

Recommended Immunization Schedule for Adults Aged 19 Years or Older, United States, 2018*

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In October 2017, the Advisory Committee on Immunization Practices (ACIP) voted to approve the Recommended Immunization Schedule for Adults Aged 19 Years or Older, United States, 2018. The 2018 adult immunization schedule summarizes ACIP recommendations in 2 figures and a table of contraindications and precautions for vaccines recommended for adults (Figure). They can be found at www.cdc.gov/vaccines/schedules. The full ACIP recommendations for each vaccine is available at www.cdc.gov/vaccines/hcp/acip-recs/index.html. The 2018 adult immunization schedule has also been approved by the American College of Physicians, the American Academy of Family Physicians, the American College of Obstetricians and Gynecologists, and the American College of Nurse-Midwives. The ACIP-recommended use of each vaccine is developed after in-depth reviews of vaccine-related data, including disease epidemiology, vaccine efficacy and effectiveness, vaccine safety, feasibility of program implementation, and economic aspects of immunization policy (1). The purpose of the adult immunization schedule is to assist health care providers in implementing the current ACIP recommendations for vaccinating adults.

In addition to the figures that display vaccination recommendations based on age and medical conditions and other indications and a table of contraindications and precautions for vaccinations, the adult immunization schedule contains information on general principles on immunization for adults; considerations for special populations, such as pregnant women; reference resources pertinent to adult immunization; instructions for reporting adverse events and suspected cases of reportable vaccine-preventable diseases; and an ACIP-approved list of standardized abbreviations for vaccines recommended for adults. The 2 figures in the adult immunization schedule are accompanied by footnotes that should be reviewed with the Figures. These footnotes provide important details on vaccination recommendations, such as the number of doses in a vaccination series and dosing intervals. Changes in the 2018 adult immunization schedule from the previous year's schedule include new ACIP recommendations on the use of recombinant zoster vaccine (RZV) for adults aged 50 years or older and the use of an addi-

tional dose of measles, mumps, and rubella vaccine (MMR) in a mumps outbreak setting.

Zoster vaccination (2). On 20 October 2017, the U.S. Food and Drug Administration approved the use of RZV (Shingrix, GlaxoSmithKline) for adults aged 50 years or older for the prevention of herpes zoster (shingles) and its complications. On 25 October, the ACIP recommended the use of 1) RZV among immunocompetent adults aged 50 years or older for the prevention of herpes zoster and related complications, 2) RZV among adults aged 50 years or older who previously received the zoster vaccine live (ZVL) (Zostavax, Merck & Co.), and 3) either RZV or ZVL for adults aged 60 years or older (RZV is preferred). On 26 October, the ACIP recommended the following in the 2018 adult immunization schedule:

- Administer 2 doses of RZV 2–6 months apart to adults aged 50 years or older regardless of past episode of herpes zoster or receipt of ZVL.
- Administer 2 doses of RZV 2–6 months apart to adults who previously received ZVL at least 2 months after ZVL.
- For adults aged 60 years or older, administer either RZV or ZVL (RZV is preferred).

The clinical trials for RZV excluded pregnancy and confirmed or suspected immunocompromising conditions that can result from disease, such as malignancy and HIV infection, or therapy, such as cancer chemotherapy and treatment for autoimmune disorders (3–6). Therefore, there is currently no ACIP recommendation on the use of RZV among pregnant women (health care providers should consider delaying administration of RZV for pregnant women) or adults with immunocompromising conditions, including HIV infection (additional discussions and recommendations by the ACIP on the use of RZV in adults with immunocompromising conditions are pending).

Consistent with the existing recommended use of ZVL, the ACIP recommended RZV for adults who are receiving low-dose immunosuppressive therapy, are anticipating immunosuppression, or have recovered from an immunocompromising illness (7). Additionally, as the clinical trials for RZV did not exclude adults with non-immunocompromising chronic health conditions (3–6), and given the safety and effectiveness profiles of

Ann Intern Med. 2018;168:210-220. doi:10.7326/M17-3439

* The 2018 adult immunization schedule appeared in *Annals of Internal Medicine* and on the Centers for Disease Control and Prevention Web site at www.cdc.gov/vaccines/schedules. An announcement summarizing changes in the 2018 adult immunization schedule is published concurrently in the *Morbidity and Mortality Weekly Report*. Readers can cite the 2018 adult immunization schedule as follows: Kim DK, Riley LE, Hunter P; Advisory Committee on Immunization Practices. Recommended immunization schedule for adults aged 19 years or older, United States, 2018. *Ann Intern Med.* 2018;168:210-20. doi:10.7326/M17-3439

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Recommended Immunization Schedule for Adults Aged 19 Years or Older, United States, 2018.

In February 2018, the *Recommended Immunization Schedule for Adults Aged 19 Years or Older, United States, 2018* became effective, as recommended by the Advisory Committee on Immunization Practices (ACIP) and approved by the Centers for Disease Control and Prevention (CDC). The adult immunization schedule was also approved by the American College of Physicians, the American Academy of Family Physicians, the American College of Obstetricians and Gynecologists, and the American College of Nurse-Midwives.

CDC announced the availability of the 2018 adult immunization schedule in the *Morbidity and Mortality Weekly Report (MMWR)*.¹ The schedule is published in its entirety in the *Annals of Internal Medicine*.²

The adult immunization schedule consists of figures that summarize routinely recommended vaccines for adults by age groups and medical conditions and other indications, footnotes for the figures, and a table of vaccine contraindications and precautions. Note the following when reviewing the adult immunization schedule:

- The figures in the adult immunization schedule should be reviewed with the accompanying footnotes.
- The figures and footnotes display indications for which vaccines, if not previously administered, should be administered unless noted otherwise.
- The table of contraindications and precautions identifies populations and situations for which vaccines should not be used or should be used with caution.
- When indicated, administer recommended vaccines to adults whose vaccination history is incomplete or unknown.
- Increased interval between doses of a multidosed vaccine series does not diminish vaccine effectiveness; it is not necessary to restart the vaccine series or add doses to the series because of an extended interval between doses.
- Combination vaccines may be used when any component of the combination is indicated and when the other components of the combination are not contraindicated.
- The use of trade names in the adult immunization schedule is for identification purposes only and does not imply endorsement by the ACIP or CDC.

