



Epidemiology, Clinical Profile, Intensive Care Needs and Outcome in Children with SARS-CoV-2 Infection Admitted to a Tertiary Hospital During the First and Second Waves of the COVID-19 Pandemic in India

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Abstract

Objectives To compare the epidemiological, clinical profile, intensive care needs and outcome of children hospitalized with SARS-CoV-2 infection during the first and second waves of the pandemic.

Methods This was a retrospective study of all children between 1 mo and 14 y, admitted to a dedicated COVID-19 hospital (DCH) during the first (1st June to 31st December 2020) and second waves (1st March to 30th June 2021).

Results Of 217 children, 104 (48%) and 113 (52%) were admitted during the first and second waves respectively. One hundred fifty-two (70%) had incidentally detected SARS-CoV-2 infection, while 65 (30%) had symptomatic COVID-19. Comorbidities were noted in 137 (63%) children. Fifty-nine (27%) and 66 (30%) children required high-dependency unit (HDU) and ICU care respectively. Severity of infection and ICU needs were similar during both waves. High-flow oxygen ($n=5$, 2%), noninvasive ventilation [CPAP ($n=34$, 16%) and BiPAP ($n=8$, 5%)] and invasive ventilation ($n=45$, 21%) were respiratory support therapies needed. NIV use was more during the second wave (26% vs. 13%; $p=0.02$). The median (IQR) length (days) of DCH stay among survivors was longer during the first wave [8 (6–10) vs. 5.5 (3–8); $p=0.0001$].

Conclusions Disease severity, associated comorbidities, PICU and organ support need and mortality were similar in the first and second waves of the pandemic. Children admitted during the second wave were younger, had higher proportion of NIV use and shorter length of COVID-19 hospital stay.

Keywords First wave · Second wave · COVID-19, Children

Introduction

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic has resulted in a significant global burden. Worldwide as on 7th November 2021, there have been about 249 million cases of SARS-CoV-2 infection with a case fatality rate of 2.0% [1]. Many countries including India have witnessed a two-wave pattern of the disease. In India, the first cases were reported at the end of January 2020. Subsequently, increase in case numbers (first wave of the

pandemic) were noticed from early June 2020 and continued to peak in mid-September 2020 with 90,000 cases per day. This was followed by a steady decline in the number of cases with nadir reached on February 1, 2021. There was a resurgence of cases once again with the second wave of the pandemic starting in March 2021 and reaching its peak in May 2021, where about 4,00,000 cases per day were reported. By June 2021, once again, there was a steady decline to about 40,000 cases per day. The total number of cases in India as on July 31st 2021 was 31.6 million [2].

It was observed during the first wave that the disease in children, as compared to adults, was less severe and carried a low mortality [3, 4]. Data in children, although limited, have shown that only 2%–3% children had severe or critical disease [5]. However, unlike the first wave, it was hypothesized that the disease during the second wave would be

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more severe in younger patients resulting in higher morbidity and mortality. The possible explanations given were lack of immunization, increased exposure, emergence of newer variants of the virus (including the B.1.617, B.1.1.7, and B.1.618 variants) and occurrence of MIS-C in previously SARS-CoV-2-infected children [6].

Patterns of disease in the first and second waves have been described in adults; a few studies have reported an increased severity/mortality during the second wave as compared to the first wave [7, 8]. However, there are no such comparative studies for pediatric population. A study comparing the clinical, epidemiological, and laboratory characteristics of children affected during the first and second waves of the pandemic is crucial to understand whether the latter wave was more severe. Data of this kind would help prepare for subsequent waves of this pandemic. The data of children with SARS-CoV-2 infection admitted to the authors' dedicated COVID-19 hospital (DCH) during the first and second waves of the pandemic were retrospectively analyzed. The aim of the study was to describe and compare the epidemiological and clinical characteristics, intensive care requirements and outcome.

Materials and Methods

This was a retrospective study of children aged between 1 mo and 14 y, admitted consecutively to a dedicated COVID hospital (DCH) of a tertiary care referral center in North India.

