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Maternal and Perinatal Outcomes Associated With the Omicron Variant of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Infection

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Abstract

Two years into the coronavirus disease 2019 (COVID-19) pandemic, we have now seen three main variant waves. We performed a retrospective cohort study of all pregnant patients with COVID-19 at our institution from March 22, 2020, to February 26, 2022, to evaluate disease severity and perinatal outcomes among the variants. Patients were categorized as pre-Delta (March

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22, 2020–May 31, 2021), Delta (July 1, 2021–December 15, 2021), or Omicron (December 16, 2021– February 26, 2022) based on variant tracking from the Centers for Disease Control and Prevention and genotype sequencing at our institution. There were fewer cases of severe–critical disease (1.8% Omicron vs 13.3% pre-Delta and 24.1% Delta) and adverse perinatal outcomes during the Omicron wave compared with the pre-Delta and Delta waves.

INTRODUCTION

We are now 2 years into the coronavirus disease 2019 (COVID-19) pandemic. The Alpha variant (B.1.1.7) predominated at the start of the pandemic, from March 2020 to June 2021. Next, the Delta variant (B.1.617.2) was most common from July 2021 to December 2021. The Omicron (B.1.1.529) variant was first identified in the United States on December 1, 2021, and on December 16, 2021, became the leading variant sequenced at our institution. We previously published perinatal outcomes associated with the Delta variant in pregnancy[1] and now seek to report differences in perinatal outcomes among the three main variants to date.

METHODS

After receiving approval from the University of Alabama at Birmingham institutional review board (IRB-300007195), we performed a retrospective cohort study of all pregnant patients with COVID-19 at the University of Alabama at Birmingham from March 22, 2020, to February 26, 2022. Patients were categorized as pre-Delta (March 22, 2020–May 31, 2021), Delta (July 1, 2021–December 15, 2021), or Omicron (December 16, 2021–February 26, 2022). Timing of variant classification was based on Centers for Disease Control and Prevention data for our region and confirmed based on a subset of pregnant patients who underwent viral genome sequencing at our institution.[2] Outcomes included disease severity, transfer rates, symptoms, intensive care unit (ICU) admission, death, need for COVID-19 treatment, intubation, extracorporeal membrane oxygenation, venous thromboembolism, admission indication, cesarean delivery for worsening maternal status, delivery complications (preeclampsia, abruption, postpartum hemorrhage, transfusion), stillbirth, preterm delivery, positive neonatal test result for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), and neonatal intensive care unit admission. A subanalysis of outcomes based on vaccination status was planned. Outcomes of patients in the Omicron group were compared with outcomes of those in the pre-Delta and Delta groups using appropriate statistical tests.

RESULTS

We noted a peak of pregnant patients with SARS-CoV-2 infection in January 2022, when the Omicron variant was predominant, which was consistent with national data (Fig. 1). Overall, 49.4% and 53.3% of cases were diagnosed on routine preprocedure screening (ie, asymptomatic) during the pre-Delta and Omicron waves, respectively; only 15.2% of the Delta variant cases were diagnosed on routine screening (ie, the remainder were symptomatic). Transfers of patients with COVID-19 to our institution for escalated care accounted for 2.2% for Omicron cases, 5.3% for pre-Delta cases, and 10.8% for Delta cases

(Table 1). Severe–critical disease was significantly different among waves and occurred in 1.8% of patients during the Omicron wave compared with 13.3% during the pre-Delta wave and 24.1% during the Delta wave. Rates of ICU admission were significantly different as well—1.3% during the Omicron wave, 8.4% during the pre-Delta wave, and 17.7% during the Delta wave (Table 1). Compared with both the pre-Delta and Delta waves, patients with the Omicron variant were less likely to undergo pharmacologic treatment, respiratory support, or intubation or to develop venous thromboembolism. Compared with patients with the Delta variant, patients with the Omicron variant were also less likely to receive extracorporeal membrane oxygenation, undergo cesarean delivery for worsening maternal status, deliver preterm, or have their newborn admitted to the neonatal intensive care unit. There were no significant differences in preeclampsia, postpartum hemorrhage, transfusion, abruption, stillbirth, or neonatal COVID-19 positivity by variant status (Table 1).

