

ISIDOG Consensus Guidelines on Covid-19 Vaccination for Women before, during and after Pregnancy.

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Abstract

Introduction. Sars-CoV-2 infection poses particular problems in pregnancy, as the infection more frequently causes severe complications than in unaffected pregnant women, or non-pregnant women with SARS-CoV-2 infection. Now that vaccination is available and rapidly getting implemented worldwide, the question arises whether pregnant women should be vaccinated, and if so, whether they should get priority.

Methods. Available scientific data and available guidelines about vaccination against SARS-CoV-2 were collected by the Guideline Committee of the International Society of Infectious Diseases in Obstetrics and Gynecology (ISIDOG), and were analyzed, discussed and summarized as guidelines for health care workers caring for pregnant women. Concluding statements were graded according to the Oxford Evidence Based Medicine Grading System.

Results. There is evidence to consider pregnancy as a risk factor for serious complications of COVID-19 infection, even in the absence of additional risk factors, such as hypertension, diabetes and obesity which increase these risks even more in pregnancy. Currently available data slightly favor mRNA-based vaccines above vector-based vaccines during pregnancy and breastfeeding, until more safety data become available.

Conclusion. ISIDOG advises policy makers and societies to prioritize pregnant women to receive vaccination against SARS-CoV-2, and favor the mRNA vaccines until further safety information becomes available.

Introduction

Soon after the start of the Sars-Cov2 pandemic, it became clear that the discussion regarding prioritization of pregnant women's vaccination deserved special attention. Indeed, first of all, pregnant women, or women intending to become pregnant, belong to a gender and age group more likely to be employed in health care settings, where not only the risks for acquiring the infection is higher, but also the risk of, once infected, spreading it further on to sick, vulnerable people being taken care of in hospitals, rehab centers and nursing homes. Also, in general, the theoretical risk of transmitting the infection to the offspring during pregnancy, delivery or breast feeding requires surveillance, as well as any potential danger of harming the course of the pregnancy by complications such as fetal anomalies, preterm birth, thrombosis, preeclampsia etc. Finally, being pregnant may influence the course of the Covid-19 disease, due to altered immunity, and ventilation restrictions of the maternal lungs due to limited diaphragm movement as a result of an increasing uterine volume. At the top of the first wave of Covid-19 infection in Europe, in April 2020, we issued International Society of Infectious Disease of Obstetrics and Gynecology (ISIDOG) recommendations on the prevention and

treatment issues of Sars-Cov2 infections in pregnancy, based on the available published data at that moment (1). Already at that point, it was clear that, direct transmission of Sars-Cov2 to the fetus did not appear a major concern, but rather to prevent or handle the more severe course of the disease during pregnancy, once infected. More premature babies were born due to Caesarian sections and induced labors in an effort to provide more efficient, sometimes lifesaving, oxygen therapy to the mother.

Sars-Cov2 vaccines are now being produced by several companies, and get gradually approved by the competent authorities, such as FDA (U.S. Food and Drugs administration, USA) and EMA (European Medicines Agency, Europe). How to prioritize provision of a vaccine that aims to cover the entire population of the globe, however, is an enormous task, given the relative shortage of vaccines and lack of means for effective delivery to the people. Indeed there are the logistic problems of production and delivery of sufficient vaccines in a timely manner by the manufacturers, as well as privacy regulations, age, logistic restriction (e.g. distance), transport requirements (e.g. frozen at -70 or -20°C), safety issues, side effect profiles etc. Especially for pregnant women the latter points are specifically important issues, that need to be addressed before general recommendations can be made.

The guideline commission of the International Society of Infections in Obstetrics and Gynecology (ISIDOG) organized an expert collaboration in order to reach consensus about the recommendations concerning vaccination of women who intend to be, are or recently were pregnant, taking into account the special questions related to these groups, the types of vaccines, and the specific risks and considerations.

