



Usability Testing of CDC Adult Immunization Schedule

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Usability Testing of Adult Schedule – Background

- 2016 schedule evaluated ad hoc to improve usability
 - By Human Factors and Ergonomics Society, Georgia Institute of Technology¹
 - Based on human factors-driven efficiency of use, select recommendations incorporated in 2017 adult schedule
- 2017 schedule footnotes updated
 - For consistency between vaccination sections
 - Format, language, abbreviations, mathematical symbols
- 2018 schedules formally evaluated for usability²

1. Chen D et al. Improving the U.S. adult immunization schedule by applying usability principles. Proceed Human Factors Ergonom Soc Ann Meet 2018;62:1316–1320

2. Porter-Novelli Public Services, Inc. Contract number 200–2015–F–88117

Adult Schedule Evaluation – Overview

- Purpose – Determine how providers use adult immunization schedule to guide practices and identify improvements to increase usability
- Methods
 - Qualitative interviews of providers
 - Redesign of immunization schedules
 - Survey of providers on immunization schedule preferences (old vs. new)
- Feb 2017 to Sep 2018

Qualitative Interviews

- Purpose – Identify ways to increase usability, acceptability, and adoption of adult immunization schedule by providers
- In-depth interviews with providers (N=48)
 - Internists (8); family physicians (8); PAs and NPs (12); RNs, LPNs, MAs (12); pharmacists (8) screened for reported familiarity with schedule
 - Feedback on case-based patient scenarios by telephone and screen-sharing platform

Qualitative Interviews Results

- Physicians, PAs, NPs, RNs, pharmacists reported recommending vaccines
 - Not confident EMRs updated and comprehensive
 - Difficulty using generic and trade names
- Most providers referenced Figure 1 (recs by age) only, few referenced Figure 2 (recs by medical and other indications), fewer referenced footnotes and Table of Contraindications and Precautions
- Many providers professed confidence using the schedule
 - Incorrect usage of schedule to answer case-based scenarios
- Minimal suggestions for improvement of the schedules



Redesign Graphics

- Purpose – Improve usability of the adult schedule based on results from qualitative interviews
- Methods
 - Little direction provided through qualitative interviews
 - Develop prototype graphics based on assumptions
 - Balance document length and text size and density
 - Include child and adolescent immunization schedule

Redesign Graphics

- Maintain overall format and flow
 - Improve where possible (ex. vaccinations listed alphabetically in notes section)
- Title changes
 - “Recommended Adult Immunization Schedule, United States, 20XX”
 - “Recommended Child and Adolescent Schedule, United States, 20XX”
 - “Figures” replaced by “Tables” and “Footnotes” replaced by “Notes”
- Reduce amount of information on cover page, redesign to “compartmentalize” information
- Adult Schedule
 - Include table of generic and trade names, abbreviations
 - Delete adult schedule table of contraindications and precautions

Survey of Providers on Usability

- Purpose – Obtain feedback from providers on redesign features of adult and child/adolescent immunization schedules
- Methods
 - Standardized survey administered online to primary care providers who see at least 50 patients/month
 - Adult schedule: 251 internists and family physicians
 - Child and adolescent schedule: 249 pediatricians and family physicians
 - Compared original and redesigned 2018 immunization schedules

2018 Cover Page

Redesigned Cover Page

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 ≥ 20 mg of prednisone or equivalent for ≥ 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/viu/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-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):

IV	inactivated influenza vaccine
RV	recombinant influenza vaccine
Tdap	tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine
Td	tetanus and diphtheria toxoids
Tdap	tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine
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	serogroups A, C, W, and Y meningococcal vaccine
MenB	serogroup B meningococcal vaccine
Hib	Haemophilus influenzae type b vaccine

- MMWR Morb Mortal Wkly Rep. 2018;66(5). Available at www.cdc.gov/mmwr/volumes/67/wr/mm6705e3.htm.
- Ann Intern Med. 2018;168:210–220. Available at annals.org/aim/article/doi/10.7326/M17-3439.
- Clin Infect Dis. 2014;58:e44–100. Available at www.idsoa.org/Template/Content.aspx?id=32212256011.
- ACIP. Available at www.cdc.gov/vaccines/hcp/acip-recs/general-recs/index.html.

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

How to determine which licensed vaccines are recommended* for adults age 19 years and older in the United States:



BEFORE ADMINISTERING ANY VACCINE

- Adults with incomplete or unknown vaccination histories may receive recommended vaccines when indicated.
- Restarting or adding doses to a multi-dose vaccine series is not necessary if the intervals increase between doses because such intervals do not diminish effectiveness.
- For adults with immunocompromising conditions: In general, inactivated vaccines, such as the pneumococcal or inactivated influenza vaccines may be used, but avoid live vaccines, such as the measles, mumps, and rubella vaccine.
- Combination vaccines may be used when any of component is indicated and the other components are not contraindicated.

Abbreviation	Vaccine	Trade Names**
IV	inactivated influenza vaccine	Many
Td	tetanus and diphtheria toxoids	Teniva
Tdap	tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine	Adacel, Boostrix
MMR	measles, mumps, and rubella vaccine	MM-RII, ProQuad
VAR	varicella vaccine	Varivax
RZV	recombinant zoster vaccine	Shingrix
IV	recombinant influenza vaccine	Flublok
ZVL	zoster vaccine live	Zostavax
HPV vaccine	human papillomavirus vaccine	Gardasil, Gardasil 9
PCV13	13-valent pneumococcal conjugate vaccine	Prevnar 13
PPSV23	23-valent pneumococcal polysaccharide vaccine	Pneumovax 23
HepA	hepatitis A vaccine	Havrix, Vaqta
HepA-HepB	hepatitis A and hepatitis B vaccines	Twinrix
HepB	hepatitis B vaccine	Engerix-B, HepBivax-B, Recombivax HB
MenACWY	serogroups A, C, W, and Y meningococcal vaccine	Menveo
MenB	serogroup B meningococcal vaccine	Bevaxo, Trumenb
Hib	Haemophilus influenzae type b conjugate vaccine	ActHib, Hibente, Pediacel, Hib

REPORT

Cases
Suspected cases of reportable vaccine-preventable diseases to the local or state health department.

Reactions
All clinically significant post-vaccination reactions to the Vaccine Adverse Event Reporting System at www.vaers.hhs.gov or 800-822-7967.

Injury Claims: All vaccines included in the 2018 adult immunization schedule except 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 800-338-2882.

QUESTIONS OR COMMENTS?

Contact us at www.cdc.gov/ncidod/dzdx or call 800-CDC-INFO (800-232-4636), in English and Spanish, 8 am to 8 pm ET, Monday through Friday, excluding holidays.



*This schedule became effective in January 1, 2018, after recommendation by the Advisory Committee on Immunization Practices (ACIP) and approval by the Centers for Disease Control and Prevention (CDC). The schedule also received review and approval from American Academy of Pediatrics (www.aap.org), American College of Physicians (www.acp.org), and American College of Physicians (www.acp.org) and American College of Obstetricians and Gynecologists (www.acog.org). Complete ACIP statements are available at www.cdc.gov/vaccines/hcp/acip-recs/index.html.

The CDC announced the availability of this schedule in the *Morbidity and Mortality Weekly Report* (MMWR) Morb Mortal Wkly Rep. 2018;66(5), 114–157. www.cdc.gov/mmwr/volumes/67/wr/mm6705e3.htm. Details on recommended vaccines are available at www.cdc.gov/vaccines/hcp/acip-recs/index.html. The Recommended Immunization Schedule for Children and Adolescents Aged 18 Years or Younger, United States, 2018 is not copyrighted and may be used and copied without permission. Citation of the source is, however, appreciated.

**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.

SUGGESTED CITATION:
Centers for Disease Control and Prevention. Recommended Immunization Schedule for Adults Aged 19 Years or Older, United States, 2018. <http://www.cdc.gov/vaccines/hcp/acip-recs/index.html>. Published February 2018. Accessed 7/2/18.



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



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

2018 Figure 2

Redesigned Table 2

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 ^{1,4}	Immuno-compromised (excluding HIV infection) ^{5,7,11}		HIV infection CD4+ count (cells/ μ L) ^{3,7,8,10}	Asplenia, complement deficiencies ^{1,10,11}	End-stage renal disease, on hemodialysis ^{7,8}	Heart or lung disease, alcoholism ⁷	Chronic liver disease ^{7,9}	Diabetes ^{7,9}	Health care personnel ^{6,9}	Men who have sex with men ^{4,9}		
		<200	\geq 200										
Influenza ¹		1 dose annually											
Tdap ³ or Td ¹	1 dose Tdap each pregnancy	1 dose Tdap, then Td booster every 10 yrs											
MMR ³	contraindicated	1 or 2 doses depending on indication											
VAR ⁴	contraindicated	2 doses											
RZV ¹ (preferred)		2 doses RZV at age \geq 50 yrs (preferred)											
or		or											
ZVL ¹	contraindicated	1 dose ZVL at age \geq 60 yrs											
HPV-Female ⁶		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 ²		1 dose											
PPSV23 ²		1, 2, or 3 doses depending on indication											
HepA ⁴		2 or 3 doses depending on vaccine											
HepB ⁴		3 doses											
MenACWY ⁸		1 or 2 doses depending on indication, then booster every 5 yrs if risk remains											
MenB ¹⁴		2 or 3 doses depending on vaccine											
Hib ¹³		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

