Infants Born to Mothers With COVID-19—Making Room for Rooming-in

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From the beginning of the coronavirus disease 2019 (COVID-19) pandemic, clinicians in all specialties have been challenged to offer optimal care to infected patients and good counsel to persons potentially affected by the novel virus severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Professional societies have also had difficulty in providing clinical guidance in the absence of the type of peer-reviewed evidence to which modern medicine has grown accustomed. Developing guidance for pregnant mothers and their newborns was particularly problematic in the initial stages of the pandemic, given that we knew little beyond this: the virus was very contagious, and it was killing people across the world. The American Academy of Pediatrics (AAP) initially recommended infection control practices that included temporary maternal-infant physical separation to protect newborns from acquiring SARS-CoV-2 infection from mothers with COVID-19 at the time of delivery. This recommendation ran counter to mother-infant rooming-in practices usually endorsed by the AAP: practices with multiple advantages to the dyad including supporting effective breastfeeding.1 In this issue of JAMA Pediatrics, Ronchi et al2 evaluate the safety of infection control practices that include rooming-in for infants born to SARS-CoV-2-infected mothers. This study adds to recent publications and registry observations that are building the evidence base that informs evolving clinical guidance.

This multicenter study from Italy describes the outcomes of 62 infants born to SARS-CoV-2-infected mothers who, at the time of delivery, had no need for respiratory support or supplemental oxygen, temperature less than 38 °C, vital signs within the reference ranges, and who felt well enough to care for their infants. The infants were born at 34 weeks’ or more gestation and weighed 2000 g or more, with normal findings on examination and vital signs within the reference ranges. Infection control and prevention methods focused on maternal handwashing as well as the use of a surgical face mask during breastfeeding or breast milk expression and during any infant care or interaction, and physical distancing (2 m) from the infant at all other times. Mothers received formal education, including written documentation of these infection prevention recommendations. Nearly all infants were breastfed (75% exclusively so). Visitors were not allowed during the study period. Infants were followed up and nasopharyngeal swab reverse transcriptase (RT)-polymerase chain reaction (PCR) testing for SARS-CoV-2 was performed at 0, 7 ± 2, and 20 ± 2 days after birth. None of the infants tested positive for SARS-CoV-2 from nasopharyngeal swabs at birth (a requirement for study entry) and the results of PCR testing in 61 of the 62 infants remained negative throughout the study. One mother who was rooming-in with her infant became increasingly ill on day 5 after birth, with symptoms progressing from mild cough to severe respiratory failure. Her infant tested positive on day 7 and developed mild respiratory distress; by day 18, the infant still tested positive for SARS-CoV-2 but was well enough for hospital discharge and subsequently tested negative on day 30.

These results are similar to a report of 120 infants from a single New York City hospital where mothers could practice skin-to-skin care and breastfeed if they wore a surgical mask when near their newborn and practiced proper hand hygiene before skin-to-skin contact, breastfeeding, and routine care.3 Infants were kept in a closed incubator in the same room as their mothers. Infants were tested for SARS-CoV-2 by RT-PCR using nasopharyngeal swabs taken at 24 hours, 5 to 7 days, and 14 days after birth, and were clinically evaluated by telemedicine at 1 month after birth. Test results were negative in all of these infants at 24 hours, and none of 82 of the 120 infants who underwent testing at 5 to 7 days had positive results. Close to 80% of the infants were breastfed the first week of life.

The low rate of perinatal transmission (newborns with positive test results within 24 hours after birth) observed by Ronchi et al2 is aligned with the changing findings of a perinatal COVID-19 case registry sponsored by the AAP Section on Neonatal Perinatal Medicine. This volunteer case registry currently has data on nearly 4000 newborns tested for SARS-CoV-2, with approximately 60% in the rooming-in setting after delivery and less than 2% of infants testing positive for SARS-CoV-2 during the birth hospitalization. These clinical data align with emerging placental studies. SARS-CoV-2 uses the angiotensin-converting enzyme 2 receptor and the serine protease TMPRSS2 for cell entry. Pique-Regi et al4 investigated the expression of angiotensin-converting enzyme 2 and TMPRSS2 throughout pregnancy in the placenta and in third-trimester chorioamnion membranes. They found that cotranscription of angiotensin-converting enzyme 2 and TMPRSS2 is negligible in the placenta, suggesting that the placenta is an unlikely route of vertical transmission for SARS-CoV-2. In contrast, congenital viral infections, such as cytomegalovirus and Zika virus, have significant in utero fetal effects, and this study also demonstrated, similar to other research,5 that the receptors used by these viruses are highly expressed by placental cell types.