All children who tested positive for SARS-CoV-2 during both waves of the pandemic and required admission were included in the study. As far as the authors know, there is no clear demarcation between the two waves of the pandemic in India. By observing the graph depicting daily new cases in India, the period extending from 1st June 2020 to 31st December 2020 was considered as the first wave and that from 1st March to 30th June as the second wave [2]. Children admitted during the early pandemic period (April and May 2020) and the plateau phase between the two waves (January and February 2021) were excluded (Fig. 1).

The authors' center followed a universal screening protocol - all children admitted or referred to the hospital were screened with a combined nasopharyngeal and oropharyngeal swab for SARS-CoV-2 virus using conventional RT-PCR (for routine indications) or cartridge-based nucleic acid amplification test (CBNAAT/GeneXpert) (for emergent indications). Those who tested positive for any of these were shifted to the DCH. Patients were admitted in general ward, high-dependency unit (HDU) or intensive care unit (ICU) depending on their severity of illness. The severity of COVID-19 disease was categorized as mild, moderate, severe or critical based on WHO guidelines [9].

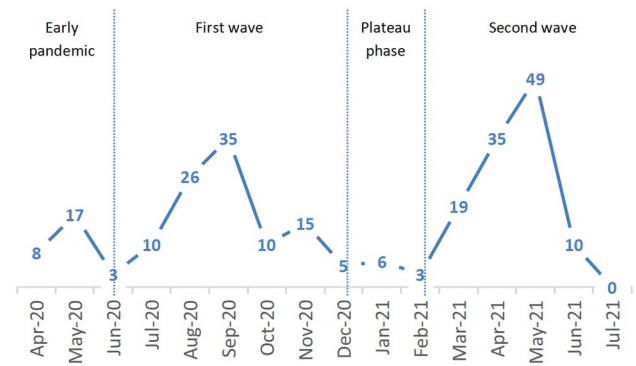


Fig. 1 The trend of monthly admissions

Depending on the severity of illness and/or presence of underlying comorbidity, laboratory investigations were ordered. Complete blood count, coagulation tests, arterial blood gas, chest radiograph, liver and renal function tests, inflammatory markers (CRP, procalcitonin, IL-6, ferritin) and blood culture were commonly performed. CT chest, ultrasonogram or MRI were performed in select cases only if clinically indicated. Pharmacological therapy was based on the department protocol which was periodically updated based on emerging evidence and national recommendations.

Data was collected from the medical records and electronic database and entered into a case record form. Severity of illness, respiratory involvement, type and duration of respiratory support, hemodynamic support (fluid bolus or vasoactive agent use), use of antimicrobial, antiplatelet, anticoagulant and immunomodulator therapy were noted. Outcomes included length of stay in DCH, recovery (transfer or discharge) or death. COVID-19 death was assigned based on WHO definition as the death resulting from a clinically compatible illness in a probable or confirmed COVID-19 case, unless an alternative cause of death not related to COVID-19 disease (e.g., trauma) was ascertained [10]. When in doubt, the cause of mortality to be assigned was discussed and reviewed by clinician in-charge and COVID-19 Committee Chair (MJ).

The study protocol was approved by the Department Review Board and Institute Ethics Committee (NK/7556/Study/870).

Data entry and statistical analysis were performed using Excel (Microsoft Office 365, Redmond, WA) and STATA Version 17.1 (StataCorp, College Station, Texas: StataCorp LLC). Descriptive statistics were used to summarize the data. Normally distributed continuous and skewed data were presented as mean \pm SD and median with interquartile range (IQR), respectively and compared using Student *t*-test or Mann–Whitney *U* test, wherever appropriate. Categorical data were summarized as frequencies & percentages and compared using Chi-square or Fischer exact test.

