Outcomes of Maternal-Newborn Dyads After Maternal SARS-CoV-2

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abstract

BACKGROUND AND OBJECTIVES: Infection with a novel coronavirus named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has become a global pandemic. There are limited data describing the impact of SARS-CoV-2 infection on pregnant mothers and their newborns. The objective of this study is to describe characteristics and outcomes of maternal-newborn dyads with confirmed maternal SARS-CoV-2.

METHODS: This was a multicenter, observational, descriptive cohort study with data collection from charts of maternal-newborn dyads who delivered at 4 major New York City metropolitan area hospitals between March 1 and May 10, 2020, with maternal SARS-CoV-2 infection.

RESULTS: There were a total of 149 mothers with SARS-CoV-2 infection and 149 newborns analyzed (3 sets of twins; 3 stillbirths). Forty percent of these mothers were asymptomatic. Approximately 15% of symptomatic mothers required some form of respiratory support, and 8% required intubation. Eighteen newborns (12%) were admitted to the ICU. Fifteen (10%) were born preterm, and 5 (3%) required mechanical ventilation. Symptomatic mothers had more premature deliveries (16% vs 3%, $P = .02$), and their newborns were more likely to require intensive care (19% vs 2%, $P = .001$) than asymptomatic mothers. One newborn tested positive for SARS-CoV-2, which was considered a case of horizontal postnatal transmission.

CONCLUSIONS: Although there was no distinct evidence of vertical transmission from mothers with SARS-CoV-2 to their newborns, we did observe perinatal morbidities among both mothers and newborns. Symptomatic mothers were more likely to experience premature delivery and their newborns to require intensive care.

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DOI: https://doi.org/10.1542/peds.2020-005637

Accepted for publication Jul 29, 2020

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WHAT'S KNOWN ON THIS SUBJECT: Pregnant mothers appear to be at similar risk of getting infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) as other healthy adults.

WHAT THIS STUDY ADDS: Vertical transmission from pregnant mothers with SARS-CoV-2 to newborns seems less likely, but there can be significant perinatal morbidities among mothers and newborns. Symptomatic mothers with SARS-CoV-2 were more likely to experience premature delivery and their newborns requiring intensive care.

To cite: Verma S, Bradshaw C, Auyeung NSF, et al. Outcomes of Maternal-Newborn Dyads After Maternal SARS-CoV-2. *Pediatrics.* 2020;146(4):e2020005637

A novel pathogenic coronavirus named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was identified as a cause for clusters of pneumonia cases in China earlier this year.[1–3] Since then, coronavirus disease (COVID-19) has been reported in >180 countries, and the World Health Organization has declared it a global pandemic.[4] The first case of COVID-19 was reported in the United States on January 20, 2020.[5] Currently, the United States has the highest number of confirmed cases and deaths worldwide. New York City emerged as a primary epicenter of this pandemic.

Because SARS-CoV-2 is a novel pathogen recently identified to cause infection in humans, there are limited data available on both maternal and neonatal outcomes and whether there is possibility of vertical transmission after a pregnant woman gets infected with SARS-CoV-2.[2,6–8] Because of a paucity of published literature and inconclusive outcomes among mothers with confirmed SARS-CoV-2 infection and their newborns, there is an urgent need for studies to better understand the impact of maternal infection with SARS-CoV-2 on both mothers and their newborns. To this end, we aimed to study the characteristics and outcomes of maternal-newborn dyads with confirmed SARS-CoV-2 in mothers at 4 major New York City metropolitan area hospitals.

METHODS

This was a multicenter, observational, descriptive cohort study. Maternal-newborn dyads who delivered at New York University (NYU) Langone Health system hospitals (NYU Tisch, NYU Brooklyn, NYU Winthrop) and Bellevue Hospital Center (academic affiliate of NYU Grossman School of Medicine) from March 1 to May 10, 2020, with a confirmed infection with SARS-CoV-2 in mothers during pregnancy were identified and included in the study. The local institutional review boards approved this study, with a waiver of consent and authorization and relevant data user agreements.

