Recommended Immunization Schedule for Adults Aged 19 Years or Older, United States, 2017*

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In October 2016, the Advisory Committee on Immunization Practices (ACIP) voted to approve the Recommended Adult Immunization Schedule for Adults Aged 19 Years or Older, United States, 2017. The 2017 adult immunization schedule summarizes ACIP recommendations in 2 figures, footnotes for the figures, and a table of contraindications and precautions for vaccines recommended for adults (Figure). These documents can also be found at www.cdc.gov/vaccines/schedules. The full ACIP recommendations for each vaccine can be found at www.cdc.gov/vaccines/hcp/acip-recs/index.html. The 2017 adult immunization schedule was also reviewed and 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.

Newly added to the 2017 adult immunization schedule is a cover page that contains information on select general principles pertinent to the adult immunization schedule, additional CDC resources, instructions for reporting adverse events related to vaccination and suspected cases of reportable vaccine-preventable diseases, and an ACIP-approved list of standardized acronyms for vaccines recommended for adults. In addition, the table of contraindications and precautions for vaccines routinely recommended for adults that was formerly a standalone document has been incorporated into the adult immunization schedule. Changes in the 2017 adult immunization schedule from the previous year’s schedule include new or revised ACIP recommendations on influenza, human papillomavirus, hepatitis B, and meningococcal vaccinations.

Influenza vaccination (1). Changes are related to concerns regarding low effectiveness of the live attenuated influenza vaccine (LAIV) (FluMist, MedImmune) against influenza A(H1N1)pdm09 in the United States during the 2013–2014 and 2015–2016 influenza seasons and revised recommendations on the use of the influenza vaccine among patients with egg allergy. These changes are reflected in the 2017 adult immunization schedule as:

- LAIV should not be used during the 2016–2017 influenza season.
- Adults with a history of egg allergy who have only hives after exposure to egg should receive age-appropriate inactivated influenza vaccine (IIV) or recombinant influenza vaccine (RIV).
- Adults with a history of egg allergy with symptoms other than hives (e.g., angioedema, respiratory distress, lightheadedness, or recurrent emesis, or who required epinephrine or another emergency medical intervention) may receive age-appropriate IIV or RIV. The selected vaccine should be administered in an inpatient or outpatient medical setting and supervised by a health care provider who is able to recognize and manage severe allergic conditions.

Human papillomavirus vaccination (2). Healthy adolescents who start their human papillomavirus vaccine (HPV) series before age 15 years are recommended to receive 2 doses of HPV. However, the recommendation remains at 3 doses for adults and adolescents who did not start their vaccination series before age 15 years. Changes in recommendations in the adult immunization schedule include updates regarding HPV vaccination for adults who did not complete HPV series as adolescents. These changes are described in the 2017 adult immunization schedule as:

- Women through age 26 years and men through age 21 years who have not received any HPV should receive a 3-dose series of HPV at 0, 1-2, and 6 months. Men aged 22 through 26 years may be vaccinated with a 3-dose series of HPV at 0, 1-2, and 6 months.
- Women through age 26 years and men through age 21 years (and men aged 22 through 26 years who may receive HPV) who initiated HPV series before age 15 years and received 2 doses at least 5 months apart are considered adequately vaccinated and do not need an additional dose of HPV.
- Women through age 26 years and adult males through age 21 years (and men aged 22 through 26 years who may receive HPV) who initiated HPV series before age 15 years and received only 1 dose, or 2 doses less than 5 months apart, are not considered ad-
equitably vaccinated and should receive 1 additional dose of HPV.

**Hepatitis B vaccination** (3). The ACIP updated chronic liver disease conditions for which a hepatitis B vaccine (HepB) series is recommended. This change is described in the 2017 adult immunization schedule as:

- Adults with chronic liver disease, including, but not limited to, hepatitis C virus infection, cirrhosis, fatty liver disease, alcoholic liver disease, autoimmune hepatitis, and an alanine aminotransferase (ALT) or aspartate aminotransferase (AST) level greater than twice the upper limit of normal, should receive a HepB series.

**Meningococcal vaccination** (4, 5). There are 2 changes in meningococcal vaccination recommendations for 2017. First, the ACIP recommended that adults with HIV infection should receive a 2-dose primary series of serogroups A, C, W, and Y meningococcal conjugate vaccine (MenACWY). Second, the ACIP provided updated dosing guidance for one of the serogroup B meningococcal vaccine (MenB)—MenB-FHbp (Trumenba, Pfizer). For adults who are at increased risk for meningococcal disease and for use during serogroup B meningococcal disease outbreaks, 3 doses of MenB-FHbp should be administered at 0, 1-2, and 6 months. When MenB-FHbp is given to healthy adolescents and young adults who are not at increased risk for meningococcal disease, 2 doses of MenB-FHbp should be administered at 0 and 6 months (MenB-FHbp was previously recommended as a 3-dose series at 0, 2, and 6 months, consistent with the original vaccine licensure for this population). Note that the dosing frequency and interval for the other MenB, MenB-4C (Bexsero, GlaxoSmithKline), have not changed; MenB-4C remains a 2-dose series administered at least 1 month apart. Either MenB can be used when indicated. The change in ACIP recommendations on the use of MenB-FHbp does not imply a preference for one MenB over the other. These updates in meningococcal vaccination are reflected in the 2017 adult immunization schedule as:

