

Evidence check

2 July 2021

Rapid evidence checks are based on a simplified review method and may not be entirely exhaustive, but aim to provide a balanced assessment of what is already known about a specific problem or issue. This brief has not been peer-reviewed and should not be a substitute for individual clinical judgement, nor is it an endorsed position of NSW Health.

COVID-19 and maternity and newborn communities of practice

Evidence check question

- Q1. What is the best practice management of a COVID-19 positive neonate?
- Q2. What is the current evidence for vaccinating breastfeeding and pregnant women and women who are on oral contraceptive pill?
- Q3. What are the current recommendations for infection control measures for group sessions in an indoor setting?

In brief

Vertical transmission

- There is no clear evidence of vertical transmission of SARS-CoV-2.(1-4) In COVID-19 positive neonates born to infected individuals, it is challenging to determine if the transmission occurred in utero, intrapartum or postpartum due to lack of standardised international definition and classification system for timing; diagnostic testing limitations, such as lack of timely collection of appropriate specimens; and method specificity and sensitivity.(3)
- A population-based cohort study from the United Kingdom estimated the neonatal incidence of SARS-CoV-2 infection to be 5-6 (95% confidence interval 4·3-7·1) per 10,000 live births.(5) In an overview of systematic reviews of outcomes of COVID-19 positive mothers, the neonatal polymerase chain reaction positivity rates range between 1.6% and 10%.(6) There were reports of neonates with serum antibody positivity yet negative polymerase chain reaction (PCR) positivity.(6) There is no clear evidence of SARS-CoV-2 transmission to neonates via breastmilk.(7)
- Around 20% of neonates with SARS-CoV-2 infection are asymptomatic and further 40%-50% have mild symptoms.(5, 7, 8) Reported symptoms include rhinorrhoea, cough, lethargy, vomiting, diarrhoea, apnea, fever, tachycardia, tachypnea, leucocytosis, thrombocytopenia, hypoxemia, hypotension, raised C-reactive protein, elevated lactate and radiographic findings of ground-glass opacities.(4, 5, 8, 9) Early onset of neonatal COVID-19 infection (between two and seven days after birth) is likely, however, the majority of symptomatic infections are late-onset (after 7 days of birth).(5, 7, 10)

Q1. What is the best practice management of a COVID-19 positive neonate?

Prevention of transmission for those with suspected or confirmed COVID-19

Peer-reviewed literature and international consensus guidance recommend the following.

- Obstetrician and neonatologist joint debriefing and preparation for neonatal resuscitation before delivery.(11)
- Neonatal clinicians attend deliveries based on hospital policies and risk indication.(7, 12)
- Personal protective equipment for healthcare providers and masks for individuals in labour (7, 11)
- Use of precautionary measures to minimise the risk of infection during aerosol-generating procedures.(13) Such procedures include T-piece and mask ventilation, bag-mask ventilation, intubation, suctioning, high-flow oxygen therapy at more than 2L/min, continuous positive airway pressure, and mechanical ventilation.(7)
- The World Health Organization does not recommend separating infants from mothers suspected or confirmed to have COVID-19 after birth.(14) The USA Centers for Disease Control and Prevention recommends not isolating infants born to suspected or confirmed COVID-19 mothers in neonatal intensive care units, unless the neonate's clinical condition warrants neonatal intensive care unit admission.(4) It recommends having a discussion between the mother and healthcare provider to decide whether a neonate should remain in mother's room, taking into consideration mother's preferences, benefits of room-in, and certain criteria concerning the COVID-19 symptoms of the mother.(4)
- In the event of transportation of neonates born to COVID-19 positive individuals to a neonatal intensive care unit, use a predetermined path in a closed incubator.(7, 13, 15)
- If the mother's clinical condition allows, both the World Health Organization and the Centers for Disease Control and Prevention recommend encouraging breastfeeding.(16, 17)
- The Australian Breastfeeding Association states that the mother and baby can be supported to remain together while breastfeeding.(18)
- Use of surgical masks, washing hands and breasts prior to breastfeeding (7, 11, 16, 18) and placing the neonate's crib, cot or incubator 1.8m away from the mother are recommended.(7, 11, 16-18) The use of masks for neonates is not recommended due to risk of suffocation.(16)
- Alternative to direct breastfeeding from the mother, expressed milk can be fed by healthy healthcare workers or caregiver.(7, 16-18)
- The World Health Organization recommends encouraging early and uninterrupted skin-to-skin contact after delivery given the low risk of transmission.(14)

