Updates in Adult Immunization Schedule

Disclosure and Disclaimer

- The presenter has no conflict of interest
- The use of trade names is for identification purposes only and does not imply endorsement
- Discussions on unlicensed products and off-label uses are in the context of ACIP recommendations
- The opinions expressed in this presentation are those of the presenter and do not necessarily represent official positions of CDC or ACIP

Overview

- Background
- ACIP policy updates
- Usability testing
- Revised display for vaccinating pregnant women
- Harmonization with child and adolescent immunization schedule
- Changes in the 2019 adult immunization schedule

Adult Immunization Schedule – Background

- Updated each year
  - Represents current, approved ACIP policy
  - Designed for implementation of ACIP policy
- Approved by
  - CDC Director
  - American College of Physicians
  - American Academy of Family Physicians
  - American College of Obstetricians and Gynecologists
  - American College of Nurse-Midwives
- Published in February 2019
  - MMWR announcement of availability on ACIP website
  - Annals of Internal Medicine (published in entirety)

Updates in Adult Immunization Recommendations

Updates in ACIP Recommendations for Adults

Policy Statements Published after 2018 Adult Schedule Approval

- Hepatitis B (Feb 2018 ACIP Meeting)
  - Schillie et al. MMWR Apr 2018;67(15):455–458
  - Recommended use of CpG-adjuvanted HepB
- Tdap (Summary)
  - Liang et al. MMWR Apr 2018;67(2):1–44
  - Reiterated use of Tdap for adult catch-up and during each pregnancy
- Influenza (Jun 2018)
  - Grohskopf et al. MMWR Aug 2018;67(3):1–20
  - Updated use of LAIV as option for 2018–2019
- Hepatitis A (Oct 2018)
  - Doshani et al. MMWR Feb 2019;68(6);153–156
  - Added homelessness as indication for HepA

Influenza Updates – LAIV

- Option for people 2–49 yrs
- Contraindicated in children and adolescents taking aspirin or salicylate-containing meds
- Should not be given to
  - Children 2–4 yrs with asthma
  - Immunocompromised
  - Close contacts, caregivers of severely immunosuppressed who need protected environment
  - Pregnant women
  - Received influenza antiviral within past 48 hours
- Precautions
  - Moderate to severe illness with or without fever, GBS within 6 weeks with previous vaccine
  - Asthma age ≥5y, other conditions for increased risk of severe influenza illness

Grohskopf et al. Prevention and control of seasonal influenza with vaccines: recommendations of the Advisory Committee on Immunization Practices—United States, 2018–19 influenza season. MMWR 2018;67(3):1–20

Heplisav-B (Dynavax)

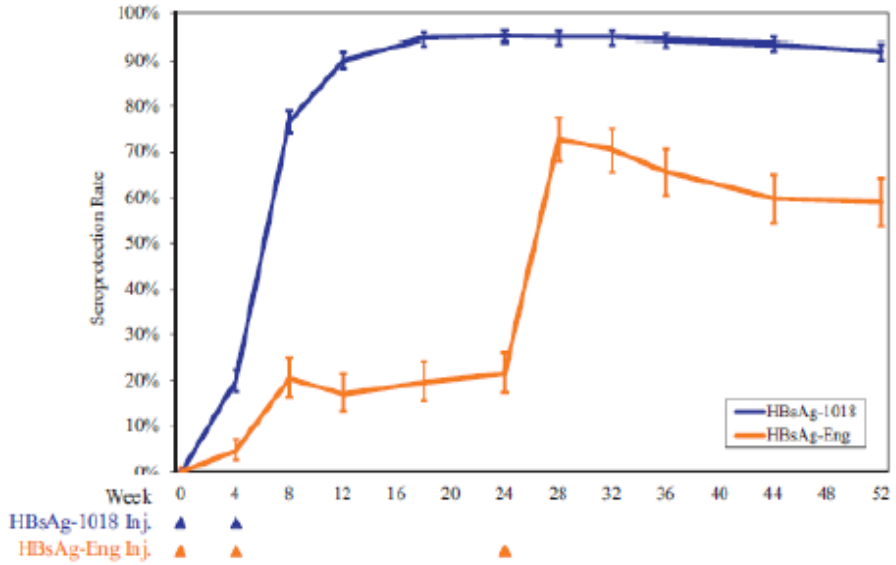
- Single-antigen hepatitis B vaccine for all HBV subtypes, 2-dose series[1], FDA-approved Nov 2017
- Contains yeast-derived recombinant HBsAg (20 mcg) with 1018 adjuvant (Toll-like Receptor 9 molecule of cytosine and guanine DNA moieties connected by phosphorous compound)
- No preservative
- Administered IM

