



# National Immunisation Advisory Committee

RECOMMENDATIONS  
COVID-19 VACCINATION IN PREGNANCY

NIAC | 26.04.2021

## About NIAC

NIAC includes representatives from the RCPI, its Faculties and Institutes, the RCSI, the ICGP, the National Immunisation Office, the Nursing and Midwifery Board of Ireland, the Infectious Diseases Society of Ireland, the Travel Medicine Society, the National Virus Reference Laboratory and lay members. Meetings are also attended by representatives from the Department of Health and the HSE, Representatives of the Health Products Regulatory Agency attend to provide regulatory advice in relation to vaccines.

This group of experts meets to consider new evidence about vaccines and provide advice to the Chief Medical Officer and the Department of Health. The Department and the Minister for Health make policy decisions on vaccines which are implemented by the HSE.

<https://www.rcpi.ie/policy-and-advocacy/national-immunisation-advisory-committee/>

## Executive summary

This document sets out the most up to date National Immunisation Advisory Committee (NIAC) recommendations for COVID-19 vaccination of pregnant women.

Pregnant women are at similar risk of COVID-19 infection to non-pregnant women of the same age. The overall risk of severe illness in pregnancy is low. However, pregnant women with COVID-19 infection are more likely to develop serious disease or to die than either pregnant women without COVID-19 or similar aged non-pregnant women with COVID-19. Additionally, COVID-19 in pregnancy may increase the risk of adverse pregnancy outcomes, such as preterm birth, compared with pregnant women without COVID-19.

In Ireland, the epidemiology of intensive care admissions in pregnant and postpartum women with COVID-19 changed between the first and subsequent waves. COVID-19 in pregnancy is a risk factor for admission to ICU and although absolute numbers are not high, they are disproportionate to the number of pregnant women in the population. There is evidence of an increase in premature delivery and in the stillbirth rate in Ireland and the UK in 2021.

There is no evidence that any COVID-19 vaccine affects fertility or the fetus. No unexpected pregnancy or infant outcomes have been observed related to COVID-19 vaccination during pregnancy.

There is limited data regarding efficacy of vaccines in pregnancy but no evidence to show they are less efficacious than in the population. Emerging data indicates that the maternal COVID-19 antibodies can cross the placenta, which may offer neonatal protection.

Pregnancy is a time sensitive condition. There is a specific window during which vaccination can be offered (14-36 weeks).

NIAC has made the following recommendation for COVID-19 vaccination in pregnancy:

### **Recommendation**

Pregnant women should be offered mRNA COVID-19 vaccination between 14-36 weeks gestation following an individual benefit/risk discussion with their obstetric care giver

**This advice may be revised as more information becomes available or if the epidemiological situation changes.**

## Introduction

The National Immunisation Advisory Committee (NIAC) regularly reviews the evidence relating to safety and efficacy of COVID-19 vaccines in pregnancy.

This document sets out the most up to date recommendations for COVID-19 vaccination of pregnant women.

## Background

Pregnant women are at similar risk of COVID-19 infection to non-pregnant women of the same age. The overall risk of severe illness in pregnancy is low. However, pregnant women with COVID-19 infection are more likely to develop serious disease or to die than either pregnant women without COVID-19 or similar aged non-pregnant women with COVID-19.

Additionally, pregnant women with COVID-19 might be at increased risk of adverse pregnancy outcomes, such as preterm birth, compared with pregnant women without COVID-19.

NIAC currently recommends that administration of COVID-19 vaccines in pregnancy should only be considered when the potential benefits outweigh any potential risks for the mother and fetus. Pregnant women at high risk of severe disease and healthcare workers should be referred to their obstetrician or GP to discuss the risks and benefits of COVID-19 vaccine.

If the benefit/risk ratio is favourable, COVID-19 vaccine should be offered. The two-dose schedule should not commence before 14 weeks gestation and should be completed by 36 weeks gestation. To assist with the decision making, NIAC collaborated with the Institute of Obstetricians and Gynaecologists (IOG) in developing a [frequently asked questions](#) document and [decision aid](#).

An updated review of the evidence for COVID-19 vaccination in pregnancy was conducted by NIAC in April 2021. A consultation process involving the Maternal Fetal Medicine specialists & Obstetricians within the IOG took place. The Irish Medicines in Pregnancy service in the Rotunda Hospital was also involved in reviewing the evidence.