Management COVID-19 positive neonates

- Currently, there are no clinical trials evaluating treatment for neonates with COVID-19 and very limited data on the safety and efficacy of drug therapy.(19) The *Coronavirus Disease 2019 (COVID-19) Treatment Guidelines* by the National Institutes of Health recommends that mild and moderate COVID-19 should be managed with supportive care alone and drug therapy should be considered based on the assessment of illness severity, age, and other risk factors.(19)
- Supportive care and management

- Appropriate respiratory support, such as continuous positive airway pressure or supplemental oxygen, in case of respiratory distress. (7)
- Although the risk of aerosol generation by respiratory support of neonates may be low, personal protective equipment and precautionary measures to limit the transmission is recommended.(15, 20)
- Fluid resuscitation.(7)
- Temperature control.(7)
- Antiviral medications
 - Remdesivir is approved by Food and Drug Administration *Emergency Use Authorization* for the treatment of paediatric patients weighing at least 3.5kg.(21) Children were not included in clinical trials of remdesivir and therefore no data is available for its pharmacokinetics, efficacy, or toxicity in children.(19)
 - Several case report studies described treating neonates, including premature infants, with remdesivir and observed clinical improvement and no adverse effects.(5, 22-25)
- In cases of COVID-19-associated multisystem inflammatory, immunomodulatory therapy, using intravenous immunoglobulins or monoclonal can be considered.(15)

Q2. What is current evidence for vaccinating breastfeeding and pregnant women and women who are on oral contraceptive pill?

Efficacy

- Pregnant and lactating individuals were not included in initial vaccine clinical trials.(26)
- For mRNA vaccines, a similar immune response in vaccinated pregnant and lactating women compared to vaccinated non-pregnant women was reported.(27)

Safety

- No obvious safety signals in pregnancy or neonatal outcomes, especially in women vaccinated during the third trimester.(28)
- In a study comparing the immunity and placental histopathology outcomes of vaccinated and non-vaccinated pregnant women, women with vaccination had higher rates of vaginal delivery, robust antibody response, and no increased incidence of decidual arteriopathy, foetal vascular malperfusion, low-grade chronic villitis, or chronic histiocytic intervillitis.(29)
- Latest update (17 May 2021) from the *Drug and Lactation Database* by the US National Library of Medicine include the following key points.(30)
 - Some mild infant effects were reported after mRNA vaccination in breastfeeding mothers, however direct attribution to the vaccines is not established.
 - Mothers who received mRNA vaccines had higher milk SARS CoV-2 antibody levels than those who were infected.
 - Shared decision approach to vaccination decisions in breastfeeding mothers are encouraged.

Newborn protection

- SARS-CoV-2 immunoglobulin G antibodies were detected in cord blood in a newborn after maternal vaccination (mRNA vaccines).(31-34)
- Maternal antibody production 5 days to 15 days after dose 1, transplacental transfer of immunity to neonate 16 days after dose 1 of mRNA vaccines were reported.(32, 35)

Recommendations

- Most national and international professional bodies recommend that pregnant and breastfeeding women are offered the vaccine with an informed and/or shared decision-making approach. According to the World Health Organization, pregnant women may receive the vaccine if the benefit of vaccinating a pregnant woman outweighs the potential vaccine risks.(36-38)

Oral contraceptive pill and COVID-19 vaccines

- No relevant peer-reviewed or grey literature was retrieved.

Q3. What are the current recommendations for infection control measures for group sessions in an indoor setting?

Clinical Excellence Commission, NSW (39)

- Outlines the principles of hierarchy of controls and safe working for acute and non-acute healthcare settings.
- From most effective to least effective, the risk avoidance or mitigation strategies include:
 - elimination: social isolation
 - substitution: not applicable
 - engineering controls: ventilation, physical barriers
 - administrative controls: work from home, stagger schedules and hand hygiene
 - personal protective equipment: masks, respirators and gloves; should be used in accordance with clinical circumstances and risk assessment; a risk assessment to be performed on the use of personal protective equipment according to current epidemiological data, local prevalence and clinical features that might indicate elevated COVID-19 risk.
- Multiple mitigation strategies can be used at the same time.
- *NSW Risk Matrix* has been developed to provide guidance to NSW health facilities on the various levels (low, moderate and high) of COVID-19 transmission risk.

Infection control and prevention strategies in acute settings and in shared spaces

Apart from physical distancing in the waiting rooms and during physical examinations and procedures, additional precautions are required in shared spaces such as meeting rooms.

Where possible:

- maintain physical distancing
- use virtual meetings
- consider having a person perform random checks on the activities in shared spaces.

