

## Pregnancy, Postpartum Care, and COVID-19 Vaccination in 2021

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**More than a year has passed** since coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was recognized in China. SARS-CoV-2 has spread rapidly throughout the world and continues to cause major morbidity, mortality, and societal disruption globally. The recent authorization by the US Food and Drug Administration (FDA) of 2 vaccines against COVID-19 has raised

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hopes for an end to the pandemic, but given the many challenges with vaccine availability, distribution, and hesitancy as well as the emergence of variants that might result in lower vaccine efficacy or overcome natural immunity, it is likely that SARS-CoV-2 will continue to circulate.

Whether pregnancy increases susceptibility to COVID-19 remains unknown. Many hospitals instituted universal SARS-CoV-2 screening for individuals presenting for labor and delivery, providing information on the frequency of asymptomatic infection among pregnant individuals, and seroprevalence studies of pregnant individuals confirmed that, as with the nonpregnant population, asymptomatic infection is common.<sup>1</sup> However, given the lack of data from universal screening of an appropriate comparison group (ie, nonpregnant women of reproductive age with similar levels of exposure), susceptibility to SARS-CoV-2 infection during pregnancy has not been assessed. Data on SARS-CoV-2 prevalence among pregnant individuals from universal screening identified risk factors for infection including race/ethnicity, insurance status, and issues related to where people live (eg, those who lived in high-density neighborhoods were more likely to test positive).<sup>2</sup>

Although data were initially unclear as to whether pregnant individuals are at increased risk of severe complications from COVID-19, a large study from the Centers for Disease Control and Prevention (CDC) provided data suggesting an increased risk. Among more than 450 000 symptomatic women of reproductive age with COVID-19 for whom pregnancy status was known, admission to an intensive care unit, invasive ventilation, extracorporeal membrane oxygenation, and death were all more likely among pregnant individuals than among nonpregnant women of reproductive age.<sup>3</sup> Non-Hispanic Black individuals accounted for a disproportionate number of deaths. Symptoms in pregnant individuals (eg, cough, headache, muscle aches, and fever) were similar to those in nonpregnant women, although most symptoms were reported less often among pregnant individuals than nonpregnant women.<sup>3</sup>

Several studies of pregnancy outcomes suggest that preterm birth might occur more often among infants born to individuals with COVID-19, although findings have been inconsistent. In a systematic review, preterm birth was 3 times more common in individuals with COVID-19 than among those uninfected, with rates of 16% vs 6%, respectively.<sup>4</sup> However, whether this difference is due to direct effects of infection or maternal illness or is iatrogenic is unknown. Some but not all studies have suggested that stillbirths occur more often among SARS-CoV-2-infected individuals or during the pandemic. For example, in an analysis from the UK, the rate of stillbirths was 2 to 3 times higher among pregnant individuals during vs before the pandemic, with rates of 9.3 vs 2.4/1000

births, respectively, although whether the increase is related to SARS-CoV-2 infection or other pandemic-related factors is unknown.<sup>5</sup>

Intrauterine transmission of SARS-CoV-2 has been documented<sup>6</sup> but appears to be rare. The reasons for this are unknown, but could be related to lower expression of the ACE2 receptor and the serine protease TMPRSS2 that are necessary for SARS-CoV-2 cell entry.<sup>7</sup> Transmission via breast milk appears to be unlikely; among 64 samples from 18 mothers, one sample tested positive for SARS-CoV-2 RNA, but no replication-competent virus was detected.<sup>8</sup>

Data regarding mother-to-infant transmission in the postnatal period have been reassuring when appropriate precautions are taken. In a study of 116 SARS-CoV-2–positive mothers who breastfed their 120 newborns, all newborns tested negative for SARS-CoV-2 and were asymptomatic. In this study, the infants roomed in with their mothers in a closed Isolette and mothers used a surgical mask and careful hand and breast hygiene before breastfeeding and other interactions with the infant.<sup>9</sup>

Two COVID-19 vaccines recently received FDA authorization through the Emergency Use Authorization process, and additional vaccines are expected to become available soon.<sup>10</sup> As often occurs with new medications and vaccines, pregnant individuals were excluded from the clinical trials for these vaccines. Results of animal studies on the first 2 vaccines authorized (Pfizer-BioNTech and Moderna) are reassuring. Data on pregnancy outcomes of the small number of pregnant individuals inadvertently exposed during the clinical trials are not yet available because pregnancies are ongoing. Nearly all vaccines are allowed during pregnancy if the benefits are expected to outweigh potential risks, with the exception of live-attenuated vaccines (such as the measles-mumps-rubella [MMR] vaccine), which are contraindicated because of theoretical risks of the virus crossing the placenta and infecting the fetus.

The first 2 authorized COVID-19 vaccines use messenger RNA (mRNA) technology; mRNA codes for the spike protein on the virus's which is then recognized by the host immune system. The mRNA is rapidly degraded in the cell cytoplasm. These mRNA vaccines (and other COVID-19 vaccine candidates) do not contain live virus. Thus, CDC, American College of Obstetricians and Gynecologists (ACOG), and the Society for Maternal-Fetal Medicine (SMFM) state that pregnant individuals who meet criteria for receiving COVID-19 vaccine may choose to be vaccinated (Table).