Special populations that need additional considerations include:

- Pregnant women. Pregnant women should receive the tetanus, diphtheria, and acellular pertussis vaccine (Tdap) during pregnancy and the influenza vaccine during or before pregnancy. Live vaccines (e.g., measles, mumps, and rubella vaccine [MMR]) are contraindicated.
- Asplenia. Adults with asplenia have specific vaccination recommendations because of their increased risk for infection by encapsulated bacteria. Anatomical or functional asplenia includes congenital or acquired asplenia, splenic dysfunction, sickle cell disease and other hemoglobinopathies, and splenectomy.
- Immunocompromising conditions. Adults with immunosuppression should generally avoid live vaccines. Inactivated vaccines (e.g., pneumococcal vaccines) are generally acceptable. High-level immunosuppression includes HIV infection with a CD4 cell count <200 cells/ μ L, receipt of daily corticosteroid therapy with \geq 20 mg of prednisone or equivalent for \geq 14 days, primary immunodeficiency disorder (e.g., severe combined immunodeficiency or complement component deficiency), and receipt of cancer chemotherapy. Other immunocompromising conditions and immunosuppressive medications to consider when vaccinating adults can be found in *IDSA Clinical Practice Guideline for Vaccination of the Immunocompromised Host*.³ Additional information on vaccinating immunocompromised adults is in *General Best Practice Guidelines for Immunization*.⁴

Additional resources for health care providers include:

- Details on vaccines recommended for adults and complete ACIP statements at www.cdc.gov/vaccines/hcp/acip-recs/index.html
- Vaccine Information Statements that explain benefits and risks of vaccines at www.cdc.gov/vaccines/hcp/vis/index.html
- Information and resources on vaccinating pregnant women at www.cdc.gov/vaccines/adults/rec-vac/pregnant.html
- Information on travel vaccine requirements and recommendations at www.cdc.gov/travel/destinations/list
- CDC Vaccine Schedules App for immunization service providers to download at www.cdc.gov/vaccines/schedules/hcp/schedule-app.html
- Adult Vaccination Quiz for self-assessment of vaccination needs based on age, health conditions, and other indications at www2.cdc.gov/nip/adultimmshed/default.asp
- *Recommended Immunization Schedule for Children and Adolescents Aged 18 Years or Younger* at www.cdc.gov/vaccines/schedules/hcp/child-adolescent.html

Report suspected cases of reportable vaccine-preventable diseases to the local or state health department, and report all clinically significant postvaccination events to the Vaccine Adverse Event Reporting System at www.vaers.hhs.gov or by telephone, 800-822-7967. All vaccines included in the adult immunization schedule except 23-valent pneumococcal polysaccharide and zoster vaccines are covered by the Vaccine Injury Compensation Program. Information on how to file a vaccine injury claim is available at www.hrsa.gov/vaccinecompensation or by telephone, 800-338-2382. Submit questions and comments to CDC through www.cdc.gov/cdc-info or by telephone, 800-CDC-INFO (800-232-4636), in English and Spanish, 8:00am–8:00pm ET, Monday–Friday, excluding holidays.

The following abbreviations are used for vaccines in the adult immunization schedule (in the order of their appearance):

IIV	inactivated influenza vaccine
RIV	recombinant influenza vaccine
Tdap	tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine
Td	tetanus and diphtheria toxoids
MMR	measles, mumps, and rubella vaccine
VAR	varicella vaccine
RZV	recombinant zoster vaccine
ZVL	zoster vaccine live
HPV vaccine	human papillomavirus vaccine
PCV13	13-valent pneumococcal conjugate vaccine
PPSV23	23-valent pneumococcal polysaccharide vaccine
HepA	hepatitis A vaccine
HepA-HepB	hepatitis A vaccine and hepatitis B vaccine
HepB	hepatitis B vaccine
MenACWY	serogroup A, C, W, and Y meningococcal vaccine
MenB	serogroup B meningococcal vaccine
Hib	<i>Haemophilus influenzae</i> type b vaccine

1. MMWR Morb Mortal Wkly Rep. 2018;66(5). Available at www.cdc.gov/mmwr.
2. Ann Intern Med. 2018;168:210-20. Available at annals.org/aim/article/doi/10.7326/M17-3439.
3. Clin Infect Dis. 2014;58:e444-100. Available at www.idsociety.org/Templates/Content.aspx?tid=32212256011.
4. Kroger et al. Available at www.cdc.gov/vaccines/hcp/acip-recs/general-recs/index.html.



U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Figure 1. Recommended immunization schedule for adults aged 19 years or older, by age group, United States, 2018.

This figure should be reviewed with the accompanying footnotes. This figure and the footnotes describe indications for which vaccines, if not previously administered, should be administered unless noted otherwise.

Vaccine	19–21 years	22–26 years	27–49 years	50–64 years	≥65 years
Influenza ¹	1 dose annually				
Tdap ² or Td ²	1 dose Tdap, then Td booster every 10 yrs				
MMR ³	1 or 2 doses depending on indication (if born in 1957 or later)				
VAR ⁴	2 doses				
RZV ⁵ (preferred)				2 doses RZV (preferred)	
or ZVL ⁵				1 dose ZVL	
HPV–Female ⁶	2 or 3 doses depending on age at series initiation				
HPV–Male ⁶	2 or 3 doses depending on age at series initiation				
PCV13 ⁷	1 dose				
PPSV23 ⁷	1 or 2 doses depending on indication				1 dose
HepA ⁸	2 or 3 doses depending on vaccine				
HepB ⁹	3 doses				
MenACWY ¹⁰	1 or 2 doses depending on indication, then booster every 5 yrs if risk remains				
MenB ¹⁰	2 or 3 doses depending on vaccine				
Hib ¹¹	1 or 3 doses depending on indication				

Recommended for adults who meet the age requirement, lack documentation of vaccination, or lack evidence of past infection

Recommended for adults with other indications

No recommendation

Figure 2. Recommended immunization schedule for adults aged 19 years or older, by medical condition and other indications, United States, 2018.

This figure should be reviewed with the accompanying footnotes. This figure and the footnotes describe indications for which vaccines, if not previously administered, should be administered unless noted otherwise.