1. HEPLISAV-B™ [Hepatitis B Vaccine (Recombinant), Adjuvanted] package insert www.fda.gov/downloads/BiologicsBloodVaccines/Vaccines/ApprovedProducts/UCM584762.pdf

Heplisav-B Seroprotection and Safety

- Immunogenicity
  - 90%–100% (2 doses Heplisav-B) vs. 70%–90% in comparison group (3 doses Engerix-B)
  - Diabetes Type II: 90% (2 doses) vs. 65% (3 doses)
  - Chronic kidney disease: 90% (3 doses) vs. 81% (4 double doses)
- Safety and reactogenicity
  - Mild and serious adverse events similar
    - Mild: 46% vs. 46%
    - Serious: 5% vs. 6%
  - Cardiovascular events not significantly different
    - 0.3% vs. 0.1%
  - Potentially immune-mediated adverse events similar (e.g., granulomatosis with polyangiitis, Grave's disease)
    - 0.1%–0.2% vs. 0%–0.7%

Healthy adults aged 40-70 years



- Jackson S, Lentino J, Kopp J, et al. Immunogenicity of a two-dose investigational hepatitis B vaccine, HBsAg-1018, using a toll-like receptor 9 agonist adjuvant compared with a licensed hepatitis B vaccine in adults. Vaccine 2017; 36:668-74
- Janssen R, Bennett S, Namini H, et al. Immunogenicity and Safety of Two Doses of Investigational Heplisav Compared to Three Doses of Licensed Hepatitis B Vaccine (Engerix-B) in Two Phase 3 Trials. Journal of Hepatology 2013; 58(Suppl 1):S574
- HEPLISAV-B™ [Hepatitis B Vaccine (Recombinant), Adjuvanted] package insert www.fda.gov/downloads/BiologicsBloodVaccines/Vaccines/ApprovedProducts/UCM584762.pdf

ACIP Recommendations – Hepatitis B

- Recommended Heplisav-B use – 2 doses 1 month apart for ≥18y
- No preferential recommendation for use of Heplisav-B over other HepB
- Heplisav-B may be used in 3-dose HepB series
  - But 3 doses HepB-containing vaccine (Engerix-B, Recombivax HB, Twinrix) or 4 doses (Twinrix expedited) needed unless 2 doses Heplisav-B administered 1 month apart

Schillie et al. MMWR 2018:67(15);455–458

Hepatitis A – Multistate Outbreaks

- >7000 outbreak-associated cases in 2018, ongoing
- Widespread – AR, CA, IN, KY, MA, MI, MO, OH, TN, UT, WV, others
- Primarily among persons who use drugs, homeless, close contacts
- Since 2006, all children recommended to receive HepA, but most adults not routinely vaccinated as children

San Diego

Nashville

Detroit

www.cdc.gov/hepatitis/outbreaks/2017March-HepatitisA.htm

ACIP Recommendations – Hepatitis A

- Routinely recommended for
  - Children age 12–23 mos
  - At increased risk for hepatitis A virus infection (chronic liver disease, clotting factor disorders, MSM, drug use, travel to endemic areas, occupational)
  - Anyone who wants protection against hepatitis A
- Routine vaccination in homelessness – Persons ≥1y should receive HepA
  - Substantial benefit to vaccination, cost/risk vaccinating much lower than not vaccinating (hospitalizations, transplantations, deaths)
  - Reduce risk for large outbreaks

Doshani et al. MMWR 2019;68(6)

FYI – PEP for Hepatitis A

- PEP with HepA or IG is effective when administered within 2 weeks of exposure
- Persons 1–40y should receive HepA, persons >40y may also receive IG depending on risk
- Persons ≥1y with immunocompromising conditions or chronic liver disease should receive HepA and IG at same time
- Completing 2-dose series HepA not necessary for PEP; however, for long-term immunity, second dose HepA should be administered ≥6 mos

Nelson et al. MMWR 2018;67(43)

Usability Testing of Adult Schedule

Usability Testing for Adult Immunization Schedule

- Formal evaluation of 2018 schedule for usability
- In-depth interviews of users
- Redesign adult immunization schedule
- Survey of providers on redesign (reactions and preferences)

