

SARS-CoV-2 infection in pregnancy: Lessons learned from the first pandemic wave

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Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) has infected over 55 million people worldwide and killed more than 1.3 million people since the global pandemic was declared by the World Health Organization (WHO) in March 2020. During the first wave, when clinical care was informed by acutely limited understanding of the virus and constrained by shortages of ventilators and personal protective equipment (PPE), health care systems across the world struggled to combat the disease caused by the virus, coronavirus disease 2019 (COVID-19). Early in the pandemic, pregnant women were considered at increased risk due to physiologic adaptations of pregnancy that make them vulnerable to complications from upper respiratory infections. While early reports of COVID-19 suggested pregnant women had similar outcomes compared with non-pregnant women,¹ recent surveillance data from the US Centers for Disease Control found that infected pregnant women were more likely to be admitted to the intensive care unit, receive mechanical ventilation, and die, compared with similarly aged, non-pregnant women.² Evidence on the epidemiology of COVID-19 in pregnancy, including risk factors for severe disease, has been elucidated,³ but risk factors for SARS-CoV-2 infection remain less clear.

As a result of hard earned experience during the initial wave of COVID-19, several interventions emerged that reduce the mortality risk, such as dexamethasone and other glucocorticoids,⁴ and promising vaccines loom on the horizon.⁵ The global community is now engaged in a second wave and is better prepared, but we continue to learn from our initial experiences with COVID-19. In this issue of *Paediatric and Perinatal Epidemiology*, Reale and colleagues⁶ prospectively assessed epidemiologic risk factors associated with SARS-CoV-2 infection among a cohort of 2495 pregnant women who delivered during the first wave in four hospitals in Boston, Massachusetts (19 April to 27 June 2020). All pregnant women admitted for delivery had universal SARS-CoV-2 testing by reverse

transcription-polymerase chain reaction tests of nasopharyngeal specimens. The authors found that 93 women or 3.2% (95% confidence interval [CI] 2.5, 3.5) were positive for SARS-CoV-2, of whom 86% were asymptomatic. Risk factors for SARS-CoV-2 infection included young age, obesity, Black and Hispanic race/ethnicity, and public insurance beneficiary, as well as geographic factors, such as living in areas with high per capita infection rates, and occupational risk factors, such as non-health care essential worker occupations.

The study provides insight into risk factors for SARS-CoV-2 infection in pregnancy, but also illustrates several salient points about universal testing for SARS-CoV-2 in labour and delivery (L&D) settings, presence of identifiable risk factors, and vulnerability of pregnant non-health care essential workers and racial/ethnic minorities. What follows in this commentary is a discussion of these issues.

1 | UNIVERSAL TESTING IN L&D IDENTIFIES INFECTED INDIVIDUALS IN OUTBREAK SETTINGS WITH HIGH PROPORTION OF ASYMPTOMATIC SARS-COV-2 INFECTIONS

The study hospitals adopted their strategy of universal testing on 19 April 2020, just one month after the WHO pandemic declaration. The rationale for routine testing in L&D in some US hospitals is largely based on the high proportion of asymptomatic infection.⁷ Interaction of asymptomatic pregnant women with undetected SARS-CoV-2 infection with the health care system for obstetrical management, rather than for COVID-19-related medical complications, poses specific risks for health care workers and potential risks for neonatal transmission. A strategy of universal testing may



help health care teams identify infected pregnant and postpartum women who are capable of spreading infection.

Most testing in the United States is allocated to symptomatic patients and those who are sick enough to require hospitalisation. Universal testing in L&D of mostly asymptomatic women therefore can also serve another purpose. Like the canary in the coal mine, universal testing of women presenting to L&D can alert public health officials about evolving epidemiology of local and regional infections. Since pregnant women are generally representative of the broader population of adults aged 15–45 years from diverse geographic, sociodemographic, and occupational backgrounds, the incidence of SARS-CoV-2 infection identified in L&D settings can provide insight about local infections and effectiveness of measures to reduce viral transmission until broader testing becomes available.⁸

2 | MOST INDIVIDUALS WITH SARS-COV-2 INFECTION HAVE IDENTIFIABLE RISK FACTORS

Reale and colleagues found that the majority of pregnant individuals with SARS-CoV-2 infections detected at the time of delivery had identifiable risk factors. In fact, of the 93 women with SARS-CoV-2 infection, 94%, 81%, 65%, and 43% had one, two, three, or four or more risk factors, respectively. This information can, and should, inform public health measures to control COVID-19 outbreaks.