Ensure:

- signage is displayed at the entrance to advise on the number of people allowed
- personal protective equipment is removed before entering the shared spaces
- hand hygiene is performed when entering or leaving the shared space
- crowding is avoided and breaks are scheduled in advance with flexibility
- when physical distancing is not possible, surgical masks are used and disposed of correctly and safely
- detergent products are made available for cleaning surfaces
- products that cannot be cleaned, such as magazines or clutter, are removed and signs or notices are laminated for wiping down with detergents
- stationary or belongings are not shared and personal belongings are not left in the shared spaces when leaving
- food or beverages are not consumed in acute settings
- ongoing enhanced cleaning and person is designated to ensure cleaning and documentation.

Infection control and prevention strategies in non-acute settings and in shared spaces

- COVID-19 risk screening prior to entering the facility should be undertaken in accordance with the recommendations as outlined in *Response and Escalation Framework (NSW Risk Matrix)*.
- A risk assessment should be undertaken, and a risk management plan developed for community group meetings and sessions in different venues. Guidance on COVID-19 infection prevention and control risk assessment for group community sessions and meetings and templates for risk assessment and action plans are available. The guiding principles include the following.
 - Use telehealth when viable.
 - Under the current *Public Health Gathering and Movement Order*,⁽⁴⁰⁾ health facilities are exempt from the four-square metre rule.
 - Healthcare workers to model COVID-19 safe behaviours and implement physical distancing when possible.
 - Use physical distancing markings on the floor if required.

Australian Government, Department of Health (41)

- Outlines the use of the hierarchy of control to manage the risk of transmission in healthcare, residential care and quarantine settings.
- From the highest level of health and safety protection and reliability to the lowest, the control measures include:
 - eliminate risks
 - substitute the hazard with a safer alternative
 - isolate the hazard from people
 - reduce the risks through engineering controls
 - reduce exposure to the hazard using administrative controls

- use personal protective equipment (with situational risk assessment)
- Engineering and administrative control measures can be directed at shared facilities such as meeting rooms, along with the use of personal protective equipment.
- Physical distancing strategies that are specific to shared spaces include using floor markings, spaced seatings and maximum room occupancy notices.

Limitations

This evidence check for Q1 does not cover the management aspects of diagnostic testing, discharge planning and re-admission of neonates who are suspected, probable or confirmed to have COVID-19 infection. Only limited key organisation statements and recommendations were reviewed for Q2 and only infection prevention and control guidelines from NSW Clinical Excellence Commission and Australian Department of Health was reviewed for Q3.

Background

Pregnant individuals were associated with an increased risk of adverse outcomes such as respiratory failure needing intensive care and stillbirth if infected with COVID-19.(42-46) The risk of transmission of COVID-19 from infected mother to the neonate is low (between 1.6% and 10%), however, the route and timing of the transmission are often unclear.(3, 6)

Methods (Appendix 1)

- Peer-reviewed articles were identified through PubMed, Google and Google Scholar. The search terms used are outlined in Appendix 1.
- A grey literature search was conducted using Google and Google Scholar.

Results

Evidence for vaccinating breastfeeding and pregnant women and women who are on oral contraceptive pill

Key organisation recommendations and statements have been summarised below and ordered by priority for NSW.

Royal Australian and New Zealand College of Obstetricians and Gynaecologists and the Australian Technical Advisory Group on Immunisation (47)

- Recommend that pregnant women are routinely offered Pfizer mRNA vaccine (Cominarty) at any stage of pregnancy.
- Pregnant women are encouraged to discuss the decision in relation to the timing of vaccination with their health professional.
- Women who are trying to become pregnant do not need to delay vaccination or avoid becoming pregnant after vaccination.

National Centre for Immunisation Research and Surveillance, Australia (48)

- Comirnaty (Pfizer) vaccine is now routinely recommended for pregnant women.

- Comirnaty continues to be recommended for breastfeeding women and women planning pregnancy.
- If Comirnaty is not available, COVID-19 Vaccine AstraZeneca can be given to pregnant women if the benefits of vaccination outweigh the risks for the individual.
- Women who are breastfeeding don't need to stop breastfeeding after vaccination.
- Women who are planning pregnancy don't need to avoid becoming pregnant after vaccination.

Australian Breastfeeding Association, the Royal Australian and New Zealand College of Obstetricians and Gynaecologists and Baby Friendly New Zealand (49)

- Breastfeeding women do not need to stop breastfeeding to receive the vaccine.
- It is important for breastfeeding women to discuss vaccination with health professionals.

World Health Organization (36-38)

- Limited data on safety in pregnancy.
- Pregnant women may receive the vaccine if the benefit of vaccinating a pregnant woman outweighs the potential vaccine risks.
- Pregnant women at high risk of exposure or who have comorbidities, which add to their risk of severe disease, may be vaccinated in consultation with a healthcare provider.