Vaccine	Pregnancy ^{1,6}	Immuno-compromised (excluding HIV infection) ^{3,7,11}	HIV infection CD4+ count (cells/ μ L) ^{3,7,9-10}	Asplenia, complement deficiencies ^{7,10,11}	End-stage renal disease, on hemodialysis ^{7,9}	Heart or lung disease, alcoholism ⁷	Chronic liver disease ^{7,9}	Diabetes ^{7,9}	Health care personnel ^{3,4,9}	Men who have sex with men ^{6,8,9}
Influenza ¹										
Tdap ² or Td ²	1 dose Tdap each pregnancy			1 dose Tdap, then Td booster every 10 yrs						
MMR ³	contraindicated	contraindicated		1 or 2 doses depending on indication						
VAR ⁴	contraindicated	contraindicated		2 doses						
RZV ⁵ (preferred)				2 doses RZV at age ≥ 50 yrs (preferred)						
or										
ZVL ⁵	contraindicated	contraindicated		1 dose ZVL at age ≥ 60 yrs						
HPV-Female ⁶		3 doses through age 26 yrs		2 or 3 doses through age 26 yrs						2 or 3 doses through age 26 yrs
HPV-Male ⁶		3 doses through age 26 yrs		2 or 3 doses through age 21 yrs						2 or 3 doses through age 26 yrs
PCV13 ⁷				1 dose						
PPSV23 ⁷				1, 2, or 3 doses depending on indication						
HepA ⁸				2 or 3 doses depending on vaccine						
HepB ⁹				3 doses						
MenACWY ¹⁰			1 or 2 doses depending on indication, then booster every 5 yrs if risk remains							
MenB ¹⁰			2 or 3 doses depending on vaccine							
Hib ¹¹		3 doses HSCT recipients only	1 dose							

Recommended for adults who meet the age requirement, lack documentation of vaccination, or lack evidence of past infection
 Recommended for adults with other indications
 Contraindicated
 No recommendation

Footnotes

Footnotes. Recommended immunization schedule for adults aged 19 years or older, United States, 2018

1. Influenza vaccination www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/flu.html
 General information
 - Administer 1 dose of age-appropriate inactivated influenza vaccine (IIV) or recombinant influenza vaccine (RIV) annually
 - Live attenuated influenza vaccine (LAIV) is not recommended for the 2017–2018 influenza season
 - A list of currently available influenza vaccines is available at www.cdc.gov/flu/protect/vaccine/vaccines.htm
 Special populations
 - Pregnant women
 - Adults with hives-only egg allergy
 - Adults with egg allergy other than hives (e.g., angioedema or respiratory distress): Administer IIV or RIV in a medical setting under supervision of a health care provider who can recognize and manage severe allergic conditions
2. Tetanus, diphtheria, and pertussis vaccination www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/tdap-td.html
 General information
 - Administer to adults who previously did not receive a dose of tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine (Tdap) as an adult or child (routinely recommended at age 11–12 years) 1 dose of Tdap, followed by a dose of tetanus and diphtheria toxoids (Td) booster every 10 years
 - Information on the use of Tdap or Td as tetanus prophylaxis in wound management is available at www.cdc.gov/mmwr/preview/mmwrhtml/r5517a1.htm
 Special populations
 - Pregnant women: Administer 1 dose of Tdap during each pregnancy, preferably in the early part of gestational weeks 27–36
3. Measles, mumps, and rubella vaccination www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/mmr.html
 General information
 - Administer 1 dose of measles, mumps, and rubella vaccine (MMR) to adults with no evidence of immunity to measles, mumps, or rubella
 - Evidence of immunity is:
 - Born before 1957 (except for health care personnel, see below)
 - Documentation of receipt of MMR
 - Laboratory evidence of immunity or disease
 - Documentation of a health care provider–diagnosed disease without laboratory confirmation is not considered evidence of immunity
 Special populations
 - Pregnant women and nonpregnant women of childbearing age with no evidence of immunity to rubella: Administer 1 dose of MMR (if pregnant, administer MMR after pregnancy and before discharge from health care facility)
4. Varicella vaccination www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/varicella.html
 General information
 - Administer to adults without evidence of immunity to varicella 2 doses of varicella vaccine (VAR) 4–8 weeks apart if previously received no varicella-containing vaccine (if previously received 1 dose of varicella-containing vaccine, administer 1 dose of VAR at least 4 weeks after the first dose)
 - Evidence of immunity to varicella is:
 - U.S.-born before 1980 (except for pregnant women and health care personnel, see below)
 - Documentation of receipt of 2 doses of varicella or varicella-containing vaccine at least 4 weeks apart
 - Diagnosis or verification of history of varicella or herpes zoster by a health care provider
 - Laboratory evidence of immunity or disease
 Special populations
 - Administer 2 doses of VAR 4–8 weeks apart if previously received no varicella-containing vaccine (if previously received 1 dose of varicella-containing vaccine, administer 1 dose of VAR at least 4 weeks after the first dose):
 - Pregnant women without evidence of immunity: Administer the first of the 2 doses or the second dose after pregnancy and before discharge from health care facility
 - Health care personnel without evidence of immunity
 - Adults with HIV infection and CD4 cell count ≥ 200 cells/ μ L: May administer, based on individual clinical decision, 2 doses of VAR 3 months apart
 - VAR is contraindicated for pregnant women and adults with severe immunodeficiency
5. Zoster vaccination www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/shingles.html
 General information
 - Administer 2 doses of recombinant zoster vaccine (RZV) 2–6 months apart to adults aged 50 years or older regardless of past episode of herpes zoster or receipt of zoster vaccine live (ZVL)
6. Human papillomavirus vaccination www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/hpv.html
 General information
 - Administer human papillomavirus (HPV) vaccine to females through age 26 years and males through age 21 years (males age 22 through 26 years may be vaccinated based on individual clinical decision)
 - The number of doses of HPV vaccine to be administered depends on age at initial HPV vaccination
 - No previous dose of HPV vaccine: Administer 3-dose series at 0, 1–2, and 6 months (minimum intervals: 4 weeks between doses 1 and 2, 12 weeks between doses 2 and 3, and 5 months between doses 1 and 3; repeat doses if given too soon)
 - Aged 9–14 years at HPV vaccine series initiation and received 1 dose or 2 doses less than 5 months apart: Administer 1 dose
 - Aged 9–14 years at HPV vaccine series initiation and received 2 doses at least 5 months apart: No additional dose is needed
 Special populations
 - Adults with immunocompromising conditions (including HIV infection) through age 26 years: Administer 3-dose series at 0, 1–2, and 6 months
 - Men who have sex with men through age 26 years: Administer 2- or 3-dose series depending on age at initial vaccination (see above), if no history of HPV vaccine, administer 3-dose series at 0, 1–2, and 6 months
 - Pregnant women through age 26 years: HPV vaccination is not recommended during pregnancy, but there is no evidence that the vaccine is harmful and no intervention needed for women who inadvertently receive HPV vaccine while pregnant; delay remaining doses until after pregnancy; pregnancy testing is not needed before vaccination
7. Pneumococcal vaccination www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/pneumo.html
 General information
 - Administer to immunocompetent adults aged 65 years or older 1 dose of 13-valent pneumococcal conjugate vaccine (PCV13); if not previously administered, followed by 1 dose of 23-valent pneumococcal polysaccharide vaccine (PPSV23) at least 1 year after PCV13; if PPSV23 was previously administered but not PCV13, administer PCV13 at least 1 year after PPSV23
 - When both PCV13 and PPSV23 are indicated, administer PCV13 first (PCV13 and PPSV23 should not be administered during the same visit); additional information on vaccine timing is available at www.cdc.gov/vaccines/vpd/pneumo/downloads/pneumo-vaccine-timing.pdf