Table 2. Medical condition and other indications recommendations for immunization of adults aged 19 years or older, United States, 2018



Note: general information and considerations for special populations are in Table 3, on page 4. Additional vaccination information and resources are available:

- **Pregnancy:** www.cdc.gov/vaccines/adult/rec-vac/pregnant.html
- **Immuno-compromising conditions:** www.idociety.org/Template/Content.aspx?tbl=12127256011 and www.cdc.gov/mmwr/preview/mmwrhtml/mm602a1.htm
- **Asplenia:** places adults at increased risk for encapsulated bacteria infection. Anatomical or functional asplenia includes congenital or acquired asplenia, splenic dysfunction, sickle cell disease and other hemoglobinopathies, and splenectomy.
- **Travel:** www.cdc.gov/travel/destination.htm

Vaccine	Pregnancy	Immuno-compromised (excluding HIV infection)	HIV infection CD4+ count <200 cells/ μ L	HIV infection CD4+ count \geq 200 cells/ μ L	Asplenia, persistent complement deficiencies	End-stage renal disease, on hemodialysis	Heart or lung disease, chronic alcoholism	Chronic liver disease	Diabetes	Health care personnel	Men who have sex with men		
IIV		1 dose annually											
Tdap or Td	1 dose Tdap each pregnancy	1 dose Tdap, then Td booster every 10 years											
MMR	contraindicated	1 or 2 doses depending on indication											
VAR	contraindicated	2 doses											
RZV (preferred) or ZVL	contraindicated	2 doses RZV at age \geq 50 years (preferred) or 1 dose ZVL at age \geq 60 years											
HPV-Female		3 doses through age 26 years			2 or 3 doses through age 26 years								
HPV-Male		3 doses through age 26 years			2 or 3 doses through age 21 years							2 or 3 doses through age 26 years	
PCV13		1 dose											
PPSV23		1, 2, or 3 doses depending on indication											
HepA		2 or 3 doses depending on vaccine											
HepB		3 doses											
MenACWY		1 or 2 doses depending on indication, then booster every 5 years if risk remains											
MenB		2 or 3 doses depending on vaccine											
Hib		3 doses post-HSCT recipients only			1 dose								

Recommended for adults who meet the age requirement, but lack either vaccination documentation or evidence of past infection.
 Recommended for adults with additional medical conditions or other indications.
 Contraindicated
 No Recommendation

2018 Footnotes

Redesigned Notes

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

1. Influenza vaccination

www.cdc.gov/vaccines/hcp/ncp/q-ncp/specific/flu.html

General information

- Administer 1 dose of age-appropriate inactivated influenza vaccine (IV) or recombinant influenza vaccine (RV) 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/vaccines/vaccines.htm

Special populations

- Administer age-appropriate IV or RV to:
 - Pregnant women**
 - Adults with **live-only egg allergy**
 - Adults with **egg allergy other than Hives** (e.g., angioedema or respiratory distress): Administer IV or RV 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/ncp/q-ncp/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/rr5117a1.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/ncp/q-ncp/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/ncp/q-ncp/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 1990 (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 VAR at least 4 weeks after the first dose) to:
 - 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**

5. Zoster vaccination

www.cdc.gov/vaccines/hcp/ncp/q-ncp/specific/zshingles.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/ncp/q-ncp/specific/hpv.html

General information

- Administer human papillomavirus (HPV) vaccine to females (through age 26 years) and males through age 21 years (males aged 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/ncp/q-ncp/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

Special populations

- Administer 2 doses of RZV to adults aged 50 years or older regardless of past episode of herpes zoster or receipt of zoster vaccine live (ZVL)

8. Special populations (continued)

- Men who have sex with men**
- Injection or noninjection drug use**
- Work with hepatitis B virus in research laboratory or nonhuman primates with hepatitis B infection**

9. Special populations

- ZVL is contraindicated for pregnant women and adults with severe immunodeficiency

Table 3. Recommended schedule and use of vaccines for adults aged 19 years and older, *United States, 2018* cont.



Vaccine	Recommended schedule and use of vaccines
HepA	<ul style="list-style-type: none"> Special populations (continued) <ul style="list-style-type: none"> Men who have sex with men Injection or noninjection drug use Work with hepatitis B virus in research laboratory or nonhuman primates with hepatitis B infection General information <ul style="list-style-type: none"> 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) Special populations <ul style="list-style-type: none"> ZVL is contraindicated for pregnant women and adults with severe immunodeficiency
HepB	<ul style="list-style-type: none"> General information <ul style="list-style-type: none"> Not at risk but want protection from hepatitis B (identification of risk factor not required): 3 doses HepB-adjuv at 0, 1, 6 months (minimum intervals: 4 weeks between doses 1 and 2, 8 weeks between doses 2 and 3); 3 doses HepB-HepB at 0, 1, 6 months (minimum intervals: 4 weeks between doses 1 and 2, 5 months between doses 2 and 3); or 2 doses HepB-CpG at least 3 months apart (unless 3 doses of HepB-CpG are used at least 1 month apart, 1 dose of HepB-CpG combined with other HepB are needed to complete series) Special populations <ul style="list-style-type: none"> At risk for hepatitis B: 3 doses HepB-adjuv, 1 dose HepA-HepB, or 2 doses HepB-CpG to alone <ul style="list-style-type: none"> Chronic liver disease (e.g., cirrhosis, fatty liver disease, alcoholic liver disease, autoimmune hepatitis, primary biliary cholangitis) or separate antinuclear antibody (ANA) level greater than twice upper limit of normal) Hepatitis C infection HIV infection General information <ul style="list-style-type: none"> Travel in countries with high or intermediate endemic hepatitis B Close contact with international adoptees in first 60 days after arrival from country with high or intermediate endemic hepatitis B Post-exposure prophylaxis: 2 doses HepA Special populations <ul style="list-style-type: none"> Perinatally or neonatal risk of exposure to blood (e.g., household contacts of hepatitis B surface antigen (HBsAg)-positive persons younger than age 60 years with diabetes mellitus (age 60 years or older with diabetes mellitus based on individual clinical decision), on predialysis care or receiving hemodialysis or peritoneal dialysis, recent or current injection drug use, 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 hepatitis B surface antigen (HBsAg)-positive persons; sexually active persons not in mutually monogamous relationships; persons seeking evaluation or treatment for a sexually transmitted infection; and men who have sex with men (MSM)) Special care in settings with high risk for hepatitis B (e.g., facilities for sexually transmitted disease treatment, HIV testing and treatment, drug abuse treatment and prevention services, hemodialysis and end-stage renal disease programs, and developmentally disabled persons; health care settings that target injection drug users or MSM; and correctional facilities) Travel in countries with high or intermediate endemic hepatitis B Information on use of HepB for post-exposure prophylaxis in health care and other settings available at www.cdc.gov/mmwr/preview/mmwrhtml/rr5117a1.htm
MenACWY or MenB	<ul style="list-style-type: none"> Special populations: MenACWY <ul style="list-style-type: none"> At risk for serogroup A, C, W, or Y meningococcal disease: 2 doses MenACWY at least 8 weeks apart and revaccinate every 5 years if risk remains Anatomical or functional asplenia (including sickle cell disease and other hemoglobinopathies) HIV infection Persistent complement component deficiency Ecdysis/ab use Other risks for serogroup A, C, W, or Y meningococcal disease: 1 dose MenACWY and revaccinate every 5 years if risk remains Travel in countries with hyperendemic or epidemic meningococcal disease Meningococcal disease outbreak attributed to serogroup A, C, W, or Y Microbiologists routinely exposed to Neisseria meningitidis Military recruits Special populations: MenB <ul style="list-style-type: none"> At risk for serogroup B meningococcal disease: 2 doses MenB-4C at least 1 month apart or 3 doses MenB-4Htg at 0, 1–2, 6 months Anatomical or functional asplenia (including sickle cell disease and other hemoglobinopathies) Persistent complement component deficiency Ecdysis/ab use Meningococcal disease outbreak attributed to serogroup B Microbiologists routinely exposed to Neisseria meningitidis Age 16–23 years (age 16–18 years preferred) who are not at increased risk but, based on individual clinical decision, want protection from serogroup B meningococcal disease: 2 doses MenB-4C at least 1 month apart or 2 doses MenB-4Htg at least 8 months apart (MenB-4C and MenB-4Htg are not interchangeable)
H1B	<ul style="list-style-type: none"> Special populations <ul style="list-style-type: none"> Anatomical or functional asplenia, including sickle cell disease: 1 dose H1B if not previously vaccinated; if elective splenectomy, 1 dose H1B preferably at least 14 days before splenectomy General information <ul style="list-style-type: none"> Travel in countries with hyperendemic or epidemic meningococcal disease Meningococcal disease outbreak attributed to serogroup A, C, W, or Y Microbiologists routinely exposed to Neisseria meningitidis Military recruits

Results – Survey of Providers on Usability

- **Adult Immunization Schedule**
 - Redesigned cover page easier to use
 - Original color scheme easier to use
 - Should increase font size
 - List fewer vaccines and health conditions per table
 - Overall, 2 out of 3 preferred original over redesigned schedule (mostly due to color)
- **Child and Adolescent Immunization Schedule**
 - No difference between original and redesigned cover page and Table 1
 - Original color scheme easier to use
 - Should increase font size
 - Overall, redesigned schedule (except for color) slightly preferred

The Final Product

Adult Schedule Cover Page

2018

2019

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 multidose 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 ≥ 20 mg of prednisone or equivalent for ≥ 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/adultimmsched/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	serogroups A, C, W, and Y meningococcal vaccine
MenB	serogroup B meningococcal vaccine
Hib	<i>Haemophilus influenzae</i> type b vaccine

- MMWR Morb Mortal Wkly Rep. 2018;66(5). Available at www.cdc.gov/mmwr/volumes/67/wr/mm6705e3.htm.
- Ann Intern Med. 2018;168:210–220. Available at annals.org/aim/article/doi/10.7326/M17-3439.
- Clin Infect Dis. 2014;58:e44–100. Available at www.idsociety.org/Templates/Content.aspx?id=32212256011.
- ACIP. Available at www.cdc.gov/vaccines/hcp/acip-recs/general-recs/index.html.

