# Letters

RESEARCH LETTER

## COVID-19 Cases and Disease Severity in Pregnancy and Neonatal Positivity Associated With Delta (B.1.617.2) and Omicron (B.1.1.529) Variant Predominance

The Omicron (B.1.1.529) variant of SARS-CoV-2 has spread rapidly but appears to cause less severe disease than the Delta (B.1.617.2) variant.[1] During pregnancy, Delta was associated with increased COVID-19 severity,[2] but infections and severity have not been examined during Omicron. We examined infections, illness severity, vaccinations, and early neonatal infections among obstetric patients during the pre-Delta, Delta, and Omicron epochs.

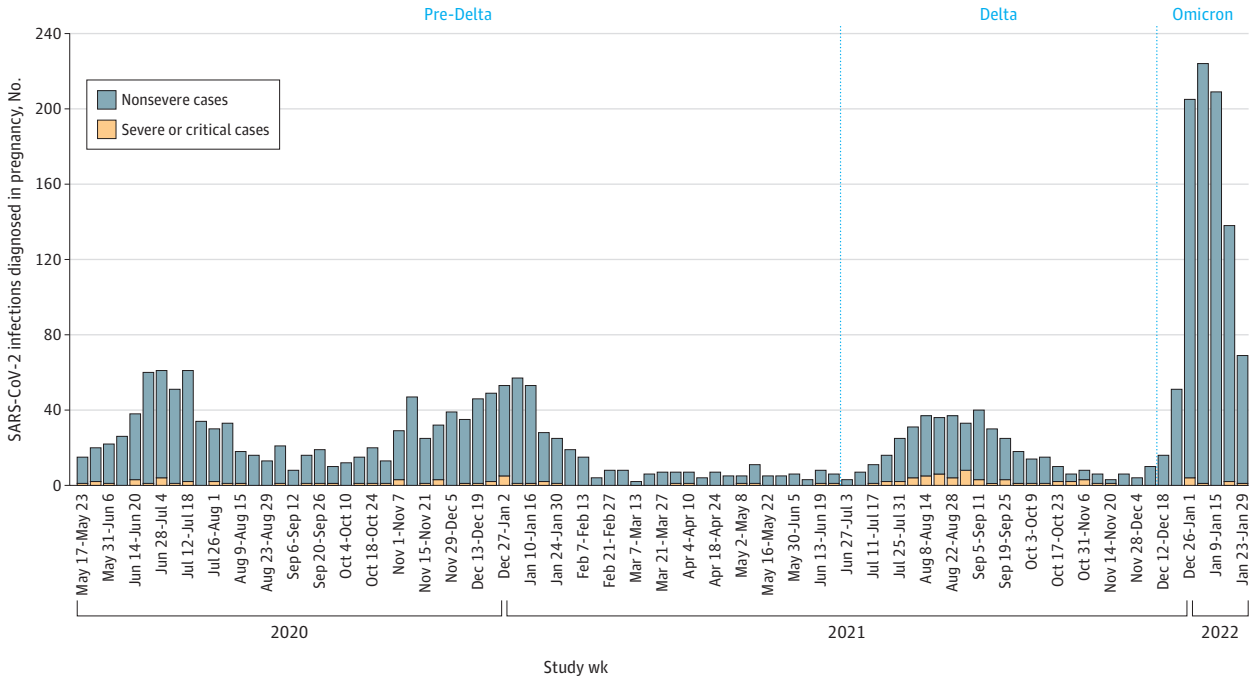
Related articles

**Methods** | We prospectively studied pregnant patients diagnosed with SARS-CoV-2 infection at Parkland Health, an urban prenatal system encompassing a centralized acute care hospital and 10 community-based prenatal clinics around Dallas, Texas. Infections were defined based on a positive result of SARS-CoV-2 reverse transcriptase–polymerase chain reaction (RT-PCR) tests administered to all inpatients, symptom-based RT-PCR or antigen tests in outpatient and emergency departments, and patient-reported positive results of PCR or antigen tests conducted elsewhere. Positive tests were grouped by week of diagnosis. Severe or critical illness was defined as requiring supplemental oxygen, high-flow nasal cannula, mechanical ventilation, or extracorporeal membrane oxygenation.[3] COVID-19 vaccines were offered beginning December 2020. Following delivery, neonatal nasal RT-PCR was performed at 24 and 48 hours for infants born within 4 weeks of maternal diagnosis or when clinically indicated until late 2021, when 1-time testing was permitted.