American College of Obstetricians and Gynecologists (50)

- Pregnant and lactating women should be offered access to COVID-19 vaccines
- Individuals to be provided with information about efficacy, safety and uncertainties about the vaccines.
- A consultation with a clinician may be helpful, but not required.
- Vaccination may occur in any authorised setting similar to that of non-pregnant individuals.
- Pregnancy testing prior to vaccination not required.

Centre for Disease Control and Prevention (US) (46)

- Pregnant individuals with COVID-19 are at increased risk of severe illness.
- Limited data on the safety of vaccines in pregnant individuals.
- COVID-19 vaccines unlikely to cause risk to pregnant individuals or foetus.
- Pregnant and lactating individuals are eligible for and can receive a COVID-19 vaccine.
- Side effects of vaccines among pregnant individuals are expected to be similar to that of non-pregnant individuals.
- No recommendation for routine pregnancy testing before receipt of a COVID-19 vaccine.

Academy of Breastfeeding Medicine (51)

- Lactating individuals were excluded from vaccine trials.
- An informed and shared decision-making approach to decision making is recommended.
- Individuals who received COVID-19 vaccines are not recommended to cease breastfeeding.

- It is unlikely that the vaccine lipid enters the bloodstream or breast tissue, or intact nanoparticle or mRNA transfer into milk.
- Antibodies and T-cells triggered by the vaccine may transfer into milk.

Royal College of Obstetricians and Gynaecologists (UK) (52)

- Pregnant individuals should be offered COVID-19 vaccines at the same time as the rest of the population.
- Pregnant individuals can receive the COVID-19 vaccine even if they have not consulted a health professional.
- There is no evidence of COVID-19 vaccines affecting fertility and individuals do not need to avoid pregnancy after vaccination.
- There is no need to stop breastfeeding to be vaccinated.

European Board and College Obstetrics and Gynaecology (53)

- Pregnant women need to be considered a high-risk population for serious COVID-19 infection.
- Breastfeeding women are believed to have a similar risk of serious infection as non-pregnant women.
- The possibility of vaccination should be offered to all pregnant women, after being adequately informed of the benefits and risks.
- All health authorities and governments are urged to make vaccination available to all pregnant women wishing to take them.

International Federation of Fertility Societies and European Society of Human Reproduction and Embryology (54)

- Women who plan to conceive but are not yet pregnant can either:
 - defer pregnancy until steps to effectively mitigate the risk of the pandemic have been undertaken (i.e. substantially reduced virus transmission or availability of vaccines and ready access to prenatal care), or
 - proceed with efforts at conception, continue with mitigation measures and seek a COVID-19 vaccination as soon as possible.
- Women who are currently pregnant can either:
 - continue all established mitigation strategies and defer COVID-19 vaccination until after pregnancy, or
 - seek a COVID-19 vaccine as soon as possible and continue established mitigation strategies including social distancing, mask-wearing, and hand washing.

Italian scientific societies (55)

- Breastfeeding individuals are not recommended to be systematically invited to cease breastfeeding to be vaccinated.
- The decision to vaccinate should be based on mutual agreement between breastfeeding individuals and health professionals.

- The risk to infants being breastfed by vaccinated individuals is extremely low based on biological plausibility.

Appendix

PubMed search terms

Q1.

("infant, newborn"[MeSH Terms] OR "infant"[Title/Abstract] OR "newborn"[Title/Abstract] OR "newborn infant"[Title/Abstract] OR "neonatal"[Title/Abstract] OR "neonate"[Title/Abstract] OR "neonates"[Title/Abstract] OR "neonatality"[Title/Abstract] OR "neonatal"[Title/Abstract] OR "neonate's"[Title/Abstract]) AND ("2019-nCoV"[Title/Abstract] OR "ncov*"[Title/Abstract] OR "covid-19"[Title/Abstract] OR "covid19"[Title/Abstract] OR "covid-19"[Title/Abstract] OR "coronavirus"[MeSH Terms] OR "coronavirus"[Title/Abstract] OR "sars-cov-2"[Title/Abstract] OR "severe acute respiratory syndrome coronavirus 2"[Supplementary Concept]) AND 2019/12/01:3000/12/31[Date - Publication] AND "LitCTREATMENT"[Filter] AND (systematicreview[Filter])

49 hits on 26 May 2021.

Q3.

Search 1

("pregnant women"[MeSH Terms] OR "pregnan*"[Title/Abstract]) AND ("2019-nCoV"[Title/Abstract] OR "ncov*"[Title/Abstract] OR "covid-19"[Title/Abstract] OR "covid19"[Title/Abstract] OR "covid-19"[Title/Abstract] OR "coronavirus"[MeSH Terms] OR "coronavirus"[Title/Abstract] OR "sars-cov-2"[Title/Abstract] OR "severe acute respiratory syndrome coronavirus 2"[Supplementary Concept]) AND ("vaccin*"[Title/Abstract] OR "immuniz*"[Title/Abstract] OR "vaccination"[MeSH Terms]) AND 2019/12/01:3000/12/31[Date - Publication]

204 hits on 26 May 2021.