Results

A total of 5247 children admitted to the authors' multispecialty pediatric hospital between April 2020 and June 2021 were screened for SARS-CoV-2 infection at admission. Of these, 251 children (4.8%) tested positive for SARS-CoV-2 and were transferred to the DCH. Two hundred and seventeen children—104 (48%) and 113 (52%)—admitted between June 2020 & December 2020 (7 mo) and between March 2021 & June 2021 (4 mo), respectively, were included. Two hundred and three (93.5%) and 14 (6.5%) had tested positive for SARS-CoV-2 by conventional RT-PCR and cartridge-based GeneXpert test, respectively.

The median (IQR) age of the study subjects was 36 (6–84) mo; about a third were infants ($n = 85$; 39%). More than half [137 (63%)] had underlying comorbidity, which included hematological malignancies (leukemia/lymphoma) [(37 (27.0%)), chronic neurological illnesses [21 (15.3%)], congenital heart diseases [19 (13.8%)], and chronic renal diseases [14 (10.2%)].

Fever was the most common presenting symptom in 137 (63%), followed by respiratory symptoms in 115 (53%), gastrointestinal symptoms in 85 (39%), and neurological symptoms in 60 (28%).

During the course of hospital stay, median (IQR) worst organ dysfunction score of the study subjects was 1 (0–2). Hypoxemia ($n = 69$; 32%), shock ($n = 41$; 19%), acute kidney injury ($n = 23$; 11%), encephalopathy ($n = 25$; 11%), and coagulopathy ($n = 18$; 8%) were the types of organ dysfunction seen. Nine (4%) children had Multisystem Inflammatory Syndrome in Children (MIS-C).

Out of 217 children, 66 (30%) required ICU admission and additional 59 (27%) required HDU care. Hundred (46%) children required supplemental oxygen and/or noninvasive respiratory support which was administered through nasal prongs ($n = 66$; 30%), nasal CPAP ($n = 34$; 16%), BiPAP ($n = 8$; 5%), or Heated Humidified High Flow Nasal Cannula (HHHFNC) ($n = 5$; 2%). About a fifth ($n = 45$, 21%) required invasive ventilation. Hemodynamic support (fluid bolus and vasoactive support) was required in about one-fifth of the children.

Remdesivir was used only in 18 (8%) children. Nearly three-fourths ($n = 168$; 77%) received antimicrobials, which included amphotericin B in 14 (6.5%) children. Antiplatelet (aspirin) and anticoagulation (enoxaparin) were used in 4 (2%) and 3 (1.5%) children, respectively.

Among the cases included, 152 (70%) children had incidentally detected SARS-CoV-2 infection (75 and 77 during the first and second waves, respectively) and had required admission for their underlying illness (Table 1). The rest 65 (30%) had symptomatic COVID-19; 29 and 36 during the first and second waves, respectively. The

Table 1 Distribution of illness in coincidental SARS-CoV-2-infected children

	<i>n</i> (%)
Coincidental SARS-CoV-2 infection	152 (70)
Hematologic malignancy	31 (14)
Infections	27 (12)
Neurologic	16 (7)
Surgical	14 (6.5)
Renal	13 (6)
Cardiac	12 (6)
Metabolic	8 (4)
Hepatobiliary	7 (3)
Asymptomatic	7 (3)
Trauma	5 (2.5)
Respiratory	4 (2)
Tumors	3 (1.5)
GI and pancreatic disorders	2 (1)
Rheumatologic conditions	1 (0.5)
Hematologic conditions	1 (0.5)
Poisoning	1 (0.5)

presenting complaints in children with COVID-19 were fever in 56 (86.2%), followed by respiratory in 35 (53.8%), and gastrointestinal symptoms in 23 (35.4%) children. Thirty-nine (18%) had moderate and 13 (6%) each had severe and critical COVID-19 disease. The ICU need was similar in children with COVID-19 (25 out of 65; 38.5%) and those with incidental SARS-CoV-2 infection (41 out of 152; 27%) [OR (95% CI) = 1.69 (0.92–3.13); $p = 0.09$].

In the present cohort, 188 children survived (87%); of these, 152 (70%) were discharged to home isolation, while 36 (17%) were transferred to non-COVID-19 pediatric wards. Twenty-nine (13.5%) children died during hospital stay and in 6 (3%) the death was attributable to COVID-19. The median (IQR) length (days) of COVID-19 ward and total hospital stay in survivors was 7 (4–10) and 7 (4–10), respectively.