- Adults with anatomical or functional asplenia or persistent complement component deficiencies should receive a 2-dose primary series of MenACWY at least 2 months apart and revaccinate every 5 years. They should also receive a series of MenB with either a 2-dose series of MenB-4C at least 1 month apart or a 3-dose series of MenB-FHbp at 0, 1-2, and 6 months.
- Adults with HIV infection who have not been previously vaccinated should receive a 2-dose primary series of MenACWY at least 2 months apart and revaccinate every 5 years. Those who previously received 1 dose of MenACWY should receive a second dose at least 2 months after the first dose. Adults with HIV infection are not routinely recommended to receive MenB because meningococcal disease in this population is caused primarily by serogroups C, W, and Y.
- Microbiologists who are routinely exposed to isolates of *Neisseria meningitidis* should receive 1 dose of MenACWY and revaccinate every 5 years if the risk for infection remains, and either a 2-dose series of MenB-4C at least 1 month apart or a 3-dose series of MenB-FHbp at 0, 1-2, and 6 months.
- Adults at risk because of a meningococcal disease outbreak should receive 1 dose of MenACWY if the outbreak is attributable to serogroup A, C, W, or Y, or either a 2-dose series of MenB-4C at least 1 month apart or a 3-dose series of MenB-FHbp at 0, 1-2, and 6 months if the outbreak is attributable to serogroup B.
- Young adults aged 16 through 23 years (preferred age range is 16 through 18 years) who are healthy and not at increased risk for serogroup B meningococcal disease may receive either a 2-dose series of MenB-4C at least 1 month apart or a 2-dose series of MenB-FHbp at 0 and 6 months for short-term protection against most strains of serogroup B meningococcal disease.

Notable changes in Figures 1 and 2 are:

- In Figures 1 and 2, standardized acronyms for vaccines are used to promote simplicity and consistency, and their listing has been reordered. Ancillary information previously contained in the figures have been consolidated and moved to the cover page. Colored blocks instead of colored bars are used to denote indications. These figures must be read with the footnotes that contain important information for each vaccine and considerations for special populations.
- In Figure 2, the columns for medical condition and other indications have been reordered to keep medical conditions together and special populations together. Additional footnotes mark appropriate columns of medical conditions and other indications to refer the reader to view relevant vaccine-specific information.
- In Figure 2, the color of the indication block for MenACWY for HIV infection has been changed to yellow (recommended for adults who meet the age requirement, lack documentation of vaccination, or lack evidence of past infection) from purple (recommended for adults with additional medical conditions or other indications).

Significant changes in the 2017 adult immunization schedule footnotes include the following:

- Footnotes are limited to the information that pertains to the vaccines listed in Figures 1 and 2 and organized by vaccine-specific information and considerations for special populations (e.g., pregnant women and adults with HIV infection). The footnote on “additional information,” contained in previous iterations of the adult immunization schedule, has been moved to the cover page. The footnote on “immunocompromising conditions” has been removed but vaccine-specific information on immunocompromising conditions has been added to appropriate footnotes, e.g., the footnote for pneumococcal vaccination.
- The format for the footnotes has been condensed, simplified, and standardized. The format for pneumococcal; human papillomavirus; meningococcal; varicella; and measles, mumps, and rubella vaccination footnotes have undergone significant revision.
Lastly, the table of contraindications and precautions for vaccines routinely recommended for adults, previously a standalone document, has been incorporated into the adult immunization schedule. The content of the table has been consolidated and simplified.

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 (6). As a result, some vaccination recommendations are complex and their implementation can be challenging. The adult immunization schedule summarizes the current ACIP recommendations and is designed to help health care providers implement those recommendations. In preparing the 2017 adult immunization schedule, the ACIP made a concerted effort to simplify, consolidate, and standardize its graphics, language, and format. Additional efforts are under way to continue to improve its usability by health care providers and to evaluate its usefulness.

The utility of the adult immunization schedule is ultimately dependent on the efforts of health care providers and health care systems to apply it in the care of their adult patients and implement the standards for adult immunization practice (7). The incorporation of ACIP recommendations into clinical practice and reducing missed opportunities to vaccinate adult patients remain a challenge (8). Barriers for vaccination for adults cited by health care providers include competing priorities with management of patients’ acute and chronic health conditions, lower prioritization of immunization for adults compared with other preventive services, and financial barriers to providing vaccination services to adults (9, 10). These and other challenges (e.g., limited awareness for adult vaccinations by adult patients, difficulties maintaining complete vaccination records for adult patients, and complexities of adult vaccine insurance coverage) contribute to low immunization coverage rates for adults in the United States (9–11).