Methods

Initially the questions that required to be answered were defined: 1) Does Covid-19 constitute a high risk situation during pregnancy that calls for systematic Sars-Cov2 vaccination during pregnancy?, 2) Can Sars-Cov2 vaccination be disadvantageous for mother or fetus if given during pregnancy?, 3) Is the type of vaccine used for pregnant women of importance?, 4) is timing of vaccination in pregnancy of importance?, and 5) Do responses to above questions also apply for women intending to become pregnant or to lactating women? Literature search in PubMed using 'Sars-cov2' or 'Covid-19' and 'pregnancy' or 'lactation' and 'Sars-cov2' or 'covid-19' and 'vaccine' or 'vaccination' identified respectively 2214 and 1424 references, from which information was collected. Of these, 16 papers were found of sufficient quality and novelty to base the consensus guidelines on. We aimed for consensus based on these literature data by all guideline group members. The consensus guidelines we produced were finally graded according the Oxford Centre for Evidence-Based Medicine's grading system (March 2019: [https://www.cebm.ox.ac.uk/resources/levels-of-evidence/oxford-centre-for-evidence-based](https://www.cebm.ox.ac.uk/resources/levels-of-evidence/oxford-centre-for-evidence-based-medicine-levels-of-evidence-march-2009) medicine-levels-of-evidence-march-2009).

Results and conclusions

1. Covid-19 infection during pregnancy.

1.1. Maternal effects of Covid-19

- 1.1.1. Although there is no proof the risk *to contract Sars-Cov-2 infection* is facilitated by pregnancy, the lowered immunity causes more sensitivity for infection of other RNA viruses such as SARS, Ebola and Marburg virus, warranting for caution(1).

- 1.1.2. *Symptoms of Covid-19 infection* are similar in pregnant as compared to non-pregnant women, except for fever, myalgia and soar throat, which are more frequent during pregnancy(2, 3). Like non-pregnant women, also in pregnancy the majority of women will be without symptoms (4).
- 1.1.3. *Thrombo-embolic risk.* Pregnant patients with mild versus severe COVID-19 have a 0.2 to 6% increased risk, respectively, of thromboembolism with much higher D-dimer levels than uninfected pregnant women.(4, 5) Therefore we advised in our previous ISIDOG guidelines for anti-coagulant therapy for pregnant Covid-19 patients admitted into the hospital (1). An overview of international recommendations concerning thromboprophylaxis of COVID-19 in pregnancy can also be found in a recent review (6)
- 1.1.4. Since the start of the epidemic, many studies have been launched to assess the *impact of Sars-Cov-2 on the mother during pregnancy*. In a study from **Centers for Disease Control and Prevention (CDC)**, Atlanta, data on pregnancy status were present on 461.825 omen with PCR proven Sars-Covid-2 infection. Of the symptomatic women, 434 (5,7%) were pregnant and followed. After adjusting for age, underlying medical conditions and ethnicity the risk of dying due to Sars-Cov-2 was increased with 70%.(7) Also admissions at intensive care units (ICU, 10.5 versus 3.0 per 1000 cases (aRR= 3.0, 95% CI 2.6-3.4)), risk of mechanical respiratory ventilation (2.9 versus 1.1. per 1000 cases (aRR 2.9, 95% CI 2.2-3.8), necessity of heart-lung machine (ECMO, 0.7 versus 0.3 per 1000 cases (aRR 2.4 95% CI 1.5-4.0) and risk to die (1.5 versus 1.2 per 1000 cases (aRR 1.7 95% CI 1.2-2.4) due to Sars-Cov-2 infection are increased in pregnant compared to non-pregnant women. As a result, CDC considers the state of pregnancy as a risk factor for increased severity of COVID-19 infection, indicating that pregnant women are a priority group for timely Covid-19 vaccination. (21 Feb 2021: <https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/pregnancy-breastfeeding.html>).
- In 77 eligible papers, Allotey et al systematically reviewed the risks of Sars-Cov2 infection on pregnant women. These data confirmed a higher risk for ICU admission (OR1.6) and mechanical ventilation (OR 1.9) when infected by SARS-CoV-2 during pregnancy (2). Moreover, they revealed *additional factors that strongly increased the risk* of these serious complications: age above 35 years (OR 1.8; 95%CI 1.3 - 2.6) BMI greater than 30 (OR 2.4; 95%CI 1.7 - 3.4), hypertension (OR 2.0; 95%CI 1.1 - 3.5), diabetes mellitus (OR 2.5; 95%CI 1.3 - 4.8) and preeclampsia (OR 6.5; 95%CI 1.1 - 36.2) all increased the risks significantly.