Only 27.2% of patients who tested positive for SARS-CoV-2 infection during the Omicron time-frame were vaccinated. Of the 61 vaccinated patients, 60.7% had mild or moderate disease, and no patients who were vaccinated and positive for the Omicron variant were admitted to the ICU for COVID-19. When considering only unvaccinated patients in the Omicron wave compared with patients in the Delta and pre-Delta waves, findings were consistent with the overall analysis (Appendix 1, available online at http://links.lww.com/AOG/C757).

DISCUSSION

During the Omicron wave of SARS-CoV-2, although the prevalence of SARS-CoV-2 positivity in patients was double that during other waves, there were fewer cases of severe–critical disease and adverse perinatal outcomes compared with the pre-Delta and Delta waves. The increased rate of positive test results obtained on routine screening and the lower transfer rate to a tertiary care center seen with the Omicron variant compared with the Delta variant suggests increased transmissibility and decreased severity of this variant. Limitations of our study include that we did not genotype all patients and were unable to capture data for patients who may have received testing outside of our hospital system, which could bias our results to underreporting in the Omicron surge. Current estimates at our Alabama institution are that 39% of our pregnant patients are vaccinated. Given that vaccines are effective at preventing critical illness, we continue to emphasize the importance of vaccinating all pregnant patients to mitigate severe perinatal morbidity and mortality due to unknown risks of adverse outcomes associated with new and future viral variants.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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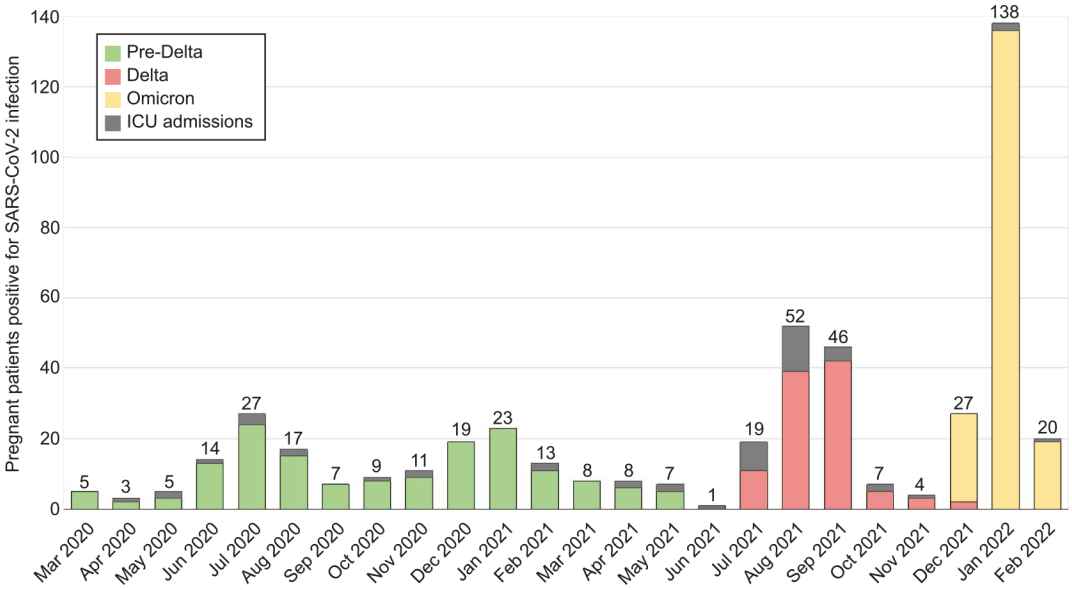

Fig. 1.

Hospital trends in relationship to the three predominant variants among pregnant patients positive for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). ICU, intensive care unit.

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Table 1.

Illness Severity and Perinatal Outcomes of Patients Who Required Delivery During Their Admission With a Positive Test Result for Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), According to Variant Type