## Discussion

### COVID-19 Morbidity and Mortality in Pregnancy

Pregnant women are at similar risk of contracting COVID-19 to their peers but pregnant women who contract COVID-19 are at higher risk of hospitalisation, preterm birth, ICU admission and death. Pregnant women admitted to hospital with symptomatic COVID-19 have worse outcomes, including an increased risk of death, compared to pregnant women without COVID-19.

The UK Obstetric Surveillance System (UKOSS) published a report on pregnant women admitted to hospital with confirmed COVID-19 in the UK covering the period from 1 March 2020 to 31 August 2020. During that time 1,148 hospitalised women had COVID-19 in pregnancy. Most (63%) were symptomatic with COVID-19; however, this includes many women from the first wave of the pandemic, when testing was only performed for symptomatic individuals.

Of the 1,148 pregnant women admitted to hospital, 63 (5%) required critical care. Six of these women died from COVID-19, giving a maternal mortality rate of 2.2 hospitalised women per 100,000 maternities (95% CI 0.9–4.3). The UK maternal mortality rate for March 2020–February 2021 may be at least 20% higher than in previous recent years (12/100,000 pregnancies compared to 10/100,000). There are also reports of increased maternal mortality rates from countries including Italy, Brazil, South Africa and Mexico. A study of patients in UK in December 2020 and January 2021 found that one in nine women under the age of 50 in ICU were either pregnant or had recently given birth. The preterm birth rate among symptomatic women was 18% (2.5 times the background rate).

In many studies symptomatic COVID-19 in pregnancy was mainly diagnosed in the third trimester. The severe illness and deaths reported occurred in the third trimester and the postpartum period. Women in the last trimester with COVID-19 have more difficulty with ventilation and cannot easily be placed prone, and delivery to relieve the added circulatory and respiratory burden is often required.

In Ireland, seven pregnant or postpartum women with COVID-19 were admitted to ICU in the first and second waves (March to November 2020 compared to 16 from 22 November 2020 to April 10, 2021, As a proportion of women of reproductive age this latter figure is higher than expected (16/49) 32%)

## Adverse Perinatal Outcomes

Pregnant women have particular risks not borne by the non-pregnant, including the risk of stillbirth, premature birth and potential adverse infant outcomes. An international systematic review estimated the risk of preterm birth to be approximately 17%. Most of these preterm deliveries (94%) were induced to improve maternal oxygenation.

There appears to be an additional risk of stillbirth / late miscarriage in Ireland in the third wave. There have been 7 cases causally linked to COVID-19 placentitis. This is an inflammatory condition of the placenta which impedes nutrient transfer to the fetus. Cases occurred between 0 and 21 days from confirmation of COVID-19 infection. Between January- March 2021, there were 840 confirmed COVID-19 positive pregnant women (likely an underestimate). This gives an estimated risk of COVID-related stillbirth of 8.3/1000, compared to a pre-pandemic rate of 2.8/1000. This suggests that COVID-19 in pregnancy may increase the risk of stillbirth. Five of these cases were laboratory confirmed as related to the B1.1.7. variant, which may explain the clustering in early 2021.

A UK Obstetric Surveillance System (UKOSS) report from 25 March 2021 indicates a stillbirth rate of pregnant women with COVID-19 of approximately 10/1000, higher than the background rate of 4/1000.

## Gestational Considerations

Pregnancy is a time sensitive condition. There is a specific window during which vaccination is recommended (14-36 weeks). It is estimated that, in Ireland, out of 47,500 pregnant women, approximately 20,000 will be eligible at any time point.

## Safety of COVID-19 vaccines

Pregnant women were not intentionally recruited to the initial trials. Trials of the COVID-19 vaccines are now taking place in pregnant women, and results are expected in the coming months.

Animal reproductive toxicology studies of the mRNA and COVID-19 vaccine Janssen vaccines did not identify any safety concerns. A preliminary animal reproductive toxicity study of Vaxzevria<sup>®</sup> COVID-19 vaccine AstraZeneca did not show toxicity.

There is no evidence that any COVID-19 vaccine affects the fetus or fertility. Over 96,000 mRNA vaccinations in pregnancy have been reported to the CDC in the US as of 13 April 2021. A similar number have received Comirnaty<sup>®</sup> Pfizer/BioNTech mRNA vaccine in Israel. All information shows pregnancy complication rates similar to what would normally be expected. No unexpected

pregnancy or infant outcomes have been observed related to COVID-19 vaccination during pregnancy. Long term follow up of vaccine recipients is ongoing.