When extrapolating these data to other parts of the world, it has to be taken into account that some characteristics may differ between populations, especially when looking at absolute numbers. In the US, insufficient or lacking medical insurance may cause delay in searching medical and prenatal care. In the US obesity is more frequent, large ethnic groups have an inherent increased risk of pregnancy complications (e.g. Afro-Americans) and Covid-19 infection is more frequent among certain ethnic groups (Latino's) than in Europe. In 2017, before the Sars-Cov-2 infection was noticed, maternal mortality was almost 5 times higher (19/100 000 births) in US compared to most European countries, like Belgium 5/100 000 life born neonates in Belgium (<http://documents1.worldbank.org/.../Trends-in-maternal-mortality-2000-to-2017-Estimates-by-WHO-UNICEF-UNFPA-World-Bank-Group-and-the-United-Nations-Population-Division.pdf>).

Due to the increased risks of severe complications of Covid-19 in pregnancy, and the increased difficulty to provide intensive care treatment, the ISIDOG guidelines advocated to protect pregnant midwives and other health care personnel from the work environment with substantial risk for Covid-

19 infection. Further, we plead for considering pregnancy a high risk factor, and therefore as a priority group for vaccination (1).

Conclusion 1. Infection risk and symptoms of Sars-Cov-2 are not substantially different in pregnant versus non-pregnant women (grade A) .

Conclusion 2. The course and severity of Sars-Cov-2 infection is worsened by pregnancy, especially in combination with additional risk factors such as increased maternal age, preeclampsia, obesity, diabetes and hypertension (Grade A). Therefore, pregnancy should be considered as a priority for vaccination.

1.2. Neonatal outcome

- 1.2.1. The main concern for pregnancy outcome in connection with SARS-CoV-2 infection is *preterm delivery*. Most studies confirm an increased rate of preterm deliveries in SARS-CoV-2 positive pregnant women, mostly because obstetricians choose for early termination of pregnancy in order to improve the oxygenation and care of severely ill mothers. For other pregnancy complications, the risk after Sars-Cov-2 infection is very comparable to that of the normal pregnant population (3). In a population-based cohort study in UK, gestation ended preterm in 26% of women, of which 60% due to maternal or fetal compromise(8). In his meta-analysis, also Allotey confirmed a 3 times higher incidence of preterm births, and increased neonatal admissions, mainly caused by iatrogenic interventions to terminate pregnancy (2).
- 1.2.2. Another matter of concern is the 2-3 fold increased rates of *perinatal mortality (both stillbirth and neonatal death)* has been reported from two prospective cohort studies in the UK (9) and Italy (10) where 11.7 and 10 per 1000 perinatal deaths (PND) occurred in women with covid-19, respectively, compared with a national average of 4 per 1000 in both nations. This was confirmed by a systematic review of Khalil et al, where a mean PND rate of 7.8/1000 was noted. (11). The fetal fatality is thought to be linked to the increased number of intervillous thromboses and decreased placental perfusion in pregnant women with Covid-19 infection(11, 12).
- 1.2.3. The *risk for a neonate to be infected at birth* is very low or negligible. The infrequent occurrence of transmission might be attributed to the minimal expression of ACE-2 receptor and TMPRSS2 in the placenta (13). Some case studies suggested transmission could have occurred, resulting in positive placental or umbilical cord Sars-Cov-2 PCR testing, but larger scale investigations, such transmission has not been confirmed yet. A positive Sars-Cov-2 PCR was shown in about 3% nasopharyngeal samples and 9.7% of rectal swabs of neonates born to covid-19 positive mothers, but urine and amniotic fluid tests were always negative, suggesting that postnatal, rather than transplacental, transmission may have occurred (14). In a meta-analysis discussing 176 neonatal Covid infections, the decision not to separate mother and child resulted in 5 fold increase of a neonatal SARS-CoV-2 infection, emphasizing the importance of postpartum transmission (15).

Conclusion 3. The increased risk to be born preterm due to iatrogenic intervention, as well as a possibly increased perinatal mortality for babies born to mothers with Covid-19 infection, supports the need for vaccination during or before pregnancy (Grade A)

Conclusion 4. Direct transplacental transmission of Sars-Cov-2 does not seem to constitute a major argument in favor of Sars-Cov-2 vaccination (Grade C).

