

# Current recommendations for vaccines for patients planning pregnancy: a committee opinion

Practice Committee of the American Society for Reproductive Medicine

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Encounters for infertility care are opportunities to assess and update immunization status. Individuals of reproductive age are often unaware of their need for immunization, their immunization status, and the potentially severe consequences of preventable disease on pregnancy outcome. The purpose of this American Society for Reproductive Medicine (ASRM) Practice Committee document is to summarize current recommendations regarding vaccinations for individuals of reproductive age. This document replaces the ASRM Practice Committee document titled "Vaccination guidelines for female infertility patients," last published in 2018 (Fertil Steril 2018;110:838-41). (Fertil Steril® 2024;122:62-67. ©2024 by American Society for Reproductive Medicine.)

**El resumen está disponible en Español al final del artículo.**

**Key words:** Immunization, sexually transmitted disease, vaccination, assisted reproduction, pregnancy

**T**his document addresses immunization recommendations for individuals seeking to carry a pregnancy. Encounters for infertility care are opportunities to assess and update immunization status.

Individuals of reproductive age often are unaware of their need for immunization, their immunization status, and the potentially severe consequences of preventable disease on pregnancy outcome. In one study, fewer than 60% of surveyed obstetrician-gynecologists routinely obtained any vaccination history, and only 10% offered vaccines currently recommended for adults (1). National vaccination standards have been established and last updated in February 2022 by the Centers for Disease Control and Prevention (CDC) and are available for review on the CDC website (2). The purpose of the present document is to summarize current recommendations regarding vaccinations for fertility patients planning pregnancy.

## VACCINATION BEFORE INFERTILITY TREATMENT AND DURING PREGNANCY

Ideally, immunizations should be completed before conception because some recommended vaccinations cannot be administered during pregnancy (1-5). Vaccinations before or during pregnancy protect individuals from potentially serious illnesses, prevent vertical transmission to the fetus, and confer passive immunity to the newborn. Transport of maternal immunoglobulin (IgG) antibodies to the fetus occurs throughout gestation and increases markedly during the last 4-6 weeks of gestation (3-5).

Many physicians are reluctant to immunize pregnant individuals because of concerns that an incidental congenital anomaly or spontaneous abortion might be misattributed to a vaccination. This fear persists even though few vaccines are contraindicated during pregnancy (2, 6). The con-

traindicated vaccines include measles, mumps, rubella (MMR), varicella, and herpes zoster. All others are either fully recommended or recommended if some other risk factor is present. Vaccinations during pregnancy are indicated when the benefits clearly outweigh the risks. Special circumstances that may influence the indication for vaccination include military service, travel to high prevalence areas, hazardous occupations, immunocompromised patients, and chronic illness. Guidelines for vaccinations in individuals with such special indications are outlined in a committee opinion published by the CDC (2).

Immunizations generally recommended for individuals of reproductive age are listed in Table 1, which provides a condensed summary of the Recommended Adult Immunization Schedule published by the CDC. Physicians are strongly encouraged to assess the history of immunizations in individuals before beginning treatment for infertility.

## ROUTINE VACCINATIONS COVID-19 vaccine

COVID-19 vaccination is recommended for all individuals  $\geq 19$  years with a primary series and bivalent mRNA

Received February 14, 2024; accepted February 15, 2024.

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Fertil Steril® Vol. 122, No. 1, July 2024 0015-0282/\$36.00

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<https://doi.org/10.1016/j.fertnstert.2024.02.027>

vaccine booster. Vaccination is particularly important for individuals who are pregnant or contemplating pregnancy because COVID-19 infection increases the risk of complications during pregnancy. Refer to CDC guidance for most recent recommendations (7–10).

### Influenza

Annual influenza vaccination is recommended for all individuals  $\geq 6$  months of age. Individuals who are pregnant or contemplating pregnancy should be immunized because influenza infection may increase the risk for medical complications, as heart rate, stroke volume, and oxygen consumption are increased, and lung capacity is decreased during pregnancy. The optimal interval for immunization spans the months of October and November because the flu season occurs from January through March. Injectable influenza vaccines, inactivated influenza vaccine (IIV) quadrivalent and trivalent contain the inactivated virus and, therefore, may be administered at any time during pregnancy. In contrast, intranasal influenza vaccines contain live attenuated virus and should not be administered during pregnancy. Pregnancy should be avoided for 1 month after intranasal vaccination.