Usability Testing of Adult Schedule – Background

- 2016 schedule evaluated ad hoc to improve usability
  - By Human Factors and Ergonomics Society, Georgia Institute of Technology[1]
  - 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 usability[2]

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
- Feb 2017 to Sep 2018
- Methods
  - Qualitative interviews of providers
  - Redesign of immunization schedules
  - Survey of providers on immunization schedule preferences (old vs. new)

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
- Discussion
  - 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

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
- Discussion
  - Simplify title to “Recommended Adult Immunization Schedule, United States, 2019”
  - Maintain overall format and flow
  - Reduce amount of information on cover page, redesign to “compartmentalize” information
  - Include table of generic and trade names, abbreviations
  - Figures replaced by Tables, Footnotes replaced by Notes (vaccinations listed alphabetically)
  - Delete Table of Contraindications and Precautions, make Notes easier to read

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

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/µL, 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	Haemophilus influenzae type b vaccine

1. MMWR Morb Mortal Wkly Rep. 2018;66(5). Available at www.cdc.gov/mmwr/volumes/67/wr/mm6705e1.htm.
2. Ann Intern Med. 2018;168:210–220. Available at annals.org/aim/article/doi/10.7326/M17-3439.
3. Clin Infect Dis. 2014;58:e44-100. Available at www.idsociety.org/Templates/Content.aspx?id=32212256011.
4. ACIP. Available at www.cdc.gov/vaccines/hcp/acip-recs/general-recs/index.html.

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

Draft Redesigned Cover Page

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:

Recommendation By Age: **Table 1.**	Recommendation By Medical Condition and Other Indications: **Table 2.**	General Information and Considerations for Special Populations: **Table 3.**

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**
IIV	inactivated influenza vaccine	Many
Td	tetanus and diphtheria toxoids	Tenivac
Tdap	tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine	Adacel, Boostrix
MMR	measles, mumps, and rubella vaccine	M-M-R II, ProQuad
VAR	varicella vaccine	Varivax
RZV	recombinant zoster vaccine	Shingrix
RIV	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, Heplisav-B, Recombivax HB
MenACWY	serogroups A, C, W, and Y meningococcal vaccine	Menveo
MenB	serogroup B meningococcal vaccine	Bexsero, Trumenba
Hib	Haemophilus influenzae type b conjugate vaccine	ActHIB, Hiberix, PedvaxHIB

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

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 800-338-2382.

QUESTIONS OR COMMENTS?

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

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

*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.acog.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;67(5):1–10–157. https://www.cdc.gov/mmwr/volumes/67/wr/mm6705e1.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.
https://www.cdc.gov/vaccines/schedules/hcp/imz/adult-age-19-years.html
Published February 2018. Accessed TBD.

1

2018 Figure 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/μL)[5-7,8-10] <200	HIV infection CD4+ count (cells/μL)[5-7,8-10] ≥200	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[8,A,B]	Men who have sex with men[6,A,B]
Influenza[1]	1 dose annually										
Tdap[2] or Td[3]	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						
	contraindicated										
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

Draft Redesigned Table 2

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/adults/rec-vac/pregnant.html
- ***Immunocompromising conditions:*** www.idsociety.org/Templates/Content.aspx?id=32212256011 and www.cdc.gov/mmwr/preview/mmwrhtml/rr6002a1.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.wwnc.cdc.gov/travel/destinations/list

Vaccine	Pregnancy	Immuno-compromised (excluding HIV infection)	HIV infection CD4+ count cell count <200 cells/uL	HIV infection CD4+ count cell count ≥200 cells/uL	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					2 doses RZV at age >50 years (preferred) or 1 dose ZVL at age >60 years						
	contraindicated										
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

3

2018 Footnotes

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

1. **Influenza vaccination**
www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/flu.html

General information
- Administer 1 dose of age-appropriate inactivated influenza vaccine (IIV) or recombinant influenza vaccine (RIV) annually
- Live attenuated influenza vaccine (LAIV) is not recommended for the 2017–2018 influenza season
- A list of currently available influenza vaccines is available at www.cdc.gov/flu/protect/vaccine/vaccines.htm

Special populations
- 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

2. **Tetanus, diphtheria, and pertussis vaccination**
www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/tdap-td.html