The 2014 National Health Interview Survey (NHIS) found that influenza vaccination coverage among adults aged ≥19 years was 43.2%; pneumococcal vaccination coverage among adults aged 19 through 64 years who are at high risk for pneumococcal disease was 20.3% and among adults aged ≥65 years was 61.3%; tetanus and diphtheria toxoids and acellular pertussis vaccination (Tdap) coverage among adults aged ≥19 years was 20.1%; and herpes zoster vaccination coverage among adults aged ≥60 years was 27.9% (8). These low immunization coverage rates have generally not changed significantly over the past several years. In addition, racial and ethnic disparities—with whites generally having higher adult immunization coverage than blacks, Hispanics, and Asians—were prevalent across vaccines recommended for adults (8, 12).

Not surprisingly, adults who have health insurance have higher vaccination coverage than those who do not have health insurance (8). Overall, immunization coverage in 2014 was 2 to 5 times higher among adults with public or private health insurance than among those without health insurance for influenza vaccination for adults aged ≥19 years (48.0% vs. 15.9%); pneumococcal vaccination for adults aged 19 through 64 years at high risk (22.5% vs. 11.0%) and adults aged ≥65 years (61.7% vs. 24.3%); Tdap for adults aged ≥19 years (21.5% vs. 11.5%); and herpes zoster vaccine for adults aged ≥60 years (28.7% vs. 5.6%). While adults with health insurance are more likely to receive vaccines than are those without, substantial proportions of adults with health insurance who reported having had at least 10 physician contacts within the past year reported missing vaccinations. For example, 23.8% of adults aged ≥65 years did not report having received influenza vaccination, 61.4% of high-risk adults aged 19 through 64 years did not report having received pneumococcal vaccination, and 64.8% of adults aged 19 through 59 years with diabetes did not report having received hepatitis B vaccination (8).

Missed opportunities for vaccinating adults may result in part from limited familiarity or challenges with the complexity of the adult immunization schedule among health care providers. In a recent survey, 25.3% (149 of 588) of general internists and family physicians reported that the age-based vaccination recommendations for adults were difficult to follow and 29.3% (172 of 587) reported that medical condition–based recommendations were difficult to follow (9). Additional data are needed to assess health care providers’ range of familiarity with the adult immunization schedule and identify ways to improve its utility and usability.

To improve overall adult vaccination rates, health care providers and health care systems can use a systematic approach to adult immunization and implement evidence-based strategies, such as use of standing orders, patient reminders, recall for patients with missing vaccinations, and provider reminders through electronic medical record alerts and other means (13). These proven amplifiers for adult vaccination, along with the implementation of the adult immunization practice standards, should help health care providers and health care systems reduce racial and ethnic disparities in vaccination levels for adults and reduce their risk for illness, disability, and death from vaccine-preventable diseases.
In February 2017, the Recommended Immunization Schedule for Adults Aged 19 Years or Older, United States, 2017., became effective, as recommended by the Advisory Committee on Immunization Practices (ACIP) and approved by the Centers for Disease Control and Prevention (CDC). The 2017 adult immunization schedule was also reviewed and approved by the following professional medical organizations:

- American College of Physicians (www.acponline.org)
- American Academy of Family Physicians (www.aafp.org)
- American College of Obstetricians and Gynecologists (www.acog.org)
- American College of Nurse-Midwives (www.midwife.org)


The adult immunization schedule describes the age groups and medical conditions and other indications for which licensed vaccines are recommended. The 2017 adult immunization schedule consists of:

- Figure 1. Recommended immunization schedule for adults by age group
- Figure 2. Recommended immunization schedule for adults by medical condition and other indications
- Table. Contraindications and precautions for vaccines routinely recommended for adults

Consider the following information when reviewing the adult immunization schedule:

- The figures in the adult immunization schedule should be read with the footnotes that contain important general information and information about vaccination of special populations.
- When indicated, administer recommended vaccines to adults whose vaccination history is incomplete or unknown.
- Increased interval between doses of a multi dose vaccine does not diminish vaccine effectiveness; therefore, it is not necessary to restart the vaccine series or add doses to the series because of an extended interval between doses.
- Adults with immunocompromising conditions should generally avoid live vaccines, e.g., measles, mumps, and rubella vaccine. Inactivated vaccines, e.g., pneumococcal or inactivated influenza vaccines, are generally acceptable.
- Combination vaccines may be used when any component of the combination is indicated and when the other components of the combination vaccine 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.

Details on vaccines recommended for adults and complete ACIP statements are available at www.cdc.gov/vaccines/hcp/acip-recs/index.html. Listed below are additional CDC resources:

- A summary of information on vaccination recommendations, vaccination of persons with immunodeficiencies, preventing and managing adverse reactions, vaccination contraindications and precautions, and other information can be found in General Recommendations on Immunization at www.cdc.gov/mmwr/preview/mmwrhtml/rr6002a1.htm.