Search 2

("lactat*"[Title/Abstract] OR "lactation"[MeSH Terms] OR "breast feeding"[MeSH Terms] OR ("breast"[Title/Abstract] AND "feeding"[Title/Abstract]) OR "breast feeding"[Title/Abstract] OR "breastfeeding"[Title/Abstract]) AND ("2019-nCoV"[Title/Abstract] OR "ncov*"[Title/Abstract] OR "covid-19"[Title/Abstract] OR "covid19"[Title/Abstract] OR "covid-19"[Title/Abstract] OR "coronavirus"[MeSH Terms] OR "coronavirus"[Title/Abstract] OR "sars-cov-2"[Title/Abstract] OR "severe acute respiratory syndrome coronavirus 2"[Supplementary Concept]) AND ("vaccin*"[Title/Abstract] OR "immuniz*"[Title/Abstract] OR "vaccination"[MeSH Terms]) AND 2019/12/01:3000/12/31[Date - Publication]

73 hits on 26 May 2021.

Search 3

("contraceptives, oral, combined"[MeSH Terms] OR ("contraceptive*"[Title/Abstract] AND "oral"[Title/Abstract]) OR ("birth control"[Title/Abstract] AND "pill*"[Title/Abstract]) OR ("contraceptive*"[Title/Abstract] AND "pill*"[Title/Abstract])) AND ("2019-nCoV"[Title/Abstract] OR "ncov*"[Title/Abstract] OR "covid-19"[Title/Abstract] OR "covid19"[Title/Abstract] OR "covid-19"[Title/Abstract] OR "coronavirus"[MeSH Terms] OR "coronavirus"[Title/Abstract] OR "sars-cov-

2"[Title/Abstract] OR "severe acute respiratory syndrome coronavirus 2"[Supplementary Concept]) AND ("vaccin*" [Title/Abstract] OR "immuniz*" [Title/Abstract] OR "vaccination" [MeSH Terms])

3 hits on 26 May 2021.

Inclusion and exclusion criteria

Inclusion	Exclusion
<ul style="list-style-type: none"> Population: neonates, pregnant women, lactating women, women on oral contraceptive pill Intervention: management of neonates suspected, probable or confirmed to have COVID-19; vaccination of COVID-19 Study design: review studies, consensus statements, key organisation statements 	<ul style="list-style-type: none"> Management of pregnant mothers without the mention of management of neonates Not in English Not related to COVID-19

References

- Pettirosso E, Giles M, Cole S, et al. COVID-19 and pregnancy: A review of clinical characteristics, obstetric outcomes and vertical transmission. *Aust N Z J Obstet Gynaecol.* 2020 Oct;60(5):640-59. DOI: 10.1111/ajo.13204
- World Health Organization. Coronavirus disease (COVID-19): Pregnancy and childbirth Geneva: World Health Organization; 2021 [Available from: <https://www.who.int/news-room/q-a-detail/coronavirus-disease-covid-19-pregnancy-and-childbirth>].
- World Health Organization. Definition and categorization of the timing of mother-to-child transmission of SARS-CoV-2: Scientific Brief, 8 February 2021. Geneva: World Health Organization; 2021. Available from: <https://www.who.int/publications/i/item/WHO-2019-nCoV-mother-to-child-transmission-2021.1>
- Centers for Disease Control and Prevention. Evaluation and management considerations for neonates at risk for COVID-19. US Department of Health & Human Services; 2020. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/caring-for-newborns.html>
- Gale C, Quigley MA, Placzek A, et al. Characteristics and outcomes of neonatal SARS-CoV-2 infection in the UK: a prospective national cohort study using active surveillance. *Lancet Child Adolesc Health.* 2021 Feb;5(2):113-21. DOI: 10.1016/S2352-4642(20)30342-4
- Papapanou M, Papaioannou M, Petta A, et al. Maternal and neonatal characteristics and outcomes of COVID-19 in pregnancy: an overview of systematic reviews. *Int J Environ Res Public Health.* 2021 Jan 12;18(2). DOI: 10.3390/ijerph18020596
- Sankaran D, Nakra N, Cheema R, et al. Perinatal SARS-CoV-2 infection and neonatal COVID-19: a 2021 update. *Neoreviews.* 2021 May;22(5):e284-e95. DOI: 10.1542/neo.22-5-e1001
- Dhir SK, Kumar J, Meena J, et al. Clinical features and outcome of SARS-CoV-2 infection in neonates: a systematic review. *J Trop Pediatr.* 2020 Aug. DOI: 10.1093/tropej/fmaa059
- Raschetti R, Vivanti AJ, Vauloup-Fellous C, et al. Synthesis and systematic review of reported neonatal SARS-CoV-2 infections. *Nat Commun.* 2020 Oct 15;11(1):5164. DOI: 10.1038/s41467-020-18982-9
- Schwartz DA, Mohagheghi P, Beigi B, et al. Spectrum of neonatal COVID-19 in Iran: 19 infants with SARS-CoV-2 perinatal infections with varying test results, clinical findings and outcomes. *J Matern -Fetal Neonatal Med.* 2020 Aug 12:1-10. DOI: 10.1080/14767058.2020.1797672