General information
- Administer to adults who previously did not receive a dose of tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine (Tdap) as an adult or child (routinely recommended at age 11–12 years) 1 dose of Tdap, followed by a dose of tetanus and diphtheria toxoids (Td) booster every 10 years
- Information on the use of Tdap or Td as tetanus prophylaxis in wound management is available at www.cdc.gov/mmwr/preview/mmwrhtml/rr5517a1.htm

Special populations
- **Pregnant women**: Administer 1 dose of Tdap during each pregnancy, preferably in the early part of gestational weeks 27–36

3. **Measles, mumps, and rubella vaccination**
www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/mmr.html

General information
- Administer 1 dose of measles, mumps, and rubella vaccine (MMR) to adults with no evidence of immunity to measles, mumps, or rubella
- Evidence of immunity is:
  - Born before 1957 (except for health care personnel, see below)
  - Documentation of receipt of MMR
  - Laboratory evidence of immunity or disease
- Documentation of a health care provider-diagnosed disease without laboratory confirmation is not considered evidence of immunity

Special populations
- **Pregnant women and nonpregnant women of childbearing age** with no evidence of immunity to rubella: Administer 1 dose of MMR (if pregnant, administer MMR after pregnancy and before discharge from health care facility)
- **HIV infection and CD4 cell count ≥200 cells/μL 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

4. **Varicella vaccination**
www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/varicella.html

General information
- Administer to adults without evidence of immunity to varicella 2 doses of varicella vaccine (VAR) 4–8 weeks apart (if previously received no varicella-containing vaccine (if previously received 1 dose of varicella-containing vaccine, administer 1 dose of VAR at least 4 weeks after the first dose)
- Evidence of immunity to varicella is:
  - U.S.-born before 1980 (except for pregnant women and health care personnel, see below)
  - Documentation of receipt of 2 doses of varicella or varicella-containing vaccine at least 4 weeks apart
  - Diagnosis or verification of history of varicella or herpes zoster by a health care provider
  - Laboratory evidence of immunity or disease

Special populations
- Administer 2 doses of VAR 4–8 weeks apart if previously received no varicella-containing vaccine (if previously received 1 dose of varicella-containing vaccine, administer 1 dose of VAR at least 4 weeks after the first dose) 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**
- Adults with **HIV infection and CD4 cell count ≥200 cells/μL**: May administer, based on individual clinical decision, 2 doses of VAR 3 months apart
- VAR is contraindicated for pregnant women and adults with severe immunodeficiency

5. **Zoster vaccination**
www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/shingles.html

General information
- Administer 2 doses of recombinant zoster vaccine (RZV) 2–6 months apart to adults aged 50 years or older regardless of past episode of herpes zoster or receipt of zoster vaccine live (ZVL)
- 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

6. **Human papillomavirus vaccination**
www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/hpv.html

General information
- Administer human papillomavirus (HPV) vaccine to **females through age 26 years** and **males through age 21 years** (males 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/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

Draft Redesigned Notes

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

HepA	• **Special populations (continued)** • **Men who have sex with men** • **Injection or noninjection drug use** • **Work with hepatitis A virus in research laboratory or nonhuman primates with hepatitis A infection**	• **Travel** in countries with high or intermediate endemic hepatitis A • Close **contact with international adoptee** in first 60 days after arrival from country with high or intermediate endemic hepatitis A • **Post-exposure prophylaxis**: 2 doses HepA
HepB	• **General recommendation** • **Not at risk but want protection from hepatitis A** (identification of risk factor not required): 3 doses HepB-alum at 0, 1, 6 months (minimum intervals: 4 weeks between doses 1 and 2, 8 weeks between doses 2 and 3); 3 doses HepA-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 1 month apart (unless 2 doses of HepB-CpG are used at least 1 month apart, 3 doses of HepB-CpG combined with other HepB are needed to complete series) • **Special populations** • **At risk for hepatitis B**: 3 doses HepB-alum, 3 doses HepA-HepB, or 2 doses HepB-CpG as above • **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) • **Hepatitis C infection** • **HIV infection**	• **Percutaneous or mucosal 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); in dialysis 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]) • **Receive 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/volumesummary/rr/rr5516a1.htm
MenACWY or MenB	• **Special populations: MenACWY** • **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** • **Eculizumab 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**	• **First-year college students who live in residential housing** (if did not receive MenACWY at age 16 years or older) • **Special populations: MenB** • **At risk for serogroup B meningococcal disease**: 2 doses MenB-4C at least 1 month apart or 3 doses MenB-FHbp at 0, 1–2, 6 months • **Anatomical or functional asplenia including sickle cell disease and other hemoglobinopathies** • Persistent **complement component deficiency** • **Eculizumab 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-FHbp at least 6 months apart (MenB-4C and MenB-FHbp are not interchangeable)
Hib	• **Special populations:** • **Anatomical or functional asplenia, including sickle cell disease**: 1 dose Hib if not previously vaccinated; if elective splenectomy, 1 dose Hib preferably at least 14 days before splenectomy	• **Hematopoietic stem cell transplant** (HSCT): 3 doses Hib 4 weeks apart between doses starting 6–12 months after successful transplant regardless of Hib vaccination history