Comparison between first and second waves of the pandemic: The comparative epidemiological and clinical characteristics, intensive care needs, laboratory parameters and outcomes between the subjects of both waves are shown in Tables 2, 3 and 4. Children admitted during the second wave were significantly younger [mean (IQR) age (months) 24 (5–84) vs. 48 (9–96); $p = 0.03$]. The gender distribution, weight, presence of comorbidities, severity of illness, organ dysfunction and need for HDU and ICU care were similar in both cohorts. However, among children with COVID-19 disease in both waves, the clinico-epidemiological and laboratory profile were similar except for presence of comorbidities [19 (29.2% vs. 14 (21.5%); $p = 0.03$] that was higher during the first wave of the pandemic (Supplementary Tables S1 and S2).

Table 2 Clinical and epidemiological profile of children during the first and second wave

	Total (<i>n</i> =217)	First wave (<i>n</i> =104)	Second wave (<i>n</i> =113)	<i>p</i> value
Age (months) (IQR)	36 (6–84)	48 (9–96)	24 (5–84)	0.03
Age group				
Infants <i>n</i> (%)	85 (39)	34 (33)	51 (45)	0.06
Older children <i>n</i> (%)	132 (61)	70 (67)	62 (55)	
Boys:Girls	1.7	1.9	1.6	0.6
Weight (Kg), median (IQR)	10 (5–21) (<i>n</i> =101)	10 (5–22) (<i>n</i> =37)	9.6 (5–19.7) (<i>n</i> =64)	0.58
Comorbidities <i>n</i> (%)	137 (63)	66 (63)	71 (63)	0.92
Lowest SpO ₂ , median (IQR)	98 (90–98)	98 (90–98)	98 (88–98)	0.49
Lowest GCS, mean (SD)	14 (3)	14 (2)	14 (3)	0.70
Organ dysfunction <i>n</i> (%)				
Shock	41 (19)	25 (24)	16 (14)	0.06
Hypoxemia	69 (32)	31 (30)	38 (34)	0.55
AKI	23 (11)	16 (15)	7 (6)	0.03
Encephalopathy	25 (11)	10 (10)	15 (13)	0.40
Coagulopathy	18 (8)	9 (9)	9 (8)	0.85
Organ dysfunction score, median (IQR)	1 (0–2)	1 (0–2)	1 (0–2)	0.18
COVID disease severity				
Moderate <i>n</i> (%)	39 (18)	16 (15)	23 (20)	0.34
Severe <i>n</i> (%)	13 (6)	6 (6)	7 (6)	0.90
Critical <i>n</i> (%)	13 (6)	7 (6)	6 (5)	0.66
MIS-C <i>n</i> (%)	9 (4)	4 (4)	5 (4.5)	0.47

AKI Acute kidney injury, GCS Glasgow Coma Scale, MIS-C Multisystem inflammatory syndrome in children

The laboratory parameters were similar in both cohorts except the median (IQR) ferritin (mg/dL) and D-dimer (ng/mL) that were higher during the first wave (Table 3).

The median (IQR) duration (hours) of supplemental oxygen requirement was longer in the first as compared to the second wave [72 (48–120) vs. 48 (24–72); $p=0.02$]. In contrast, the use of nasal CPAP was more frequent during the second wave (11% vs. 20%; $p=0.05$).

Antibacterial agents, anticoagulant, antiplatelet, and steroid use was similar in both waves. The proportion of children discharged to home isolation (73% vs. 67%), transferred to non-COVID facility (13% vs. 19%) and who died (13% vs. 13%) ($p=0.97$) was similar in both waves. The median (IQR) length (days) of COVID-19 ward stay [8 (6–10) vs. 5.5 (3–8); $p=0.000$] and hospital stay [8 (6–11) vs. 6 (3–9); $p=0.001$] among survivors were significantly longer in the first wave.