## Efficacy of COVID-19 vaccines

There is limited data regarding efficacy of vaccines in pregnancy, but there is no evidence that they are less efficacious than in the general population. There is some emerging data indicating that maternal COVID-19 antibodies cross the placenta, raising the likelihood of neonatal protection.

## Current recommendations for COVID-19 vaccination in pregnancy

### Ireland

NIAC currently recommends that administration of COVID-19 vaccines in pregnancy should only be considered when the potential benefits outweigh any potential risks for the mother and fetus. Pregnant women at high risk of severe disease and healthcare workers should be referred to their obstetrician or GP to discuss the risks and benefits of COVID-19 vaccine.

If the benefit/risk is favourable, vaccination should not commence before 14 weeks gestation and should be completed by 36 weeks gestation.

## International Recommendations

### European Network of Teratology Information Services

Vaccination is currently the most effective measure to reduce the risks associated with COVID-19 disease in pregnant women. Current safety data are reassuring, leading to a favourable benefit-risk ratio for COVID-19 vaccination in pregnancy.

[ENTIS Position Statement; COVID-19 vaccines in pregnancy and lactation](#)

### France

A mRNA COVID-19 vaccine was recommended for pregnant women with a high-risk medical condition up to 1 April 2021. Since then, a mRNA COVID-19 vaccine is now recommended for all pregnant women.

[The vaccination strategy and the list of priority audiences](#)  
[Should pregnant women be vaccinated against COVID-19?](#)

## **Italy**

Vaccination should be considered for pregnant women at high risk of exposure or with underlying conditions predisposing them to poor outcomes.

[The use of COVID-19 vaccines in pregnant and lactating patients](#)

## **Netherlands**

The Health ministry advises against vaccination in pregnancy except for where a woman is deemed high risk.

[www.government.nl](http://www.government.nl)

## **UK**

The Joint Committee on Vaccination and Immunisation (JCVI) advises that all pregnant women should have access to COVID-19 vaccination, preferably mRNA vaccines where available.

[The Green Book Chapter 14a](#)

## **Israel**

The vaccine is available to women at any stage of pregnancy who wish to receive it, although first trimester vaccination is only recommended for women in risk groups.

[Vaccinating Women who are Planning a Pregnancy, Pregnant or Breastfeeding with the COVID-19 Vaccine – Clarification](#)

## **USA**

All pregnant women are advised to avail of vaccination with no gestational limits. The CDC advises that pregnant women can choose to become vaccinated with any of the authorised vaccines (Pfizer or Moderna).

[Vaccination of pregnant or lactating people](#)

## **Canada**

The National Advisory Committee on Immunization recommends that a mRNA COVID-19 vaccine may be offered to pregnant individuals in the authorized age group if a risk assessment deems that the benefits outweigh the potential risks for the individual and the fetus.

[Recommendations on authorized COVID-19 vaccines for public health program level decision-making](#)

The Society of Obstetricians and Gynecologists of Canada recommends prioritisation of women who are more than 20 weeks pregnant for vaccination. They also recommend that all pregnant women should be eligible for vaccination.

[SOGC Statement on COVID-19 Vaccination in Pregnancy](#)

## Conclusions

In Ireland, the epidemiology of intensive care admissions in pregnant and postpartum women with COVID-19 changed between the first and subsequent waves. COVID-19 in pregnancy is a risk factor for admission to ICU and although absolute numbers are not high, they are disproportionate to the number of pregnant women in the population. There is evidence of an increase in premature delivery and in the stillbirth rate in Ireland and the UK in 2021.

There is no evidence that any COVID-19 vaccine affects the fetus or fertility. No unexpected pregnancy or infant outcomes have been observed related to COVID-19 vaccination during pregnancy.

There is limited data regarding efficacy of vaccines in pregnancy but no evidence to show they are less efficacious than in the population. Emerging data indicate that the maternal COVID-19 antibodies can cross the placenta, which may offer neonatal protection. To date, the side effects of the vaccines in pregnant women is similar to that expected.

Pregnancy is a time sensitive condition. There is a specific window during which vaccination can be offered (14-36 weeks).