Concerns had previously been raised about administering thimerosal-containing influenza vaccine to pregnant individuals. Thimerosal is a mercury-based preservative used in vaccines that was thought to be associated with adverse effects. However, no scientific evidence has correlated ill effects in the children born to individuals who have taken vaccines containing thimerosal (11). Therefore, the influenza vaccine can be given to pregnant individuals whether they contain thimerosal or not.

### Tetanus-diphtheria-pertussis and tetanus-diphtheria

A tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine (tetanus-diphtheria-pertussis [Tdap]) was approved by the Advisory Committee on Immunization Practices in 2011 and was recommended for adults (19 to 64 years of age) who have or who anticipate having close contact with an infant  $< 12$  months of age (12). Due to the recent increase in pertussis outbreaks, health care providers should vaccinate individuals who are pregnant or might become pregnant and have not previously received Tdap. If they are currently pregnant, Tdap preferably should be administered during the third trimester or late second trimester (i.e., after 20 weeks' gestation). If not given during pregnancy, it should be administered immediately postpartum to ensure pertussis immunity and to reduce transmission to the newborn.

### Varicella

The varicella vaccine contains live attenuated virus. Before pregnancy, all adults should be asked about previous varicella infection or vaccination. Those without evidence of immunity or previous infection should receive 2 doses of single-antigen varicella vaccine administered 1 month apart or a second dose

if they have previously received only 1 dose. Pregnancy should be avoided for 1 month after vaccination (2). If exposed to varicella before pregnancy, the vaccine should be administered within 96 hours of exposure, and pregnancy should be avoided. Pregnant individuals should be assessed for evidence of varicella immunity. Pregnant individuals who do not show signs of immunity should receive the first dose of the varicella vaccine on completion or termination of pregnancy and before discharge from the hospital. Cases of congenital varicella after immunization have been reported.

### Human papillomavirus

Individuals through age 26 should be vaccinated to prevent human papillomavirus (HPV) infections and HPV-associated diseases, including cancers; the dosing schedule varies on the basis of the age that vaccination started (2). Originally, the HPV vaccine was a bivalent compound; however, the current vaccine is either quadrivalent or 9-valent (9v). Individuals who began with bivalent or quadrivalent compounds may complete the series with the 9v HPV compound. There is no Advisory Committee on Immunization Practices recommendation regarding additional vaccination with 9v HPV for those individuals who completed immunization with bivalent or quadrivalent vaccines. Although HPV vaccination is not recommended during pregnancy, there is no evidence that the vaccine is harmful, and no intervention is needed for individuals who inadvertently receive it while pregnant. Individuals who discover they are pregnant should delay the remaining doses until after pregnancy. Pregnancy testing is not needed before vaccination (13).

### Measles, mumps, and rubella

MMR vaccine is a live, attenuated virus recommended for all individuals without confirmed immunity to rubella. MMR vaccine contains live attenuated virus. Therefore, vaccination should be administered before pregnancy to avoid the possibility of intrauterine infection, and pregnancy should be avoided for 1 month after the last dose. However, there is no confirmed instance where the MMR vaccine has been linked to congenital malformation or significant intrauterine infection (6, 14). Consequently, inadvertent MMR administration during pregnancy is not an indication for pregnancy termination.

## NONROUTINE VACCINATIONS

### Pneumococcus

The pneumococcal vaccine is recommended for anyone at increased risk for pneumococcal infection. Individuals at high risk include those with asplenia, sickle-cell anemia, chronic cardiovascular/pulmonary disease, diabetes, or immunocompromise as may result from human immunodeficiency virus infection, systemic illness, or malignancy. Ideally, high-risk individuals should be immunized before pregnancy. The dose should be 2–3 injections depending on the vaccine and indication (2).