Discussion

In this study, the epidemiological characteristics and outcomes of children admitted to a DCH during the first (June 2020 to December 2020) and second waves (March 2021 to June 2021) of the COVID-19 pandemic in India are described.

The present cohort comprised of significantly younger children [median (IQR) 36 (6–84) mo], more so in the second wave as compared to most other studies [11–15]. This is in concordance with a large Indian registry-based observational study of 18,961 patients, which included all age groups. The mean age of the patients in this registry was significantly lower, with higher proportion of patients in the younger age group intervals in the second wave [16]. Spread of newer variants and increased exposure of younger cohort during the second wave, were the potential explanations for this finding.

In the present study, 63% children had underlying comorbidity. The frequency of comorbidities reported among children with SARS-CoV-2 infection is variable (21%–83%) with a greater proportion among the sicker cohorts [11, 13, 17–24]. The authors' pediatric multispecialty hospital caters to complex medical and surgical illnesses and followed a universal screening policy for all admissions, which could have resulted in a higher proportion of children with comorbidities testing positive for SARS-CoV-2.

The common comorbidities that have been reported in different studies includes chronic infection, chronic kidney disease, medically complex disease and heart disease [15, 21–23]. A similar distribution of underlying illnesses was found, although hematological malignancies predominated in the present cohort.

Table 3 Laboratory parameters of children during the first and second wave

	Total	Wave 1	Wave 2	<i>p</i> value
Hemoglobin (g/dL)	10 (8.2–11.4) (<i>n</i> = 190)	10 (8.4–10.9) (<i>n</i> = 85)	10 (8.1–11.6) (<i>n</i> = 105)	0.95
Total lymphocyte count (cells/mm ³)	10150 (5800–15700) (<i>n</i> = 190)	10300 (5000–15600) (<i>n</i> = 85)	10000 (6600–15800) (<i>n</i> = 105)	0.62
Platelet count (cells/mm ³)	250000 (71000–385000) (<i>n</i> = 187)	196000 (42000–369500) (<i>n</i> = 84)	275000 (110000–540000) (<i>n</i> = 103)	0.06
INR	1.2 (1.0–1.4) (<i>n</i> = 73)	1.2 (1.0–1.6) (<i>n</i> = 34)	1.1 (1.0–1.4) (<i>n</i> = 39)	0.98
D-dimer (ng/mL)	1554 (670–2940) (<i>n</i> = 30)	1920 (1094–9172) (<i>n</i> = 18)	660 (344–1115) (<i>n</i> = 12)	0.00
Fibrinogen (g/L)	3.9 (2.3–3.9) (<i>n</i> = 20)	3.7 (2.0–4.4) (<i>n</i> = 15)	4.8 (4–4.8) (<i>n</i> = 5)	0.32
ProBNP (pg/mL)	3327 (347–14681) (<i>n</i> = 16)	5228 (438–15399) (<i>n</i> = 10)	2184 (155–13963) (<i>n</i> = 6)	0.59
Urea (mg/dL)	25 (17–41) (<i>n</i> = 183)	24.5 (17.3–41.5) (<i>n</i> = 80)	25 (17–41) (<i>n</i> = 103)	0.93
Creatinine (mg/dL)	0.35 (0.24–0.51) (<i>n</i> = 185)	0.38 (0.24–0.55) (<i>n</i> = 82)	0.33 (0.22–0.51) (<i>n</i> = 103)	0.31
Total bilirubin (mg/dL)	0.5 (0.4–1) (<i>n</i> = 129)	0.5 (0.4–1.2) (<i>n</i> = 56)	0.5 (0.4–0.8) (<i>n</i> = 73)	0.77
Conjugated bilirubin (mg/dL)	0.2 (0.1–0.5) (<i>n</i> = 125)	0.2 (0.1–0.5) (<i>n</i> = 53)	0.2 (0.1–0.5) (<i>n</i> = 72)	0.21
Total protein (mg/dL)	6.3 (5.6–7) (<i>n</i> = 143)	6.3 (5–7) (<i>n</i> = 62)	6.3 (5.7–6.9) (<i>n</i> = 81)	0.70
Albumin (mg/dL)	3.5 (2.9–4) (<i>n</i> = 143)	3.5 (2.7–4) (<i>n</i> = 62)	3.5 (3–4) (<i>n</i> = 81)	0.74
C-reactive protein (mg/L)	21 (6–117) (<i>n</i> = 115)	45 (7–145) (<i>n</i> = 47)	19 (5–95) (<i>n</i> = 68)	0.17
Procalcitonin (ng/mL)	0.7 (0.2–4.1) (<i>n</i> = 61)	0.7 (0.2–6.0) (<i>n</i> = 27)	0.7 (0.3–2.7) (<i>n</i> = 34)	0.86
IL-6 (pg/mL)	69 (25–96) (<i>n</i> = 12)	219 (76–658) (<i>n</i> = 4)	42 (15–80) (<i>n</i> = 8)	0.06
Ferritin (mg/dL)	465 (266–945) (<i>n</i> = 29)	700 (400–2299) (<i>n</i> = 12)	334 (151–690) (<i>n</i> = 17)	0.04

