4%) and 52.8% (95% CI = 47.3%, 58.2%) of PMA during April–July 2020 and the corresponding period in 2019,

respectively [Figure 2]. Private office was the source of referral in 6.7% (95% CI = 3.7%, 11.8%) and 12.5% (95% CI = 9.2%, 16.6%) of PMA during the pandemic and the corresponding months in 2019, respectively. This difference in the proportion of referrals from the private office during the two given periods was statistically significant ($P = 0.0023$).

The reason for admission (the primary discharge diagnosis) of children admitted during the pandemic and the corresponding period in 2019 is shown in Table 2. The maximum decline in PMA during the pandemic when compared with the corresponding period in 2019 was seen for various asthma phenotypes (95.8%; 95% CI = 87.3%, 98.9%) and this decline was statistically significant (Odds ratio [OR] = 15.6; 95% CI = 4.8, 50.4; $P \leq 0.0001$). A similar decline was seen for PMA from respiratory infections (89.7%; 95% CI = 78.2%, 95.7%) and this decline was statistically significant (OR = 6.0; 95% CI = 2.5, 14.2; $P < 0.00001$). The decline in the number of admissions from asthma phenotypes, respiratory infections, and gastrointestinal infections accounted for 88.0% (95% CI = 78.6%, 94.8%) of the total decline in PMA during the pandemic-related lockdown period when compared with the corresponding period in 2019. The proportion of PMA from neonatal infections (neonatal sepsis, meningitis, omphalitis, and urinary tract infection)

Table 1: Demography of children hospitalized during COVID-19 pandemic and the corresponding period in 2019 in Barbados

Demography	2019 April - July (%)	2020 April - July (%)
Age groups (years)		
≤1	26.9	29.4
≤5	40.0	27.1
6-10	21.5	25.4
11-15	11.6	18.1
Gender		
Female	43.9	55.9
Male	59.1	44.1

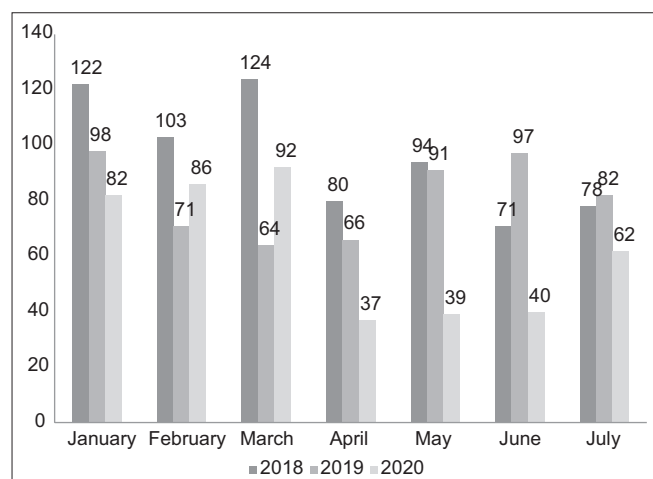


Figure 1: Pattern of pediatric medical admissions during the COVID-19 pandemic and the corresponding period in 2019 and 2018 in Barbados

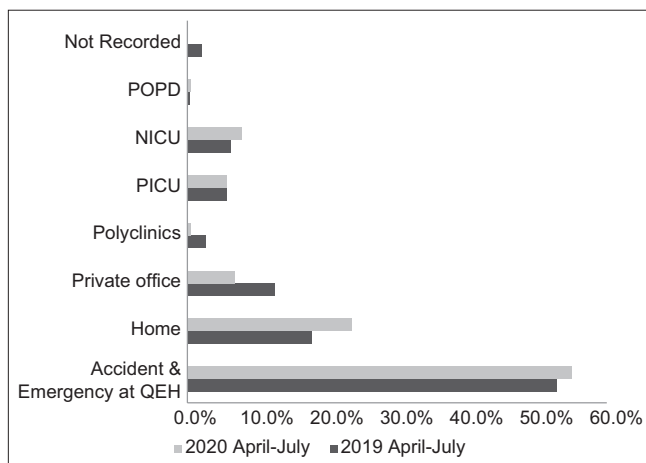


Figure 2: Source of referral for pediatric medical admissions during the COVID-19 pandemic and the corresponding period in 2019 in Barbados

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Table 2: Discharge diagnosis for children hospitalized during the COVID-19 pandemic and the corresponding period in 2019 in Barbados

Diagnosis at discharge	April - July 2019	April - July 2020	OR	95% CI	P
Asthma phenotypes	71	3	15.6	4.8-50.4	<0.0001
Respiratory infections	58	6	6	2.5-14.2	<0.0001
Gastro-intestinal infections	23	4	3.2	1.1-9.4	0.0262
Other infections of children	25	14	0.94	0.48-1.86	0.8624
Neonatal infections	23	11	1.12	0.53-2.34	0.7772
Seizure disorders	28	26	0.53	0.3-0.94	0.029
Diabetes mellitus	9	6	0.79	0.28-2.25	0.8625
Sickle cell disease	15	6	1.34	0.51-3.51	0.5485
Malignancy	27	35	0.36	0.21-0.61	0.0001
Other noninfectious conditions	105	81	0.54	0.37-0.79	0.0014

OR: Odds ratio, CI: Confidence interval

during the pandemic period and the corresponding period in 2019 also declined, but the difference was statistically not significant ($P = 0.7772$).