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

Updated Display for Pregnancy

Review Immunization Recommendations for Pregnancy

- "No recommendation" for HPV, zoster, PCV13, MenB, Hib in pregnancy

Figure 2. Recommended immunization schedule for adults aged 19 years or older by

This figure should be reviewed with the accompanying footnotes. This figure and the footnotes describe indications for whi

Vaccine	Pregnancy[1-6]	Immuno-compromised (excluding HIV infection)[2-7,11]	HIV infection CD4+ count (cells/µL)[2-7,9-10] <200	HIV infection CD4+ count (cells/µL)[2-7,9-10] ≥200	Asplenia, complement deficiencies[7,10,11]	End-stage r disease, o hemodialys
Influenza[1]						1 dose
Tdap[2] or Td[2]	1 dose Tdap each pregnancy					1 dose Tdap, then Td
MMR[2]	con	aindicated				1 or 2 doses depe
VAR[4]	con	aindicated				
RZV[3] (preferre or						2 doses RZV at a
ZVL[5]	con	aindicated				1 dose ZV
HPV–Female[6]		3 doses through age 26 yrs				2 or 3 d
HPV–Male[6]		3 doses through age 26 yrs				2 or 3 d
PCV13[7]						
PPSV23[7]						
HepA[8]						
HepB[9]						
MenACWY[10]			1 or 2 doses depending on indication ,			
MenB[10]					2 or 3 doses depending o	
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 indications

Review Available Information on Pregnancy

"In general, inactivated vaccines may be administered to pregnant women… [except] HPV vaccine, which should be deferred during pregnancy because of a lack of safety and efficacy data." Pink Book

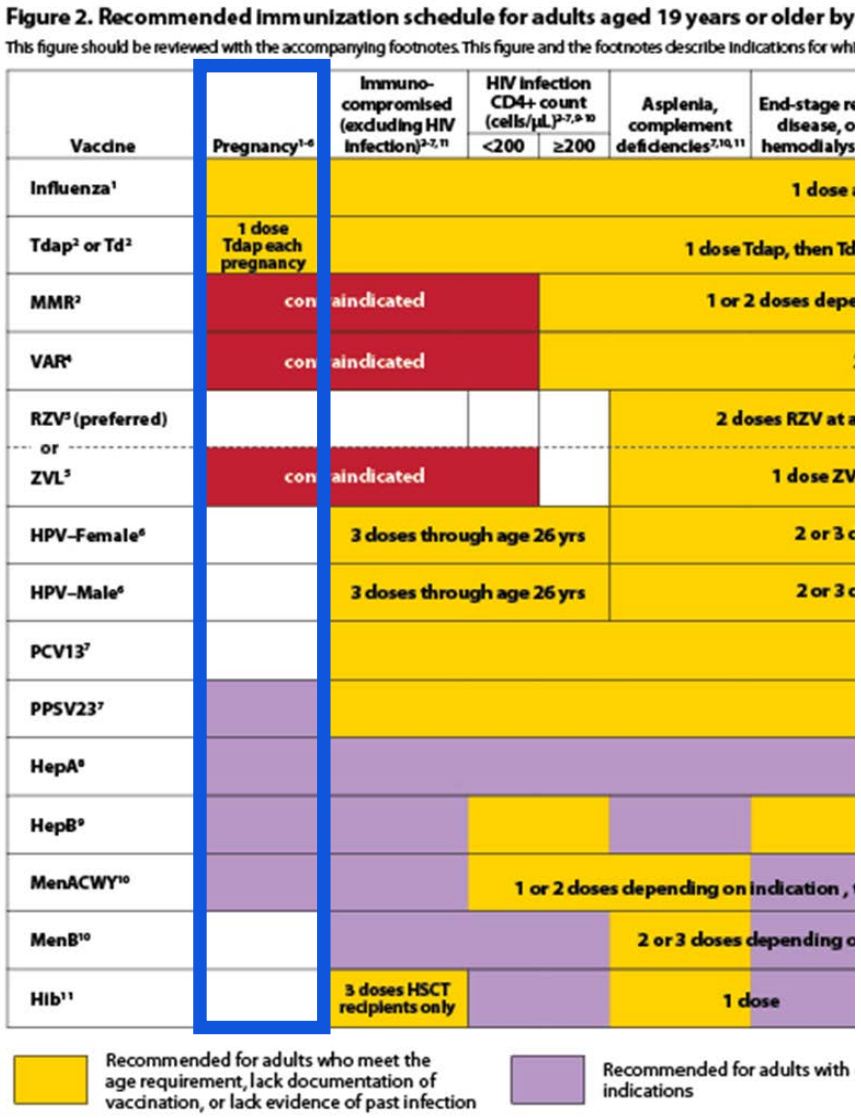
"There are no available data to establish whether RZV is safe in pregnant or lactating women and there is currently no ACIP recommendation for RZV… Consider delaying vaccination with RZV…" MMWR 67(3);103–108

