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DOI: 10.1542/peds.2020-001842

Journal: *Pediatrics*

Article Type: Commentary

Citation: Gupta M, Zupancic JAF, Pursley D. Caring for newborns born to mothers with COVID-19: more questions than answers. *Pediatrics*. 2020; doi: 10.1542/peds.2020-001842

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Caring for Newborns Born to Mothers with COVID-19: More Questions than Answers

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Short title: Caring for Newborns Born to Mothers with COVID-19

Financial Disclosure: The authors have no financial relationships relevant to this article to disclose.

Funding Source: This article was completed with no specific funding support.

Conflicts of Interest: The authors have no conflicts of interest relevant to this article to disclose.

Abbreviations:

Coronavirus 2019: COVID-19
Severe acute respiratory syndrome-coronavirus-2: SARS-CoV-2
World Health Organization: WHO
American Academy of Pediatrics: AAP
Centers for Disease Control and Prevention: CDC

As the novel coronavirus 2019 (COVID-19) pandemic continues, its impact on newborns remains uncertain. Early reports from China suggested that while severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) infection could be associated with adverse pregnancy outcomes, newborns did not appear to show clinical signs of infection and had negative viral testing.^{1,2} More recent reports suggest that, while low, risk of neonatal infection does exist. A recent (as we write this commentary) review identified 27 publications describing 217 newborns born to mothers with COVID-19, of which 21 publications describing 187 newborns were from China.³ Of the 217 newborns, seven (3%) had evidence of SARS-CoV-2 infection: three had positive serum levels of IgG and IgM antibodies with negative PCR tests, and four had positive PCR tests. Beyond the immediate postnatal period, several case studies report positive SARS-CoV-2 tests in symptomatic newborns in the first month of life, and new reports are published frequently.³⁻⁷ The mechanism of neonatal infection is unclear. Vertical transmission during pregnancy is not thought to be likely; SARS-CoV-2 testing on placenta, umbilical cord, amniotic fluid, vaginal secretions, and breastmilk samples has uniformly been negative.⁸ More likely is postnatal infection through horizontal transmission.

This uncertainty around neonatal infection risk has led to notable variations in care practices for newborns born to mothers with COVID-19. Hospitals, professional organizations, and public health agencies have interpreted the limited available data in the context of their local environments to develop practice recommendations that then are applied to a wide range of clinical and social conditions. While there is some agreement on certain aspects of newborn care, such as use of precautions for delivery room resuscitation or isolation of exposed infants requiring intensive care, approaches to other aspects of care differ widely, including location of

care and breastfeeding for term infants that are well and born to mothers without severe symptoms. Recommendations on these areas from several national-level organizations as well as the World Health Organization (WHO) are summarized in Table 1. In China, consensus guidelines for COVID-19 positive mothers suggest immediate cord clamping and no mother-baby contact in the delivery room, isolation of the infant for 14 days after birth, and avoidance of breastmilk use until mother has recovered from the infection.^{9, 10} WHO supports skin-to-skin care, rooming-in, and breastfeeding for infants born to mothers with COVID-19.¹¹ The Italian Society of Neonatology, the Royal College of Paediatrics and Child Health, and the Canadian Paediatric Society support rooming-in and breastfeeding with appropriate infection prevention measures for these infants, unless mothers are too ill.¹²⁻¹⁴ The American Academy of Pediatrics (AAP) suggests separation of the COVID-19 positive mother and her infant when possible and use of expressed breast milk rather than breastfeeding.¹⁵ The Centers for Disease Control and Prevention (CDC) suggest shared-decision making between family and clinical team with regards to location of care as well as breastfeeding.¹⁶

How can these disparate practice recommendations be reconciled? It seems unlikely that the differences between these recommendations are driven primarily by differences in resource availability or care environments. Rather, they are likely driven by differences in balancing the largely unknown risks and benefits of different approaches. Given that there appears to be some risk of acquiring neonatal infection after birth, it follows that the safest care for the newborn, in terms of minimizing this risk, would be separation from the infected mother. This approach may be particularly justified given the low neonatal infection rates in China where consensus guidelines recommend mother-newborn separation. Conversely, separation limits opportunities

for parent teaching, has known risks of breastfeeding disruption, and may have negative short and long-term impacts on maternal mental health and mother-newborn bonding. While separation would theoretically lower infection risk during hospitalization, the impact of separation on infection risk after discharge home is unknown. Rooming-in during hospitalization, by allowing for demonstration and teaching of infection prevention practices to the family, might even lower infection risk when the family is caring for the newborn at home; this may be particularly true for socially vulnerable families without alternatives to high-density living quarters. These uncertainties are reflected in clinical practice; practice surveys of hospitals in Massachusetts have shown wide variation in protocols, with some centers following AAP guidance and recommending mother-newborn separation and other centers using CDC and WHO guidance to recommend shared decision-making or rooming-in.