- Vaccine Information Statements that explain benefits and risks of vaccines are available at www.cdc.gov/vaccines/hcp/vis/index.html.
- Information and resources regarding vaccination of pregnant women are available at www.cdc.gov/vaccines/adults/rec-vac/pregnant.html.
- Information on travel vaccine requirements and recommendations is available at wwwnc.cdc.gov/travel/destinations/list.
- CDC Vaccine Schedules App for clinicians and other immunization service providers to download is available at www.cdc.gov/vaccines/schedules/hcp/schedule-app.html.
- Recommended Immunization Schedule for Children and Adolescents Aged 18 Years or Younger is available at www.cdc.gov/vaccines/schedules/hcp/index.html.

Report suspected cases of reportable vaccine-preventable diseases to the local or state health department.

Report all clinically significant post vaccination reactions to the Vaccine Adverse Event Reporting System at www.vaers.hhs.gov or by telephone, 800-822-7967. All vaccines included in the 2017 adult immunization schedule except herpes zoster and 23-valent pneumococcal polysaccharide 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.

The following acronyms are used for vaccines recommended for adults:

- HepA: hepatitis A vaccine
- HepA-HepB: hepatitis A and hepatitis B vaccines
- HPV: human papillomavirus vaccine
- HZV: herpes zoster vaccine
- IIV: inactivated influenza vaccine
- LAIV: live attenuated influenza vaccine
- MenACWY: serogroups A, C, W, and Y meningococcal conjugate vaccine
- MenB: serogroup B meningococcal vaccine
- MMR: measles, mumps, and rubella vaccine
- MPSV4: serogroups A, C, W, and Y meningococcal polysaccharide vaccine
- PCV13: 13-valent pneumococcal conjugate vaccine
- PPSV23: 23-valent pneumococcal polysaccharide vaccine
- RIV: recombinant influenza vaccine
- TD: tetanus and diphtheria toxoids
- Tdap: tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine
- VAR: varicella vaccine


U.S. Department of Health and Human Services
Centers for Disease Control and Prevention
Figures 1 and 2 must be read with the footnotes that contain important general information and considerations for special populations.

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>19–21 years</th>
<th>22–26 years</th>
<th>27–59 years</th>
<th>60–64 years</th>
<th>≥65 years</th>
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<tbody>
<tr>
<td>Influenza¹</td>
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<td>Td/Tdap²</td>
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<td>MMR³</td>
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<td>VAR⁴</td>
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<td>HZV⁵</td>
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<td>HPV – Female⁶</td>
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<td>HPV – Male⁶</td>
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<td>PCV13⁷</td>
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<td>PPSV23⁷</td>
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<tr>
<td>HepA⁸</td>
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<td>HepB⁹</td>
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<td>MenACWY or MPSV4¹⁰</td>
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<td>MenB¹⁰</td>
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<td>Hib¹¹</td>
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1 dose annually:
- Substitute Tdap for Td once, then Td booster every 10 yrs

2 doses:

3 doses:
- 1 or 2 doses depending on indication
- 1 or more doses depending on indication

1 dose:
- Recommended for adults who meet the age requirement, lack documentation of vaccination, or lack evidence of past infection
- Recommended for adults with additional medical conditions or other indications
- No recommendation
**Figure 2.** Recommended immunization schedule for adults aged 19 years or older by medical condition and other indications, United States, 2017

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Pregnancy</th>
<th>Immuno-compromised (excluding HIV infection)</th>
<th>HIV infection</th>
<th>CD4+ count (cells/µL)</th>
<th>Asplenia, persistent complement deficiencies</th>
<th>Kidney failure, end-stage renal disease, on hemodialysis</th>
<th>Heart or lung disease, chronic alcoholism</th>
<th>Chronic liver disease</th>
<th>Diabetes</th>
<th>Health care personnel</th>
<th>Men who have sex with men</th>
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<tbody>
<tr>
<td>Influenza¹</td>
<td>1 dose annually</td>
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<tr>
<td>Td/Tdap²</td>
<td>1 dose Tdap each pregnancy</td>
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<td>Substitute Tdap for Td once, then Td booster every 10 yrs</td>
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<td>MMR³</td>
<td>contraindicated</td>
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<td>1 or 2 doses depending on indication</td>
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<td>VAR⁴</td>
<td>contraindicated</td>
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<td>2 doses</td>
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<td>HZV⁵</td>
<td>contraindicated</td>
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<td>1 dose</td>
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<td>HPV–Female⁶</td>
<td>3 doses through age 26 yrs</td>
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<td>HPV–Male⁶</td>
<td>3 doses through age 26 yrs</td>
<td>3 doses through age 21 yrs</td>
<td>3 doses through age 26 yrs</td>
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<td>PCV13⁷</td>
<td>1 dose</td>
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<tr>
<td>PPSV23⁷</td>
<td>1, 2, or 3 doses depending on indication</td>
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<tr>
<td>HepA⁸</td>
<td>2 or 3 doses depending on vaccine</td>
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<td>HepB⁹</td>
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<td>3 doses</td>
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<td>MenACWY or MPSV4¹⁰</td>
<td>1 or more doses depending on indication</td>
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<tr>
<td>Hib¹¹</td>
<td>3 doses post-HSCT recipients only</td>
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<td>1 dose</td>
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- **Recommended for adults who meet the age requirement, lack documentation of vaccination, or lack evidence of past infection**
- **Recommended for adults with additional medical conditions or other indications**
- **Contraindicated**
- **No recommendation**
Footnotes. Recommended immunization schedule for adults aged 19 years or older, United States, 2017