Footnotes—Continued

- Special populations
- Administer to adults aged 19 through 64 years with the following chronic conditions 1 dose of PPSV23 (at age 65 years or older, administer 1 dose of PCV13; if not previously received, and another dose of PPSV23 at least 1 year after PCV13 and at least 5 years after PPSV23):
 - Chronic heart disease (excluding hypertension)
 - Chronic lung disease
 - Chronic liver disease
 - Alcoholism
 - Diabetes mellitus
 - Cigarette smoking
 - Administer to adults aged 19 years or older with the following indications 1 dose of PCV13 followed by 1 dose of PPSV23 at least 8 weeks after PCV13, and a second dose of PPSV23 at least 5 years after the first dose of PPSV23 (if the most recent dose of PPSV23 was administered before age 65 years, at age 65 years or older, administer another dose of PPSV23 at least 5 years after the last dose of PPSV23):
 - Immunodeficiency disorders (including B- and T-lymphocyte deficiency, complement deficiencies, and phagocytic disorders)
 - HIV infection
 - Anatomical or functional asplenia (including sickle cell disease and other hemoglobinopathies)
 - Chronic renal failure and nephrotic syndrome
 - Administer to adults aged 19 years or older with the following indications 1 dose of PCV13 followed by 1 dose of PPSV23 at least 8 weeks after PCV13 (if the dose of PPSV23 was administered before age 65 years, at age 65 years or older, administer another dose of PPSV23 at least 5 years after the last dose of PPSV23):
 - Cerebrospinal fluid leak
 - Cochlear implant
8. Hepatitis A vaccination
www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/hepa.html
 General information
- Administer to adults who have a specific risk (see below), or lack a risk factor but want protection, 2-dose series of single antigen hepatitis A vaccine (HepA; Havrix at 0 and 6–12 months or Vaqta at 0 and 6–18 months; minimum interval: 6 months) or a 3-dose series of combined hepatitis A and hepatitis B vaccine (HepA-HepB) at 0, 1, and 6 months; minimum intervals: 4 weeks between first and second doses, 5 months between second and third doses
- Special populations
- Administer HepA or HepA-HepB to adults with the following indications:
 - Travel to or work in countries with high or intermediate hepatitis A endemicity
 - Men who have sex with men
 - Injection or noninjection drug use
 - Work with hepatitis A virus in a research laboratory or with nonhuman primates infected with hepatitis A virus
 - Clotting factor disorders
 - Chronic liver disease
9. Hepatitis B vaccination
www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/hepb.html
 General information
- Administer to adults who have a specific risk (see below), or lack a risk factor but want protection, 3-dose series of single antigen hepatitis B vaccine (HepB) or combined hepatitis A and hepatitis B vaccine (HepA-HepB) at 0, 1, and 6 months (minimum intervals: 4 weeks between doses 1 and 2 for HepB and HepA-HepB; between doses 2 and 3, 8 weeks for HepB and 5 months for HepA-HepB)
- Special populations
- Administer HepB or HepA-HepB to adults with the following indications:
 - Chronic liver disease (e.g., hepatitis C infection, cirrhosis, fatty liver disease, alcoholic liver disease, autoimmune hepatitis, alanine aminotransferase [ALT] or aspartate aminotransferase [AST] level greater than twice the upper limit of normal)
 - HIV infection
 - Percutaneous or mucosal risk of exposure to blood (e.g., household contacts of hepatitis B surface antigen [HBsAg]-positive persons; adults younger than age 60 years with diabetes mellitus or aged 60 years or older with diabetes mellitus based on individual clinical decision; adults in predialysis care or receiving hemodialysis or peritoneal dialysis; recent or current injection drug users; health care and public safety workers at risk for exposure to blood or blood-contaminated body fluids)
 - Sexual exposure risk (e.g., sex partners of HBsAg-positive persons; sexually active persons not in a mutually monogamous relationship; persons seeking evaluation or treatment for a sexually transmitted infection; and men who have sex with men [MSM])
 - Receive care in settings where a high proportion of adults have risks for hepatitis B infection (e.g., facilities providing sexually transmitted disease treatment, drug-abuse treatment and prevention services, hemodialysis and end-stage renal disease programs, institutions for developmentally disabled persons, health care settings targeting services to injection drug users or MSM, HIV testing and treatment facilities, and correctional facilities)
 - Travel to countries with high or intermediate hepatitis B endemicity
10. Meningococcal vaccination
www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/mening.html
 Special populations: Serogroups A, C, W, and Y meningococcal vaccine (MenACWY)
11. Haemophilus influenzae type b vaccination
www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/hib.html
 Special populations
- Administer *Haemophilus influenzae* type b vaccine (Hib) to adults with the following indications:
 - Anatomical or functional asplenia (including sickle cell disease) or undergone elective splenectomy: Administer 1 dose if not previously vaccinated (preferably at least 14 days before elective splenectomy)
 - Hematopoietic stem cell transplant (HSCT): Administer 3-dose series with doses 4 weeks apart starting 6 to 12 months after successful transplant regardless of Hib vaccination history
- Special populations: MenB
- Administer 2-dose series of MenB-4C at least 1 month apart or 3-dose series of MenB-FHbp at 0, 1–2, and 6 months to adults with the following indications:
 - Anatomical or functional asplenia (including sickle cell disease)
 - Persistent complement component deficiency
 - Eculizumab use
 - At risk from a meningococcal disease outbreak attributed to serogroup B
 - Microbiologists routinely exposed to *Neisseria meningitidis*
- Special populations: MenB
- Administer 2-dose series of MenB-4C at least 1 month apart or 3-dose series of MenB-FHbp at 0, 1–2, and 6 months to adults with the following indications:
 - Anatomical or functional asplenia (including sickle cell disease)
 - Persistent complement component deficiency
 - Eculizumab use
 - At risk from a meningococcal disease outbreak attributed to serogroup B
 - Microbiologists routinely exposed to *Neisseria meningitidis*
- General Information: Serogroup B meningococcal vaccine (MenB)
- May administer, based on individual clinical decision, to young adults and adolescents aged 16–23 years (preferred age is 16–18 years) who are not at increased risk 2-dose series of MenB-4C (Bexsero) at least 1 month apart or 2-dose series of MenB-FHbp (Trumenba) at least 6 months apart
 - MenB-4C and MenB-FHbp are not interchangeable
- Special populations: MenB
- Administer 2-dose series of MenB-4C at least 1 month apart or 3-dose series of MenB-FHbp at 0, 1–2, and 6 months to adults with the following indications:
 - Anatomical or functional asplenia (including sickle cell disease)
 - Persistent complement component deficiency
 - Eculizumab use
 - At risk from a meningococcal disease outbreak attributed to serogroup B
 - Microbiologists routinely exposed to *Neisseria meningitidis*
- General Information: Serogroup B meningococcal vaccine (MenB)
- May administer, based on individual clinical decision, to young adults and adolescents aged 16–23 years (preferred age is 16–18 years) who are not at increased risk 2-dose series of MenB-4C (Bexsero) at least 1 month apart or 2-dose series of MenB-FHbp (Trumenba) at least 6 months apart
 - MenB-4C and MenB-FHbp are not interchangeable
- Special populations: MenB
- Administer 2-dose series of MenB-4C at least 1 month apart or 3-dose series of MenB-FHbp at 0, 1–2, and 6 months to adults with the following indications:
 - Anatomical or functional asplenia (including sickle cell disease)
 - Persistent complement component deficiency
 - Eculizumab use
 - At risk from a meningococcal disease outbreak attributed to serogroup B
 - Microbiologists routinely exposed to *Neisseria meningitidis*
- Special populations: MenB
- Administer 2-dose series of MenB-4C at least 1 month apart or 3-dose series of MenB-FHbp at 0, 1–2, and 6 months to adults with the following indications:
 - Anatomical or functional asplenia (including sickle cell disease) or undergone elective splenectomy: Administer 1 dose if not previously vaccinated (preferably at least 14 days before elective splenectomy)
 - Hematopoietic stem cell transplant (HSCT): Administer 3-dose series with doses 4 weeks apart starting 6 to 12 months after successful transplant regardless of Hib vaccination history