## Recommendation for COVID-19 vaccination in pregnancy

**This advice may be revised as more information becomes available or if the epidemiological situation changes.**

### **Recommendation**

Pregnant women should be offered mRNA COVID-19 vaccination between 14-36 weeks gestation following an individual benefit/risk discussion with their obstetric care giver

## References

American College of Obstetricians and Gynecologists' Immunization, Infectious Disease, and Public Health Preparedness Expert Work Group. Vaccinating Pregnant and Lactating Patients Against COVID-19 [Internet]. [cited 2021 Mar 29]. Available from:

<https://www.acog.org/en/clinical/clinical-guidance/practice-advisory/articles/2020/12/vaccinating-pregnant-and-lactating-patients-against-covid-19>

Allotey J, Stallings E, Bonet M, Yap M, Chatterjee S, Kew T, et al. Clinical manifestations, risk factors, and maternal and perinatal outcomes of coronavirus disease 2019 in pregnancy: living systematic review and meta-analysis. *BMJ*. 2020 Sep 1;370:m3320.

Basu JK, Chauke L, Magoro T. Maternal mortality from COVID 19 among South African pregnant women. *J Matern-Fetal Neonatal Med Off J Eur Assoc Perinat Med Fed Asia Ocean Perinat Soc Int Soc Perinat Obstet*. 2021 Mar 22;1–3.

BioNTech SE. A PHASE 2/3, PLACEBO-CONTROLLED, RANDOMIZED, OBSERVER-BLIND STUDY TO EVALUATE THE SAFETY, TOLERABILITY, AND IMMUNOGENICITY OF A SARS-COV-2 RNA VACCINE CANDIDATE (BNT162b2) AGAINST COVID-19 IN HEALTHY PREGNANT WOMEN 18 YEARS OF AGE AND OLDER [Internet]. *clinicaltrials.gov*; 2021 Mar [cited 2021 Mar 28]. Report No.: NCT04754594. Available from: <https://clinicaltrials.gov/ct2/show/NCT04754594>

CDC. V-safe COVID-19 Vaccine Pregnancy Registry [Internet]. Centers for Disease Control and Prevention. 2020 [cited 2021 Apr 13]. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/safety/vsafepregnancyregistry.html>

CDC. COVID-19 and Your Health [Internet]. Centers for Disease Control and Prevention. 2020 [cited 2021 Mar 26]. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-with-medical-conditions.html>

Ceulemans M, Foulon V, Panchaud A, Winterfeld U, Pomar L, Lambelet V, et al. Vaccine Willingness and Impact of the COVID-19 Pandemic on Women's Perinatal Experiences and Practices—A Multinational, Cross-Sectional Study Covering the First Wave of the Pandemic. *Int J Environ Res Public Health*. 2021 Jan;18(7):3367.

Di Guardo F, Di Grazia FM, Di Gregorio LM, Zambrotta E, Carrara G, Gulino FA, et al. Poor maternal-neonatal outcomes in pregnant patients with confirmed SARS-Cov-2 infection: analysis of 145 cases. *Arch Gynecol Obstet*. 2021 Jan 3;

European Network of Teratology Information Services. ENTIS Position Statement; COVID-19 vaccines in pregnancy and lactation – ENTIS [Internet]. [cited 2021 Apr 18]. Available from:

<https://www.entis-org.eu/entis-news/entis-position-statement-covid-19-vaccines-in-pregnancy-and-lactation>

Friedman MR, Kigel A, Bahar Y, Yogev Y, Dror Y, Lubetzky R, et al. BNT162b2 COVID-19 mRNA vaccine elicits a rapid and synchronized antibody response in blood and milk of breastfeeding women. medRxiv. 2021 Jan 1;2021.03.06.21252603.

Gray KJ, Bordt EA, Atyeo C, Deriso E, Akinwunmi B, Young N, et al. COVID-19 vaccine response in pregnant and lactating women: a cohort study. Am J Obstet Gynecol [Internet]. 2021 Mar 25 [cited 2021 Apr 12];0(0). Available from: [https://www.ajog.org/article/S0002-9378\(21\)00187-3/abstract](https://www.ajog.org/article/S0002-9378(21)00187-3/abstract)

Hsu AL, Guan M, Johannesen E, Stephens AJ, Khaleel N, Kagan N, et al. Placental SARS-CoV-2 in a pregnant woman with mild COVID-19 disease. J Med Virol. 2021 Feb;93(2):1038–44.