1. Influenza vaccination
   General information:
   • Adults who have not received tetanus and diphtheria vaccination (TDp) should receive 1 dose of TDp gastrointestinal vaccine (TDaP) or for whom percutaneous vaccination was given should receive 1 dose of TDp followed by a tetanus and diphtheria toxoid (Td) booster every 10 years. TDp should be administered regardless of the age of a tetanus or diphtheria toxoid-containing vaccine was last received.
   • Adults with an unknown or incomplete history of a 3-dose primary series with tetanus and diphtheria toxoid-containing vaccine should complete the primary series that includes 1 dose of Td.
   • Unvaccinated adults should receive the first dose at least 4 weeks after onset of symptoms and the second dose 6–12 months after the second dose.
   • Note: Information on the use of Td or Tdap as tetanus prophylaxis in wound management is available at www.cdc.gov/mmwr/preview/mmwrhtml/mm5117.htm.

Special populations:
   • Pregnant women who should receive 1 dose of Tdap during each pregnancy, preferably during the early part of gestational weeks 20–34.

2. Measles, mumps, and rubella vaccination
   General information:
   • Adults born in 1957 or later with a history of immunity to measles, mumps, or rubella should receive 1 dose of MMR upon completion of or termination of pregnancy and before discharge from the health care facility; non-pregnant women of childbearing age with evidence of immunity should receive 1 dose of MMR.
   • Adults with primary or acquired immunity deficiency, inquiring medical professionals who are affecting the bone marrow or lymphatic system, systemic immunosuppressive therapy, or cellular immunity deficiency should receive 1 dose of MMR.
   • Adults with HIV infection and CD4 T-lymphocyte count ≥200 cells/ml should receive 1 dose of MMR.
   • Adults who work in health care facilities should receive 2 doses of MMR at least 28 days apart; health care personnel born before 1957 who are unvaccinated or lack laboratory evidence of immunity should receive 1 dose of MMR.
   • Adults who are students in postsecondary educational institutions or plan to travel internationally should receive 2 doses of MMR at least 28 days apart.
   • Adults who received inactivated (killed) measles vaccine or measles vaccine of unknown type who are at high risk for measles infection, e.g., work in a health care facility, should be considered for revaccination with 2 doses of MMR at least 28 days apart.

Vaccination:
   General information:
   • Adults without evidence of immunity to varicella should receive 2 doses of varicella vaccine at 12–23 months and 4–6 years of age; children born after 1980 who have not received varicella vaccine (VAR) 4–6 weeks apart, or a second dose if they have received only 1 dose.
   • Pregnant women with evidence of immunity should be considered for revaccination if they have evidence of immunity and the disease has not been diagnosed in the prior 4 weeks or is not currently present.
   • Adults with evidence of immunity should receive 1 dose of MMR upon completion of or termination of pregnancy and before discharge from the health care facility.

Special populations:
   • Pregnant women who should receive the first dose of VAR upon completion or termination of pregnancy and before discharge from the health care facility; non-pregnant women of childbearing age should receive 1 dose of MMR upon completion or termination of pregnancy and before discharge from the health care facility; non-pregnant women of childbearing age with evidence of immunity should receive 1 dose of MMR.
   • Adults with primary or acquired immunity deficiency, inquiring medical professionals who are affecting the bone marrow or lymphatic system, systemic immunosuppressive therapy, or cellular immunity deficiency should receive 1 dose of MMR.
   • Adults with HIV infection and CD4 T-lymphocyte count ≥200 cells/ml should receive 1 dose of MMR.
   • Adults who work in health care facilities should receive 2 doses of MMR at least 28 days apart; health care personnel born before 1957 who are unvaccinated or lack laboratory evidence of immunity should receive 1 dose of MMR.
   • Adults who are students in postsecondary educational institutions or plan to travel internationally should receive 2 doses of MMR at least 28 days apart.
   • Adults who received inactivated (killed) measles vaccine or measles vaccine of unknown type who are at high risk for measles infection, e.g., work in a health care facility, should be considered for revaccination with 2 doses of MMR at least 28 days apart.
   • Adults with evidence of immunity to varicella should receive 2 doses of varicella vaccine at 12–23 months and 4–6 years of age; children born after 1980 who have not received varicella vaccine (VAR) 4–6 weeks apart, or a second dose if they have received only 1 dose.
   • Pregnant women with evidence of immunity should be considered for revaccination if they have evidence of immunity and the disease has not been diagnosed in the prior 4 weeks or is not currently present.
   • Adults with evidence of immunity should receive 1 dose of MMR upon completion of or termination of pregnancy and before discharge from the health care facility.

215

Clinical Guideline for Adults: United States, 2017
by 23-valent pneumococcal polysaccharide vaccine (PPSV23) at least 1 year after PCV13.

