

EDITORIAL COMMENT

Addressing the Urgent Need for Education Around Cardiovascular Complications of COVID-19 Among Unvaccinated Pregnant Patients*



Doreen DeFaria Yeh, MD

The COVID-19 pandemic has had a staggering impact on health care systems worldwide, with significant disparities in morbidity and mortality across racial, ethnic, and demographic groups. Pregnant patients, historically excluded from clinical trials, have experienced particularly devastating consequences of COVID-19 infection. Prior studies have demonstrated that pregnant patients with COVID-19 are more likely to be hospitalized, require admission to the intensive care unit, mechanical ventilation, and extracorporeal membranous oxygenation, and experience an increased risk of preterm delivery, hemorrhage, hypertensive disorders of pregnancy, and fetal or newborn death.^{1,2}

The recent work of Zahid et al³ highlights the cardiovascular (CV) impact of COVID-19 infection among pregnant individuals. Using the 2020 National Inpatient Sample, a large multiethnic cohort, this study identified that after adjustment for age, race/ethnicity, comorbidities, insurance and income, COVID-19 infection during pregnancy was independently associated with peripartum CV complications, including pre-eclampsia, peripartum cardiomyopathy, acute coronary syndrome, and heart failure. Additionally, pregnant patients with COVID-19 infection also had higher rates of mortality,

pulmonary edema, acute kidney injury, stroke, and venous thromboembolism during delivery, with increased associated costs of hospitalization compared to those without COVID-19 infection.³ It is plausible that the physiologic stress of severe viral illness unmasks subclinical CV disease or exacerbates pre-existing CV disease, as is seen with influenza. Notably an increased risk of acute coronary syndrome was noted in COVID-19 infected individuals, typically is a very rare event in pregnancy. Possible mechanisms that may predispose COVID-19 infection to exacerbating CV events include heightened inflammatory state, endothelial injury, platelet activation, and hypercoagulability. Although the findings of this study may not be generalizable to CV outcomes with other strains of COVID-19 such as the Delta or Omicron variants, they nonetheless highlight the critical need for increased awareness and vigilance regarding CV health in pregnant patients with COVID-19 infection.

Importantly, this study examined patients infected with COVID-19 in 2020, thus none of the patients included had yet been vaccinated. Vaccination is known to significantly mitigate CV risks among patients with COVID-19,^{4,5} and although this necessitates further study it is anticipated the increased CV events associated with COVID-19 infection during pregnancy may also be mitigated with vaccination. The COVID-19 vaccine is recommended by the American College of Obstetrics and Gynecology for pregnant and lactating patients, with evidence of safety and efficacy, without evidence of fertility problems in men or women.⁶⁻¹¹ However, pregnant patients may be more hesitant to consider vaccination.¹² A study of pregnant women in Norway and Sweden identified vaccination rates among pregnant

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From the Division of Cardiology, Harvard Medical School, Massachusetts General Hospital, Boston, Massachusetts, USA.

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patients are lower than the general population, with lower vaccination uptake in pregnant women was associated with low levels of education and income, being born outside Scandinavia, smoking during pregnancy, living alone, and young age, highlighting the need for outreach and increased education around complications of COVID-19 among those who are unvaccinated.¹³

Although vaccination is critically important to reducing the number of COVID-19 cases and adverse CV outcomes of COVID-19 infection among pregnant mothers, vaccination alone it is likely not enough to eliminate excess CV morbidity seen. Stark racial disparities exist in maternal morbidity and mortality in the United States, only further exacerbated during the pandemic, with CV causes contributing to nearly 30% of maternal death.¹⁴ Sadly, the majority of CV deaths are preventable with earlier detection. It is crucial to address the underlying health inequities and social determinants of health that have contributed to the increased CV vulnerability of pregnant patients, particularly Black mothers, to adverse outcomes of COVID-19 infection.