Hosier H, Farhadian SF, Morotti RA, Deshmukh U, Lu-Culligan A, Campbell KH, et al. SARS-CoV-2 infection of the placenta. J Clin Invest. 2020 Sep 1;130(9):4947–53.

Intensive Care National Audit & Research Centre. ICNARC report on COVID-19 in critical care: England, Wales and Northern Ireland 26 March 2021 [Internet]. 2021. Available from: <https://www.icnarc.org/DataServices/Attachments/Download/b5f59585-5870-ea11-9124-00505601089b>

Knight M, Rema Ramakrishnan, Kathryn Bunch, Nicola Vousden, Jennifer J K, Sarah Dunn, et al. UKOSS/ISARIC/CO-CIN: Females in Hospital with SARS-CoV-2 infection, the association with pregnancy and pregnancy outcomes, 25 March 2021 [Internet]. GOV.UK. [cited 2021 Apr 12]. Available from: <https://www.gov.uk/government/publications/ukossisaricco-cin-females-in-hospital-with-sars-cov-2-infection-the-association-with-pregnancy-and-pregnancy-outcomes-25-march-2021>

Knight M, Bunch K, Vousden N, Morris E, Simpson N, Gale C, et al. Characteristics and outcomes of pregnant women admitted to hospital with confirmed SARS-CoV-2 infection in UK: national population based cohort study. BMJ. 2020 Jun 8;369:m2107.

Martinez-Portilla RJ, Smith ER, He S, Torres-Torres J, Espino-Y-Sosa S, Solis-Paredes JM, et al. Young pregnant women are also at an increased risk of mortality and severe illness due to coronavirus disease 2019: analysis of the Mexican National Surveillance Program. Am J Obstet Gynecol. 2021 Apr 1;224(4):404–7.

Menezes MO, Takemoto MLS, Nakamura-Pereira M, Katz L, Amorim MMR, Salgado HO, et al. Risk factors for adverse outcomes among pregnant and postpartum women with acute respiratory distress syndrome due to COVID-19 in Brazil. Int J Gynaecol Obstet Off Organ Int Fed Gynaecol Obstet. 2020 Dec;151(3):415–23.

Mercedes BR, Serwat A, Naffaa L, Ramirez N, Khalid F, Steward SB, et al. New-onset myocardial injury in pregnant patients with coronavirus disease 2019: a case series of 15 patients. *Am J Obstet Gynecol*. 2021 Apr;224(4):387.e1-387.e9.

Nakamura-Pereira M, Knobel R, Menezes MO, Andreucci CB, Takemoto MLS. The impact of the COVID-19 pandemic on maternal mortality in Brazil: 523 maternal deaths by acute respiratory distress syndrome potentially associated with SARS-CoV-2. *Int J Gynecol Obstet* [Internet]. [cited 2021 Mar 26];n/a(n/a). Available from:

<https://obgyn.onlinelibrary.wiley.com/doi/abs/10.1002/ijgo.13643>

Souza ASR, Amorim MMR. Maternal mortality by COVID-19 in Brazil. *Rev Bras Saúde Materno Infant*. 2021 Feb;21(suppl 1):253–6.

Kadiwar S, Smith JJ, Ledot S, Johnson M, Bianchi P, Singh N, et al. Were pregnant women more affected by COVID-19 in the second wave of the pandemic? *The Lancet* [Internet]. 2021 Apr 14 [cited 2021 Apr 18];0(0). Available from:

[https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(21\)00716-9/abstract](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)00716-9/abstract)

Lokken EM, Huebner EM, Taylor GG, Hendrickson S, Vanderhoeven J, Kachikis A, et al. Disease severity, pregnancy outcomes, and maternal deaths among pregnant patients with severe acute respiratory syndrome coronavirus 2 infection in Washington State. *Am J Obstet Gynecol* [Internet]. 2021 Jan 26 [cited 2021 Apr 12];0(0). Available from:

[https://www.ajog.org/article/S0002-9378\(21\)00033-8/abstract](https://www.ajog.org/article/S0002-9378(21)00033-8/abstract)

Patberg ET, Adams T, Rekawek P, Vahanian SA, Akerman M, Hernandez A, et al. Coronavirus disease 2019 infection and placental histopathology in women delivering at term. *Am J Obstet Gynecol*. 2021 Apr 1;224(4):382.e1-382.e18.