Notes: Adults recommended to receive 1 dose of PCV13 and 1, 2, or 3 doses of PPSV23 depending on indication. When both PCV13 and PPSV23 are indicated, PCV13 should be administered first. PCV13 and PPSV23 should not be administered during the same visit. If PCV13 has previously been administered, PCV13 should be administered at least 1 year after the PPSV23. When 2 or more doses of PPSV23 are indicated, the interval between PPSV23 doses should be at least 5 years. Supplemental information on pneumococcal vaccine timing for adults aged 65 years or older and adults aged 19 years or older at high risk for pneumococcal disease (described below) is available at www.cdc.gov/vaccines/pneumococcal-route-of-administration/adults-clinician-guidance.pdf. No additional doses of PPSV23 are indicated for adults who received PPSV23 at age 65 years or older. When indicated, PCV13 and PPSV23 should be administered to adults whose pneumococcal vaccination history is incomplete or unknown.

Special populations

- Adults aged 19 through 64 years with chronic heart disease, including congestive heart failure and cardiomyopathies (excluding hypertension); chronic lung disease, including chronic obstructive lung disease, emphysema, and asthma; chronic liver disease, including cirrhosis; alcoholism; or diabetes mellitus or those who smoke cigarettes should receive PPSV23. At age 65 years or older, they should receive PCV13 and another dose of PPSV23 at least 1 year after PCV13 and at least 5 years after the most recent dose of PPSV23.

- Adults aged 19 years or older with immunocompromising conditions or anatomical or functional asplenia (described below) should receive PPSV23 and a dose of PPSV23 at least 8 weeks after PCV13, followed by 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 8 weeks after PCV13 and at least 5 years after the most recent dose of PPSV23.

- Adults aged 19 years or older with cerebrospinal fluid leak or cochlear implantation should receive PCV13 followed by PPSV23 at least 8 weeks after PCV13 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 8 weeks after PCV13 and at least 5 years after the most recent dose of PPSV23.

Notes: Immunocompromising conditions that are indications for pneumococcal vaccination are congenital or acquired immunodeficiency syndromes including B- or T-lymphocyte deficiency, complement deficiencies, and phagocytic disorders excluding chronic granulomatous disease; HIV infection; chronic renal failure and nephrotic syndrome; leukemia, lymphoma, Hodgkin disease, generalized malignancy, and progressive myeloma; solid organ transplant; and iatrogenic immunosuppression including long-term systemic treatment with corticosteroids and radiation therapy. Anatomical or functional asplenia that are indications for pneumococcal vaccination are sickle cell disease and other hemoglobinopathies, congenital or acquired asplenia, splenic dysfunction, and splenectomy. Pneumococcal vaccines should be given at least 12 weeks before starting any splenic-sparing therapy or an elective splenectomy. As soon as possible to adults who are diagnosed with HIV infection.

8. Hepatitis A Vaccination

General information

- Adult who protect from hepatitis A virus infection may receive a 2-dose series of single antigen hepatitis A vaccine (HepA) at either 0 and 6 months (Havrix) or 0 and 6–18 months (HepA-Twinrix) when administered at least 4–6 weeks apart. Adults may also receive a combined hepatitis A and hepatitis B vaccine (HepA-HepB) (Twinrix) as a 3-dose series at 0, 1, and 6 months. Acknowledgement of a specific risk factor by those who seek protection is not needed.

Special populations

- Adults with any of the following indications should receive a HepA series: have chronic liver disease, receive dialysis, or have cystic fibrosis patients with diabetes mellitus at the discretion of the treating clinician.

Notes: Immunocompromising conditions that are indications for pneumococcal vaccination are congenital or acquired immunodeficiency syndromes including B- or T-lymphocyte deficiency, complement deficiencies, and phagocytic disorders excluding chronic granulomatous disease; HIV infection; chronic renal failure and nephrotic syndrome; leukemia, lymphoma, Hodgkin disease, generalized malignancy, and progressive myeloma; solid organ transplant; and iatrogenic immunosuppression including long-term systemic treatment with corticosteroids and radiation therapy. Anatomical or functional asplenia that are indications for pneumococcal vaccination are sickle cell disease and other hemoglobinopathies, congenital or acquired asplenia, splenic dysfunction, and splenectomy. Pneumococcal vaccines should be given at least 12 weeks before starting any splenic-sparing therapy or an elective splenectomy. As soon as possible to adults who are diagnosed with HIV infection.

9. Hepatitis B Vaccination

General information

- Adults who seek protection from hepatitis B virus infection may receive a 2-dose series of single-antigen hepatitis B vaccine (HepB) (Engerix-B, Recombivax HB) at 0, 1, and 6 months. Adults may also receive a combined hepatitis A and hepatitis B vaccine (HepA-HepB) (Twinrix) at 0, 1, and 6 months. Acknowledgement of a specific risk factor by those who seek protection is not needed.

Special populations

- Adults at risk for hepatitis B virus infection by sexual exposure should receive a HepB series, including sex partners of hepatitis B surface antigen (HBsAg)-positive persons, persons seeking evaluation or treatment of a sexually transmitted infection, and men who have sex with men.