During the study period, there were 31 (17.4%; 95% CI = 12.3%, 24.0%) children who required intensive care and were transferred to the pediatric intensive care unit compared to the 48 (14.3%; 95% CI = 10.8%, 18.6%) and 53 (16.4%; 95% CI = 12.6%, 21.0%) children who required intensive care during the corresponding period in 2019 and 2018, respectively. The difference in the proportion of children who required transfer to the pediatric intensive care unit during the pandemic and the corresponding period in 2019 and 2018 was statistically not significant ($P = 0.8234$). There were two deaths during the pandemic period and both these deaths were in children on treatment for relapsed malignancy. In 2018 and 2019, there were three deaths and two deaths, respectively.

DISCUSSION

Although there are numerous reports of pandemic-related decline in the utilization of primary health care as well as the emergency health care,^[6,7,9,10,13,14] little is known about the impact of this pandemic on hospitalization of children for the COVID-19-unrelated illnesses. Our data from this population-based prospective study of PMA to the only tertiary care hospital in Barbados have shown that the number of admissions declined by nearly 50% during the COVID-19-related lockdown period when compared to the corresponding period in 2019 and 2018. The mean monthly PMA from April to July 2020 period showed a similar decline when compared with the mean monthly PMA during the corresponding months in 2019 and 2018 [Figure 1]. Many of the studies reporting a decline in the utilization of primary health-care and emergency care services for children were from countries severely affected and in the early phase of this pandemic and have attributed this decline largely to the fear factors.^[6,7,9,10,13-15] Fear of contracting COVID-19, especially for the parents or caregiver in the health-care setting, was thought to have impacted their health-care-seeking behavior

in a timely fashion. However, the findings from our study assume added significance given the fact that the management of COVID-19-infected or suspected patients was kept out of the QEH and that the hospital functioned normally providing all the services for care of the Barbadian public for COVID-19-unrelated illnesses. Furthermore, throughout the lockdown period, Barbados had very few cases of COVID-19, which were all among persons with a travel history. There was no community transmission of COVID-19 at any point of time during this pandemic. There was no panic among the public at any point during the lock-down, although most people adhered to the COVID-19 transmission prevention guidelines.^[11,12] Therefore, one can reasonably exclude the fear factor as the major reason for this decline in PMA of children seen in this population.

Analysis of the pattern of discharge diagnosis of the PMA during the lockdown period may explain the possible reason for the decline in the PMA that was seen in this study. During the pandemic-related lockdown when compared to the corresponding period in 2019, the steepest decline in the number of admissions was seen from those for asthma phenotypes, respiratory tract infections, and gastrointestinal tract infections. The decline in the number of admissions from these three subsets of pediatric conditions accounted for close to 90% of the total decline in PMA during the pandemic-related lockdown in this population. Similar findings were reported from a study of the utilization of primary health care during this pandemic in this population.^[16] There are reports of the decline in pediatric hospital admissions from respiratory illnesses.^[17,18] In addition, there are reports of a significant decrease in emergency room visits from children for asthma and infections of the respiratory tract and gastrointestinal tracts.^[13-15] It is noteworthy, several studies including a recent study from this population have shown that the majority of the asthma phenotypes seen in younger children are wheezing induced by viral infections.^[19-21] Therefore, it is quite likely that use of mask, rigorous hand hygiene, and social distancing along with closure of schools and daycare facilities have resulted in reduced infections in the community and this may explain the decline in the PMA during this pandemic. A number of recent

studies have demonstrated a reduction in various infections as collateral benefits from the preventative measures instituted to limit the spread of COVID-19 infection.^[22,23]

We also analyzed the number of admissions to the PICU and the number of deaths during the pandemic-related lockdown period and compared these data with those of the corresponding period in 2019. It was postulated, based on the findings from previous studies, that delay in seeking care due to the fear of contracting COVID-19 would reflect a higher than expected PICU admission and/or mortality during the lockdown period.^[24,25] Our finding did not show any increase in the PICU admissions or in the mortality rate among the PMA during the lockdown period when compared with the corresponding period in 2019. These findings lend further support to the idea that the reduction in the number of PMA during this pandemic was not related to the delay in seeking medical care when necessary secondary to the fear of contracting COVID-19 in this population.

CONCLUSIONS

In summary, in this prospective population-based study, we observed a significant decline in the PMAs to the only tertiary care hospital in this country during the COVID-19 pandemic-related lock down when compared to the corresponding period in 2019 and 2018. The decline was sharpest for the admissions from asthma phenotypes and those from the respiratory tract and gastrointestinal tract infections. Source of referrals for these admissions remained unchanged during the pandemic. No concomitant increase in the admissions to the intensive care unit or any increase in the mortality rate among children admitted for medical conditions was seen during the lockdown period.

Ethical code

This study report forms part of an ongoing audit of pediatric admission and has ethical approval from the Institutional Review Board at the QEH (REF 2018-01-17).

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Nil.

Conflicts of interest

There are no conflicts of interest.

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