As CV professionals and partners with our obstetric colleagues, we have a critical role to play in both patient and provider education and advocacy. It is essential that we share data on the high rates of CV complications in unvaccinated pregnant patients and

provide reassurance on the safety and efficacy of the COVID-19 vaccine in pregnancy. We must advocate for increased awareness of these risks, particularly those patients with pre-existing CV conditions or with risk factors for adverse outcomes. We must work toward earlier detection of CV complications of pregnancy, and for those who are most vulnerable, aim to achieve reproductive health equity by addressing uniform insurance coverage postpartum, access to routine pregnancy care and safe abortion care, and importantly increase patient and provider education around gender and racial bias mitigation as addressed by the CDC *HEAR HER* Campaign. Through action and a multipronged strategy, we should remain optimistic that we can turn the tide of adverse CV outcomes for pregnant patients during the COVID-19 pandemic and beyond.

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ADDRESS FOR CORRESPONDENCE: Prof Doreen DeFaria Yeh, Division of Cardiology, Harvard Medical School, Massachusetts General Hospital, 55 Fruit Street, Yawkey 5700, Boston, Massachusetts 02114, USA. E-mail: ddefariayeh@mg.harvard.edu.

REFERENCES

- Magnus MC, Oakley L, Gjessing HK, et al. Pregnancy and risk of COVID-19: a Norwegian registry-linkage study. *BJOG*. 2022;129(1):101-109.
- Metz TD, Clifton RG, Hughes BL, et al. Association of SARS-CoV-2 infection with serious maternal morbidity and mortality from obstetric complications. *JAMA*. 2022;327(8):748-759.
- Zahid S, Agrawal A, Rai D, Zia Khan M, Michos ED. Cardiovascular complications associated with COVID-19 during delivery hospitalizations in pandemic year 2020. *JACC: Adv*. 2023;2(4):100386.
- Kim Y, Huh K, Park Y, Peck KR, Jung J. Association between vaccination and acute myocardial infarction and ischemic stroke after COVID-19 infection. *JAMA*. 2022;328(9):887-889.
- Jiang J, Chan L, Kauffman J, et al. Impact of vaccination on major adverse cardiovascular events in patients with COVID-19 infection. *J Am Coll Cardiol*. 2023;81(9):928-930. <https://doi.org/10.1016/j.jacc.2022.12.006>
- Dagan N, Barda N, Biron-Shental T, et al. Effectiveness of the BNT162b2 mRNA COVID-19 vaccine in pregnancy. *Nat Med*. 2021;27:1693-1695.
- Theiler RN, Wick M, Mehta R, Weaver AL, Virk A, Swift M. Pregnancy and birth outcomes after SARS-CoV-2 vaccination in pregnancy. *Am J Obstet Gynecol*. 2021;3(6):100467.
- Magnus MC, Örtqvist AK, Dahlqvist E, et al. Association of SARS-CoV-2 vaccination during pregnancy with pregnancy outcomes. *JAMA*. 2022;327(15):1469-1477.
- Fell DB, Dhinsa T, Alton GD, et al. Association of COVID-19 vaccination in pregnancy with adverse peripartum outcomes. *JAMA*. 2022;327(15):1478-1487.
- Centers for Disease Control and Prevention. COVID-19 vaccination among pregnant people aged 18-49 years overall, by race/ethnicity, and date reported to CDC - vaccine safety datalink, United States. Accessed March 1, 2022. <https://covid.cdc.gov/covid-data-tracker/#vaccinations-pregnant-women>
- Watanabe A, Yasuhara J, Iwagami M, et al. Peripartum outcomes associated with COVID-19 vaccination during pregnancy: a systematic review and meta-analysis. *JAMA Pediatr*. 2022;176(11):1098-1106.
- Bhattacharya O, Siddiquea BN, Shetty A, et al. COVID-19 vaccine hesitancy among pregnant women: a systematic review and meta-analysis. *BMJ Open*. 2022;12:e061477.
- Örtqvist AK, Dahlqvist E, Magnus MC, et al. COVID-19 vaccination in pregnant women in Sweden and Norway. *Vaccine*. 2022;40(33):4686-4692.
- Hoyert DL. Maternal mortality rates in the United States, 2021. *NCHS Health E-Stats*. 2023. <https://doi.org/10.15620/cdc:124678>

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