- Adults at risk for hepatitis B virus infection by percutaneous or mucosal exposure to blood should receive a HepB series, including adults who are recent or current users of injection drugs, household contacts of HBsAg-positive persons, residents and staff of facilities for developmentally disabled persons, incarcerated, health care and public safety workers at risk for exposure to blood or blood-contaminated body fluids, younger than age 19 years with diabetes mellitus or older with diabetes mellitus at the discretion of the treating clinician.

- Adults with chronic liver disease including, but not limited to, hepatitis C virus infection, cirrhosis, fatty liver disease, alcoholic liver disease, autoimmune hepatitis, or other liver disorders, or those with an aminotransferase (AST) level greater than twice the upper limit of normal should receive a HepB series.

- Adults with end-stage renal disease including those on pre-dialysis care, hemodialysis, peritoneal dialysis, and home dialysis should receive a HepB series. Adults on hemodialysis should receive a 3-dose series of 40 µg Recombivax HB at 0, 1, and 6 months, or a 4-dose series of 40 µg Engerix-B at 0, 1, 2, and 6 months.

- Adults with HIV infection should receive a HepB series.

- Persons at risk for occupational exposure to hepatitis B virus infection during pregnancy, e.g., having more than one sex partner during the previous 6 months, evaluated or treated for a sexually transmitted infection, recent or past injection drug use, persons or partners of sexual partners, or had an HBsAg-positive sex partner, should receive a HepB series.

- Individuals traveling to regions with high or intermediate levels of endemic hepatitis B virus infection should receive a HepB series.

- Adults with chronic or long-term conditions associated with a greater risk for HBV disease including, but not limited to, hepatitis C virus infection, chronic hepatitis D and E, HIV infection; chronic renal failure and nephrotic syndrome; human immunodeficiency virus (HIV) infection; chronic liver disease including, but not limited to, hepatitis C virus infection, cirrhosis, fatty liver disease, alcoholic liver disease, autoimmune hepatitis, or other liver disorders, or those with an AST level greater than twice the upper limit of normal should receive a HepB series.

- Adults with chronic liver disease including, but not limited to, hepatitis C virus infection, chronic hepatitis D and E, HIV infection; chronic renal failure and nephrotic syndrome; human immunodeficiency virus (HIV) infection; chronic liver disease including, but not limited to, hepatitis C virus infection, cirrhosis, fatty liver disease, alcoholic liver disease, autoimmune hepatitis, or other liver disorders, or those with an AST level greater than twice the upper limit of normal should receive a HepB series.

- Adults with chronic liver disease including, but not limited to, hepatitis C virus infection, chronic hepatitis D and E, HIV infection; chronic renal failure and nephrotic syndrome; human immunodeficiency virus (HIV) infection; chronic liver disease including, but not limited to, hepatitis C virus infection, cirrhosis, fatty liver disease, alcoholic liver disease, autoimmune hepatitis, or other liver disorders, or those with an AST level greater than twice the upper limit of normal should receive a HepB series.

- Adults with a hematopoietic stem cell transplant (HSCT) should receive a 2-dose primary series of serogroups A, C, W, Y meningococcal vaccine and need only 1 dose of MenACWY prior to transplantation. Men B is not routinely indicated because meningococcal disease in these countries is generally not caused by serogroup B.

- Military recruits should receive 1 dose of MenACWY and revaccinate every 5 years if the risk for infection remains.

- First-year college students aged 16 years or younger who live in residence halls should receive 1 dose of MenACWY if they have not received MenACWY at age 16 years or older.

- Young adults aged 16 through 23 years (preferred age range is 16 through 18 years) who are healthy and not at increased risk for serogroup B meningococcal disease (described above) may receive a 2-dose series of MenACWY at least 1 month apart or a 3-dose series of MenACWY at 0, 1–2, and 6 months if the outbreak is attributable to serogroup B.

- Adults who travel to or live in countries with hyperendemic or epidemic meningococcal disease should receive 1 dose of MenACWY and revaccinate every 5 years if the risk for infection remains. Men B is not routinely indicated because meningococcal disease in these countries is generally not caused by serogroup B.

11. Haemophilus influenzae type b vaccination

Special populations

- Adults who have anatomical or functional asplenia or sickle cell disease, or are undergoing elective splenectomy should receive 1 dose of Haemophilus influenzae type b conjugate vaccine (Hib) if they have not previously received Hib. Hib should be administered at least 14 days after transplant regardless of their Hib history.

- Note that Hib is not routinely recommended for adults with HIV infection because their risk for Haemophilus influenzae type b infection is low.
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 recipient. For a person with a severe allergy, e.g., anaphylaxis, to latex, vaccines supplied in vials or syringes that contain natural rubber latex should not be administered unless the benefit of vaccination clearly outweighs the risk for a potential allergic reaction. For latex allergies other than anaphylaxis, vaccines supplied in vials or syringes that contain dry, natural rubber or natural rubber latex may be administered.