11. Salma U. Relationship of COVID-19 with pregnancy. *Taiwan J Obstet Gynecol.* 2021 May;60(3):405-11. DOI: 10.1016/j.tjog.2021.03.005
12. Queensland Health. Maternity care for mothers and babies during the COVID-19 pandemic. Guideline No. MN20.63-V5-R25. Brisbane: Queensland Health; 2020 [updated March 2021; cited 2021 Jul 1]. Available from: https://www.health.qld.gov.au/data/assets/pdf_file/0033/947148/g-covid-19.pdf.
13. Shalish W, Lakshminrusimha S, Manzoni P, et al. COVID-19 and neonatal respiratory care: current evidence and practical approach. *Am J Perinatol.* 2020;37(8):780. DOI: 10.1055/s-0040-1710522
14. World Health Organization. COVID-19 clinical management: living guidance, 25 January 2021. World Health Organization; 2021. Available from: <https://www.who.int/publications/i/item/WHO-2019-nCoV-clinical-2021-1>
15. Auriti C, De Rose DU, Mondì V, et al. Neonatal SARS-CoV-2 infection: practical tips. *Pathogens.* 2021;10(5):611. DOI: 10.3390/pathogens10050611
16. Centers for Disease Control and Prevention. Interim guidance on breastfeeding and breast milk feeds in the context of COVID-19. US Department of Health & Human Services; 2020. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/care-for-breastfeeding-women.html>
17. World Health Organization. Breastfeeding and COVID-19 Geneva: World Health Organization; 2020 [updated 2020 Jun 23; cited 2021 May 26]. Available from: https://www.who.int/publications/i/item/WHO-2019-nCoV-Sci_Brief-Breastfeeding-2020.1.
18. Australian Breastfeeding Association. COVID-19 Melbourne: Australian Breastfeeding Association; 2021 [updated June 2021 Jul 1]. Available from: <https://www.breastfeeding.asn.au/bfinfo/covid-19>.
19. COVID-19 Treatment Guidelines Panel. Coronavirus disease 2019 (COVID-19) treatment guidelines: National Institutes of Health; 2021 [updated 2021 Jun 17 Jul 1]. Available from: <https://www.covid19treatmentguidelines.nih.gov>.
20. Pooririsak P, Bivolarova MP, Bekö G, et al. Aerosol generation by respiratory support of neonates may be low. *Acta Paediatr.* 2020. DOI: 10.1111/apa.15704
21. US Food and Drug Administration. Fact sheet for healthcare providers: emergency use authorization (EUA) of veklury (remdesivir) for hospitalized pediatric patients weighing 3.5 kg to less than 40 kg or hospitalized pediatric patients less than 12 years of age weighing at least 3.5 kg. US Food and Drug Administration; 2020. Available from: <https://www.fda.gov/media/137566/download>
22. Saikia B, Tang J, Robinson S, et al. Neonates with SARS-CoV-2 infection and pulmonary disease safely treated with remdesivir. *Pediatr Infect Dis J.* 2021 May 1;40(5):e194-e6. DOI: 10.1097/INF.0000000000003081
23. Hopwood AJ, Jordan-Villegas A, Gutierrez LD, et al. Severe acute respiratory syndrome coronavirus-2 pneumonia in a newborn treated with remdesivir and coronavirus disease 2019 convalescent plasma. *J Pediatric Infect Dis Soc.* 2021 May 28;10(5):691-4. DOI: 10.1093/jpids/piaa165
24. Frauenfelder C, Brierley J, Whittaker E, et al. Infant with SARS-CoV-2 infection causing severe lung disease treated with remdesivir. *Pediatrics.* 2020 Sep;146(3). DOI: 10.1542/peds.2020-1701
25. Wardell H, Campbell JI, VanderPluym C, et al. Severe acute respiratory syndrome coronavirus 2 infection in febrile neonates. *J Pediatric Infect Dis Soc.* 2020 Nov 10;9(5):630-5. DOI: 10.1093/jpids/piaa084
26. Stafford IA, Parchem JG, Sibai BM. The coronavirus disease 2019 vaccine in pregnancy: risks, benefits, and recommendations. *Am J Obstet Gynecol.* 2021 May;224(5):484-95. DOI: 10.1016/j.ajog.2021.01.022
27. Gray KJ, Bordt EA, Atyeo C, et al. Coronavirus disease 2019 vaccine response in pregnant and lactating women: a cohort study. *Am J Obstet Gynecol.* 2021 Mar 26:S0002-9378(21)00187-3. DOI: 10.1016/j.ajog.2021.03.023