"HPV vaccines are not recommended for use in pregnant women… [Vaccination] should be delayed until completion of pregnancy." MMWR 64(11);300–304

"Available data… are insufficient to inform… risks in pregnancy. [A study] in female rabbits… revealed no evidence of harm to the fetus… due to [PCV13]." Package Insert (FDA)

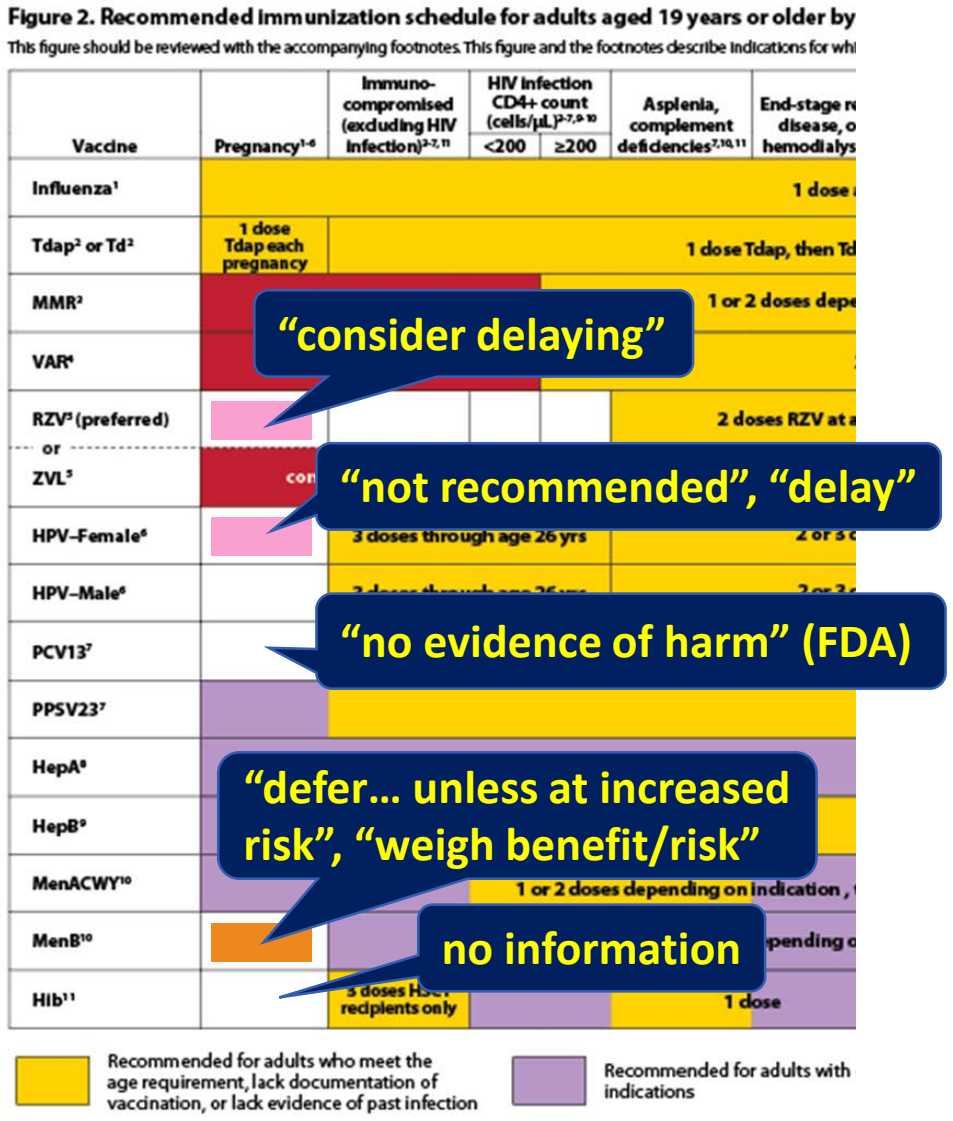
"MenB… vaccination should be deferred in women known to be pregnant or lactating unless the woman is at increased risk for serogroup B meningococcal disease, and, after consultation with her health care provider, the benefits of vaccination are considered to outweigh the potential risks." MMWR 66(19);509–513