Table. Contraindications and precautions for vaccines recommended for adults aged 19 years or older

The Advisory Committee on Immunization Practices (ACIP) recommendations and package inserts for vaccines provide information on contraindications and precautions related to vaccines. Contraindications are conditions that increase chances of a serious adverse reaction in vaccine recipients and the vaccine should not be administered when a contraindication is present. Precautions should be reviewed for potential risks and benefits for vaccine recipients.

Vaccine(s)	Contraindications		Precautions
	Severe reaction, e.g., anaphylaxis, after a previous dose or to a vaccine component	Moderate or severe acute illness with or without fever	
Additional contraindications and precautions for vaccines routinely recommended for adults			
Additional Contraindications			
IV ¹			<ul style="list-style-type: none"> History of Guillain-Barré syndrome within 6 weeks after previous influenza vaccination Egg allergy other than hives, e.g., angioedema, respiratory distress, lightheadedness, or recurrent emesis; or required epinephrine or another emergency medical intervention (IV may be administered in an inpatient or outpatient medical setting and under the supervision of a health care provider who is able to recognize and manage severe allergic conditions) History of Guillain-Barré syndrome within 6 weeks after previous influenza vaccination
RIV ¹			
Tdap, Td	<ul style="list-style-type: none"> For pertussis-containing vaccines: encephalopathy, e.g., coma, decreased level of consciousness, or prolonged seizures, not attributable to another identifiable cause within 7 days of administration of a previous dose of a vaccine containing tetanus or diphtheria toxoid or acellular pertussis 		<ul style="list-style-type: none"> History of Guillain-Barré syndrome within 6 weeks after a previous dose of tetanus toxoid-containing vaccine History of Arthus-type hypersensitivity reactions after a previous dose of tetanus or diphtheria toxoid-containing vaccine. Defer vaccination until at least 10 years have elapsed since the last tetanus toxoid-containing vaccine For pertussis-containing vaccine, progressive or unstable neurologic disorder, uncontrolled seizures, or progressive encephalopathy (until a treatment regimen has been established and the condition has stabilized)
MMR ²	<ul style="list-style-type: none"> Severe immunodeficiency, e.g., hematologic and solid tumors, chemotherapy, congenital immunodeficiency or long-term immunosuppressive therapy³, human immunodeficiency virus (HIV) infection with severe immunocompromise Pregnancy 		<ul style="list-style-type: none"> Recent (within 11 months) receipt of antibody-containing blood product (specific interval depends on product)⁴ History of thrombocytopenia or thrombocytopenic purpura Need for tuberculin skin testing⁵
VAR ²	<ul style="list-style-type: none"> Severe immunodeficiency, e.g., hematologic and solid tumors, chemotherapy, congenital immunodeficiency or long-term immunosuppressive therapy³, HIV infection with severe immunocompromise Pregnancy 		<ul style="list-style-type: none"> Recent (within 11 months) receipt of antibody-containing blood product (specific interval depends on product)⁴ Receipt of specific antiviral drugs (acyclovir, famciclovir, or valacyclovir) 24 hours before vaccination (avoid use of these antiviral drugs for 14 days after vaccination)
ZVL ²	<ul style="list-style-type: none"> Severe immunodeficiency, e.g., hematologic and solid tumors, chemotherapy, congenital immunodeficiency or long-term immunosuppressive therapy³, HIV infection with severe immunocompromise Pregnancy 		<ul style="list-style-type: none"> Receipt of specific antiviral drugs (acyclovir, famciclovir, or valacyclovir) 24 hours before vaccination (avoid use of these antiviral drugs for 14 days after vaccination)
HPV vaccine			<ul style="list-style-type: none"> Pregnancy
PCV13	<ul style="list-style-type: none"> Severe allergic reaction to any vaccine containing diphtheria toxoid 		