All values are represented as median (IQR)

BNP B type natriuretic peptide, *IL* Interleukin

Symptomatic COVID-19 was seen in 30%, with only 6% each with severe and critical disease. The proportion of illness severity reported among hospitalized children greatly varies among different studies and ranges from 0.5%–79.3% for moderate, 0–42% for severe and 9%–34% for critical disease. Studies in children admitted to intensive care settings, expectedly, had a higher proportion of severe disease [11, 17, 18, 25–27]. The interpretation of severity of illness is inconsistent, as many studies have not distinguished children with symptomatic COVID-19 from those admitted with another unrelated illness but having incidental SARS-CoV-2 infection.

About one-third of children in the present cohort required ICU care and the need was similar for children with symptomatic COVID-19 and those with incidental SARS-CoV-2 infection during both waves. In a large cohort of hospitalized

children with COVID-19 from the USA, 17.6% (118 out of 672) required ICU admission [14]. Another multicenter study of 4063 children from 45 hospitals across USA reported an ICU admission rate of 21% [27]. Reasons for higher PICU requirement in the present study is possibly related to referral bias and higher proportion of children with comorbidities.

The need for invasive ventilation has ranged from 4.1 to 47% [11–14, 18, 21, 28, 29] in different studies similar to the authors' observations. About a fifth of the children, in the present study, required noninvasive respiratory support, the need being higher particularly during the second wave. This was in concurrence with emerging evidence that emphasized safety and utility of NIV in COVID-19 pneumonia [30].

Twenty-nine children died (13.5%); of these only 6 (3%) were COVID-19 death (disease-specific mortality). There