"Animal reproduction studies have not been conducted with [Hib]. It is also not known whether [Hib] can cause fetal harm when administered to a pregnant woman…" Package Inserts (FDA)



Refine Display for Pregnancy Column

- Influenza (IIV, RIV), Tdap
  - Recommended routinely
- PPSV23, HepA, HepB, MenACWY
  - Recommended if other indications present
- MMR, VAR, ZVL, LAIV
  - Contraindicated
- RZV, HPV, PCV13, MenB, Hib
  - Delay until after pregnancy → RZV, HPV
  - Precaution—weigh risk vs. benefit → MenB
  - No recommendation → PCV13, Hib



ACOG Committee Opinion, 2018

Table 1. Summary of Maternal Immunization Recommendations

Vaccine*	Indicated During Every Pregnancy	May Be Given During Pregnancy in Certain Populations	Contraindicated During Pregnancy	Can Be Initiated Postpartum or When Breastfeeding or Both
Inactivated influenza	X[†,1,2]			X[‡]
Tetanus toxoid, reduced diphtheria toxoid and acellular pertussis (Tdap)	X[†,3,4]			X[‡]
Pneumococcal vaccines		X[§,5,6]		X[§,5,6]
Meningococcal conjugate (MenACWY) and Meningococcal serogroup B		X[‖,7]		X[‖,7]
Hepatitis A		X[¶,8]		X[¶,8]
Hepatitis B		X[#,9,10]		X[#,9,10]
Human papillomavirus (HPV)**				X[**,11,12]
Measles–mumps–rubella			X[††,13,14]	X[††]
Varicella			X[††,13,15,16]	X[††]

*An "X" indicates that the vaccine can be given in this window. See the corresponding numbered footnote for details.

Maternal immunization. ACOG Committee Opinion No. 741. American College of Obstetricians and Gynecologists. Obstet Gynecol 2018;131:e214–217

Harmonization with Child and Adolescent Schedule

Harmonization with Child and Adolescent Schedule

- Overlapping vaccinations
  - H. flu, hepatitis A, hepatitis B, HPV, influenza, MMR, meningococcal, pneumococcal, Tdap/Td, varicella
- Harmonize language, text structure, graphics (to extent possible)
- Collaborators
  - Adult Immunization WG, Child/Adolescent Immunization WG, disease and vaccination SMEs, communication and training staff

Harmonization of Schedules & Standardization of Notes

- Shortened title
- Included trade names on list (trade names used in HepA, HepB, MenACWY, MenB notes)
- Simplified and compartmentalized content on cover page
- Changed “footnotes” to “notes” and alphabetized “notes”
- Organized notes by heading (“routine vaccination” and “special situations”—”special situations” used to refer to people and indications)
- Revised notes for brevity, clarity, consistency
- Used bold text to highlight population or indication for which vaccination recommended, minimized use of specialized text
- Removed articles, conjunctions, other words if meaning not compromised
- Used consistent text structure and language (e.g., 00-dose series VAC at 0, 00, 000 months)

Recommended Adult Immunization Schedule, United States, 2019

Cover Page

Recommended Adult Immunization Schedule

Recommended Adult Immunization Schedule
for ages 19 years or older

UNITED STATES 2019

Shortened title

How to use the adult immunization schedule

1 Determine recommended vaccinations by age **(Table 1)**

2 Assess need for additional recommended vaccinations by medical condition and other indications **(Table 2)**

3 Review vaccine types, freque and co special

Instructions on how to use

on Immunization Practices (www.cdc.gov/vaccines/acip) and approved by the Centers for Disease lege of Physicians www.aafp.org), (www.acog.org), and American College of Nurse-Midwives (www.midwife.org).