Recommended Adult Immunization Schedule for ages 19 years or older

UNITED STATES
2019

How to use the adult immunization schedule

- Determine recommended vaccinations by age (Table 1)
- Assess need for additional recommended vaccinations by medical condition and other indications (Table 2)
- Review vaccine types, frequencies, and intervals, and considerations for special situations (Notes)

Recommended by the Advisory Committee on Immunization Practices (www.cdc.gov/vaccines/acip) and approved by the Centers for Disease Control and Prevention (www.cdc.gov), American College of Physicians (www.acponline.org), American Academy of Family Physicians (www.aafp.org), American College of Obstetricians and Gynecologists (www.acog.org), and American College of Nurse-Midwives (www.midwife.org).

Vaccines in the Adult Immunization Schedule*

Vaccines	Abbreviations	Trade names
<i>Haemophilus influenzae</i> type b vaccine	Hib	ActHIB Hiberix
Hepatitis A vaccine	HepA	Havrix Vaqta
Hepatitis A and hepatitis B vaccine	HepA-HepB	Twinrix
Hepatitis B vaccine	HepB	Engerix-B Recombivax HB Hepslav-B
Human papillomavirus vaccine	HPV vaccine	Gardasil 9
Influenza vaccine, inactivated	IIV	Many brands
Influenza vaccine, live attenuated	LAIV	FluMist Quadrivalent
Influenza vaccine, recombinant	RIV	Flublok Quadrivalent
Measles, mumps, and rubella vaccine	MMR	M-M-R II
Meningococcal serogroups A, C, W, Y vaccine	MenACWY	Menactra Menveo
Meningococcal serogroup B vaccine	MenB-4C MenB-FHbp	Bexsero Trumenba
Pneumococcal 13-valent conjugate vaccine	PCV13	Prenvax 13
Pneumococcal 23-valent polysaccharide vaccine	PPSV23	Pneumovax
Tetanus and diphtheria toxoids	Td	Tenivac Td vaccine
Tetanus and diphtheria toxoids and acellular pertussis vaccine	Tdap	Adacel Boostrix
Varicella vaccine	VAR	Varivax
Zoster vaccine, recombinant	RZV	Shingrix
Zoster vaccine live	ZVL	Zostavax

*Administer recommended vaccines if vaccination history is incomplete or unknown. Do not restart or add doses to vaccine series for extended intervals between doses. The use of trade names is for identification purposes only and does not imply endorsement by the ACIP or CDC.

Report

- Suspected cases of reportable vaccine-preventable diseases or outbreaks to the local or state health department
- Clinically significant postvaccination reactions to the Vaccine Adverse Event Reporting System at www.vaers.hhs.gov or 800-822-7967

Injury claims

All vaccines included in the adult immunization schedule except pneumococcal 23-valent 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 800-338-2382.

Questions or comments

Contact www.cdc.gov/cdc-info or 800-CDC-INFO (800-232-4636), in English or Spanish, 8 a.m.–8 p.m. ET, Monday through Friday, excluding holidays.

Download the CDC Vaccine Schedules App for providers at www.cdc.gov/vaccines/schedules/hcp/schedule-app.html.

Helpful Information

- Complete ACIP recommendations: www.cdc.gov/vaccines/hcp/acip-recs/index.html
- General Best Practice Guidelines for Immunization (including contraindications and precautions): www.cdc.gov/vaccines/hcp/acip-recs/general-recs/index.html
- Vaccine Information Statements: www.cdc.gov/vaccines/hcp/vis/index.html
- Manual for the Surveillance of Vaccine-Preventable Diseases (including case identification and outbreak response): www.cdc.gov/vaccines/pubs/surv-manual
- Travel vaccine recommendations: www.cdc.gov/travel
- Recommended Child and Adolescent Immunization Schedule, United States, 2019: www.cdc.gov/vaccines/schedules/hcp/child-adolescent.html



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



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Adult Schedule Table 1

2018

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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) or ZVL ⁵				2 doses RZV (preferred) or 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

Table 1 Recommended Adult Immunization Schedule by Age Group United States, 2019

Vaccine	19–21 years	22–26 years	27–49 years	50–64 years	≥65 years
Influenza inactivated (IV) or Influenza recombinant (RIV) or Influenza live attenuated (LAIV)	1 dose annually				
Tetanus, diphtheria, pertussis (Tdap or Td)	1 dose Tdap, then Td booster every 10 yrs				
Measles, mumps, rubella (MMR)	1 or 2 doses depending on indication (if born in 1957 or later)				
Varicella (VAR)	2 doses (if born in 1980 or later)				
Zoster recombinant (RZV) (preferred) or Zoster live (ZVL)				2 doses or 1 dose	
Human papillomavirus (HPV) Female	2 or 3 doses depending on age at initial vaccination				
Human papillomavirus (HPV) Male	2 or 3 doses depending on age at initial vaccination				
Pneumococcal conjugate (PCV13)				1 dose	
Pneumococcal polysaccharide (PPSV23)		1 or 2 doses depending on indication			1 dose
Hepatitis A (HepA)	2 or 3 doses depending on vaccine				
Hepatitis B (HepB)	2 or 3 doses depending on vaccine				
Meningococcal A, C, W, Y (MenACWY)	1 or 2 doses depending on indication, then booster every 5 yrs if risk remains				
Meningococcal B (MenB)	2 or 3 doses depending on vaccine and indication				
<i>Haemophilus influenzae</i> type b (Hib)	1 or 3 doses depending on indication				

Recommended vaccination for adults who meet age requirement, lack documentation of vaccination, or lack evidence of past infection
 Recommended vaccination for adults with an additional risk factor or another indication
 No recommendation

Adult Schedule Table 2

2018

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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) ^{7,11}	HIV infection CD4+ count (cells/μL) ^{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}
			<200	≥200							
Influenza ¹											1 dose annually
Tdap ² or Td ²	1 dose Tdap each pregnancy										1 dose Tdap, then Td booster every 10 yrs
MMR ³		contraindicated									1 or 2 doses depending on indication
VAR ⁴		contraindicated									2 doses
RZV ⁵ (preferred) or ZVL ⁵											2 doses RZV at age ≥50 yrs (preferred) or 1 dose ZVL at age ≥60 yrs
HPV-Female ⁶											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

Table 2 Recommended Adult Immunization Schedule by Medical Condition and Other Indications United States, 2019

Vaccine	Pregnancy	Immuno-compromised (excluding HIV infection)	HIV infection CD4 count		Asplenia, complement deficiencies	End-stage renal disease, on hemodialysis	Heart or lung disease, alcoholism ¹	Chronic liver disease	Diabetes	Health care personnel ²	Men who have sex with men
			<200	≥200							
IIV or RIV or LAIV											1 dose annually
Tdap or Td	1 dose Tdap each pregnancy										1 dose Tdap, then Td booster every 10 yrs
MMR		CONTRAINDICATED									1 or 2 doses depending on indication
VAR		CONTRAINDICATED									2 doses
RZV (preferred) or ZVL	DELAY										2 doses at age ≥50 yrs or 1 dose at age ≥60 yrs
HPV Female	DELAY										3 doses through age 26 yrs; 2 or 3 doses through age 26 yrs
HPV Male											3 doses through age 26 yrs; 2 or 3 doses through age 21 yrs; 2 or 3 doses through age 26 yrs
PCV13											1 dose
PPSV23											1, 2, or 3 doses depending on age and indication
HepA											2 or 3 doses depending on vaccine
HepB											2 or 3 doses depending on vaccine
MenACWY											1 or 2 doses depending on indication, then booster every 5 yrs if risk remains
MenB	PRECAUTION										2 or 3 doses depending on vaccine and indication
Hib											3 doses HSCT recipients only; 1 dose

Recommended vaccination for adults who meet age requirement, lack documentation of vaccination, or lack evidence of past infection
 Recommended vaccination for adults with an additional risk factor or another indication
 Precaution—vaccine might be indicated if benefit of protection outweighs risk of adverse reaction
 Delay vaccination until after pregnancy if vaccine is indicated
 Contraindicated—vaccine should not be administered because of risk for serious adverse reaction
 No recommendation

1. Precaution for LAIV does not apply to alcoholism. 2. See notes for influenza; hepatitis B; measles, mumps, and rubella; and varicella vaccinations. 3. Hematopoietic stem cell transplant.