2. Covid vaccine safety in pregnancy

2.1. *Need for studies in pregnancy.* Any intervention in pregnancy, including vaccinations, especially new ones, require special careful attention to ensure safety for mother and child. In pregnancy immune reaction against viral infections are usually less intense, but can also be hyperacute. This makes it difficult to transpose general data to a pregnant population. With new drugs and vaccinations, commonly no studies on pregnant populations are available. In addition the fetus should not be exposed to harmful or unknown substances. This results in the safety principle that any new vaccine is not for routine use in pregnancy until evidence of its efficacy and safety is proven. On the other hand, this poses the problem that pregnant women may be excluded from the benefits of important and even life-saving vaccines, as they are systematically excluded from studies dealing with new vaccines.

2.2. *Vaccines using a viral vector.* Both the Astra-Zeneca and the J&J/Janssen COVID-19 vaccines are based on a (adeno-)virus vector to deliver important instructions to our cells. These vaccine types have been tested substantially, both on animals as humans, without negative effects, and are used on a large scale. Similar viral vector vaccines have been given to pregnant people in all trimesters of pregnancy, e.g. in a large-scale Ebola vaccination trial. In these trials, no adverse pregnancy-related outcomes were reported. Formal studies on the effects of these vaccines in pregnancy are lacking (https://www.ema.europa.eu/en/documents/product-information/zabdeno-epar-product-information_fr.pdf).

2.3. From *vaccines based on the messenger-RNA*, such as COVID-19 vaccines manufactured by Pfizer-BioNTech and Moderna, no official study data were published so far. Animal studies did not reveal any impact on the offspring of rat being exposed to the vaccine. As mRNA vaccines do not contain the live virus that causes COVID-19 it cannot cause COVID-19 infection. Additionally, mRNA vaccines do not interact with a person's DNA or cause genetic changes because the mRNA does not enter the nucleus of the cell. Covid vaccine manufacturing companies announced their intention to perform studies on pregnant subjects in order to confirm the safety of the vaccine for mother and child. Pfizer started as a first company a phase 2 and 3 study with 4000 pregnant women to ensure safety during the second and third trimesters of pregnancy as well as to monitor potential effects on the newborns.

2.3.1. In the US the V(accination)-Safe program allows participants to voluntarily enter their personal information on a website. The participants may receive follow-up text messages and phone calls from the CDC asking for additional information at various times after vaccination. This information is collected and connected to information from the Vaccine Adverse Event Reporting System (VAERS), where healthcare workers, patients and other people can report adverse events on a standardized form. In their latest communication, 55,220,364 reports had been received from people who received at least one dose of the Pfizer-BioNTech or Moderna vaccine, including 30,494 pregnant women, of whom 16,039 had received the Pfizer-BioNTech and 14,455 women the Moderna vaccine. (MEscape – 10/3/21 Laird Harrison <https://www.medscape.com/viewarticle/947211>). The rates of side effects and complications in vaccinated women do not appear significantly different from those of unvaccinated pregnant women. The additional follow up of 1815 pregnant women, of which 275 already completed pregnancy, revealed similar or lower rates of miscarriages, preterm births, stillbirths, hypertensive disorders, diabetes, growth restriction and perinatal mortality than was as expected from population based estimates. Based on these surveillance data, CDC suggests that vaccination with the Pfizer-BioNTech and Moderna vaccines for COVID-19 is safe for pregnant women.

2.3.2. A specific adverse event, which can be particularly serious, is the risk of post-vaccination anaphylaxis. Women seem to be more sensitive to this complication. In the VAERS system, reporting on almost 10 million women having received Pfizer-BioNTech and over 7.5 million having received Moderna vaccines, 47 and 19 women reported an anaphylactic reaction, respectively, accounting for a rate of 2.5 to 4.7 per million people vaccinated (16). Strikingly, 94 and 100% of the anaphylactic reactions in both vaccinated groups occurred in women, 77 and 88% having had allergic reactions before, of which 25 and 34% were anaphylactic, respectively.

2.3.3. The potential risk of thrombo-embolic events raised concerns after being noted in some vaccinated women after having received Covid-19 vaccination, especially of the Astra-Zeneca type. The majority of such post-vaccine events were encountered in women, below 50 years of age, and some with fatal outcome. This has led some countries in Europe to arrest use of this type of vaccine, while others continued their vaccination policy. As the array of clinical pictures was very diverse (generalized disseminated thrombocytopenia as well as localized thrombo-embolic phenomena in bowel or brain), it took some time to realize this rare condition is related to the use of such vector vaccines. Furthermore, the risk of having serious complications after COVID-19 infection in pregnancy, including thrombo-embolism, is much greater, leading EMA to the decision (18 March 2021) that the benefits of vaccination outweigh the potential risks. However, an increased surveillance is warranted. During pregnancy, being a hyper-coagulative condition in itself, this applies even more.