28. Shimabukuro TT, Kim SY, Myers TR, et al. Preliminary findings of mRNA COVID-19 vaccine safety in pregnant persons. *N Engl J Med*. 2021 Apr 21;384(24):2273-82. DOI: 10.1056/NEJMoa2104983
29. Shanes ED, Otero S, Mithal LB, et al. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) vaccination in pregnancy: measures of immunity and placental histopathology. *Obstet Gynecol*. 2021 May 11. DOI: 10.1097/aog.0000000000004457
30. Drugs and Lactation Database (LactMed) [Internet]. Bethesda, Maryland, USA: National Library of Medicine (US); 2006- [updated 17 May 2021. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK565969/>.
31. Paul G, Chad R. Newborn antibodies to SARS-CoV-2 detected in cord blood after maternal vaccination - a case report. *BMC Pediatr*. 2021 Mar 22;21(1):138. DOI: 10.1186/s12887-021-02618-y
32. Beharier O, Plitman Mayo R, Raz T, et al. Efficient maternal to neonatal transfer of antibodies against SARS-CoV-2 and BNT162b2 mRNA COVID-19 vaccine. *J Clin Invest*. 2021 May 20. DOI: 10.1172/jci150319
33. Collier AY, McMahan K, Yu J, et al. Immunogenicity of COVID-19 mRNA vaccines in pregnant and lactating women. *Jama*. 2021 May 13. DOI: 10.1001/jama.2021.7563
34. Rottenstreich A, Zarbiv G, Oiknine-Djian E, et al. Efficient maternofetal transplacental transfer of anti-SARS-CoV-2 spike antibodies after antenatal SARS-CoV-2 BNT162b2 mRNA vaccination. *Clin Infect Dis*. 2021 Apr 3. DOI: 10.1093/cid/ciab266
35. Prabhu M, Murphy EA, Sukhu AC, et al. Antibody response to coronavirus disease 2019 (COVID-19) messenger RNA vaccination in pregnant women and transplacental passage into cord blood. *Obstet Gynecol*. 2021 Apr 28. DOI: 10.1097/aog.0000000000004438
36. World Health Organization. The Pfizer BioNTech COVID-19 vaccine: What you need to know Geneva: World Health Organization,; 2021 [updated 2021 Apr 2021 May 26]. Available from: <https://www.who.int/news-room/feature-stories/detail/who-can-take-the-pfizer-biontech-covid-19-vaccine>.
37. World Health Organization. The Moderna COVID-19 (mRNA-1273) vaccine: what you need to know Geneva: World Health Organization,; 2021 [updated 2021 Jan 26; cited 2021 May 26]. Available from: <https://www.who.int/news-room/feature-stories/detail/the-moderna-covid-19-mrna-1273-vaccine-what-you-need-to-know>.
38. World Health Organization. The Oxford/AstraZeneca COVID-19 vaccine: what you need to know Geneva: World Health Organization,; 2021 [updated 2021 Apr 19; cited 2021 May 26]. Available from: <https://www.who.int/news-room/feature-stories/detail/the-oxford-astrazeneca-covid-19-vaccine-what-you-need-to-know>.
39. Clinical Excellence Commission. COVID-19 infection prevention and control manual for acute and non-acute healthcare settings Sydney, Australia: Clinical Excellence Commission; 2021 [Available from: <https://www.cec.health.nsw.gov.au/keep-patients-safe/COVID-19/COVID-19-IPAC-manual>].
40. NSW Government. Public Health (COVID-19 Gathering Restrictions) Order (No 2) 2021 1 June 2021 [cited 2021 1 July]. Available from: https://gazette.legislation.nsw.gov.au/so/download.w3p?id=Gazette_2021_2021-231.pdf.
41. Department of Health. Minimising the risk of infectious respiratory disease transmission in the context of COVID-19: the hierarchy of controls Canberra, Australia: Commonwealth of Australia; 2021 [updated 2021 Apr 30; cited 2021 May 26]. Available from: <https://www.health.gov.au/resources/publications/minimising-the-risk-of-infectious-respiratory-disease-transmission-in-the-context-of-covid-19-the-hierarchy-of-controls>.
42. Dashraath P, Nielsen-Saines K, Madhi SA, et al. COVID-19 vaccines and neglected pregnancy. *Lancet*. 2020 Sep 5;396(10252):e22. DOI: 10.1016/s0140-6736(20)31822-5
43. Collin J, Byström E, Carnahan A, et al. Public Health Agency of Sweden's brief report: pregnant and postpartum women with severe acute respiratory syndrome coronavirus 2 infection in intensive care in Sweden. *Acta Obstet Gynecol Scand*. 2020 May 9;99(7):819-22. DOI: 10.1111/aogs.13901