At the initiation of the study period, maternal testing for SARS-CoV-2 occurred as per institutional infection control protocols, which included a screening of all mothers for maternal symptoms or exposures, and testing based on screening results. However, all sites then began universal screening of every pregnant mother presenting to the labor and delivery unit regardless of symptoms at different time points (March 30–May 4, 2020). As testing capabilities improved, the turnaround time for results and guidance regarding isolation of mothers and newborns rapidly evolved as per the Centers for Disease Control and Prevention's guidance, and internal protocols changed at all sites, leading to differences in initial newborn testing for SARS-CoV-2 and isolation status from the mother at the 4 institutions. NYU Tisch, NYU Winthrop, and Bellevue hospitals are regional perinatal centers in New York City. All study sites have uniform criteria for admission to the NICU. Asymptomatic mothers were defined as having no symptoms of COVID-19 as per the Center's for Disease Prevention and Control[9] and were tested as a part of universal screening of all pregnant mothers presenting to the labor unit.

Information regarding maternal and neonatal testing for SARS-CoV-2 as well as short-term morbidity data were recorded from the electronic medical charts of mother and newborn subjects from their hospital course. All mothers and newborns were tested for SARS-CoV-2 by using real-time reverse transcriptase polymerase chain reaction (RT-PCR) of nasopharyngeal swabs. At the start of the pandemic in early March, there was limited availability of testing nationwide. The testing samples of our patients were sent to the New York City Department of Health and Mental Hygiene for processing. All study sites started performing in-house testing using RT-PCR (Roche Cobas SARS-CoV-2 Test and Cepheid Xpert Xpress SARS-CoV-2 Test, both with similar limits of detection of SARS-CoV-2 viral RNA, 100–200 and 250 copies/mL, respectively) by April 1, 2020, under the Food and Drug Administration's Emergency Use Authorization. One site (Bellevue Hospital Center) used 2 private laboratories in the interim (BioReference and LabCorp) until all testing eventually changed to in-house testing. All these qualitative RT-PCR tests resulted as either positive or negative.

Maternal demographic and clinical characteristics were collected, including gestational age (GA) at birth, parity, number of newborns, comorbid conditions among mothers, rupture of amniotic membranes, *group B Streptococcus* colonization status of the mother, maternal symptoms, medications received by mother during pregnancy and for COVID-19, past medical history, exposure to sick contacts, method, and reason for delivery. In addition, any other diagnoses for mothers, such as maternal chorioamnionitis (as per definition by The American College of Obstetricians and Gynecologists[10]), maternal respiratory support, need for admission to the ICU for mother, cord blood gases, and outcomes of pregnancy such as live born or stillbirth were also recorded. For the newborns in this study, their baseline demographics (sex, anthropometric data, and vitals) and delivery information were gathered. We also recorded the newborn's need for any resuscitation at birth, admission to the NICU, and presence of any symptoms (including respiratory distress and feeding intolerance), infection prevention isolation status after

birth, invasive or noninvasive respiratory support, and need for total parenteral nutrition.

Mean, median, and percentages were used to express descriptive characteristics of study subjects. Pregnant mothers were subdivided into 2 categories, symptomatic and asymptomatic at the time of testing for SARS-CoV-2, and both groups were compared for demographic characteristics, clinical course, and maternal and neonatal outcomes. Pearson χ^2 test and Fisher exact test were conducted using IBM SPSS 24.0 software (IBM SPSS Statistics, IBM Corporation) to compare categorical variables between the groups and the independent sample *t* test was used to analyze continuous variables. A nonparametric test was used to compare medians between both groups. A *P* value of $<.05$ was considered significant.

RESULTS

We identified 149 maternal-newborn dyads (3 sets of twins, 3 stillbirths, and 1 neonatal demise) (Tables 1 and 2). All mothers tested positive for SARS-CoV-2 at the time of admission to the labor unit, and their newborns were admitted to the well-baby nursery or the NICU at the study sites. The majority of mothers delivered within a week of testing (93%). Of 23 mothers who were tested at <37 weeks' GA, 16 (70%) delivered prematurely (14 of 16 mothers were symptomatic) (Supplemental Tables 3 and 4). Approximately 40% of mothers were asymptomatic in the described cohort. White (46%) and Hispanic (29%) individuals were represented the most in the study population. There was no difference in the rates for number of Hispanic and Black mothers between asymptomatic or symptomatic mothers (*P* = .72).