	Pre-Delta (n=225)	*P* (Omicron vs Pre-Delta)	Delta (n=158)	*P* (Omicron vs Delta)	Omicron (n=224)
Disease severity *		<.001		<.001	
Asymptomatic	103 (45.8)	.61	31 (19.6)	<.001	108 (48.2)
Mild–moderate	92 (40.9)	.05	89 (56.3)	.22	112 (50.0)
Severe–critical	30 (13.3)	<.001	38 (24.1)	<.001	4 (1.8)
ICU admission	19 (8.4)	<.001	28 (17.7)	<.001	3 (1.3)
Respiratory support †	30 (13.4)	<.001	42 (26.6)	<.001	5 (2.2)
Intubation	13 (5.8)	.001	21 (13.3)	<.001	1 (0.5)
ECMO	4 (1.8)	.12	4 (2.5)	.029	0 (0.0)
VTE	6 (2.7)	.030	7 (4.4)	.002	0 (0.0)
Received pharmacologic treatment ‡	36 (16.0)	<.001	53 (33.5)	<.001	6 (2.7)
Maternal death	1 (0.4)	>.99	3 (1.9)	.07	0 (0.0)
Transfer rate	12 (5.3)	.09	17 (10.8)	<.001	5 (2.2)
Received COVID-19 vaccine	0 (0.0)	<.001	6 (3.8)	<.001	61 (27.2)
Indication for hospital presentation		.001		<.001	
Symptomatic COVID-19 or complication from COVID-19	57 (31.3)		87 (64.4)		81 (41.1)
Labor or PROM	61 (33.5)		18 (13.3)		34 (17.3)
Planned procedure or surgery	28 (15.4)		8 (5.9)		25 (12.7)
Other medical indication	36 (19.8)		22 (16.3)		57 (28.9)
COVID-19 symptoms	81 (40.9)	.05	111 (74.5)	<.001	113 (50.5)
Fever, chills, or both	41 (20.7)	<.001	44 (29.5)	<.001	19 (8.5)
Cough	49 (24.8)	.019	80 (53.7)	<.001	35 (15.6)
Shortness of breath	37 (18.7)	.003	49 (32.9)	<.001	20 (8.9)
Fatigue	8 (4.0)	.67	21 (14.1)	.002	11 (4.9)
Body aches	19 (9.6)	.94	28 (18.8)	.008	21 (9.4)
Headache	16 (8.1)	.44	23 (15.4)	.14	23 (10.3)
Loss of taste, smell, or both	17 (8.6)	<.001	17 (11.4)	<.001	1 (0.5)

	Pre-Delta (n=225)	*P* (Omicron vs Pre-Delta)	Delta (n=158)	*P* (Omicron vs Delta)	Omicron (n=224)
Sore throat	4 (2.0)	.34	9 (6.0)	.26	8 (3.6)
Congestion	11 (5.6)	.08	35 (23.5)	<.001	23 (10.3)
Nausea, vomiting, diarrhea	17 (8.6)	.56	34 (10.3)	.001	23 (10.3)
Patients who required delivery	(n=96)		(n=57)		(n=77)
Gestational age at delivery (wk)	35.6±5.6	.29	33.6±5.6	.002	36.5±4.9
Cesarean birth	28 (31.5)	.75	28 (49.1)	.07	26 (33.8)
Indication for cesarean: worsening maternal status	4 (14.3)	.35	14 (50.0)	<.001	1 (3.9)
Preterm birth (37 wk)	30 (31.3)	.18	34 (59.7)	<.001	17 (22.1)
NICU admission	37 (44.1)	.19	31 (58.5)	.006	25 (33.8)
Delivery complications					
Preeclampsia	22 (22.9)	.79	13 (23.6)	.89	19 (24.7)
Abruption	2 (2.1)	.50	1 (1.8)	.42	0 (0.0)
PPH	10 (10.4)	.21	7 (12.7)	.20	4 (5.2)
Transfusion	10 (10.4)	.55	10 (18.2)	.07	6 (7.8)
Stillbirth	5 (5.2)	.46	2 (3.5)	>.99	2 (2.6)
Positive neonatal SARS-CoV-2 test result[§]	0 (0.0)	—	1 (2.0)	.40	0 (0.0)

ICU, intensive care unit; ECMO, extracorporeal membrane oxygenation; VTE, venous thromboembolism; COVID-19, coronavirus disease 2019; PROM, prelabor rupture of membranes; NICU, neonatal intensive care unit; PPH, postpartum hemorrhage; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

Data are n (%) or mean±SD unless otherwise specified.

[*] Disease severity based on National Institutes of Health guidelines and categorized by Metz et al.[3]

[†] Respiratory support included any form of supplemental oxygen (nasal cannula, high-flow, bilevel positive airway pressure, and intubation).

[‡] Treatment includes azithromycin, cephalosporins, remdesivir, dexamethasone or convalescent plasma.

[§] Positive neonatal SARS-CoV-2 test result within 48 hours of delivery.

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