TABLE 1

## Summary of the adult vaccination schedule outlined by the Centers for Disease Control and Prevention.

	Age (y)				
	19–26	27–45	46–64	50–64	> 65
COVID-19	Primary series: monovalent vaccine of same manufacturer 2 doses 4 weeks apart Booster: bivalent mRNA vaccine (Moderna or Pfizer-BioNTech bivalent COVID-19 vaccine dose) at least 8 weeks after dose 2				
Influenza (recombinant or inactivated)	1 dose annually <sup>a</sup>				
Tetanus, diphtheria, pertussis (Td/Tdap)	1 dose Tdap, then Td or Tdap booster every 10 years. 1 dose Tdap each pregnancy, preferably in early part of gestational weeks 27–36 <sup>b</sup>				
Varicella	2 doses 1 month apart <sup>b, c</sup>				
Human papilloma virus (HPV)	2–3 doses depending on age at initial vaccination or condition <sup>b</sup>				
Measles, mumps, rubella (MMR)	1–2 doses <sup>b, c</sup>				
Pneumococcal (polysaccharide)	1 dose PCV15 followed by PPSV3 or 1 dose PCV20 <sup>d</sup>				1 dose PCV15 followed by PPSV23 or 1 dose PCV20
Meningococcal	2–3 or more doses depending on vaccine and indication <sup>d</sup>				
Hepatitis A	2–3 doses depending on vaccine <sup>d</sup>				
Hepatitis B	2, 3 or 4 doses depending on vaccine or condition <sup>d</sup>				
Zoster recombinant	2 doses				

PCV = Pneumococcal conjugate vaccine; PPSV = Pneumococcal polysaccharide vaccine.

<sup>a</sup> Live attenuated nasal spray contraindicated in pregnancy.

<sup>b</sup> For all persons in this category who meet the age requirements and who lack documentation of vaccination or have no evidence of previous infection.

<sup>c</sup> Live attenuated virus, avoid getting pregnant for 1 month after last dose.

<sup>d</sup> Recommended if some other risk factor is present (e.g., on the basis of medical, occupational, lifestyle, or other indications).

Practice Committee of the American Society for Reproductive Medicine. Vaccines for patients planning pregnancy. *Fertil Steril* 2024.

## Hepatitis A

Hepatitis A (HA) vaccine is recommended for any individuals at high risk, including those receiving clotting-factor concentrates, those with chronic liver disease, individuals working with HA virus or HA-infected laboratory animals, individuals traveling to countries with a high prevalence of HA infection, and intravenous drug users. The vaccine contains inactivated virus and poses no known risk to the fetus.

## Hepatitis B

Hepatitis B (HB) vaccine is approved for any woman at high risk, including those receiving hemodialysis or clotting-factor concentrates, health care workers exposed to blood and blood products, intravenous drug users, individuals having a sexually transmitted infection or multiple sexual partners, those traveling to countries with a high prevalence of hepatitis B infection, and individuals living in the same household with a known infected individual (2). The vaccine contains noninfectious DNA particles, can be administered during pregnancy if needed, and poses no known risk to the fetus.

## Meningococcus

The meningococcal vaccine should be administered to any person who is at increased risk for meningococcal infection. For pregnant individuals, its use should be limited to those at high risk who have not been inoculated previously (2). Individuals at high risk include those who live in high-endemic areas, such as sub-Saharan Africa, parts of the Middle East,

and college dormitories. Preferably, such high-risk individuals should be vaccinated before pregnancy because experience with the vaccine in pregnancy is limited.

## VACCINE HESITANCY

Individuals attempting pregnancy may have similar concerns about the safety of vaccines as those who are pregnant. In a 2021 Internet survey, the CDC found that nearly a third of pregnant individuals who had not received the flu vaccine due to safety concerns, stating concerns for both them and their infant (15). Although providers believe that they are giving recommendations for vaccinations, not all patients remember hearing about vaccine recommendations, and the recommendations may not be strong enough. Providers' awareness of patients' safety concerns may facilitate a more targeted discussion, improving patient education and communication to strengthen their recommendations. The CDC provides resources to providers to assist in improving the efficacy of their communication with patients when recommending vaccines, which include suggestions to highlight personalized reasons why a particular vaccine is important to an individual and sharing positive personal or patient experiences with vaccines (16).

Research has shown that multiple interventions in obstetrics and gynecology clinics can increase vaccination rates, including automatic reminders, streamlining workflows for provider ordering, staff education, and financial assistance (17). The American College of Obstetricians and Gynecologists provides an immunization toolkit that includes

information about effective communication and addresses vaccine coding and financing to lower financial barriers (18). Financial costs have been cited as a common barrier to vaccination in addition to safety concerns (19).

Disparities in maternal vaccination coverage have been reported (20).

Lower vaccination rates in Black adults have been attributed to attitudes and beliefs about vaccines, mistrust of vaccines as a result of past medical racism, and limited access to care (21, 22). Specific to the flu vaccine, previous CDC data have shown that Black and White individuals had a similar acceptance of the vaccine, but Black individuals were less likely to report a provider referral for the vaccine (20).