In symptomatic mothers, the most common symptoms included cough (67%), followed by fever (50%), shortness of breath, and myalgia (15% each). Other presenting symptoms included nasal congestion, sore throat, headache, and chills. One-third of all pregnant mothers had ≥1 comorbidity documented in the chart, with obesity, gestational hypertension or preeclampsia, gestational, or pregestational diabetes as the other common conditions among them. The majority of pregnant mothers (56%) delivered after natural labor, whereas induction of labor was done in 35 (23%) deliveries. Fetal or maternal distress was the primary reasons for delivery in 8 (5%) and 8 (5%) of the mothers, respectively. Thirteen symptomatic mothers (15%) required some form of respiratory support, and 7 (8%) received mechanical ventilation. Six of the 7 mothers who had deteriorating respiratory status due to COVID-19 were subsequently intubated and had premature delivery (1 newborn at <28 weeks GA, 1 newborn at 28 0/7 to 33 6/7 weeks', and 4 newborns at 34 0/7 to 36 6/7 weeks' GA). All 7 mothers delivered via emergent cesarean delivery. Eight symptomatic mothers (9%) were admitted to the ICU.

Nine symptomatic mothers (10%) received hydroxychloroquine, of which 4 (4%) received a combination of hydroxychloroquine and azithromycin, and 1 (1%) received remdesivir in addition to the other two as part of a treatment regimen for COVID-19. Patients requiring some form of respiratory support were more likely to receive medications for their infection with SARS-CoV-2. Twenty-five mothers (17%) received enoxaparin following The American College of Obstetricians and Gynecologists guidelines,[11] and none of the mothers developed deep vein thrombosis, pulmonary embolism, or any other major coagulation-related complications. Detailed initial maternal laboratory indices are listed in Supplemental Table 3. There were 3 intrauterine fetal deaths among this cohort of mothers with SARS-CoV-2 during pregnancy. One mother with obesity, uncontrolled type 2 diabetes mellitus, and known fetal anomalies at 36 weeks' GA had nausea, fever, chills, and congestion 1 week before delivery. The second mother, in

TABLE 1 Baseline Demographics, Maternal Characteristics and Outcomes for All Mothers and Comparison Between Asymptomatic and Symptomatic Mothers

	All Mothers (*n* = 149)	Asymptomatic Mothers (*n* = 60)	Symptomatic Mothers (*n* = 89)	*P*
Maternal age, y[a]	31.4±6.5	30.4±6.2	32±6.6	.07
Alive[b]	149/149 (100)	60/60 (100)	89/89 (100)	.99
Cesarean delivery[b]	36/149 (24)	13/60 (22)	23/89 (26)	.56
Premature delivery, <37 wk GA[b]	16/149 (11)	2/60 (3)	14/89 (16)	.02
Intensive care admission[b]	8/149 (5)	0/60 (0)	8/89 (9)	.02
Comorbid conditions[b]				
Obesity, BMI ≥30	62/149 (41)	24/60 (39)	38/89 (42)	.74
Asthma	12/149 (8)	6/60 (10)	6/89 (7)	.47
Type 1 or 2 diabetes mellitus	4/149 (3)	2/60 (3)	2/89 (2)	.99
Gestational diabetes	10/149 (7)	5/60 (8)	5/89 (5)	.52
Gestational hypertension	17/149 (11)	5/60 (8)	12/89 (13)	.33
Onset of delivery[b]				
Natural labor	84/149 (56)	32/60 (53)	52/89 (58)	.54
Induction of labor	35/149 (23)	19/60 (32)	16/89 (18)	.05
Fetal distress	8/149 (5)	4/60 (7)	4/89 (5)	.71
Maternal distress	8/149 (5)	1/60 (2)	7/89 (8)	.14
Meconium stained amniotic fluids[b]	23/149 (15)	10/60 (17)	13/89 (15)	.73
Rupture of membranes, h[a]	5.3±6.8	5.3±6.5	5.4±7	.93

[a] Expressed as mean ± SD.

[b] Expressed as *n*/number of patients with available data for the variable (%).