Pregnant individuals considering COVID-19 vaccination may benefit from a discussion with their physician or other health care professional to weigh the benefits and potential risks of vaccination. However, this discussion should be optional so that it does not impose a barrier to vaccine receipt. Issues to consider in that discussion include data from animal studies and on pregnant individuals who were inadvertently exposed during vaccine clinical trials (once these data become available), risks of vaccine reactogenicity (eg, fever), timing of vaccination by trimester, evidence for safety of other vaccines, potential for mitigation of SARS-CoV-2 exposure risk (eg, working from home), risk of COVID-19 to the fetus or newborn, and the individual's risk of complications due to pregnancy, her age, and underlying conditions.<sup>10</sup> Studies to examine

Table. Recommendations for Pregnant or Lactating Individuals Regarding Use of Pfizer-BioNTech and Moderna COVID-19 Vaccines<sup>a</sup>

Pregnancy	Lactation
<b>US Food and Drug Administration (FDA)</b>	
<ul style="list-style-type: none"> <li>Available data on COVID-19 vaccine administered to pregnant individuals are insufficient to inform vaccine-associated risks in pregnancy</li> </ul>	<ul style="list-style-type: none"> <li>Data are not available to assess the effects of COVID-19 vaccine on the breastfed infant or on milk production/excretion</li> </ul>
<b>Centers for Disease Control and Prevention (CDC)</b>	
<ul style="list-style-type: none"> <li>People who are pregnant and part of a group recommended to receive COVID-19 vaccination, such as health care personnel, may choose to be vaccinated</li> <li>A conversation between pregnant patients and their clinicians may help them decide whether to receive a vaccine that has been authorized for use under EUA</li> <li>A conversation with a clinician may be helpful but is not required prior to vaccination</li> <li>Routine testing for pregnancy before COVID-19 vaccination is not recommended</li> <li>Persons who are trying to become pregnant do not need to avoid pregnancy after receiving an mRNA COVID-19 vaccine</li> </ul>	<ul style="list-style-type: none"> <li>There are no data on the safety of COVID-19 vaccines in lactating mothers or on the effects of mRNA vaccines on the breastfed infant or on milk production/excretion</li> <li>mRNA vaccines are not thought to be a risk to the breastfeeding infant</li> <li>People who are breastfeeding and are part of a group recommended to receive a COVID-19 vaccine, such as health care personnel, may choose to be vaccinated</li> </ul>
<b>American College of Obstetricians and Gynecologists (ACOG)</b>	
<ul style="list-style-type: none"> <li>ACOG recommends that COVID-19 vaccines should not be withheld from pregnant individuals who meet criteria for vaccination based on ACIP-recommended priority groups</li> <li>While a conversation with a clinician may be helpful, it should not be required prior to vaccination because this may cause unnecessary barriers to access</li> <li>Pregnancy testing should not be a requirement prior to receiving any EUA-approved COVID-19 vaccine</li> <li>Pregnant patients who decline vaccination should be supported in their decision</li> </ul>	<ul style="list-style-type: none"> <li>ACOG recommends COVID-19 vaccines be offered to lactating individuals similar to nonlactating individuals when they meet criteria for receipt of the vaccine based on prioritization groups outlined by the ACIP</li> <li>While lactating mothers were not included in most clinical trials, COVID-19 vaccines should not be withheld from lactating individuals who otherwise meet criteria for vaccination</li> <li>Theoretical concerns regarding the safety of vaccinating lactating individuals do not outweigh the potential benefits of receiving the vaccine; there is no need to avoid initiation or discontinue breastfeeding in patients who receive a COVID-19 vaccine</li> </ul>
<b>Society for Maternal-Fetal Medicine (SMFM)</b>	
<ul style="list-style-type: none"> <li>SMFM strongly recommends that pregnant people have access to COVID-19 vaccines and that they discuss potential benefits and unknown risks with their clinicians regarding receipt of vaccine</li> <li>Counseling should also include the theoretical risk of harm to the fetus; the risk from mRNA vaccines is thought to be low due to the expected degradation of mRNA in the circulation</li> <li>Individual decision-making needs to balance theoretical risks with risks associated with delayed vaccination and possible maternal SARS-CoV-2 infection</li> </ul>	<ul style="list-style-type: none"> <li>Vaccination is recommended for lactating persons</li> <li>Counseling should balance the lack of data on vaccine safety and a person's individual risk for infection and severe disease</li> <li>The theoretical risks regarding the safety of vaccinating lactating people do not outweigh the potential benefits of the vaccine</li> </ul>

Abbreviations: ACIP, Advisory Committee on Immunization Practices; EUA, Emergency Use Authorization.

<sup>a</sup> Sources: FDA (Pfizer-BioNTech) (Moderna); CDC; ACOG; SMFM.

the effects of COVID-19 vaccines during pregnancy are in progress. For persons planning pregnancy, there is no evidence nor theoretical concerns regarding effects of COVID-19 vaccines on fertility. It is not necessary to delay pregnancy after COVID-19 vaccination. As part of pregnancy planning, clinicians should ensure that patients are up-to-date with all recommended vaccines, including COVID-19.

Data on the effects of COVID-19 vaccines on the breastfed infant are also unavailable. However, CDC, ACOG, and SMFM are all reassur-

ing about initiating or continuing breastfeeding in a recently vaccinated individual, given the benefits of breastfeeding to the infant and what is known about the safety of other vaccines given during lactation.

In the last year much has been learned about the effects of COVID-19 on persons who are pregnant or postpartum; however, many questions remain. Clinicians will need to follow updates from CDC, ACOG, and SMFM for the latest information related to COVID-19 during pregnancy and approaches for prevention and treatment.

#### ARTICLE INFORMATION

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