1. For additional information on use of influenza vaccines among persons with egg allergy, see: CDC. Prevention and control of seasonal influenza with vaccines: recommendations of the Advisory Committee on Immunization Practices—United States, 2016–17 influenza season. MMWR. 2016;65(RR-5):1–54. Available at www.cdc.gov/mmwr/volumes/65/rr/rr6505a1.htm.

2. MMR may be administered together with VAR or ZVL on the same day. If not administered on the same day, separate live vaccines by at least 28 days.

3. Immunosuppressive steroid dose is considered to be daily receipt of 20 mg or more prednisone or equivalent for 2 or more weeks. Vaccination should be deferred for at least 1 month after discontinuation of immunosuppressive steroid therapy. Providers should consult ACIP recommendations for complete information on the use of specific live vaccines among persons on immune-suppressing medications or with immune suppression because of other reasons.

4. Vaccine should be deferred for the appropriate interval if replacement immune globulin products are being administered. See: Best practices guidance of the Advisory Committee on Immunization Practices (ACIP). Available at www.cdc.gov/vaccines/hcp/acip-recs/general-recs/index.html

5. Measles vaccination may temporarily suppress tuberculin reactivity. Measles-containing vaccine may be administered on the same day as tuberculin skin testing, or should be postponed for at least 4 weeks after vaccination.

Adapted from: CDC. Table 6. Contraindications and precautions to commonly used vaccines. General recommendations on immunization: recommendations of the Advisory Committee on Immunization Practices. MMWR. 2011;60(No. RR-2):40–1 and from: Hamborsky J, Kroger A, Wolfe S, eds. Appendix A. Epidemiology and prevention of vaccine preventable diseases. 13th ed. Washington, DC: Public Health Foundation, 2015. Available at www.cdc.gov/vaccines/pubs/pinkbook/index.html.

Abbreviations of vaccines	VAR	ZVL	HPV vaccine	PCV13	PPSV23	HepA	HepA-HepB	HepB	MenACWY	MenB	Hib	Hepatitis A vaccine	Hepatitis A and hepatitis B vaccines	Hepatitis B vaccine	serogroups A, C, W, and Y meningococcal vaccine	serogroup B meningococcal vaccine	<i>Haemophilus influenzae</i> type b vaccine
IIV																	
RIV																	
Tdap																	
Td																	
MMR																	

other conjugate vaccines recommended for adults, such as hepatitis B and pneumococcal vaccines, the ACIP recommended that RZV should routinely be used for adults with diabetes mellitus; chronic heart, lung, liver, or kidney disease; functional or anatomical asplenia; or complement deficiencies who meet the age criterion.

Note that ZVL is contraindicated for pregnant women and adults with severe primary or acquired immunodeficiency, including those with HIV infection and a CD4 cell count <200 cells/ μ L (there is no recommendation for ZVL for adults with HIV infection and a CD4 cell count \geq 200 cells/ μ L).

MMR vaccination (8). On 25 October, the ACIP updated MMR vaccination recommendations to include the use of a third dose of a mumps-containing vaccine for persons previously vaccinated with 2 doses of a mumps-containing vaccine who are identified by public health authorities as being a part of a group or population at risk for acquiring mumps because of an outbreak. For implementation purposes, the recommendation is that, during a mumps outbreak, persons identified as being at increased risk and who have received \leq 2 doses of mumps virus-containing vaccine or have unknown vaccination status should receive 1 dose of MMR. This change is described in the 2018 adult immunization schedule as:

- Administer 1 dose of MMR to adults who previously received \leq 2 doses of mumps-containing vaccine and are identified by a public health authority to be at increased risk during a mumps outbreak.

Adults without evidence of immunity to mumps (defined as: born before 1957, have documented receipt of MMR, or have laboratory evidence of immunity or disease) are routinely recommended to receive 1 dose of MMR for mumps prevention unless they are students in postsecondary educational institutions, international travelers, or household contacts of immunocompromised persons, in which case they should receive 2 doses of MMR at least 28 days apart. In a mumps outbreak setting, those adults identified by a public health authority to be at risk should receive 1 dose of MMR regardless of whether they previously received 0, 1, or 2 doses of a mumps-containing vaccine.

Notable changes in the Figures are:

- In **Figures 1 and 2**, “ZVL” replaced the term “HZV” (herpes zoster vaccine) that was used in past adult immunization schedules to refer to the live zoster vaccine. A row for RZV was added above the row for ZVL to distinguish the 2 zoster vaccines and a dashed line was used to separate RZV and ZVL rows to denote that the 2 zoster vaccines are recommended for the same purpose. In the indication bars for RZV, the text that RZV is preferred over ZVL has been added when either RZV or ZVL can be used for adults aged 60 years or older.

- In **Figures 1 and 2**, “Td/Tdap” (tetanus and reduced diphtheria toxoids/tetanus and reduced diphtheria toxoids and acellular pertussis vaccine) has been replaced by “Tdap or Td” and the text in the indication bar has been revised to “1 dose Tdap, then Td booster

every 10 years.” One dose of Tdap is recommended for adults who have not previously received Tdap as an adult or child (1 dose of Tdap is routinely recommended at age 11–12 years), except for pregnant women who are recommended to receive 1 dose of Tdap for each pregnancy during the early part of gestational weeks 27–36.