Adult Schedule Notes

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

- 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**
 - Administer age-appropriate IIV or RIV to:
 - 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
- 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/rr5517a1.htm**Special populations**
 - Pregnant women:** Administer 1 dose of Tdap during each pregnancy, preferably in the early part of gestational weeks 27–36
- 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)
 - HIV infection and CD4 cell count ≥ 200 cells/ μ L** for at least 6 months and no evidence of immunity to measles, mumps, or rubella: Administer 2 doses of MMR at least 28 days apart
 - Students in postsecondary educational institutions, international travelers, and household contacts of immunocompromised persons:** Administer 2 doses of MMR at least 28 days apart (or 1 dose of MMR if previously administered 1 dose of MMR)
 - Health care personnel born in 1957 or later** with no evidence of immunity: Administer 2 doses of MMR at least 28 days apart for measles or mumps, or 1 dose of MMR for rubella (if born before 1957, consider MMR vaccination)
 - Adults who **previously received ≤ 2 doses of mumps-containing vaccine and are identified by public health authority to be at increased risk for mumps in an outbreak:** Administer 1 dose of MMR
 - MMR is contraindicated for pregnant women and adults with severe immunodeficiency
- 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) to:
 - Pregnant women without evidence of immunity:** Administer the first of the 2 doses on 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
- 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)
 - 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)**Special populations**
 - ZVL is contraindicated for pregnant women and adults with severe immunodeficiency
- 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 aged 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
- 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

Notes

Recommended Adult Immunization Schedule United States, 2019

Haemophilus influenzae type b vaccination

Special situations

- Anatomical or functional asplenia (including sickle cell disease):** 1 dose Hib if previously did not receive Hib; if elective splenectomy, 1 dose Hib, preferably at least 14 days before splenectomy
- Hematopoietic stem cell transplant (HSCT):** 3-dose series Hib 4 weeks apart starting 6–12 months after successful transplant, regardless of Hib vaccination history

Hepatitis A vaccination

Routine vaccination

- Not at risk but want protection from hepatitis A** (identification of risk factor not required): 2-dose series HepA (Havrix 6–12 months apart or Vaqta 6–18 months apart [minimum interval: 6 months]) or 3-dose series HepA-HepB (Twinrix at 0, 1, 6 months [minimum intervals: 4 weeks between doses 1 and 2, 5 months between doses 2 and 3])

Special situations

- At risk for hepatitis A virus infection:** 2-dose series HepA or 3-dose series HepA-HepB as above
 - Chronic liver disease**
 - Clotting factor disorders**
 - Men who have sex with men**
 - Injection or non-injection drug use**
 - Homelessness**
 - Work with hepatitis A virus** in research laboratory or nonhuman primates with hepatitis A virus infection
 - Travel in countries with high or intermediate endemic hepatitis A**
 - Close personal contact with international adoptee** (e.g., household, regular babysitting) in first 60 days after arrival from country with high or intermediate endemic hepatitis A (administer dose 1 as soon as adoption is planned, at least 2 weeks before adoptee's arrival)

Hepatitis B vaccination

Routine vaccination

- Not at risk but want protection from hepatitis B** (identification of risk factor not required): 2- or 3-dose series HepB (2-dose series Heplisav-B at least 4 weeks apart [2-dose series HepB only applies when 2 doses of Heplisav-B are used at least 4 weeks apart] or 3-dose series Engerix-B or Recombivax HB at 0, 1, 6 months [minimum intervals: 4 weeks between doses 1 and 2, 8 weeks between doses 2 and 3, 16 weeks between doses 1 and 3]) or 3-dose series HepA-HepB (Twinrix at 0, 1, 6 months [minimum intervals: 4 weeks between doses 1 and 2, 5 months between doses 2 and 3])

Special situations

- At risk for hepatitis B virus infection:** 2-dose (Heplisav-B) or 3-dose (Engerix-B, Recombivax HB) series HepB, or 3-dose series HepA-HepB as above
 - Hepatitis C virus infection**
 - Chronic liver disease** (e.g., cirrhosis, fatty liver disease, alcoholic liver disease, autoimmune hepatitis, alanine aminotransferase [ALT] or aspartate aminotransferase [AST] level greater than twice upper limit of normal)
 - HIV infection**
 - Sexual exposure risk** (e.g., sex partners of hepatitis B surface antigen (HBsAg)-positive persons; sexually active persons not in mutually monogamous relationships, persons seeking evaluation or treatment for a sexually transmitted infection, men who have sex with men)
 - Current or recent injection drug use**
 - Percutaneous or mucosal risk for exposure to blood** (e.g., household contacts of HBsAg-positive persons; residents and staff of facilities for developmentally disabled persons; health care and public safety personnel with reasonably anticipated risk for exposure to blood or blood-contaminated body fluids; hemodialysis, peritoneal dialysis, home dialysis, and predialysis patients; persons with diabetes mellitus age younger than 60 years and, at discretion of treating clinician, those age 60 years or older)
 - Incarcerated persons**
 - Travel in countries with high or intermediate endemic hepatitis B**

Human papillomavirus vaccination

Routine vaccination

- Females through age 26 years and males through age 21 years:** 2- or 3-dose series HPV vaccine depending on age at initial vaccination; males age 22 through 26 years may be vaccinated based on individual clinical decision (HPV vaccination routinely recommended at age 11–12 years)
 - Age 15 years or older at initial vaccination:** 3-dose series HPV vaccine at 0, 1–2, 6 months (minimum intervals: 4 weeks between doses 1 and 2, 12 weeks between doses 2 and 3, 5 months between doses 1 and 3; repeat dose if administered too soon)
 - Age 9 through 14 years at initial vaccination and received 1 dose, or 2 doses less than 5 months apart:** 1 dose HPV vaccine
 - Age 9 through 14 years at initial vaccination and received 2 doses at least 5 months apart:** HPV vaccination complete, no additional dose needed
 - If completed valid vaccination series with any HPV vaccine, no additional doses needed
- Special situations**
- Immunocompromising conditions (including HIV infection) through age 26 years:** 3-dose series HPV vaccine at 0, 1–2, 6 months as above
 - Men who have sex with men and transgender persons through age 26 years:** 2- or 3-dose series HPV vaccine depending on age at initial vaccination as above
 - Pregnancy through age 26 years:** HPV vaccination not recommended until after pregnancy; no intervention needed if vaccinated while pregnant; pregnancy testing not needed before vaccination

Adult Schedule Contraindications and Precautions Table

2018

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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.

Contraindications and precautions for vaccines routinely recommended for adults

Vaccine(s)	Contraindications	Precautions
All vaccines routinely recommended for adults	• 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

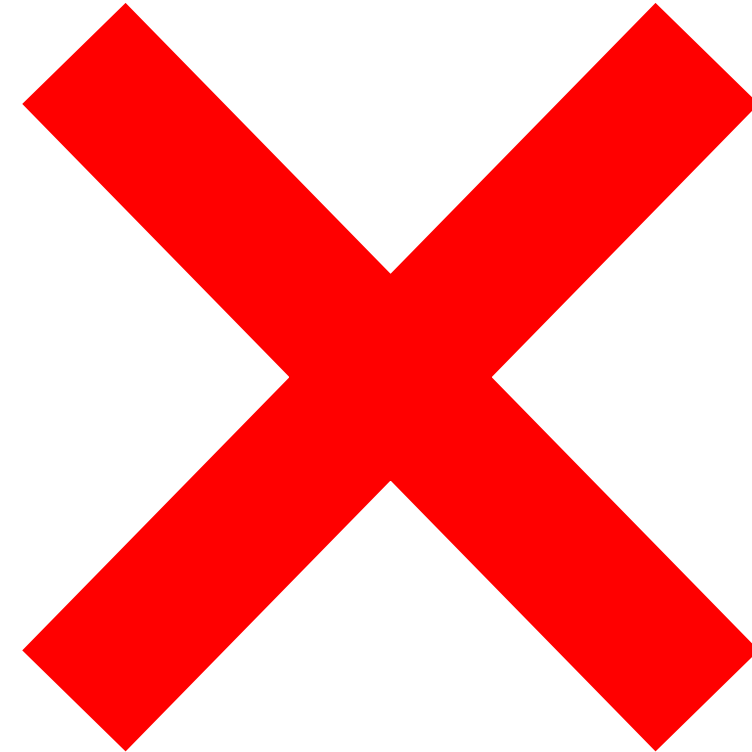
Vaccine(s)	Additional Contraindications	Additional Precautions
IIV ^a		<ul style="list-style-type: none"> History of Guillain-Barré syndrome within 6 weeks after previous influenza vaccination Egg allergy other than hives, e.g., angioedema, respiratory distress, lightheadedness, or recurrent emesis; or required epinephrine or another emergency medical intervention (IIV 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)
RIV ^a		<ul style="list-style-type: none"> History of Guillain-Barré syndrome within 6 weeks after previous influenza vaccination
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"> 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		• Pregnancy
PCV13	• Severe allergic reaction to any vaccine containing diphtheria toxoid	

- 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/r6505a1.htm.
- 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.
- 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.
- 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.
- 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

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



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Recommended Immunization Schedule for Children and Adolescents Aged 18 Years or Younger, UNITED STATES, 2018

- Consult relevant ACIP statements for detailed recommendations (www.cdc.gov/vaccines/hcp/acip-recs/index.html).
- When a vaccine is not administered at the recommended age, administer at a subsequent visit.
- Use combination vaccines instead of separate injections when appropriate.
- Report clinically significant adverse events to the Vaccine Adverse Event Reporting System (VAERS) online (www.vaers.hhs.gov) or by telephone (800-822-7967).
- Report suspected cases of reportable vaccine-preventable diseases to your state or local health department.
- For information about precautions and contraindications, see www.cdc.gov/vaccines/hcp/acip-recs/general-recs/contraindications.html.