Conclusion 5. Formal studies in pregnancy are lacking. However, follow up of over 30.000 pregnant women having received m-RNA vaccines reported no increase in side effects or complications (Grade B).

Conclusion 6. As women in general, and particularly during pregnancy, are more vulnerable to anaphylactic reactions and thrombo-embolic events, these complications require extra surveillance (Grade B).

3. Recommendations of vaccination during, before and after pregnancy

Pregnant women and their unborn offspring appear to be a particular risk group for COVID-19 complications. On the other hand, potential complications like thrombo-embolism and anaphylaxis may pose pregnant women more at risk than non-pregnant women or men. Formal studies in pregnant women are currently lacking, but secondary subgroup analysis in large observational population based studies indicate that the currently available vaccines are safe and do not cause more side effects during pregnancy. Based on currently available knowledge, we recommend that pregnant women should receive priority vaccination. Guidelines are dynamic and should be adapted according to new information.

3.1. Recommendations of countries and societies

The *American College of Obstetrics and Gynecology*, the *Canadian Society of Obstetrics and Gynaecologists*, the *German Society for Gynecology and Obstetrics* and the *Flemish Society of Obstetricians and Gynecologists (VVOG)* all favor vaccination for all pregnant women and claim that "COVID-19 vaccines should not be withheld from pregnant individuals, nor from breastfeeding women." (ACOG Clinical, Vaccinating Pregnant and Lactating Patients against Covid-19, December 2020, SOGC Déclaration de la SOGC sur la vaccination contre la Covid-19 pendant la grossesse, 4 January 2021), and advice which was also supported by others (17, 18). In UK, the RCOG (Royal

College of Ob/Gyn) guidelines have recently been adapted in favor of using COVID-19 vaccines in pregnancy. They follow the latest advice from the British Joint Committee on Vaccination and Immunisation (JCVI), namely that COVID-19 vaccines should be considered for pregnant women when their risk of exposure to the virus is high and cannot be avoided, or if the woman has underlying conditions that place her at high risk of complications from COVID-19. Also you should not stop breastfeeding in order to be vaccinated against COVID-19 and women trying to become pregnant do not need to avoid pregnancy after vaccination, while there is no evidence to suggest that COVID-19 vaccines will affect fertility. Also the World Health Organisation (WHO) holds a position 'in between', proposing to give the vaccines only to pregnant women with an additional risk factor, or who have a high risk to be exposed to the Sars-Cov-2 virus (e.g. health care workers), but allegedly their advice recently was adjusted towards the promotion of general vaccination for all pregnant women. (29/01/2021. <https://www.fox32chicago.com/news/who-changes-covid-19-vaccine-recommendation-for-pregnant-women/>). In the Netherlands, on the contrary, the opinion of the NVOG is that there is still not enough evidence to support routine vaccination in pregnancy, but if benefits outweigh the risk, like in women with co-morbidities, the vaccine should be proposed (NVOG) (18 February 2021, <https://www.nvog.nl/actueel/standpunt-vaccinatie-tegen-covid-19-random-zwangerschap-en-kraambed/>). In Belgium, on April 8th 2021, the High Medical Council, advising the Ministry of Health, accepted a motion that sufficient evidence permit to see pregnancy as a high risk for severe COVID-19 complications, irrespective of additional risk factors, justifying this group to be vaccinated with priority.

Conclusion 7. Most countries are in favor of giving pregnant women the advantages of vaccination, which is considered more beneficial than getting Covid-19 in pregnancy (Grade C). This is irrespective of the presence of additional risk factors that might be present.

3.2. Which vaccine to choose in pregnancy

Other than against Covid-19, there is more experience with several vector-based vaccines in pregnancy. However, concerning COVID-19 vaccines, currently we have most experience with the mRNA vaccines. Both types have high safety profiles outside as well during pregnancy, but recent unexpected adverse effects after Astra-Zeneca vaccines (Vaxzevria®), such as thrombo-embolic phenomena, currently under investigation, indicate restrictive use in pregnancy and postpartum, because pregnancy constitutes a higher risk of coagulopathies. For the Janssen-COVID-19 vaccine®, which is also vector based, very little information is available in pregnancy, but J&J/Janssen's Ebola vaccine, based on a similar structure, has shown to be very safe in pregnancy.