TABLE 2 Neonatal Characteristics and Outcomes for All Live Born Neonates and Comparison Between Those Born to Asymptomatic or Symptomatic Mothers

	All Live Born Neonates (n = 149)	Neonates Born to Asymptomatic Mothers (n = 59)	Neonates Born to Symptomatic Mothers (n = 90)	P
Admission to the NICU[a]	18/149 (12)	1/59 (2)	17/89 (19)	.001
Neonatal demise[a]	1/149 (1)	0/59 (0)	1/90 (1)	.99
Discharged from the hospital[a]	142/149 (95)	59/59 (100)	83/90 (92)	.04
Need for more than routine resuscitation at birth[a]	15/149 (10)	2/59 (3)	13/90 (14)	.04
Highest neonatal respiratory support in the NICU[a]				
Nasal cannula	1/148 (1)	0/59 (0)	1/89 (1)	.99
High flow nasal cannula	1/148 (1)	0/59 (0)	1/89 (1)	.99
CPAP or SiPaP	3/148 (2)	1/59 (2)	2/89 (2)	.99
Mechanical ventilation	5/148 (3)	0/59 (0)	5/89 (6)	.16
Clinical characteristics in the NICU[a]				
Respiratory distress	13/148 (9)	1/59 (2)	12/89 (13)	.02
Systemic hypotension requiring vasopressors	2/148 (1)	0/59 (0)	2/89 (2)	.52
Feeding difficulty	8/148 (5)	1/59 (2)	7/89 (8)	.15
Other support used in the NICU[a]				
Total parenteral nutrition	6/148 (4)	0/59 (0)	6/89 (7)	.08
Inhaled nitric oxide	1/148 (1)	0/59 (0)	1/89 (1)	.99
RT-PCR for SARS-CoV-2				
Age at first test after birth, h[b]	20±10	23±5	18±13	.005
Positive[a]	0/140 (0)	0/54 (0)	0/86 (0)	—
Age at second test after birth, h[b]	55±26	50±12	55±28	.26
Positive[a]	1/87 (1)	0/21 (0)	1/66 (1)	.99

CPAP, continuous positive airway pressure; siPaP, synchronized intermittent positive airway pressure; —, not applicable.
[a] Expressed as n/number of patients with available data for the variable (%); different denominator for some variables because of missing data points.
[b] Expressed as mean ± SD.

addition to type 2diabetes mellitus, had chronic hypertension and presented with preeclampsia with severe features at 27 weeks' GA. The third mother was obese with poorly controlled type 2 diabetes mellitus at 36 weeks' GA. The last 2 mothers were asymptomatic and tested at presentation to labor and delivery unit as per protocol.

Outcomes were compared between symptomatic and asymptomatic mothers with SARS-CoV-2. Symptomatic mothers were more likely to be admitted to the ICU (9% vs 0%, P = .02). They were also more likely to have sick contacts when compared with asymptomatic mothers (37% vs 10%, P = .001). There was no significant difference in the rates of cesarean births when comparing symptomatic to asymptomatic mothers (26% vs 22%, P = .57). Symptomatic mothers had more premature deliveries (<37 weeks' GA) than asymptomatic mothers (16% vs 3%, P = .02). A further subanalysis was performed between asymptomatic and those symptomatic mothers who did not require any respiratory support during hospitalization and also were not admitted to the ICU. Although the rate of premature deliveries was higher among this subcohort of symptomatic mothers compared with asymptomatic mothers, this was not found to be statistically significant (11% vs 3%, P = .18). However, this study was not powered to necessarily analyze this. Also, after excluding 9 symptomatic mothers with a diagnosis of chorioamnionitis, rates of premature delivery were still significantly increased among symptomatic mothers (P = .02).

Among 149 newborns (including 3 sets of twins, 1 neonatal demise), 140 newborns were tested initially at 20±10 hours of life, and all resulted negative. Then 87 newborns were tested again at 55±26 hours of life, with 1 neonatal subject testing positive (Table 2). Fifteen newborns (10%) were small for GA in this cohort. Ten percent of newborns required more than routine resuscitation at birth, of which few received endotracheal intubation, chest compressions, and intravenous epinephrine. Eighteen newborns (12%) were admitted to the NICU, and 13 (9%) had respiratory distress. The highest respiratory support required among newborns admitted to the NICU included 5 (28%) requiring invasive mechanical ventilation and 5 (28%) receiving noninvasive ventilation. One extremely premature neonate born at 22 6/7 weeks GA was a twin delivery to a mother with advanced cervical dilation and preterm labor. This 500-g infant died after birth in the delivery room despite full resuscitation. This mother had an episode of fever but developed no respiratory symptoms.

A total of 142 (95%) of these neonates were discharged from the hospital from well-baby nursery or the NICU by the end of the study period, and 7 (5%) were still admitted in the NICU. One newborn was readmitted for the treatment of hyperbilirubinemia in this cohort. Ninety-eight newborns (66%) were immediately separated from mother after birth, whereas 39 (26%) were in the same room with 6-feet separation and isolation precautions. Eleven mothers (7%) had direct contact with their newborn throughout the hospital stay because of parental preference or changed isolation and testing guidelines for newborns to asymptomatic mothers toward the end of study period (mother required hand hygiene, mask, and gloves

during rooming-in with the newborn).