Approved by the

Advisory Committee on Immunization Practices
(www.cdc.gov/vaccines/acip)

American Academy of Pediatrics
(www.aap.org)

American Academy of Family Physicians
(www.aafp.org)

American College of Obstetricians and Gynecologists
(www.acog.org)

This schedule includes recommendations in effect as of January 1, 2018.

The table below shows vaccine acronyms, and brand names for vaccines routinely recommended for children and adolescents. The use of trade names in this immunization schedule is for identification purposes only and does not imply endorsement by the ACIP or CDC.

Vaccine type	Abbreviation	Brand(s)
Diphtheria, tetanus, and acellular pertussis vaccine	DTaP	Daptacel Infanrix
Diphtheria, tetanus vaccine	DT	No Trade Name
<i>Haemophilus influenzae</i> type B vaccine	Hib (PRP-T) Hib (PRP-OMP)	ActHIB Hiberix PedvaxHIB
Hepatitis A vaccine	HepA	Havrix Vaqta
Hepatitis B vaccine	HepB	Engerix-B Recombivax HB
Human papillomavirus vaccine	HPV	Gardasil 9
Influenza vaccine (inactivated)	IIV	Multiple
Measles, mumps, and rubella vaccine	MMR	M-M-R II
Meningococcal serogroups A, C, W, Y vaccine	MenACWY-D MenACWY-CRM	Menactra Menveo
Meningococcal serogroup B vaccine	MenB-4C MenB-FHbp	Bexsero Trumenba
Pneumococcal 13-valent conjugate vaccine	PCV13	Prennar 13
Pneumococcal 23-valent polysaccharide vaccine	PPSV23	Pneumovax
Poliovirus vaccine (inactivated)	IPV	IPOL
Rotavirus vaccines	RV1 RV5	Rotarix RotaTeq
Tetanus, diphtheria, and acellular pertussis vaccine	Tdap	Adacel Boostrix
Tetanus and diphtheria vaccine	Td	Tenivac No Trade Name
Varicella vaccine	VAR	Varivax
Combination Vaccines		
DTaP, hepatitis B and inactivated poliovirus vaccine	DTaP-HepB-IPV	Pediarix
DTaP, inactivated poliovirus and <i>Haemophilus influenzae</i> type B vaccine	DTaP-IPV/Hib	Pentacel
DTaP and inactivated poliovirus vaccine	DTaP-IPV	Kinrix Quadracel
Measles, mumps, rubella, and varicella vaccines	MMRV	ProQuad

Recommended Child and Adolescent Immunization Schedule for ages 18 years or younger

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2019

Vaccines in the Child and Adolescent Immunization Schedule*

Vaccines	Abbreviations	Trade names
Diphtheria, tetanus, and acellular pertussis vaccine	DTaP	Daptacel Infanrix
Diphtheria, tetanus vaccine	DT	No Trade Name
<i>Haemophilus influenzae</i> type b vaccine	Hib (PRP-T) Hib (PRP-OMP)	ActHIB Hiberix PedvaxHIB
Hepatitis A vaccine	HepA	Havrix Vaqta
Hepatitis B vaccine	HepB	Engerix-B Recombivax HB
Human papillomavirus vaccine	HPV	Gardasil 9
Influenza vaccine (inactivated)	IIV	Multiple
Influenza vaccine (live, attenuated)	LAIV	FluMist
Measles, mumps, and rubella vaccine	MMR	M-M-R II
Meningococcal serogroups A, C, W, Y vaccine	MenACWY-D MenACWY-CRM	Menactra Menveo
Meningococcal serogroup B vaccine	MenB-4C MenB-FHbp	Bexsero Trumenba
Pneumococcal 13-valent conjugate vaccine	PCV13	Prennar 13
Pneumococcal 23-valent polysaccharide vaccine	PPSV23	Pneumovax
Poliovirus vaccine (inactivated)	IPV	IPOL
Rotavirus vaccine	RV1 RV5	Rotarix RotaTeq
Tetanus, diphtheria, and acellular pertussis vaccine	Tdap	Adacel Boostrix
Tetanus and diphtheria vaccine	Td	Tenivac Td vaccine
Varicella vaccine	VAR	Varivax
Combination Vaccines (Use combination vaccines instead of separate injections when appropriate)		
DTaP, hepatitis B, and inactivated poliovirus vaccine	DTaP-HepB-IPV	Pediarix
DTaP, inactivated poliovirus, and <i>Haemophilus influenzae</i> type b vaccine	DTaP-IPV/Hib	Pentacel
DTaP and inactivated poliovirus vaccine	DTaP-IPV	Kinrix Quadracel
Measles, mumps, rubella, and varicella vaccines	MMRV	ProQuad

*Administer recommended vaccines if immunization history is incomplete or unknown. Do not restart or add doses to vaccine series for extended intervals between doses. When a vaccine is not administered at the recommended age, administer at a subsequent visit. The use of trade names for identification purposes only and does not imply endorsement by the ACIP or CDC.

How to use the child/adolescent immunization schedule

- Determine recommended vaccine by age (Table 1)
- Determine recommended interval for catch-up vaccination (Table 2)
- Assess need for additional recommended vaccines by medical condition and other indications (Table 3)
- Review vaccine types, frequencies, intervals, and considerations for special situations (Notes)

Recommended by the Advisory Committee on Immunization Practices (www.cdc.gov/vaccines/acip) and approved by the Centers for Disease Control and Prevention (www.cdc.gov), American Academy of Pediatrics (www.aap.org), American Academy of Family Physicians (www.aafp.org), and American College of Obstetricians and Gynecologists (www.acog.org).

Report

- Suspected cases of reportable vaccine-preventable diseases or outbreaks to your state or local health department
- Clinically significant adverse events to the Vaccine Adverse Event Reporting System (VAERS) at www.vaers.hhs.gov or (800-822-7967)

Download the CDC Vaccine Schedules App for providers at www.cdc.gov/vaccines/schedules/hcp/schedule-app.html

Helpful information

- Complete ACIP recommendations: www.cdc.gov/vaccines/hcp/acip-recs/index.html
- General Best Practice Guidelines for Immunization: www.cdc.gov/vaccines/hcp/acip-recs/general-recs/index.html
- Outbreak information (including case identification and outbreak response), see Manual for the Surveillance of Vaccine-Preventable Diseases: www.cdc.gov/vaccines/pubs/surv-manual



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Centers for Disease Control and Prevention

Child/Adolescent Schedule Table 1

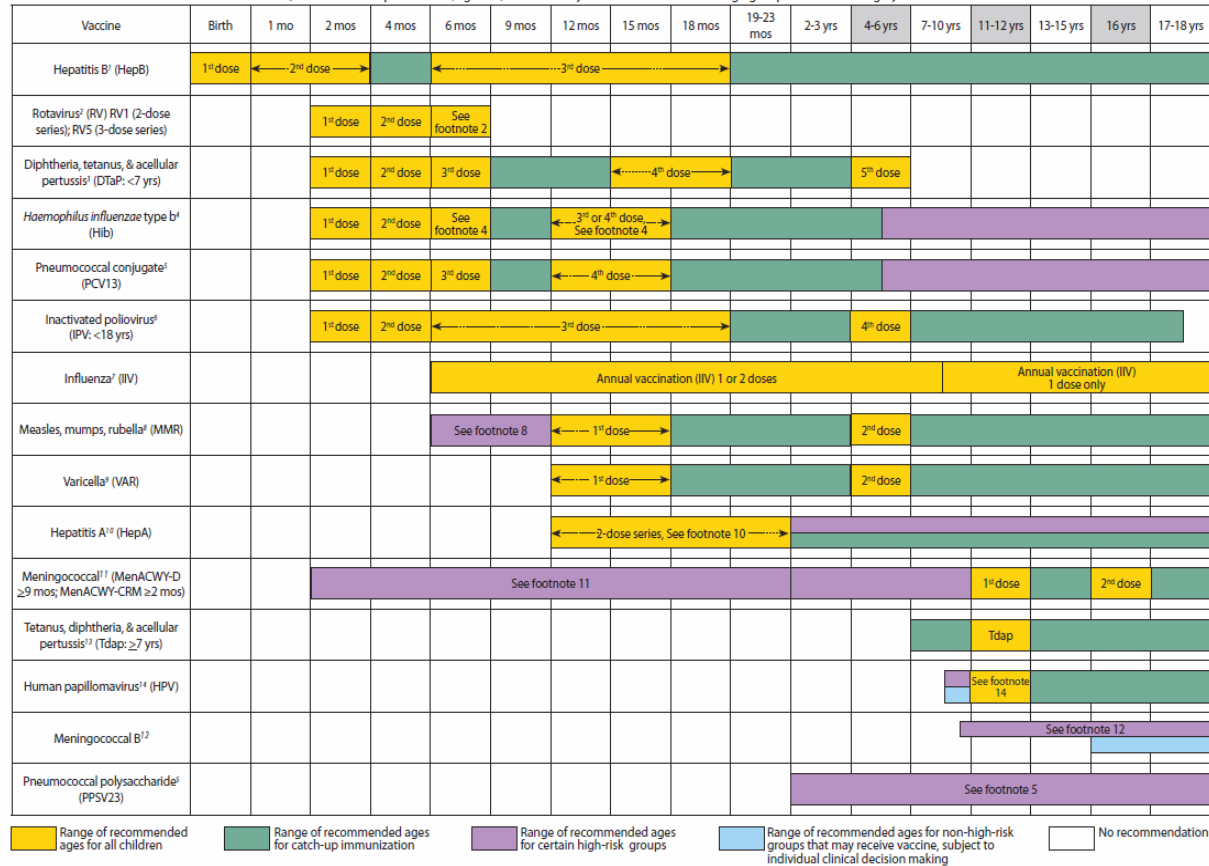
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Figure 1. Recommended Immunization Schedule for Children and Adolescents Aged 18 Years or Younger—United States, 2018.