44. Ellington S, Strid P, Tong VT, et al. Characteristics of women of reproductive age with laboratory-confirmed SARS-CoV-2 infection by pregnancy status - United States, January 22-June 7, 2020. *MMWR Morb Mortal Wkly Rep.* 2020 Jun 26;69(25):769-75. DOI: 10.15585/mmwr.mm6925a1
45. Khalil A, Von Dadelszen P, Draycott T, et al. Change in the incidence of stillbirth and preterm delivery during the COVID-19 pandemic. *Jama.* 2020 Jun;324(7):705-6. DOI: 0.1001/jama.2020.12746
46. Centers for Disease Control and Prevention. Interim clinical considerations for use of COVID-19 Vaccines currently authorized in the United States: vaccination of pregnant or lactating people Washington, DC, USA: US Department of Health & Human Services; 2021 [updated 1 June 2021; cited 2021 May 26]. Available from: <https://www.cdc.gov/vaccines/covid-19/clinical-considerations/covid-19-vaccines-us.html#pregnant>.
47. Royal Australian and New Zealand College of Obstetricians and Gynaecologists, Australian Technical Advisory Group on Immunisation. Joint statement between RANZCOG and ATAGI about COVID-19 vaccination for pregnant women Canberra: Australian Government Department of Health; 2021 [cited 2021 17 June]. Available from: <https://www.health.gov.au/news/joint-statement-between-ranzcog-and-atagi-about-covid-19-vaccination-for-pregnant-women>.
48. National Centre for Immunisation Research and Surveillance. COVID-19 vaccines: Frequently asked questions Sydney: NCIRS; 2021 [updated 9 June 2021; cited 2021 17 June]. Available from: <https://www.ncirs.org.au/covid-19/covid-19-vaccines-frequently-asked-questions>.
49. Australian Breastfeeding Association, Royal Australian and New Zealand College of Obstetricians and Gynaecologists, Baby Friendly New Zealand. COVID-19 vaccine and breastfeeding. Melbourne, Australia: Australian Breastfeeding Association; 2021. Available from: <https://www.breastfeeding.asn.au/system/files/RANZCOG-ABA-NZBA%20COVID-19%20vaccination%20and%20breastfeeding%20infographic%20final.pdf>
50. American College of Obstetricians and Gynecologists (ACOG). Vaccinating Pregnant and Lactating Patients Against COVID-19 Washington, DC: ACOG; 2020 [updated 28 April 2021].
51. Academy of Breastfeeding Medicine. ABM statement: considerations for COVID-19 vaccination in lactation Chicago, IL: ABM; 2020 [Available from: https://abm.memberclicks.net/abm-statement-considerations-for-covid-19-vaccination-in-lactation?fbclid=IwAR0LC26lCj_pJmpIHMa5QGdq9V8bN5XQsdIBYSyTXoYJMwqEP4SJV2k5xw].
52. Royal College of Obstetricians and Gynaecologists. COVID-19 vaccines, pregnancy and breastfeeding London: Royal College of Obstetricians and Gynaecologists 2021 [cited 2021 2 June]. Available from: <https://www.rcog.org.uk/en/guidelines-research-services/coronavirus-covid-19-pregnancy-and-womens-health/covid-19-vaccines-and-pregnancy/covid-19-vaccines-pregnancy-and-breastfeeding/>.
53. Martins I, Louwen F, Ayres-de-Campos D, et al. EBCOG position statement on COVID-19 vaccination for pregnant and breastfeeding women. *Eur J Obstet Gynecol Reprod Biol.* 2021 May 14. DOI: 10.1016/j.ejogrb.2021.05.021
54. Ory S, Veiga A, Horton M, et al. Joint IFFS/ESHRE statement on COVID-19 vaccination for pregnant women and those considering pregnancy. *Hum Reprod Open.* 2021 Apr 16;2021(2):hoab016. DOI: 10.1093/hropen/hoab016
55. Davanzo R, Agosti M, Cetin I, et al. Breastfeeding and COVID-19 vaccination: position statement of the Italian scientific societies. *Ital J Pediatr.* 2021 Feb 27;47(1):45. DOI: 10.1186/s13052-021-00998-6

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