On comparing neonates born to symptomatic and asymptomatic mothers, there were no differences in Apgar scores, weight, length, head circumference, size for GA, initial vital signs at admission to well-baby nursery or the NICU, cord blood gas pH, and base deficit between neonates born to symptomatic and asymptomatic mothers (Supplemental Table 5). Neonates born to symptomatic mothers were more frequently admitted to the NICU than those born to asymptomatic mothers (17% vs 2%, P = .001). All premature live born neonates were born to symptomatic mothers in the described cohort (17% vs 0%, P = .006).

DISCUSSION

In this study, we have described both characteristics and maternal–neonatal outcomes after the delivery of mothers with SARS-CoV-2. To the best of our knowledge, this is the largest cohort reported of maternal-newborn dyads with confirmed maternal SARS-CoV-2 infection in the United States to date. We did not observe any distinct case of vertical transmission of SARS-CoV-2 from mothers to their newborns. However, we did observe significant perinatal morbidities among mothers with SARS-CoV-2 and their newborns. We also observed that neonates born to symptomatic mothers with SARS-CoV-2 were more likely to be born prematurely and also be admitted to the NICU than were infants born to asymptomatic mothers diagnosed during universal screening.

In limited published data, outcomes among neonates born to mothers with confirmed COVID-19 remains inconclusive; however, currently there does not distinctly appear to be evidence of in utero infection or vertical transmission. In 1 case series of 9 pregnant mothers with COVID-19 pneumonia, amniotic fluid, cord blood, neonatal throat swab, and breast milk samples were all negative for the virus.[6] There are some case reports of neonates born to mothers with COVID-19 and the presence of serum specific immunoglobulins G and M for SARS-CoV-2, but RT-PCR results from throat swabs and blood samples on these asymptomatic neonates were negative.[12,13] Researchers have suggested caution in interpreting this as vertical transmission or true congenital infection because lower sensitivity or specificity of immunoglobulin M enzyme-linked immunosorbent assay testing for congenital infections than molecular diagnostic tests based on nucleic acid amplification and detection.[14]

Our results are similar to these published reports,[6,7] and we did not have any clear case of vertical transmission in this cohort. Among 149 live born neonates, 140 were tested for SARS-CoV-2 via RT-PCR of nasopharyngeal swabs, and all tested negative. One newborn in our study tested positive for SARS-CoV-2 on the fifth day of life during their standardized repeat test (first test result was negative at 24-hours of life) as per our local protocol for infants. This was considered to be postnatal transmission after careful analysis of the clinical situation. This mother's test result came back positive after delivery. The newborn was subsequently admitted to the NICU because of transient hypoglycemia and monitoring for neonatal abstinence syndrome. Before the newborn's admission to the NICU, the mother wanted to maintain close contact with her newborn doing skin-to-skin care. The subject did not require any respiratory support but did undergo a 48-hour rule-out sepsis workup on day of life 20 for a fever while medications were adjusted for neonatal abstinence syndrome.

Other respiratory illnesses, such as influenza, are known to cause severe illness in pregnant mothers and subsequently adverse outcomes among their newborns.[15,16] Researchers have shown that pregnant mothers with influenza are more likely have preterm birth and their newborns requiring intensive care admission.[17,18] Some pregnant mothers with SARS-CoV-2 experienced perinatal morbidities in our study, which is similar to other published reports with a smaller number of patients.[7,19–21] Worsening maternal respiratory status was associated with premature deliveries of newborns in our study as well. There were 3 stillbirths in this cohort of mothers with SARS-CoV-2 during pregnancy. There was no clear association of their current infection with SARS-CoV-2 and these stillbirths, but interestingly, all 3 mothers also suffered from type-2 diabetes mellitus.

In our study, all mothers were tested using RT-PCR from nasopharyngeal swabs. This is in contrast to a study of 118 pregnant mothers from China by Chen et al,[7] in which 71% of mothers were tested with RT-PCR and the rest were clinically diagnosed. A total of 35% pregnancies were still ongoing in the Chinese study, whereas we only included mothers with known delivery outcomes. Our understanding of this infection on pregnant mothers during the first and second trimester and their delivery outcomes is still limited. There is a need for larger longitudinal epidemiological studies with more accurate antibody or molecular diagnostic testing to understand precisely about characteristics and outcomes among pregnant mothers with SARS-CoV-2 that occurs in earlier stages of pregnancy.