(FOR THOSE WHO FALL BEHIND OR START LATE, SEE THE CATCH-UP SCHEDULE [FIGURE 2]).

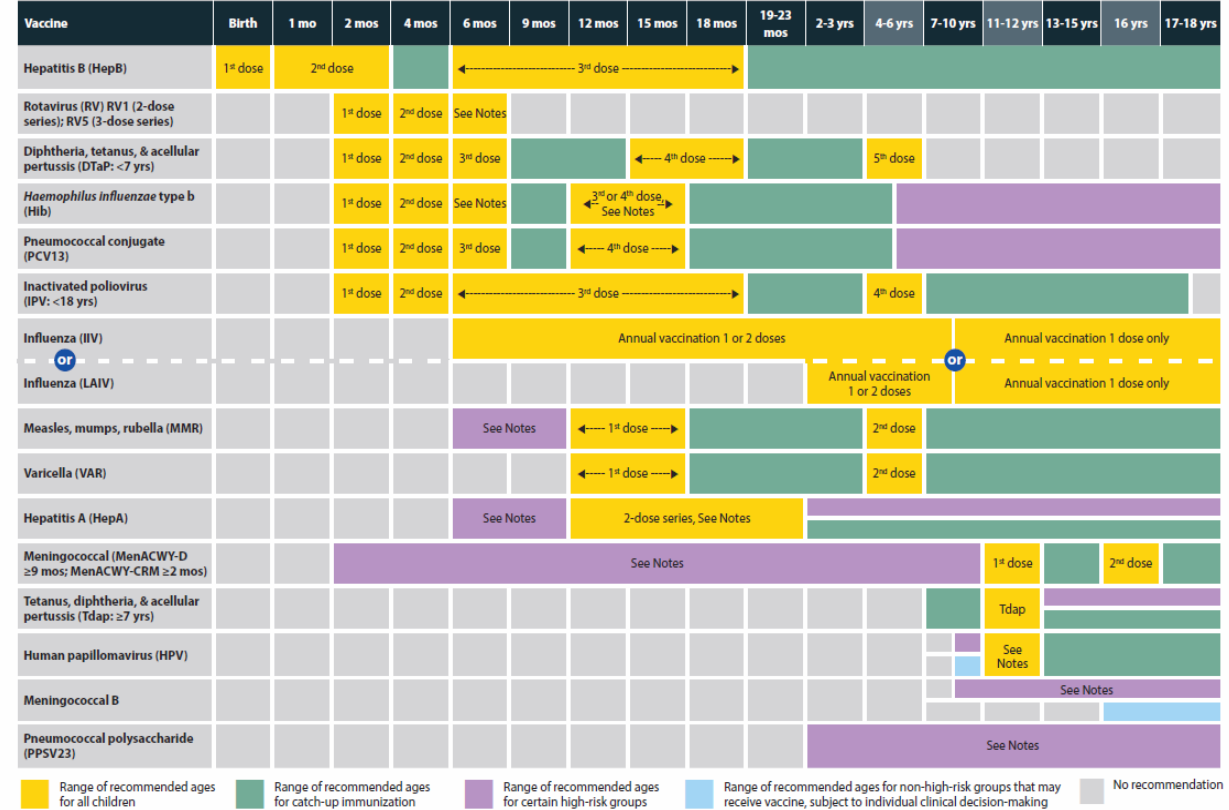
These recommendations must be read with the footnotes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars in Figure 1. To determine minimum intervals between doses, see the catch-up schedule (Figure 2). School entry and adolescent vaccine age groups are shaded in gray.



NOTE: The above recommendations must be read along with the footnotes of this schedule.

Table 1 Recommended Child and Adolescent Immunization Schedule for ages 18 years or younger United States, 2019

These recommendations must be read with the Notes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars in Table 1. To determine minimum intervals between doses, see the catch-up schedule (Table 2). School entry and adolescent vaccine age groups are shaded in gray.



Child/Adolescent Schedule Table 2

2018

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FIGURE 2. Catch-up immunization schedule for persons aged 4 months–18 years who start late or who are more than 1 month behind—United States, 2018.

The figure below provides catch-up schedules and minimum intervals between doses for children whose vaccinations have been delayed. A vaccine series does not need to be restarted, regardless of the time that has elapsed between doses. Use the section appropriate for the child's age. Always use this table in conjunction with Figure 1 and the footnotes that follow.

Children age 4 months through 6 years					
Vaccine	Minimum Age for Dose 1	Minimum Interval Between Doses			
		Dose 1 to Dose 2	Dose 2 to Dose 3	Dose 3 to Dose 4	Dose 4 to Dose 5
Hepatitis B ¹	Birth	4 weeks	8 weeks and at least 16 weeks after first dose. Minimum age for the final dose is 24 weeks.		
Rotavirus ²	6 weeks Maximum age for first dose is 14 weeks, 6 days	4 weeks	4 weeks ² Maximum age for final dose is 8 months, 0 days.		
Diphtheria, tetanus, and acellular pertussis ³	6 weeks	4 weeks	4 weeks	6 months	6 months ³
<i>Haemophilus influenzae</i> type b ⁴	6 weeks	4 weeks if first dose was administered before the 1 st birthday. 8 weeks (as final dose) if first dose was administered at age 12 through 14 months. No further doses needed if first dose was administered at age 15 months or older.	4 weeks ⁴ if current age is younger than 12 months and first dose was administered at younger than age 7 months, and at least 1 previous dose was PRP-T (ActHib, Pentacel, Hiberix) or unknown. 8 weeks and age 12 through 59 months (as final dose) ⁴ • if current age is younger than 12 months and first dose was administered at age 7 through 11 months; OR • if current age is 12 through 59 months and first dose was administered before the 1 st birthday, and second dose administered at younger than 15 months; OR • if both doses were PRP-OMP (PedvaxiHB; Comvax) and were administered before the 1 st birthday. No further doses needed if previous dose was administered at age 15 months or older.	8 weeks (as final dose) This dose only necessary for children age 12 through 59 months who received 3 doses before the 1 st birthday.	
Pneumococcal conjugate ⁵	6 weeks	4 weeks if first dose administered before the 1 st birthday. 8 weeks (as final dose for healthy children) if first dose was administered at the 1 st birthday or after. No further doses needed for healthy children if first dose was administered at age 24 months or older.	4 weeks if current age is younger than 12 months and previous dose given at <7 months old. 8 weeks (as final dose for healthy children) if previous dose given between 7–11 months (wait until at least 12 months old); OR if current age is 12 months or older and at least 1 dose was given before age 12 months. No further doses needed for healthy children if previous dose administered at age 24 months or older.	8 weeks (as final dose) This dose only necessary for children aged 12 through 59 months who received 3 doses before age 12 months or for children at high risk who received 3 doses at any age.	
Inactivated poliovirus ⁶	6 weeks	4 weeks ⁶	4 weeks ⁶ if current age is < 4 years 6 months (as final dose) if current age is 4 years or older	6 months ⁶ (minimum age 4 years for final dose).	
Measles, mumps, rubella ⁷	12 months	4 weeks			
Varicella ⁹	12 months	3 months			
Hepatitis A ¹⁰	12 months	6 months			
Meningococcal ¹¹ (MenACWY-D ≥9 mos; MenACWY-CRM ≥2 mos)	6 weeks	8 weeks ¹¹	See footnote 11	See footnote 11	
Children and adolescents age 7 through 18 years					
Meningococcal ¹¹ (MenACWY-D ≥9 mos; MenACWY-CRM ≥2 mos)	Not Applicable (N/A)	8 weeks ¹¹			
Tetanus, diphtheria, and acellular pertussis ³	7 years ¹²	4 weeks	4 weeks if first dose of DTaP/DT was administered before the 1 st birthday. 6 months (as final dose) if first dose of DTaP/DT or Tdap/Td was administered at or after the 1 st birthday.	6 months if first dose of DTaP/DT was administered before the 1 st birthday.	
Human papillomavirus ¹⁴	9 years		Routine dosing intervals are recommended. ¹⁴		
Hepatitis A ¹⁰	N/A	6 months			
Hepatitis B ¹	N/A	4 weeks	8 weeks and at least 16 weeks after first dose.		
Inactivated poliovirus ⁶	N/A	4 weeks	6 months ⁶ A fourth dose is not necessary if the third dose was administered at age 4 years or older and at least 6 months after the previous dose.	A fourth dose of IPV is indicated if all previous doses were administered at <4 years or if the third dose was administered <6 months after the second dose.	
Measles, mumps, rubella ⁷	N/A	4 weeks			
Varicella ⁹	N/A	3 months if younger than age 13 years, 4 weeks if age 13 years or older.			

NOTE: The above recommendations must be read along with the footnotes of this schedule.