- In **Figures 1 and 2**, the text in the indication bar for MenACWY (serogroups A, C, W, and Y meningococcal vaccine) has been revised to “1 or 2 doses depending on indication, then booster every 5 years if risk remains.” Adults with functional or anatomical asplenia, persistent complement component deficiencies, or HIV infection should receive 2 doses of MenACWY and revaccinate every 5 years. One dose of MenACWY is recommended for microbiologists who to work with isolates of *Neisseria meningitidis* and travelers in countries with endemic or epidemic meningococcal disease, and a booster dose of MenACWY is indicated every 5 years if the risk remains. First-year college students living in residence halls and military recruits are also recommended to receive 1 dose of MenACWY. MPSV4 (4-valent meningococcal polysaccharide vaccine) is no longer available and has been removed from the adult immunization schedule.

- In **Figure 1**, the text in the indication bar for MMR has been changed to “1 or 2 doses depending on indication (if born in 1957 or later).” Adults born in 1957 or later who do not have evidence of immunity to measles, mumps, or rubella are routinely recommended to receive 1 dose of MMR. However, students in postsecondary educational institutions, international travelers, and household contacts of immunocompromised persons are routinely recommended to receive 2 doses of MMR at least 28 days apart.

- In **Figure 1**, the text in the indication bars for human papillomavirus (HPV) vaccine for females and males has been revised to “2 or 3 doses depending on age at series initiation.” In 2016, the recommended number of doses of HPV vaccine was revised to 2 or 3 depending on the age at which the HPV vaccination series began (9). Before 2016, 3 doses of HPV vaccine was recommended for adolescents and young adults. In 2016, for adolescents and young adults whose HPV vaccination series was initiated before age 15 years, 2 doses of HPV vaccine was recommended. That is, adult females through age 26 years and adult males through age 21 years (and adult males aged 22 through 26 years who may be vaccinated based on individual clinical decision) who received 2 doses of HPV vaccine at least 5 months apart at age 9–14 years are considered fully immunized. Those who received 1 dose of HPV vaccine or 2 doses of HPV vaccine less than 5 months apart at age 9–14 years are recommended to receive 1 additional dose of HPV vaccine at least 5 months after the last dose. Those who previously have not received any HPV vaccine should receive 3 doses at 0, 1–2, and 6 months (minimum intervals: 4 weeks between doses 1 and 2, 12 weeks between doses 2 and 3, and 5 months between doses 1 and 3; repeat doses if they were given too soon). Males and females through age 26

years with immunocompromising conditions, including HIV infection, are recommended to receive 3 doses of HPV vaccine. Men who have sex with men and transgender persons through age 26 years are recommended to receive 2 or 3 doses of HPV vaccine depending on the age at which they started their HPV vaccination series.

The footnotes in the 2018 adult immunization schedule should be read when reviewing **Figures 1 and 2**. The footnotes contain additional general information, such as dosing intervals for vaccination series, and considerations for special populations, such as pregnant women and adults with HIV infection. The footnotes in the adult immunization schedule and the child and adolescent immunization schedule have been harmonized to read more consistently (10).

Although modest increases in vaccination coverage rates were observed in several groups of adult population in 2015, the overall vaccination coverage rates for adults in the United States have remained low (11). Among adults, modest increases in influenza vaccination (44.8%, an increase of 1.6 percentage points), Tdap vaccination (23.1%, an increase of 3.1 percentage points), pneumococcal vaccination among adults aged 19–64 years who are at increased risk for pneumococcal disease (23.0%, an increase of 3.3 percentage points), and zoster vaccination among adults aged 60 years or older (30.6%, an increase of 2.7 percentage points) were observed when compared with 2014. Except for the gradual but consistent increase in zoster vaccination among adults aged 60 years or older, no sustained increases in vaccination coverage for adults were seen over several years.

In response to the persistently low vaccination coverage rates among adults, the National Vaccine Advisory Committee updated the standards for adult immunization practice to promote the integration of vaccinations as a part of routine clinical care for adults (12). The standards for adult immunization practice is a call to action for health care providers to 1) assess the vaccination status of adult patients at every clinical encounter, 2) strongly recommend needed vaccines to patients, 3) offer vaccines recommended to patients (providers who do not stock vaccines should refer patients to another provider or pharmacist who stocks and administers vaccines), and 4) document vaccines administered in the state or local immunization information system (IIS). The standards for adult immunization practice is the framework with which health care providers are encouraged to implement specific evidence-based strategies to improve the uptake of vaccines by their adult patients, such as designing patient flow to include immunization services, recommending and offering vaccines during the same clinical visit, utilizing standing orders to routinely administer vaccines, and using the IIS to document patient vaccination records and to assess their vaccination status (12).

Also known as vaccination registries, IIS are confidential, electronic systems that collect and consolidate vaccination data from vaccination service providers

(13). When automated and interoperable with electronic health record (EHR) systems, IIS can lend clinical decision support for the provider, generate reminders for providers, create notifications for patients, generate vaccination data reports for individual patients or groups of patients, help manage vaccine inventories, and other vaccination activities. Immunization programs in all states and municipalities have the authority to collect vaccination records for all age groups (“life-long IIS”), except Rhode Island and Connecticut, where IIS are limited to vaccination records for children (14). Fifty-five immunization programs in 49 states (the New Hampshire legislature approved the establishment and use of statewide IIS in 2016 and its implementation is pending) and 6 cities (Chicago, District of Columbia, Houston, New York city, Philadelphia, and San Antonio) operate IIS (13). IIS in these state and city immunization programs have matured individually and their capabilities vary. Collectively, they are increasingly becoming important infrastructure for clinical point-of-care and population-level vaccination strategies.

Reports submitted by immunization programs estimate that the percentage of adults with 1 or more vaccinations documented in IIS was 25% in 2008, 25% in 2012, and 44% in 2016 (15–17). Note that these percentages reflect a minimum of 1 routinely recommended vaccination documented for adults documented in IIS, far fewer than what they need to be current. In contrast, IIS participation by children younger than 6 years of age with 2 or more vaccinations documented in IIS was 63% in 2006, 86% in 2012, and 94% in 2016 (15, 18).