We observed that symptomatic mothers with SARS-CoV-2 were more likely to have premature deliveries (16% vs ~6%–10%), and their newborns had higher rates for the

NICU admissions (19% vs ~8%–12%) than previously observed at collaborating sites before the pandemic. Because symptomatic mothers were more likely to have premature deliveries, there is an impact on the neonates because of these delivery outcomes irrespective of any vertical transmission possibility. A majority of symptomatic newborns admitted to the NICU had respiratory distress after birth as ≥1 reason for their admission.

The clinical spectrum of SARS-CoV-2 infection among pregnant mothers and its impact on outcomes of pregnancy is not entirely understood. Further studies similar to ours will be important to better understand the characteristics and outcomes among pregnant mothers and their newborns in various regions within the United States. In this study, 40% of the SARS-CoV-2–positive mothers were asymptomatic at the time of testing as part of universal screening, but this did not represent the true incidence of asymptomatic mothers at the study sites because of evolving guidelines and availability of testing. At one of the collaborating institution, we had complete information regarding proportion of mothers who tested positive for SARS-CoV-2 after starting universal screening and were asymptomatic. At this hospital, ~15% of all mothers who presented to the labor and delivery unit at the peak of pandemic from April 14 to May 10 (end of study period) tested positive but were asymptomatic, which is similar to the published rates at other institutions from New York City.[22]

We did not observe overt maternal or neonatal complications among asymptomatic mothers with SARS-CoV-2. However, universal screening of all mothers admitted to labor and delivery units may potentially help in early identification of asymptomatic patients and appropriate isolation precautions for health care workers and patient's families during and after delivery.[23] Once data from a larger data set become available, testing requirements for neonates born to symptomatic or asymptomatic mothers may further evolve. With more widespread community transmission, there is a serious concern for "horizontal transmission" of infection with SARS-CoV-2 to neonatal patients in the labor unit, newborn nursery, and NICU, by mothers, family members, or health care professionals.[24] Careful considerations from the hospitals and public health authorities are therefore needed when optimizing isolation guidelines in health care facilities and at home.

Our study has several limitations. First, because of rapidly evolving testing and management guidelines for pregnant mothers with SARS-CoV-2 and their newborns at all study locations, there may have been some initial inconsistency in diagnosis and management over this study period. Second, we recognize that we did not have an ideal comparison group in this study because we compared asymptomatic to symptomatic mothers. Nevertheless, this provides valuable information for risk stratification in the mothers with SARS-CoV-2 by understanding more about their maternal-newborn outcomes. Finally, we did not collect information regarding placentas and their pathologic reports among mothers with SARS-CoV-2 during pregnancy. Studying gross and histologic changes in the placenta of mothers with SARS-CoV-2 could be helpful to understand further about this infection's impact on pregnancy.

CONCLUSIONS

Although there was no clear evidence of vertical transmission from mothers with SARS-CoV-2 to their newborns, we did observe perinatal morbidities among mothers and their newborns. Symptomatic mothers were more likely to have more premature deliveries than asymptomatic mothers diagnosed on universal screening. Universal testing of all mothers admitted to the labor and delivery unit may help in understanding the accurate magnitude and impact of SARS-CoV-2 infection on delivery outcomes in mothers and their newborns. Larger epidemiological studies and longitudinal follow-up of the mothers with SARS-CoV-2 during different stages of pregnancy and their newborns are urgently required to understand the long-term impact of SARS-CoV-2 on this patient population.

ACKNOWLEDGMENTS

We thank the staff members of multiple disciplines who did exceptional patient care during this pandemic. We thank the patients and their families included in this study.

ABBREVIATIONS

COVID-19: coronavirus disease
GA: gestational age
NYU: New York University
RT-PCR: real-time reverse transcriptase polymerase chain reaction
SARS-CoV-2: severe acute respiratory syndrome coronavirus 2

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

FINANCIAL DISCLOSURE: The authors have indicated they have no financial relationships relevant to this article to disclose.

FUNDING: No external funding.

POTENTIAL CONFLICT OF INTEREST: The authors have indicated they have no potential conflicts of interest to disclose.

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