Table 2 Catch-up immunization schedule for persons aged 4 months–18 years who start late or who are more than 1 month behind, United States, 2019

The figure below provides catch-up schedules and minimum intervals between doses for children whose vaccinations have been delayed. A vaccine series does not need to be restarted, regardless of the time that has elapsed between doses. Use the section appropriate for the child's age. Always use this table in conjunction with Table 1 and the notes that follow.

Children age 4 months through 6 years					
Vaccine	Minimum Age for Dose 1	Minimum Interval Between Doses			
		Dose 1 to Dose 2	Dose 2 to Dose 3	Dose 3 to Dose 4	Dose 4 to Dose 5
Hepatitis B	Birth	4 weeks	8 weeks and at least 16 weeks after first dose. Minimum age for the final dose is 24 weeks.		
Rotavirus	6 weeks Maximum age for first dose is 14 weeks, 6 days	4 weeks	4 weeks Maximum age for final dose is 8 months, 0 days.		
Diphtheria, tetanus, and acellular pertussis	6 weeks	4 weeks	4 weeks	6 months	6 months
<i>Haemophilus influenzae</i> type b	6 weeks	No further doses needed if first dose was administered at age 15 months or older. 4 weeks if first dose was administered before the 1 st birthday. 8 weeks (as final dose) if first dose was administered at age 12 through 14 months.	No further doses needed if previous dose was administered at age 15 months or older. 4 weeks if current age is younger than 12 months and first dose was administered at younger than age 7 months, and at least 1 previous dose was PRP-T (ActHib, Pentacel, Hiberix) or unknown. 8 weeks and age 12 through 59 months (as final dose) if current age is younger than 12 months and first dose was administered at age 7 through 11 months; OR if current age is 12 through 59 months and first dose was administered before the 1 st birthday, and second dose administered at younger than 15 months; OR if both doses were PRP-OMP (PedvaxiHB; Comvax) and were administered before the 1 st birthday.	8 weeks (as final dose) This dose only necessary for children age 12 through 59 months who received 3 doses before the 1 st birthday.	
Pneumococcal conjugate	6 weeks	No further doses needed for healthy children if first dose was administered at age 24 months or older. 4 weeks if first dose administered before the 1 st birthday. 8 weeks (as final dose for healthy children) if previous dose given between 7–11 months (wait until at least 12 months old); OR if current age is 12 months or older and at least 1 dose was given before age 12 months.	No further doses needed for healthy children if previous dose administered at age 24 months or older. 4 weeks if current age is younger than 12 months and previous dose given at <7 months old. 8 weeks (as final dose for healthy children) if previous dose given between 7–11 months (wait until at least 12 months old); OR if current age is 12 months or older and at least 1 dose was given before age 12 months.	8 weeks (as final dose) This dose only necessary for children age 12 through 59 months who received 3 doses before age 12 months or for children at high risk who received 3 doses at any age.	
Inactivated poliovirus	6 weeks	4 weeks	4 weeks if current age is < 4 years. 6 months (as final dose) if current age is 4 years or older.	6 months (minimum age 4 years for final dose).	
Measles, mumps, rubella	12 months	4 weeks			
Varicella	12 months	3 months			
Hepatitis A	12 months	6 months			
Meningococcal	2 months MenACWY-CRM 9 months MenACWY-D	8 weeks	See Notes	See Notes	See Notes
Children and adolescents age 7 through 18 years					
Meningococcal	Not Applicable (N/A)	8 weeks			
Tetanus, diphtheria, and acellular pertussis	7 years	4 weeks	4 weeks if first dose of DTaP/DT was administered before the 1 st birthday. 6 months (as final dose) if first dose of DTaP/DT or Tdap/Td was administered at or after the 1 st birthday.	6 months if first dose of DTaP/DT was administered before the 1 st birthday.	
Human papillomavirus	9 years		Routine dosing intervals are recommended.		
Hepatitis A	N/A	6 months			
Hepatitis B	N/A	4 weeks	8 weeks and at least 16 weeks after first dose.		
Inactivated poliovirus	N/A	4 weeks	6 months A fourth dose is not necessary if the third dose was administered at age 4 years or older and at least 6 months after the previous dose.	A fourth dose of IPV is indicated if all previous doses were administered at <4 years or if the third dose was administered <6 months after the second dose.	
Measles, mumps, rubella	N/A	4 weeks			
Varicella	N/A	3 months if younger than age 13 years, 4 weeks if age 13 years or older.			

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Child/Adolescent Schedule Table 3

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Figure 3. Vaccines that might be indicated for children and adolescents aged 18 years or younger based on medical indications

VACCINE	INDICATION	Pregnancy	Immunocompromised status (excluding HIV infection)	HIV Infection CD4+ count*		Kidney failure, end-stage renal disease, on hemodialysis	Heart disease, chronic lung disease	CSF leaks/cochlear implants	Asplenia and persistent complement component deficiencies	Chronic liver disease	Diabetes
				<15% or total CD4 cell count of <200/mm ³	≥15% or total CD4 cell count of ≥200/mm ³						
Hepatitis B ¹											
Rotavirus ²			SCID ³								
Diphtheria, tetanus, & acellular pertussis ³ (DTaP)											
<i>Haemophilus influenzae</i> type b ⁴											
Pneumococcal conjugate ⁵											
Inactivated poliovirus ⁶											
Influenza ⁷											
Measles, mumps, rubella ⁸											
Varicella ⁹											
Hepatitis A ¹⁰											
Meningococcal ACWY ¹¹											
Tetanus, diphtheria, & acellular pertussis ¹³ (Tdap)											
Human papillomavirus ¹⁴											
Meningococcal B ¹²											
Pneumococcal polysaccharide ⁵											

*Severe Combined Immunodeficiency
¹For additional information regarding HIV laboratory parameters and use of live vaccines; see the General Best Practice Guidelines for Immunization "Altered Immunocompetence" at: www.cdc.gov/vaccines/hcp/acip-recs/general-recs/immunocompetence.html, and Table 4-1 (footnote D) at: www.cdc.gov/vaccines/hcp/acip-recs/general-recs/contraindications.html.
² Severe Combined Immunodeficiency
³ LAIV contraindicated for children 2-4 years of age with asthma or wheezing during the preceding 12 months.

NOTE: The above recommendations must be read along with the footnotes of this schedule.

Table 3 Recommended Child and Adolescent Immunization Schedule by Medical Indication United States, 2019

VACCINE	Pregnancy	Immunocompromised status (excluding HIV infection)	HIV Infection CD4+ count ¹		INDICATION						
			<15% and total CD4 cell count of <200/mm ³	≥15% and total CD4 cell count of ≥200/mm ³	Kidney failure, end-stage renal disease, on hemodialysis	Heart disease, chronic lung disease	CSF leaks/cochlear implants	Asplenia and persistent complement component deficiencies	Chronic liver disease	Diabetes	
Hepatitis B											
Rotavirus		SCID ²									
Diphtheria, tetanus, & acellular pertussis (DTaP)											
<i>Haemophilus influenzae</i> type b											
Pneumococcal conjugate											
Inactivated poliovirus											
Influenza (IIV) or Influenza (LAIV)							Asthma, wheezing: 2-4 yrs ³				
Measles, mumps, rubella											
Varicella											
Hepatitis A											
Meningococcal ACWY											
Tetanus, diphtheria, & acellular pertussis (Tdap)											
Human papillomavirus											
Meningococcal B											
Pneumococcal polysaccharide											

Vaccination according to the routine schedule recommended
 Recommended for persons with an additional risk factor for which the vaccine would be indicated
 Vaccination is recommended, and additional doses may be necessary based on medical condition. See Notes.
 Contraindicated or use not recommended—vaccine should not be administered because of risk for serious adverse reaction
 Precaution—vaccine might be indicated if benefit of protection outweighs risk of adverse reaction
 Delay vaccination until after pregnancy if vaccine indicated
 No recommendation

Child/Adolescent Schedule Notes

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Footnotes — Recommended Immunization Schedule for Children and Adolescents Aged 18 Years or Younger, UNITED STATES, 2018
For further guidance on the use of the vaccines mentioned below, see: www.cdc.gov/vaccines/hcp/acip-recs/index.html.
For vaccine recommendations for persons 19 years of age and older, see the Adult Immunization Schedule.

Additional information

- For information on contraindications and precautions for the use of a vaccine, consult the *General Best Practice Guidelines for Immunization* and relevant ACIP statements, at www.cdc.gov/vaccines/hcp/acip-recs/index.html.
- For calculating intervals between doses, 4 weeks = 28 days. Intervals of ≥ 4 months are determined by calendar months.
- Within a number range (e.g., 12–18), a dash (–) should be read as “through.”
- Vaccine doses administered ≤ 4 days before the minimum age or interval are considered valid. Doses of any vaccine administered ≥ 5 days earlier than the minimum interval or minimum age should not be counted as valid and should be repeated as age-appropriate. The repeat dose should be spaced after the invalid dose by the recommended minimum interval. For further details, see Table 3-1, *Recommended and minimum ages and intervals between vaccine doses*, in *General Best Practice Guidelines for Immunization* at www.cdc.gov/vaccines/hcp/acip-recs/general-recs/timing.html.
- Information on travel vaccine requirements and recommendations is available at www.cdc.gov/travel/.
- For vaccination of persons with immunodeficiencies, see Table 8-1, *Vaccination of persons with primary and secondary immunodeficiencies*, in *General Best Practice Guidelines for Immunization*, at www.cdc.gov/vaccines/hcp/acip-recs/general-recs/immunocompetence.html; and Immunization in Special Clinical Circumstances. (In: Kimberlin DW, Brady MT, Jackson MA, Long SS, eds. *Red Book: 2015 report of the Committee on Infectious Diseases*. 30th ed. Elk Grove Village, IL: American Academy of Pediatrics, 2015:68–107).
- The National Vaccine Injury Compensation Program (VICP) is a no-fault alternative to the traditional legal system for resolving vaccine injury claims. All routine child and adolescent vaccines are covered by VICP except for pneumococcal polysaccharide vaccine (PPSV23). For more information; see www.hrsa.gov/vaccinecompensation/index.html.