Conclusion 8. Given the uncertainty on potential increased risks of thrombo-embolic complications in young women after vector-based vaccines like Astra-Zeneca's and Janssens', we currently advocate to use mRNA vaccines in pregnancy, until more safety data become available. (Grade D)

3.3. Timing of vaccination

A prospective study supported by the U.S. National Institutes of Health describes 84 pregnant, 31 lactating and 16 non-pregnant women receiving the mRNA vaccine. Pregnant women receiving the vaccine developed equivalent antibody titers as non-pregnant women (two doses being better than one) and titers were significantly higher than those induced by natural SARS-Cov-2 infection during pregnancy. Secondly antibodies are proven to cross the placenta (umbilical cord samples) and breast milk, suggesting possibility for passive immunization of the newborn after vaccination of the mother. Infected newborns have a symptomatic COVID-19 infection in 50% of case, however severe complications of COVID-19 in newborns are rare (15).

Since transmission of antibodies generally occurs in the third trimester and vaccine titers did not differ based on the trimester in which the vaccine is administered, administration of the vaccine before the third trimester is desirable to achieve the highest maternal titers and passive immunization of the newborn before birth. Vaccination in the first trimester (before 16 weeks) however remains unclear due to limited data on teratogenicity.

Conclusion 9: if pregnant during vaccination, antibodies can cross the placenta and possibility for passive immunization of the newborn (grade A). Preferable time for vaccination in pregnancy is the second trimester, avoiding first trimester for uncertainty about teratogenicity and before third trimester to allow antibodies to form and pass the placenta.

3.4. Women wanting to become pregnant, postpartum and breastfeeding women

3.4.1. Women who intend to become pregnant are at no excess risk to have negative effects of being vaccinated. The effects of the vaccine last maximum three weeks for building an immune response, and immunity related effects, including disseminated intravascular coagulation, are not to be expected beyond that period. Women intending to become pregnant are advised to finish their vaccination schedule before pregnancy in order to have maximal protection for both mother and neonate during pregnancy.(19) Women getting pregnant after the first dose should not be worried as there is no reason to believe the vaccine causes negative effects in pregnancy, even when provided in the first trimester. According to ESHRE's guidelines, women having received one or two doses of the vaccine don't need to wait longer than a few days to get pregnant. However, couples engaging in fertility enhancing procedures (ART), are advised to wait for 2 months to allow antibody development, as the effect on oocytes, sperm and embryo implantation is yet insufficiently examined. (12 Jan 2021, <https://www.eshre.eu/Europe/Position-statements/COVID19/vaccination>). Also when a severe immune reaction has taken place in response to the vaccine, 2 months delay with ART is advised.

Conclusion 10. Women who intend to become pregnant can safely be vaccinated and get pregnant soon after vaccination (Grade C). When extracorporeal fertilization is necessary (ART) or when a severe immune response occurred subsequent to vaccination, 2 months delay is advised, but this is not based on strong evidence (Grade D).

3.4.2. Postpartum vaccination. There is ongoing discussion about the need to separate mother and child in order to avoid infection of the newborn after Covid-19 positive of the mother. A meta-analysis studying 261 neonates born to mothers with Covid-19 infection showed that 10% of those neonates tested positive with PCR tests for Sars-Cov-2. Of these, 20% had light dyspnea or fever, but no serious complications.(20) Placenta, cord blood and vaginal secretions remained negative for SARS-CoV-2 with PCR tests. As vaccination drastically reduces the risk of transmission, and there is doubt about the risks of transmission to the neonate after maternal COVID-19 infection, postpartum vaccination can be safely considered.

Conclusion 10. As there are conflicting data about the infection of the neonate, vaccination is expected to reduce the risk of mother-child transmission of Sars-Cov-2. Based on current knowledge, postpartum vaccination appears safe (Grade D).

3.4.3. Breastfeeding. In general vaccines are not contraindicated in breastfeeding women. As Covid-19 vaccines, especially those based on mRNA technology, cannot transmit virus into the breastmilk, and further protection against infection will also protect the neonate against Sars-Cov-2 infection,

vaccination should be promoted for breastfeeding women.(17) Other arguments are that SARS-CoV-2 antibodies are passed over by breast milk and that most neonatal infections are passed on by caregivers who are not the parents.

Conclusion 12. Breastfeeding women should be motivated to become vaccinated (Grade C).

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