In this issue of *Pediatrics*, Perlman et al. seek to inform these management questions by starting to address the paucity of data on newborn outcomes in models of care that include rooming-in. The authors share their experience with 31 newborns born to mothers with COVID-19 over a three-week period at their center in New York City.¹⁷ This complements obstetric-focused reports from two other New York centers that include brief descriptions of 18 and 29 exposed newborns.^{18, 19} While all three series are modest in size, they likely are the largest published series from the U.S., which is not surprising given the patterns of COVID-19 in this country.

In the Perlman report, the 31 newborns did well during their birth hospitalization. Twenty-nine were term, roomed-in with mothers, and breastfed depending on maternal choice. All had negative PCR testing for SARS-CoV-2 and were discharged home with their mothers at 1 to 2

days of life. Two were preterm, required CPAP, and have had uncomplicated courses in the neonatal intensive care unit. Both had negative PCR testing at 1, 2, 7 and 14 days of life. The authors suggest their outcomes reflect the importance of several aspects of their care, including surge preparation, adequate personal protective equipment, rapid turnaround of SARS-CoV-2 test results, and their ability to minimize risk of horizontal viral transmission through careful attention to infection prevention practices. The latter may be the most interesting; to what extent does this report address concerns for infection risk with a rooming-in approach to care?

The answer is likely some, but not much. Knowing that all term infants born to mothers with COVID-19 roomed-in with unremarkable newborn hospitalizations is clearly reassuring. Although the sample size is limited, it matches the largest reported series from China. However, much more needs to be known. What precautions were used to minimize infection risk during the post-birth hospital course? What was the approach to skin-to-skin care and direct mother-newborn contact? Were restrictions placed on family members? Were changes made to routine interventions such as hearing screens or circumcisions? What practices were in place around environmental cleaning? Most important, *how did the newborns do after discharge?*

This report highlights at least three critical and time-sensitive needs for research around neonatal care and outcomes related to COVID-19: (1) much larger sample sizes reflecting diverse populations that allow for reliable measurement of outcomes; (2) detailed descriptions of care practices, particularly around infection prevention, with ability to assess the comparative effectiveness of different approaches; and (3) follow-up information on maternal and neonatal outcomes after the birth hospitalization. Clearly, single center reports, even from New York, will

not be able to address these needs. Fortunately, multicenter collaborations have already been launched that should. Several of these are summarized in Table 2.

SARS-CoV-2 has infected millions of people worldwide. Nevertheless, fundamental questions remain on how best to care for newborns born to mothers with COVID-19. Perlman and colleagues are to be applauded for driving forward this discussion and helping to identify critical questions; it will take all of us working together to answer them.

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Table 1: Guidance on Location of Newborn Care and Breastfeeding for Mothers with COVID-19 from Selected Organizations

	Location of newborn care	Breastfeeding
China ^{8,9}	Separation	No breast milk
WHO ¹⁰	Rooming-in encouraged	Breastfeeding encouraged
Italy ¹¹	Rooming-in encouraged	Breastfeeding encouraged
Great Britain ¹²	Rooming-in encouraged	Breastfeeding encouraged
Canada ¹³	Rooming-in supported	Breastfeeding supported
AAP ¹⁴	Separation preferred	Pumping preferred
CDC ¹⁵	Shared decision-making	Shared decision-making

Table 2: Selected Multicenter and National Collaborations on COVID-19 and Newborns

Organization	Registry	Website
AAP Section on Neonatal Perinatal Medicine	NPC-19	https://services.aap.org/en/community/aap-sections/sonpm/
Vermont-Oxford Network	COVID-19 Impact Audit	https://public.vtoxford.org/covid-19/
Imperial College of London	PAN-COVID	https://pan-covid.org/
European Society of Paediatric and Neonatal Intensive Care	EPICENTRE	https://espnice-online.org/COVID-19-Outbreak/EPICENTRE

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The online version of this article, along with updated information and services, is located on the World Wide Web at:

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