1. Hepatitis B (HepB) vaccine. (minimum age: birth)

Birth Dose (Monovalent HepB vaccine only):

- Mother is HBsAg-Negative:** 1 dose within 24 hours of birth for medically stable infants $\geq 2,000$ grams. Infants $< 2,000$ grams administer 1 dose at chronological age 1 month or hospital discharge.
- Mother is HBsAg-Positive:**
 - Give **HepB vaccine** and **0.5 mL of HBIG** (at separate anatomic sites) within 12 hours of birth, regardless of birth weight.
 - Test for HBsAg and anti-HBs at age 9–12 months. If HepB series is delayed, test 1–2 months after final dose.
- Mother's HBsAg status is unknown:**
 - Give **HepB vaccine** within 12 hours of birth, regardless of birth weight.
 - For infants $< 2,000$ grams, give **0.5 mL of HBIG** in addition to HepB vaccine within 12 hours of birth.
 - Determine mother's HBsAg status as soon as possible. If mother is HBsAg-positive, give **0.5 mL of HBIG** to infants $\geq 2,000$ grams as soon as possible, but no later than 7 days of age.

Routine Series:

- A complete series is 3 doses at 0, 1–2, and 6–18 months. (Monovalent HepB vaccine should be used for doses given before age 6 weeks.)

- Infants who did not receive a birth dose should begin the series as soon as feasible (see Figure 2).
- Administration of **4 doses** is permitted when a combination vaccine containing HepB is used after the birth dose.
- Minimum age** for the final (3rd or 4th) dose: 24 weeks.
- Minimum Intervals:** Dose 1 to Dose 2: 4 weeks / Dose 2 to Dose 3: 8 weeks / Dose 1 to Dose 3: 16 weeks. (When 4 doses are given, substitute “Dose 4” for “Dose 3” in these calculations.)

Catch-up vaccination:

- Unvaccinated persons should complete a 3-dose series at 0, 1–2, and 6 months.
- Adolescents 11–15 years of age may use an alternative 2-dose schedule, with at least 4 months between doses (adult formulation **Recombivax HB** only).
- For other catch-up guidance, see Figure 2.

2. Rotavirus vaccines. (minimum age: 6 weeks)

Routine vaccination:

- Rotarix:** 2-dose series at 2 and 4 months.
 - RotaTeq:** 3-dose series at 2, 4, and 6 months.
- If any dose in the series is either RotaTeq or unknown, default to 3-dose series.

Catch-up vaccination:

- Do not start the series on or after age 15 weeks, 0 days.
- The maximum age for the final dose is 8 months, 0 days.
- For other catch-up guidance, see Figure 2.

3. Diphtheria, tetanus, and acellular pertussis (DTaP) vaccine. (minimum age: 6 weeks [4 years for Kinrix or Quadracel])

- 5-dose series at 2, 4, 6, and 15–18 months, and 4–6 years.

- Prospectively:** A 4th dose may be given as early as age 12 months if at least 6 months have elapsed since the 3rd dose.
- Retrospectively:** A 4th dose that was inadvertently given as early as 12 months may be counted if at least 4 months have elapsed since the 3rd dose.

Catch-up vaccination:

- The 5th dose is not necessary if the 4th dose was administered at 4 years or older.
- For other catch-up guidance, see Figure 2.

Notes

Recommended Child and Adolescent Immunization Schedule for ages 18 years or younger, United States, 2019

For vaccine recommendations for persons 19 years of age and older, see the Recommended Adult Immunization Schedule.

Additional information

- Consult relevant ACIP statements for detailed recommendations at www.cdc.gov/vaccines/hcp/acip-recs/index.html.
- For information on contraindications and precautions for the use of a vaccine, consult the *General Best Practice Guidelines for Immunization* and relevant ACIP statements at www.cdc.gov/vaccines/hcp/acip-recs/index.html.
- For calculating intervals between doses, 4 weeks = 28 days. Intervals of ≥ 4 months are determined by calendar months.
- Within a number range (e.g., 12–18), a dash (–) should be read as “through.”

- Vaccine doses administered ≤ 4 days before the minimum age or interval are considered valid. Doses of any vaccine administered ≥ 5 days earlier than the minimum age or minimum interval should not be counted as valid and should be repeated as age-appropriate. The repeat dose should be spaced after the invalid dose by the recommended minimum interval. For further details, see Table 3-1, *Recommended and minimum ages and intervals between vaccine doses*, in *General Best Practice Guidelines for Immunization* at www.cdc.gov/vaccines/hcp/acip-recs/general-recs/timing.html.
- Information on travel vaccine requirements and recommendations is available at wwwnc.cdc.gov/travel/.

- For vaccination of persons with immunodeficiencies, see Table 8-1, *Vaccination of persons with primary and secondary immunodeficiencies*, in *General Best Practice Guidelines for Immunization* at www.cdc.gov/vaccines/hcp/acip-recs/general-recs/immunocompetence.html, and Immunization in Special Clinical Circumstances (In: Kimberlin DW, Brady MT, Jackson MA, Long SS, eds. *Red Book: 2018 Report of the Committee on Infectious Diseases*. 31st ed. Itasca, IL: American Academy of Pediatrics; 2018:67–111).
- For information regarding vaccination in the setting of a vaccine-preventable disease outbreak, contact your state or local health department.
- The National Vaccine Injury Compensation Program (VICP) is a no-fault alternative to the traditional legal system for resolving vaccine injury claims. All routine child and adolescent vaccines are covered by VICP except for pneumococcal polysaccharide vaccine (PPSV23). For more information, see www.hrsa.gov/vaccinecompensation/index.html.

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02/22/19

Diphtheria, tetanus, and pertussis (DTaP) vaccination (minimum age: 6 weeks [4 years for Kinrix or Quadracel])

Routine vaccination

- 5-dose series at 2, 4, 6, 15–18 months, 4–6 years
- Prospectively:** Dose 4 may be given as early as age 12 months if at least 6 months have elapsed since dose 3.
- Retrospectively:** A 4th dose that was inadvertently given as early as 12 months may be counted if at least 4 months have elapsed since dose 3.

Catch-up vaccination

- Dose 5 is not necessary if dose 4 was administered at age 4 years or older.
- For other catch-up guidance, see Table 2.

Haemophilus influenzae type b vaccination (minimum age: 6 weeks)

Routine vaccination

- ActHIB, Hibertix, or Pentacel:** 4-dose series at 2, 4, 6, 12–15 months
- PedvaxHIB:** 3-dose series at 2, 4, 12–15 months

Catch-up vaccination

- Dose 1 at 7–11 months:** Administer dose 2 at least 4 weeks later and dose 3 (final dose) at 12–15 months or 8 weeks after dose 2 (whichever is later).
- Dose 1 at 12–14 months:** Administer dose 2 (final dose) at least 8 weeks after dose 1.
- Dose 1 before 12 months and dose 2 before 15 months:** Administer dose 3 (final dose) 8 weeks after dose 2.
- 2 doses of PedvaxHIB before 12 months:** Administer dose 3 (final dose) at 12–15 months and at least 8 weeks after dose 2.
- Unvaccinated at 15–59 months:** 1 dose
- For other catch-up guidance, see Table 2.

Special situations

Chemotherapy or radiation treatment:

- 12–59 months:**
 - Unvaccinated or only 1 dose before age 12 months: 2 doses, 8 weeks apart
 - 2 or more doses before age 12 months: 1 dose at least 8 weeks after previous dose
- Doses administered within 14 days of starting therapy or during therapy should be repeated at least 3 months after therapy completion.*

Hematopoietic stem cell transplant (HSCT):

- 3-dose series 4 weeks apart starting 6 to 12 months after successful transplant regardless of Hib vaccination history

Anatomic or functional asplenia (including sickle cell disease):

- 12–59 months:**
 - Unvaccinated or only 1 dose before 12 months: 2 doses, 8 weeks apart
 - 2 or more doses before 12 months: 1 dose at least 8 weeks after previous dose
- Unvaccinated* persons age 5 years or older*
 - 1 dose

Elective splenectomy:

- Unvaccinated* persons age 15 months or older*
 - 1 dose (preferably at least 14 days before procedure)

HIV Infection:

- 12–59 months:**
 - Unvaccinated or only 1 dose before age 12 months: 2 doses, 8 weeks apart
 - 2 or more doses before age 12 months: 1 dose at least 8 weeks after previous dose
- Unvaccinated* persons age 5–18 years*
 - 1 dose

Immunoglobulin deficiency, early component complement deficiency:

- 12–59 months:**
 - Unvaccinated or only 1 dose before age 12 months: 2 doses, 8 weeks apart
 - 2 or more doses before age 12 months: 1 dose at least 8 weeks after previous dose

*Unvaccinated = Less than routine series (through 14 months) OR no doses (14 months or older)

Thank You

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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