The take-home message of Ronchi et al2 is positive for perinatal clinicians and patients who wish to follow the recommended practice of mother-newborn rooming-in and who plan to breastfeed their infants during the current pandemic.
how reassuring? As clinical experience evolves, so does investigation inform our understanding of SARS-CoV-2 viral dynamics. These findings are perhaps best viewed with our current understanding of how the virus is shed and when women are potentially infectious to their infants. Studies assessing the relationship between symptom onset, PCR testing results, and shedding of infectious virus informed recent Centers for Disease Control and Prevention updates on determining when infection control and prevention measures can be discontinued. Immunocompetent patients who are not critically ill, at least 10 days removed from their onset of symptoms or first positive test, afebrile for at least 24 hours, and are improving overall are highly unlikely to be shedding infectious virus. The Centers for Disease Control and Prevention recommendations now use this time- and symptom-based approach to determine when infection control and prevention measures are no longer needed. Nearly three-quarters (44 of 61) of the mothers in this study had an onset of illness within 14 days before delivery, and the study entry requirements were such that these women may have not been infectious at the time of delivery. Thirty-four mothers (55%) were asymptomatic at the time of delivery. Asymptomatic women identified as having PCR-positive test results only by obstetric screening practices rather than by illness have an uncertain onset of infection and therefore unclear infectiousness, as we now know that individuals may remain PCR-positive for days or weeks after they are no longer infectious. In evaluating the management implications of this study, it is perhaps most important to note that the infant born to the one woman in this study who, as evidenced by the progression of her illness, was most likely to be contagious during the postpartum period, was the only infant who became infected with SARS-CoV-2.

The lessons of this study support the most recent updates to the AAP neonatal guidance, which now recommend rooming-in unless mothers are too ill to care for their newborn, and use of the updated Centers for Disease Control and Prevention time- and symptom-based approach to determine when a mother is no longer infectious to her well newborn. The AAP revised guidance also supports the critical lesson of this study: for mothers who are potentially infectious with SARS-CoV-2 at the time of delivery, preventive measures should be taken, as newborns are at risk of acquiring the virus from mothers who are truly infectious (Figure). Perinatal clinicians need to emphasize the importance of following recommended infection control and prevention practices at home as well until the mother and other caregivers meet the metrics for being noninfectious. Such practices will help protect the newborn from acquiring SARS-CoV-2 and becoming ill. In addition, a recent study examining age-related differences in nasopharyngeal SARS-CoV-2 levels found that infants and children younger than 5 years had a 10- to 100-fold greater amount of virus in their upper respiratory tract compared with adults. This finding suggests that infected infants could be a source of community spread—an additional motivation to protect them from acquiring SARS-CoV-2. In the end, families and clinicians should be reassured that our current understanding of viral dynamics and careful studies, such as that reported by Ronchi and colleagues, is moving us slowly away from an evidence-free zone. For newborns, this accumulation of evidence is ensuring that, with proper precautions, they can stay where they belong: with their mothers.

### Figure. Current Practice for Infants Born to Mothers With Coronavirus Disease 2019 (COVID-19)

- **Mother COVID-19-positive**
  - Mother with nonsevere symptoms or asymptomatic, able to care for her infant
  - Mother critically ill or otherwise unable to care for her infant
- **Mother and newborn room-in together with infection control practices**
  - Breastfeeding encouraged
  - Infection control practices
  - Face mask
  - Hand hygiene
  - Distancing between episodes of care
- **Mother and newborn separated**
  - Expressed breast milk encouraged
  - Additional family/caregiver education
  - Do not cover infant’s face, mouth, or nose. This would be a risk for sudden infant death syndrome.
  - For COVID-19-positive infants until not infectious: family members aged ≥2 y should use mask when within 2 m of infant, and mask and hand hygiene when caring for the infant.
  - Minimize care by older or medically vulnerable persons, if possible
  - Limit home visitation

Guidance for rooming-in and infection control and prevention practices for infants born to mothers with COVID-19 after birth while in the hospital and at home.

### REFERENCES