Historically, the primary focus of IIS has been on pediatric populations, particularly with the role of the IIS in supporting Vaccines for Children, a federally funded program that provides vaccines at no cost to children who might not otherwise get vaccinated (19). IIS for children have been successful largely through partnerships with pediatricians and family practitioners who provide “medical homes” for children and routinely use IIS to assess and document pediatric vaccination records. In addition, mandates for vaccinating children, such as vaccination requirements for school entry, compel pediatricians and family practitioners to maintain accurate and current vaccination records for children in IIS. In contrast, adults are vaccinated by multiple health care providers, including specialty care providers, such as obstetricians and cardiologists, in frequently changing “medical homes” due to changes in employment status or health insurance plans, and often in settings outside of health care provider offices or health centers, such as pharmacies, retail clinics, and the workplace. That is, vaccination records for adults are often scattered, incomplete, and difficult to keep up to date. Consolidated adult vaccination records maintained in IIS would, therefore, play an important role in providing point-of-care clinical support for health care providers for adults. Having consolidated vaccination records for adults in IIS necessarily means that health care providers submit adult vaccination records to IIS. In a 2016 survey of approximately 1,300 health care

providers whose practices included vaccination services for adults, more than 90% reported routinely assessing their patients for vaccinations, but only 32% reported that their practices submitted adult vaccination records to the IIS in their state or city (Lutz CS, Kim D, Black CL, et al. Implementation of adult immunization practice standards by US clinicians and pharmacists. In preparation.). In contrast, in a 2013 survey of 627 pediatricians who offered vaccinations to their patients, approximately 90% reported using the IIS in their state or city (20).

Health care providers and state and municipal immunization programs increasingly depend on technology to document and maintain updated vaccination records. IIS are an underused tool for primary care providers, including primary care providers; specialty care providers, such as obstetricians and gynecologists; occupational health clinic providers; and pharmacists. The use of IIS is a proven systematic approach that can help health care systems and providers make efficient and effective decisions on vaccinating their adult patients (21, 22). IIS can assist health care providers utilize adult vaccination as a quality measure to report to different payers. For example, health care providers who participate in the Medicare Quality Payment Program's Merit-based Incentive Payment System could use IIS data, such as pneumococcal vaccination records for adults aged 65 years or older, to submit as a quality measure (23). Bidirectional data exchanges between provider EHRs and IIS automate vaccination updates and promote high vaccination coverage. In 2016, IIS in 91% of 49 states and 6 cities received patient vaccination records submitted by health care providers, and 67% received and responded to provider requests for patient vaccination records (18). In addition, IIS can exchange data with health information systems and forecast vaccinations needed by patients that are consistent with ACIP recommendations. Eligible health care providers also have a financial incentive to acquire certified EHR products and demonstrate their meaningful use, defined in part by the Centers for Medicare & Medicaid Services as the data exchange between EHR and IIS (24).

There are challenges in the common use of IIS to document vaccinations for adults. First, there are different state regulations regarding consent to retain information in the state or city IIS. Most IIS jurisdictions have the authority to operate an IIS for adults with implied consent and with or without the right to opt out by patients (14). In several IIS jurisdictions, an explicit patient consent is required before adult vaccination information can be submitted to IIS. Second, not all immunization programs have IIS for adults (as mentioned earlier, Rhode Island and Connecticut have IISs for children only). Third, although infrastructure and functional standards describe the operations, data quality, and technology needed by the IIS (9), not all IIS have met all of the functional standards.

Multiple factors contribute to low adult vaccination rates. At the individual level, adult patients may not have the awareness or interest in vaccines routinely rec-

ommended for adults. Health care providers for adults have a myriad of competing clinical priorities that they feel take precedence over vaccinations and are challenged by coding and billing processes and perceived inadequate payments associated with vaccination services (25-30). At the systems level, health care providers have difficulties ascertaining which vaccines their adult patients need because of incomplete vaccination records, and their EHRs may not be able to systematically assess vaccination records from IISs. Health care systems and providers and immunization programs continue to collaborate to automate bidirectional flow of vaccination data between EHRs and IIS.

Plans for IIS include immunization programs continuing to onboard adult vaccination service providers into IIS and automate EHRs to submit and import vaccination data, continuing to develop up-to-date clinical decision-support tools that interface between EHRs and IIS to forecast vaccination needs of adult patients, and sharing adult vaccination data securely and efficiently (13). In addition to developing vaccination procedural coding manuals to help health care providers administer vaccines to their adult patients (31, 33), the American College of Physicians, the American Academy of Family Physicians, and the American College of Obstetricians and Gynecologists, among other organizations, promote the use of IIS to document and manage adult vaccination records. Consistent use of IIS by health care providers will improve clinical and preventive health services delivery and reduce the burden of illnesses, hospitalizations, and mortality associated with vaccine-preventable diseases among adults.

From Centers for Disease Control and Prevention, Atlanta, Georgia.

Disclosures: To assure the integrity of the ACIP, the U.S. Department of Health and Human Services has taken steps to assure that there is technical adherence to ethics statutes and regulations regarding financial conflicts of interest. Concerns regarding the potential for the appearance of a conflict are addressed, or avoided altogether, through pre and postappointment considerations. Individuals with particular vaccine-related interests will not be considered for appointment to the committee. Potential nominees are screened for conflicts of interest and, if any are found, are asked to divest or forgo certain vaccine-related activities. In addition, at the beginning of each ACIP meeting, each member is asked to declare his or her conflicts. Members with conflicts are not permitted to vote if the conflict involves the vaccine or biological being voted on. Details can be found at www.cdc.gov/vaccines/acip/committee/structure-role.html. Disclosure forms for the author can be viewed at www.acponline.org/authors/icmje/ConflictOfInterestForms.do?msNum=M17-3439.

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APPENDIX

Recommendations for routine use of vaccines in children, adolescents, and adults are developed by the Advisory Committee on Immunization Practices (ACIP). ACIP is chartered as a federal advisory committee to provide expert external advice and guidance to the Director of the Centers for Disease Control and Prevention (CDC) on the use of vaccines and related agents to control vaccine-preventable diseases in the civilian population of the United States. Recommendations for routine use of vaccines in children and adolescents are harmonized to the greatest extent possible with recommendations made by the American Academy of Pediatrics (AAP), the American Academy of Family Physicians (AAFP), and the American College of Obstetricians and Gynecologists (ACOG). Recommendations for routine use of vaccines in adults are harmonized with recommendations of AAFP, ACOG, the American College of Physicians (ACP), and the American College of Nurse-Midwives (ACNM). ACIP recommendations adopted by the CDC Director become agency guidelines on the date published in the *Morbidity and Mortality Weekly Report* (MMWR). Additional information on ACIP is available at www.cdc.gov/vaccines/acip.

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