Vaccination coverage of pregnant individuals and individuals attempting pregnancy can be increased through improved patient education, including safety and benefit information, provider education on effective communication tools, increasing awareness of existing disparities in vaccine coverage, implementation of facilitative clinic workflows, and reduction of financial barriers. Although reimbursement makes it difficult for many practices to stock certain vaccines, vaccinations are often available at major pharmacy chains and can be administered with a physician's order.

## SUMMARY

- Vaccination in individuals of reproductive age before or during pregnancy confers resistance to intrauterine infections and provides the newborn with passive immunity to neonatal infections.
- Immunization schedules are best completed before beginning treatment for infertility because some vaccinations should not be administered during pregnancy.
- Rubella, measles, and varicella immunity should be documented before pregnancy. If nonimmune, the vaccine should be administered, and pregnancy should be avoided for 4 weeks.
- COVID-19 vaccination is recommended for individuals who are pregnant or contemplating pregnancy because COVID-19 infection increases the risk of complications during pregnancy.
- The influenza and tetanus-diphtheria immunizations should be completed before pregnancy but can be administered during pregnancy. The inactivated influenza vaccine can be given anytime during pregnancy. Tdap should be given preferably during the third trimester or late second trimester.
- Hepatitis A, Hepatitis B, and meningococcal vaccinations may be indicated in some circumstances during pregnancy when benefits exceed risks.
- Live attenuated vaccines, including MMR, varicella, and live attenuated influenza vaccines, are contraindicated during pregnancy.

## CONCLUSIONS

Before, during, or after pregnancy, it is important to be aware of a patient's immunization history and to update her vaccine status when appropriate.

## Acknowledgments

This report was developed under the direction of the Practice Committee of the American Society for Reproductive Medicine as a service to its members and other practicing clinicians. Although this document reflects appropriate management of a problem encountered in the practice of reproductive medicine, it is not intended to be the only approved standard of practice or to dictate an exclusive course of treatment. Other plans of management may be appropriate, taking into account the needs of the individual patient, available resources, and institutional or clinical practice limitations. The Practice Committee and the Board of Directors of the American Society for Reproductive Medicine have approved this report.

This document was reviewed by ASRM members and their input was considered in the preparation of the final document. The following members of the ASRM Practice Committee participated in the development of this document: Alan Penzias, M.D.; Paula Amato, M.D.; Jacob Anderson, M.B.A.; Kristin Bendikson, M.D.; Clarisa Gracia, M.D., M.S.C.E.; Tommaso Falcone, M.D.; Rebecca Flyckt, M.D.; Jessica Goldstein, R.N.; Karl Hansen, M.D., Ph.D.; Micah Hill, D.O.; Sangita Jindal, Ph.D.; Suleena Kalra, M.D., M.S.C.E.; Tarun Jain, M.D.; Bruce Pier, M.D.; Michael Thomas, M.D.; Richard Reindollar, M.D.; Jared Robins, M.D.; Chevis N. Shannon, Dr.Ph., M.B.A., M.P.H.; Anne Steiner, M.D., M.P.H.; Cigdem Tanrikut, M.D.; and Belinda Yauger, M.D. The Practice Committee acknowledges the special contribution of Kristin Bendikson, M.D., in the preparation of this document. All Committee members disclosed commercial and financial relationships with manufacturers or distributors of goods or services used to treat patients. Members of the Committee who were found to have conflicts of interest on the basis of the relationships disclosed did not participate in the discussion or development of this document.

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**Recomendaciones actuales sobre vacuna para pacientes que planean un embarazo: opinión del comité.**

Los contactos para la atención de la esterilidad son oportunidades para evaluar y actualizar el estado de inmunización. Las personas en edad reproductiva a menudo desconocen su necesidad de inmunizarse, su estado de vacunación y las consecuencias potencialmente severas de enfermedades prevenibles sobre el embarazo. El objetivo de este documento del Comité de Práctica de la Sociedad Americana de Medicina Reproductiva (ASRM) es resumir las recomendaciones actuales sobre vacunación para personas en edad reproductiva. Este documento sustituye al Documento del Comité de Práctica de la ASR titulado "Directrices de vacunación para pacientes con esterilidad femenina" publicado por última vez en 2018.