Local SARS-CoV-2 variant surveillance was conducted beginning in early 2021 using a combination of whole genome sequencing and genotyping using a validated multiplex, non-sequencing-based capillary electrophoresis assay in a Clinical Laboratory Improvement Amendments–certified laboratory.[4]

Poisson regression was used to model new cases each week. Covariates included dominant variant, week (to account for differing lengths of the 3 periods), and complete vaccination status. Dominant variant was assigned based on 50% or more of surveillance samples having Delta or Omicron predominance (pre-Delta epoch, May 17, 2020, through June 26, 2021; Delta epoch, June 27 through December 11, 2021; and Omicron epoch, December 12, 2021, through January 29, 2022). Complete vaccination was defined as at least 2 weeks elapsed following a complete primary series. Estimates are presented

Figure. Weekly Severe and Nonsevere Cases of SARS-CoV-2 Infections Diagnosed in Pregnancy at Parkland Health, Dallas, Texas




The pre-Delta epoch is May 17, 2020, through June 26, 2021; Delta epoch, June 27 through December 11, 2021; and Omicron epoch, December 12, 2021, through January 29, 2022. Variant epoch was assigned based on greater than 50% of local surveillance samples having Delta or Omicron predominance.

Table. COVID-19 Infections and Illness Severity in Pregnancy During Pre-Delta, Delta, and Omicron Epochs

| Variant epoch | No. of weeks | No. of infections | Incidence rate ratio (95% CI)[a] | Severe or critical illness, No. (%) | Odds ratio (95% CI)[a] |
|---|---|---|---|---|---|
| Pre-Delta | 58 | 1298 | 1 [Reference] | 53 (4.1) | 1 [Reference] |
| Delta | 24 | 431 | 3.07 (2.46-3.82) | 51 (11.8) | 2.93 (1.18-7.69) |
| Omicron | 7 | 912 | 10.09 (7.42-13.69) | 8 (0.9) | 0.20 (0.05-0.83) |

[a] The IRRs and ORs are adjusted for variant, week, and complete vaccination status, defined as 2 weeks or longer after a complete primary series.

as incidence rate ratios. Logistic regression was used to model case severity, with dominant variant, week, and complete vaccination status as covariates. Statistical analysis was conducted in R version 3.6.1; a 2-sided $P < .05$ was considered statistically significant. This study was approved by the University of Texas Southwestern institutional review board with a waiver of informed consent.

**Results** | The median number of deliveries per week was similar in the 3 periods (216 during pre-Delta, 239 during Delta, and 222 during Omicron epochs). There were 2641 SARS-CoV-2 infections diagnosed in pregnancy (**Figure**), 1298 (median, 17 cases per week) during the pre-Delta epoch, 431 (median, 14 cases per week) during Delta, and 912 (median, 138 cases per week) during Omicron. Two infected individuals (0.15%) were fully vaccinated pre-Delta, 49 (11.4%) during Delta, and 256 (28.1%) during Omicron. Of the 2641 cases, 112 (4.2%) were severe or critical. These included 53 (4.1%) severe or critical cases pre-Delta (0 vaccinated), 51 (11.8%) during Delta (2 vaccinated), and 8 (0.9%) during Omicron (2 vaccinated). Compared with the pre-Delta epoch, periods of Delta and Omicron predominance were associated with increased infections (incidence rate ratios, 3.07 [95% CI, 2.46-3.82] and 10.09 [95% CI, 7.42-13.69], respectively) (**Table**). Delta predominance was associated with increased (odds ratio, 2.93 [95% CI, 1.18-7.69]) and Omicron associated with decreased (odds ratio, 0.20 [95% CI, 0.05-0.83]) severe or critical illness in pregnancy compared with pre-Delta infections after adjusting for vaccination.

Of 1919 infants delivered during the study period, 1015 were tested and 32 (3.1%) were positive for SARS-CoV-2 (13 during pre-Delta, 8 during Delta, and 11 during Omicron epochs); none had significant illness. There was no difference in early neonatal positivity in the pre-Delta, Delta, or Omicron epochs ($P = .39$). Twenty-nine infants (90.6%) were born to individuals with nonsevere illness, and 18 (90%) of 20 infected neonates were born after December 2020 to vaccine-eligible but unvaccinated individuals.

**Discussion** | As in nonpregnant people, Delta and Omicron variant predominance were associated with increased SARS-CoV-2 infections in pregnancy, with the majority occurring in unvaccinated individuals. Delta variant predominance was associated with increased illness severity and Omicron with decreased illness severity after adjusting for prior vaccination. The majority of early neonatal SARS-CoV-2 infections occurred among unvaccinated mothers with nonsevere COVID-19. Long-term risks of early neonatal SARS-CoV-2 infection are unknown, but maternal vaccination may be protective.[5]

Limitations include the cases from a single institution and potentially missing data on vaccination or positive results of tests conducted outside the health care system. Rates of SARS-CoV-2 exposure and vaccinations among uninfected individuals were not available. Whether the decreased illness severity during Omicron is related to greater numbers of pregnant people previously infected or vaccinated or to intrinsic virological properties cannot be determined.[6]

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