Contraindications and precautions for vaccines routinely recommended for adults

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Contraindications</th>
<th>Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>All vaccines routinely recommended for adults</td>
<td>Severe reaction, e.g., anaphylaxis, after a previous dose or to a vaccine component</td>
<td>Moderate or severe acute illness with or without fever</td>
</tr>
</tbody>
</table>

Additional contraindications and precautions for vaccines routinely recommended for adults

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Additional Contraindications</th>
<th>Additional Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIV</td>
<td>History of Guillain-Barré syndrome within 6 weeks after previous influenza vaccination</td>
<td>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)</td>
</tr>
<tr>
<td>LAIV</td>
<td>History of Guillain-Barré syndrome within 6 weeks after previous influenza vaccination</td>
<td>LAIV should not be used during 2016–2017 influenza season</td>
</tr>
<tr>
<td>Tdap/Td</td>
<td>Guillain-Barré syndrome within 6 weeks after a previous dose of tetanus toxoid-containing vaccine</td>
<td>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</td>
</tr>
</tbody>
</table>
| MMR     | Severe immunodeficiency, e.g., hematologic and solid tumors, chemotherapy, congenital immunodeficiency or long-term immunosuppressive therapy; HIV infection with severe immunosuppression; Pregnancy | Recent (within 11 months) receipt of antibody-containing blood product (specific interval depends on product)
| VAR     | Severe immunodeficiency, e.g., hematologic and solid tumors, chemotherapy, congenital immunodeficiency or long-term immunosuppressive therapy; HIV infection with severe immunosuppression; Pregnancy | Recent (within 11 months) receipt of antibody-containing blood product (specific interval depends on product)
| HZV     | Severe immunodeficiency, e.g., hematologic and solid tumors, chemotherapy, congenital immunodeficiency or long-term immunosuppressive therapy; HIV infection with severe immunosuppression; Pregnancy | Recent (within 11 months) receipt of antibody-containing blood product (specific interval depends on product) |
| HPV     | Severe immunodeficiency, e.g., hematologic and solid tumors, chemotherapy, congenital immunodeficiency or long-term immunosuppressive therapy; HIV infection with severe immunosuppression; Pregnancy | Receives antiviral drugs (acyclovir, famciclovir, or valacyclovir) 24 hours before vaccination (avoid use of these antiviral drugs for 14 days after vaccination) |
| PCV13   | Severe allergy to any vaccine containing diphtheria toxoid                         | Pregnancy              |

2. MMR may be administered together with VAR or HZV 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: CDC. General recommendations on immunization: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR. 2011;60(No. RR-2). Available at www.cdc.gov/mmwr/preview/mmwrhtml/rr6002a1.htm.
5. Measles-containing vaccine 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.


Acronyms of vaccines recommended for adults

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Vaccine</th>
<th>Live attenuated influenza vaccine</th>
<th>PCV13 13-valent pneumococcal conjugate vaccine</th>
</tr>
</thead>
<tbody>
<tr>
<td>HepA</td>
<td>hepatitis A vaccine</td>
<td>LAIV</td>
<td>13-valent pneumococcal conjugate vaccine</td>
</tr>
<tr>
<td>HepA-HepB</td>
<td>hepatitis A and hepatitis B vaccines</td>
<td>MenACWY</td>
<td>23-valent pneumococcal polysaccharide vaccine</td>
</tr>
<tr>
<td>HepB</td>
<td>hepatitis B vaccine</td>
<td>MenB</td>
<td>RPV recombinant influenza vaccine</td>
</tr>
<tr>
<td>Hib</td>
<td>Haemophilus influenzae type b conjugate vaccine</td>
<td>MenB</td>
<td>Tdap tetanus and diphtheria toxoids</td>
</tr>
<tr>
<td>HPV</td>
<td>human papillomavirus vaccine</td>
<td>MMR</td>
<td>Td tetrax toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine</td>
</tr>
<tr>
<td>HZV</td>
<td>herpes zoster vaccine</td>
<td>Mumps</td>
<td>HPV varicella vaccine</td>
</tr>
<tr>
<td>IV</td>
<td>inactivated influenza vaccine</td>
<td>PSV23</td>
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</tr>
</tbody>
</table>
From the 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 ensure 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, they 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. Conflict of interest disclosures of members of the ACIP are available at www.acponline.org/authors/icmje/ConflictOfInterestForms.do?msNum=M16-2936.

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**References**

3. Updated 2016 ACIP statement on October 2016 hepatitis B vaccination recommendations. MMWR. [Forthcoming]
5. Updated ACIP statement on October 2016 meningococcal vaccination recommendations. MMWR. [Forthcoming]
APPENDIX

Recommendations for routine use of vaccines in adults, and children and adolescents 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 use of vaccines and related agents for the control of vaccine-preventable diseases in the civilian population of the United States. Recommendations for routine use of vaccines in adults are harmonized with recommendations of the American College of Physicians (ACP), the American Academy of Family Physicians (AAFP), the American College of Obstetricians and Gynecologists (ACOG), and the American College of Nurse-Midwives (ACNM). 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), AAFP, and ACOG. 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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