An important observation of this study was that living in communities with higher rates of per capita infection (organised based on zip codes) was a strong risk factor for testing positive. Compared to women residing in towns with SARS-CoV-2 infection rates < 90th percentile, those living in towns with infection rates in the 90–94th percentile or ≥ 95th percentile had threefold higher and 12-fold higher odds, respectively, of SARS-CoV-2 infection themselves. We do not know whether these are local “hot spots” or larger areas because the geographic configuration of at-risk areas is not shown in the study, but further research is needed to understand why some areas have more prevalent infections. There are likely local practices that drive high rates of viral transmission, such as attitudes about mask wearing or perceptions about social interaction and risks. Local initiatives to address these perceptions may have substantial benefits to reduce infection rates.

3 | PREGNANT NON-HEALTH CARE ESSENTIAL WORKERS ARE VULNERABLE

Pregnant women with non-health care essential occupations, such as military support occupations, had higher rates of SARS-CoV-2 infection than pregnant health care workers. With pregnant non-essential workers as the reference, non-health care essential workers had an increased odds of SARS-CoV-2 infection (odds ratio [OR] 6.2, 95% CI 3.3, 11.2), whereas health care essential workers were at slightly reduced odds of infection (OR 0.8, 95% CI 0.3, 1.7). While

both groups of essential workers were likely exposed to SARS-CoV-2-infected individuals, health care workers were more likely to be exposed to infected and sicker individuals with overt manifestations of disease, yet, even in this context, they had lower rates of infection than non-health care essential workers.

Reasons for disparate rates of infection among essential workers remain uncertain. Health care workers, by virtue of their professions, will undoubtedly have greater (and freer) access to PPE or a stronger commitment to use PPE, both shown to reduce transmission in health care settings.⁹ Another potential explanation is driven by changes to social or occupational interactions with people known to have SARS-CoV-2 infection, which is much more likely to be known in health care settings. SARS-CoV-2 testing has limitations, but it is likely that knowledge of an individual's SARS-CoV-2 status results in behaviours that reduce the risk of transmission. Greater access to testing and ensuring access to PPE may minimise the occupational risk for pregnant, non-health care essential workers.

4 | RACIAL AND ETHNIC MINORITIES ARE AT INCREASED RISK OF INFECTION

The results of this study add to a growing body of literature about disproportionate outcomes for individuals from racial/ethnic minority groups during the COVID-19 pandemic. Compared with White women, Reale and colleagues found that Black women had a sixfold (95% CI 3.0, 11.9) higher odds of infection and Hispanic women had an 11-fold (95% CI 6.7, 18.7) higher odds. The observation of disproportionate rates of infection among Black and Hispanic women in this study likely translates to the greater morbidity and mortality associated with COVID-19 seen in other studies. This was demonstrated in the CDC surveillance report, which found that Black and Hispanic pregnant women had significantly higher rates of COVID-19-related deaths compared with White women.² The social and economic determinants of health that contribute to these disparities are unlikely to be solved soon, and certainly not before widespread availability of a vaccine. As there is evidence that Black people may have higher reluctance to vaccinate,¹⁰ there is potential that this gap may widen before the end of this crisis. This will be a challenge for vaccine campaigns, which need to gain the trust of these communities or risk aggravating existing disparities.

In summary, Reale and colleagues' prospective cohort study provides important insights on risk factors for SARS-CoV-2 infection in the obstetric population. The results illustrate the potential importance of universal testing in L&D, especially in communities with high transmission, given the high proportion of asymptomatic infection and implications for prevention in health care settings. Of particular concern are findings of increased risk for non-health care essential workers and those from racial/ethnic minority groups. We do not know whether the demographic characteristics reflect the fact that Black and Hispanic people are more at-risk because they live in communities with more risk or because they are more likely to be in essential jobs, and it would have been useful had the authors stratified by infection rates or use other techniques to tease out this



question, but clearly strategies to reduce transmission rates among these populations require further study. As we respond to the challenges of the second wave of COVID-19, we still have much to learn, but we are better prepared too.

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CONFLICT OF INTEREST

The authors have no conflict of interests to declare.

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