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## Obstetrics

# Outcomes of cesarean delivery in obstetric patients with SARS-CoV-2 infection

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The impact of SARS-CoV-2's infection on cesarean delivery (CD) outcomes is not well described in the current literature. The present study's objective was to explore outcomes in SARS-CoV-2 infected CD patients using a statewide administrative database in Maryland, USA.

The University of Maryland, Baltimore, institutional review board provided ethical approval for this study. Data was obtained from the Maryland Health Services Cost Review Commission (HSCRC) on May 27, 2021, and covered approximately the first half of the 2021 fiscal year. CD patients were identified using Medicare diagnosis related groups. For all patients, we collected demographics, insurance status, comorbidities, postoperative morbidity and mortality, hospital charges, discharge location, and unplanned hospital readmissions. Primary outcomes were maternal mortality, intensive care unit (ICU) admission, mechanical ventilation, preterm birth (PTB), and stillbirth. Patient characteristics and outcomes were summarized with descriptive statistics and were compared using the Wilcoxon rank-sum test (skewed continuous data), the chi-squared test (categorical data), or Fisher's exact test (categorical data with a low cell count).

36 174 patients underwent vaginal or CD and had SARS-CoV-2 testing. In total, 727 (2.0%) of these patients were positive for SARS-CoV-2 infection. Furthermore, 261 CD patients were SARS-CoV-2 positive, and 12 046 CD patients were SARS-CoV-2 negative. Table 1 lists patient characteristics and outcomes. Patients with SARS-CoV-2 infection were more frequently non-white ( $P < 0.001$ ) and had Medicaid ( $P < 0.001$ ). They were also more likely to have pre-eclampsia (7.3% vs. 4.1%,  $P = 0.01$ ).

There was no 30-day mortality in patients with SARS-CoV-2 infection and one 30-day mortality occurred in 12 046 patients without SARS-CoV-2 infection. SARS-CoV-2 patients had more ICU admissions (3.1% vs. 0.8%,  $P < 0.001$ ) and mechanical ventilation for

24–96 h or >96 h ( $P = 0.009$  and  $P = 0.02$ , respectively). PTB and stillbirth rates were higher in SARS-CoV-2 patients; 8.8% vs. 4.5% for PTB and 3.1% vs. 0.8% for stillbirth ( $P = 0.001$  and  $P < 0.001$ ).

The present study suggests that SARS-CoV-2 infection was not associated with excess maternal mortality in CD patients, although there was a modest increase in maternal morbidity (mainly respiratory failure). PTB and stillbirth were also more common in SARS-CoV-2 patients, which is consistent with prior studies and suggests that SARS-CoV-2 infection may confer increased perinatal risk.<sup>1–3</sup> More SARS-CoV-2 positive patients were Hispanic and had Medicaid, highlighting the disproportionate impact of the COVID-19 pandemic on underserved minority women with access to fewer resources in the USA. These findings highlight the critical need for continued vaccination efforts in underserved obstetric patients who are at risk of adverse maternal and fetal outcomes.

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The Maryland Health Services Cost Review Commission provided the data for this study, but is not responsible for the analysis that was performed.

**CONFLICTS OF INTEREST**

The authors have no conflicts of interest.

**AUTHOR CONTRIBUTIONS**

AL, JB, IB, AJ, HA, MM: substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; drafting the work or revising it critically for important intellectual content; final approval of the version to be published; and agreement to be accountable for all aspects of the

TABLE 1 Obstetric outcomes for CD patients in Maryland with and without SARS-CoV-2 infection

Variable	No SARS-CoV-2 infection N = 12 046	SARS-CoV-2 infection N = 261	P value
Patient characteristics			
Age group			
<19	242 (2.0)	8 (3.1)	0.09
20–29	4203 (34.9)	107 (41.0)	
30–39	6821 (56.6)	132 (50.6)	
>40	780 (6.5)	14 (5.3)	
Race			
White	5140 (42.7)	77 (29.5)	<0.001
African American	4373 (36.3)	86 (33.0)	
Other	2533 (21.0)	98 (37.5)	
Latino ethnicity	1787 (14.8)	106 (40.6)	<0.001
Primary payer			
Commercial	6654 (55.2)	75 (28.7)	<0.001
Medicaid	4862 (40.4)	171 (65.5)	
Other	419 (3.5)	8 (3.1)	
No insurance	111 (0.9)	7 (2.7)	
Chronic arterial hypertension	454 (3.8)	15 (5.7)	0.10
Chronic diabetes mellitus	312 (2.6)	7 (2.7)	0.93
Pre-eclampsia	489 (4.1)	19 (7.3)	0.01
Gestational diabetes	1346 (11.2)	37 (14.2)	0.13
Outcomes			
Preterm delivery	546 (4.5)	23 (8.8)	0.001
Live birth only	11 950 (99.2)	253 (96.9)	<0.001
Stillbirth	96 (0.8)	8 (3.1)	
Postpartum hemorrhage	491 (4.1)	11 (4.2)	0.91
Venous thromboembolism	9 (0.07)	1 (0.4)	0.19
ICU admission	49 (0.4)	8 (3.1)	<0.001
24–96 h of mechanical ventilation	5 (0.04)	2 (0.8)	0.009
Greater than 96 h of mechanical ventilation	0 (0)	1 (0.4)	0.02
Total hospital days <sup>b</sup>	3 [2, 3]	3 [2, 3]	0.38
Total charges (\$) <sup>b</sup>	10 289 [7641, 13 910]	11 789 [9150, 15 390]	<0.001
Discharge to home/self-care	11 946 (99.2)	260 (99.6)	0.73
30-day mortality <sup>a</sup>	1 (0.01)	0 (0)	0.99
Unplanned 30-day readmission	293 (1.7)	7 (2.7)	0.22

Abbreviations: ICU, intensive care unit.

<sup>a</sup>Values are presented as number (percentage) unless stated otherwise.

<sup>b</sup>Median value shown and square brackets represent the interquartile range [25th, 75th percentile].

work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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