Poisson TM, Pierone G. Placental pathology and fetal demise at 35 weeks of gestation in a woman with SARS-CoV-2 infection: A case report. *Case Rep Womens Health*. 2021 Apr;30:e00289.

Royal College of Obstetricians & Gynaecologists. 2021 [cited 2021 Apr 18]. Vaccine choice for pregnant women welcomed by maternity Royal Colleges [Internet]. Available from:

<https://www.rcog.org.uk/en/news/vaccine-choice-pregnant-women-welcomed-maternity-royal-colleges/>

Schwartz DA, Morotti D. Placental Pathology of COVID-19 with and without Fetal and Neonatal Infection: Trophoblast Necrosis and Chronic Histiocytic Intervillositis as Risk Factors for Transplacental Transmission of SARS-CoV-2. *Viruses*. 2020 Nov 15;12(11).

Shimabukuro T, Advisory Committee on Immunization Practices (ACIP), CDC COVID 19 Vaccine Janssen Vaccines & Prevention B.V. An Open-label, Phase 2 Study to Evaluate the Safety,

Reactogenicity, and Immunogenicity of Ad26.COVID-19 in Healthy Pregnant Participants [Internet]. *clinicaltrials.gov*; 2021 Mar [cited 2021 Mar 28]. Report No.: NCT04765384. Available from: <https://clinicaltrials.gov/ct2/show/NCT04765384>

Shimabukoro et al (2021) Preliminary Findings of mRNA Covid-19 Vaccine Safety in Pregnant Persons. published on April 21, 2021, at *NEJM.org*. DOI: 10.1056/NEJMoa2104983  
<https://www.nejm.org/doi/full/10.1056/NEJMoa2104983>

Society for Maternal-Fetal Medicine. Society for Maternal-Fetal Medicine (SMFM) Statement: SARS-CoV-2 Vaccination in Pregnancy [Internet]. 2021 [cited 2021 Mar 29]. Available from: [https://s3.amazonaws.com/cdn.smfm.org/media/2591/SMFM\\_Vaccine\\_Statement\\_12-1-20\\_\(final\).pdf](https://s3.amazonaws.com/cdn.smfm.org/media/2591/SMFM_Vaccine_Statement_12-1-20_(final).pdf)

Task Force. COVID-19 vaccine safety update [Internet]. 2021. Available from: <https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2021-02/28-03-01/05-covid-Shimabukuro.pdf>

The Society of Obstetricians and Gynaecologists of Canada. SOGC statement regarding pregnant woman with COVID-19 in ICUs in Ontario [Internet]. 2021 [cited 2021 Apr 18]. Available from: [https://www.pregnancyinfo.ca/wp-content/uploads/2021/04/EN\\_Statement-COVID-19\\_PregnantWomen.pdf](https://www.pregnancyinfo.ca/wp-content/uploads/2021/04/EN_Statement-COVID-19_PregnantWomen.pdf)

Tolcher MC, McKinney JR, Eppes CS, Muigai D, Shamshirsaz A, Guntupalli KK, et al. Prone Positioning for Pregnant Women With Hypoxemia Due to Coronavirus Disease 2019 (COVID-19). *Obstet Gynecol*. 2020 Aug;136(2):259–61.

Villar et al. (2021) Maternal and Neonatal Morbidity and Mortality Among Pregnant Women With and Without COVID-19 Infection: The INTERCOVID Multinational Cohort Study. *JAMA Pediatrics* [Internet]. 2021 Apr 22 [cited 2021 Apr 23]; Available from: <https://doi.org/10.1001/jamapediatrics.2021.1050>

Vousden N, Bunch K, Morris E, Simpson N, Gale C, O'Brien P, et al. The incidence, characteristics and outcomes of pregnant women hospitalized with symptomatic and asymptomatic SARS-CoV-2 infection in the UK from March to September 2020: a national cohort study using the UK Obstetric Surveillance System (UKOSS). *medRxiv*. 2021 Jan 1;2021.01.04.21249195.

Woodworth KR, Olsen EO, Neelam V, Lewis EL, Galang RR, Oduyebo T, et al. Birth and Infant Outcomes Following Laboratory-Confirmed SARS-CoV-2 Infection in Pregnancy - SET-NET, 16 Jurisdictions, March 29-October 14, 2020. *MMWR Morb Mortal Wkly Rep*. 2020 Nov 6;69(44):1635–40.

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