Table 4 Treatment and outcome of children during the first and second wave

	Total	Wave 1	Wave 2	<i>p</i> value
HDU need <i>n</i> (%)	59 (27)	27 (26)	32 (28)	0.70
ICU need <i>n</i> (%)	66 (30)	30 (29)	36 (32)	0.63
IV fluid bolus need <i>n</i> (%)	45 (21)	25 (24)	20 (18)	0.25
Inotrope/Vasoactive drugs <i>n</i> (%)	38 (18)	23 (22)	15 (13)	0.09
Respiratory support <i>n</i> (%)				
NPO ₂	66 (30)	36 (35)	30 (27)	0.20
Noninvasive ventilation (one or more modes)	43 (20)	14 (13)	29 (26)	0.02
CPAP	34 (16)	11 (11)	23 (20)	0.05
HHHFNC	5 (2)	1 (1)	4 (4)	0.21
BiPAP	8 (5)	3 (3)	5 (4)	0.55
IMV	45 (21)	21 (20)	24 (21)	0.85
Length of respiratory support (hours)*				
NPO ₂	48 (24–96)	72 (48–120)	48 (24–72)	0.02
CPAP	48 (24–72)	48 (24–72)	48 (24–72)	0.73
HHHFNC	48 (36–72)	12	60 (42–300)	0.16
BiPAP	72 (24–96)	24 (24–96)	72 (72–96)	0.54
IMV	48 (24–72)	48 (24–72)	30 (12–120)	0.36
Antibacterial drugs <i>n</i> (%)	168 (77)	80 (77)	88 (78)	0.87
Remdesivir <i>n</i> (%)	18 (8)	7 (7)	11 (10)	0.42
Amphotericin B <i>n</i> (%)	14 (6.5)	10 (10)	4 (4)	0.07
Aspirin <i>n</i> (%)	4 (2)	1 (1)	3 (3)	0.35
Enoxaparin <i>n</i> (%)	3 (1.5)	2 (2)	1 (1)	0.51
Prednisolone <i>n</i> (%)	11 (5)	5 (5)	6 (5)	0.87
Methylprednisolone <i>n</i> (%)	8 (4)	4 (4)	4 (4)	0.90
Dexamethasone <i>n</i> (%)	19 (9)	7 (7)	12 (11)	0.31
IVIG <i>n</i> (%)	13 (6)	5 (5)	8 (7)	0.48
Tocilizumab <i>n</i> (%)	1 (0.5)	0 (0)	1 (1)	0.34
Length of hospital stay (days) among survivors*	7 (4–10)	8 (6–11)	6 (3–9)	0.001
Length of stay in COVID hospital (days) among survivors*	7 (4–10)	8 (6–10)	5.5 (3–8)	0.000
Outcome <i>n</i> (%)				
Discharge	152 (70)	76 (73)	76 (67)	0.35
Transfer	36 (17)	14 (13)	22 (19)	0.24
Death	29 (13.5)	14 (13)	15 (13)	0.97
COVID-related deaths <i>n</i> (%)	6 (3)	4 (4)	2 (2)	0.35

*All values are represented as median (IQR)

BiPAP Bi-level positive airway pressure, *CPAP* Continuous positive airway pressure, *HDU* High-dependency unit, *HHHFNC* Heated humidified high-flow nasal cannula, *ICU* Intensive care unit, *IMV* Invasive mechanical ventilation, *IVIG* Intravenous immunoglobulin, *NPO₂* Nasal prong oxygen

was no difference in mortality rates between both waves. Overall, the mortality rates reported have ranged from 1% to 27% with higher mortality among studies conducted in intensive care settings [12–16, 19, 22, 25, 30]. None of the earlier studies have however distinguished between overall and attributable mortality. As guidelines evolved, asymptomatic or mildly symptomatic children were treated under home isolation and re-testing of hospitalized children for SARS-CoV-2 negativity before discharge was taken off. This trend was reflected in the present study too, which

showed the duration of DCH and further hospital stay were shorter in the second as compared to the first wave.

The present study has some important strengths. The universal screening policy provided a more generalizable hospital-based cohort. The authors identified symptomatic infections and attempted to differentiate them from incidentally detected SARS-CoV-2 infections to provide clinically meaningful frequencies. However, the retrospective nature of the study design and subjectivity in categorization are some of the limitations.

Conclusions

The disease severity, associated comorbidities, intensive care and organ support needs and mortality were similar in both first and second waves of the pandemic. Children admitted during the second wave were however, younger, had received NIV more often and had shorter length of COVID-19 hospital stay as compared to the first.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s12098-022-04283-0>.

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Authors' Contributions MJ had full access to all the data in the study and took responsibility for the integrity of the data and the accuracy of data analysis; all authors participated in the study concept and design; MJ, VCR, and R Sharma had collected, analyzed, and interpreted the study data; MJ, VCR, R Sharma, KN, SKA and AB drafted the manuscript; MPS and KG helped in laboratory confirmation of COVID-19 through RT-PCR; PVML helped in the epidemiological data; JM, NS, SD, SV, RK, MD, PCV, R Samujh and AKS gave critical inputs during revision of the manuscript; MJ, NS, and MD provided administrative, technical or material support. All authors read and approved the final manuscript. MJ will act as the guarantor for this paper.

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Declarations

Conflict of Interest None.


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