Preterm birth and severe maternal morbidity associated with SARS-CoV-2 infection during the Omicron wave

OBJECTIVE: Data exploring adverse outcomes associated with SARS-CoV-2 infection in pregnancy during the Omicron wave are lacking. Therefore, we set out to evaluate the risk of preterm birth (PTB) and severe maternal morbidity (SMM) in pregnant patients with SARS-CoV-2 infection during the most recent wave of the COVID-19 pandemic.

STUDY DESIGN: This was a retrospective cohort study of all pregnant patients who underwent SARS-CoV-2 testing during their delivery hospitalization at 7 hospitals within a large health system in New York between December 1, 2021 and February 7, 2022. During the study period, the Omicron variant accounted for most of the new infections in New York,[1] and universal SARS-CoV-2 testing occurred for all patients admitted to labor and delivery. An institutional review board approval was obtained. The primary outcomes of PTB <37 weeks and SMM, derived from the Centers for Disease Control and Prevention list of 21 indicators,[2] were compared between the following 2 groups: those who tested positive for SARS-CoV-2 infection during pregnancy via qualitative real-time polymerase chain reaction and those who tested negative. Two subgroup analyses comparing the rates of primary outcomes in vaccinated vs unvaccinated patients and in SARS-CoV-2 IgG antibody-positive (against the spike protein) vs antibody-negative patients among those who tested positive for SARS-CoV-2 infection were also performed. In those analyses, missing data regarding vaccination status (1.7%) were excluded, whereas missing data regarding antibody status (21.2%) were included as unknown. Backward selection with multivariable logistic regression was used to adjust for the following potential confounders in the primary analysis: maternal age, body mass index, race or ethnic group, parity, hypertensive disorders of pregnancy, multiple gestation, placenta previa or accreta, autoimmune disease or lupus, diabetes mellitus, sickle cell disease or bleeding disorder, previous cesarean delivery, and mode of delivery. Data were presented as adjusted odds ratios (aOR) with 95% confidence intervals (CI) and statistical significance set at $P < .05$.

RESULTS: Of the 4738 patients included, 631 (13.3%) tested positive for SARS-CoV-2 infection. Patients with the infection were more commonly younger, multiparous, and Hispanic or non-Hispanic Black; also, they used public insurance less commonly and reported English as their preferred language less often. The average body mass index and rates of hypertensive disorders of pregnancy, multiple gestations, and cesarean delivery were similar between the 2 groups. Patients with SARS-CoV-2 infection were at an increased risk of PTB than those without infection (10.8% vs 8.0%; aOR, 1.46; 95% CI, 1.08−1.97). The rate of SMM was similar between the groups (5.1% vs 4.1%; aOR, 1.15; 95% CI, 0.77−1.73) (Table 1). On subgroup analyses of patients in the SARS-CoV-2-positive group, the rates of PTB and SMM were similar between vaccinated and unvaccinated patients and SARS-CoV-2 IgG antibody-positive and -negative patients (Table 2). There was also no statistically significant difference in the rate of SMM between unvaccinated SARS-CoV-2-positive patients and unvaccinated SARS-CoV-2-negative patients (18/307 [5.9%] vs 70/1522 [4.6%]; $P = .3$).

CONCLUSION: During the Omicron wave, SARS-CoV-2 infection in pregnancy was associated with an increased risk of PTB than noninfected cases. Although this risk was not altered by vaccination or SARS-CoV-2 antibody status in our subgroup analyses, these findings should be interpreted with caution owing to our sample size and low prevalence of outcomes, which may have limited the power to detect significant differences between groups. Although the association between SARS-CoV-2 infection and PTB has been well-characterized during the early part of the COVID-19 pandemic,[3] the risk of PTB was also increased during the most recent Omicron wave. These findings confirm that SARS-CoV-2 infection in pregnancy is a risk factor for PTB despite evidence suggesting less virulence with emerging variants and the available interventions aimed at reducing progression to severe disease.[4,5] Our results are in contrast to earlier reports suggesting an increased risk of SMM associated with SARS-CoV-2 infection.[6] Whether these findings are owing to the reported less virulence of the Omicron variant or higher rates of passive and active immunity via increasing vaccination among pregnant patients or past exposure requires further study. Of note, our finding that patients with SARS-CoV-2 infection during the Omicron wave had public insurance less commonly is in contrast to previous reports evaluating outcomes in our patient population earlier in the COVID-19 pandemic.[6] This may have been owing to differences in patient behaviors among those who were and were not previously exposed to infection or related to altered risk of reinfection during the 2 study periods. Future research exploring the sociodemographic differences associated with infection throughout the pandemic should be considered.

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TABLE 1
Preterm birth and severe maternal morbidity associated with SARS-CoV-2 infection

Outcome	SARS-CoV-2 PCR positive n = 631	SARS-CoV-2 PCR negative n = 4107	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Preterm birth <37 wk	68 (10.8)	329 (8.0)	1.39 (1.05–1.83)	1.46 (1.08–1.97)[a]
Severe maternal morbidity	32 (5.1)	169 (4.1)	1.24 (0.84–1.83)	1.15 (0.77–1.73)[b]

CI, confidence interval; OR, odds ratio; PCR, polymerase chain reaction.

[a] Model adjusted for maternal age (continuous), body mass index (categorical), race or ethnic group, hypertensive disorders of pregnancy, multiple gestation, placenta previa or accreta, autoimmune disease or lupus, diabetes mellitus, and mode of delivery; [b] Model adjusted for race or ethnic group, parity (categorical), hypertensive disorders of pregnancy, placenta previa or accreta, sickle cell disease or bleeding disorder, previous cesarean delivery, and mode of delivery.

Gulersen. Preterm birth and severe maternal morbidity associated with SARS-CoV-2 infection during the Omicron wave. Am J Obstet Gynecol MFM 2022.

TABLE 2
Preterm birth and severe maternal morbidity rates stratified by vaccination and SARS-CoV-2 immunoglobulin G antibody status in the SARS-CoV-2 polymerase chain reaction positive group

Outcome	SARS-CoV-2 PCR positive		
	Vaccinated (n = 313)	Unvaccinated (n = 307)	*P* value
Preterm birth <37 wks	29 (9.3)	34 (11.1)	.5
Severe maternal morbidity	13 (4.2)	18 (5.9)	.3
	SARS-CoV-2 IgG positive (n = 405)	SARS-CoV-2 IgG negative (n = 92)	
Preterm birth <37 wks	41 (10.1)	14 (15.2)	.2
Severe maternal morbidity	19 (4.7)	4 (4.3)	.6

Vaccination status and SARS-CoV-2 IgG antibody testing missing for 11 (1.7%) and 134 (21.2%) patients, respectively. Am J Obstet Gynecol MFM 2022.

Ig, immunoglobulin; PCR, polymerase chain reaction.

Gulersen. Preterm birth and severe maternal morbidity associated with SARS-CoV-2 infection during the Omicron wave. Am J Obstet Gynecol MFM 2022.

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