Vaccines in the Adult Immunization Schedule*

Vaccines	Abbreviations	Trade names
Haemophilus influenzae type b vaccine	Hib	ActHIB Hiberix
Hepatitis A vaccine	HepA	Havrix Vaqta
Hepatitis A and hepatitis B vaccine	HepA-HepB	Twinrix
		Engerix-B Recombivax HB Heplisav-B
	accine	Gardasil 9
		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	Prevnar 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.

List of vaccines, abbreviations, trade names

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 adu pneumococcal 23-valent polys by the Vaccine Injury Compens vaccine injury claim is available 800-338-2382.

Questions or comments
Contact CDC at 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: www.cdc.gov/vaccines/hcp/acip-recs/general-recs/index.html
- Vaccine Information Statements: www.cdc.gov/vaccines/hcp/vis/index.html
- Man (incl www
- Trave
- Reco Unite www

Compartmentalized information

Added resource on disease case identification and outbreak response

Centers for Disease Control and Prevention

Table 1

Recommended Adult Immunization Schedule by Age Group

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 (IIV) or **Influenza recombinant** (RIV)	1 dose annually				
or	or				
Influenza live attenuated (LAIV)	1 dose annually				
Tetanus, diphtheria, pertussis	1 dose Tdap, then Td booster every 10 yrs				
			g on indication (if born in 1957 or later)		
Varicella (VAR)	2 doses (if born in 1980 or later)				
Zoster recombinant (RZV) *(preferred)*				2 doses	
or				or	
Zoster live (ZVL)					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				
***Haemophilus influenzae* type b** (Hib)	1 or 3 doses depending on indication				

LAIV listed separately from IIV and RIV

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

Table 2

Recommended Adult Immunization Schedule by Medical Condition and Other Indications

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 <200	HIV infection CD4 count ≥200	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
IIV or RIV	1 dose annually										
or										or	
LAIV	CONTRAINDICATED						PRECAUTION			1 dose annually	
Tdap or Td	1 dose Tdap each pregnancy	1 dose Tdap									
MMR	CONTRAINDICATED										
VAR	CONTRAINDICATED	2 doses									
RZV (preferred)	DELAY				2 doses at age ≥50 yrs						
or						or					
ZVL	CONTRAINDICATED				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							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									
Hib		3 doses HSCT[3] recipients only									

LAIV listed separately from IIV and RIV

Updated display for pregnancy

Updated key

- 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.

Notes

Recommended Adult Immunization Schedule

Removed language on use of HepA and Hep B in outbreaks

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
  - **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)

Added "homelessness" for HepA

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 [minim
8 weeks
doses 1
0, 1, 6 months [minimum intervals: 4 weeks between doses 1 and 2, 5 months between doses 2 and 3])

Added use of CpG-adjuvanted HepB

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, m
    who have sex with men)
  - **ijection drug use**
  - **icosal risk for exposure to**
    ld contacts of HBsAg-positi
    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)
  dose
  eks
  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

Added "transgender persons" for HPV vaccination

Notes

Recommended Adult Immunization Schedule United States, 2019

Influenza vaccination

Routine vaccination

Persons age 6 months or older: 1 dose IIV, RIV, or LAIV appropriate for age and health status annually

- For additional guidance, see www.cdc.gov/flu/professionals/index.htm

Added LAIV option, when not to use LAIV

IV, or
nually
care
provider who can recognize and manage severe allergic conditions

Immunocompromising conditions (including HIV infection), anatomical or functional asplenia, pregnant women, close contacts and caregivers of severely immunocompromised persons in protected environment, use of influenza antiviral medications in previous 48 hours, with cerebrospinal fluid leak or cochlear implant: 1 dose IIV or RIV annually (LAIV not recommended)

- **History of Guillain-Barré syndrome within 6 weeks of previous dose of influenza vaccine**: Generally should not be vaccinated

Measles, mumps, and rubella vaccination

Routine vaccination

- **No evidence of in**
  rubella: 1 dose M
  - Evidence of imm
    health care perso
    of receipt of MM
    or disease (diagn
    confirmation is n

Removed language on use of MMR in mumps outbreak and MenACWY and MenB in meningococcal outbreak

Special situation

- **Pregnancy with n**
  rubella: MMR contraindicated during pregnancy; after pregnancy (before discharge from health care facility), 1 dose MMR
- **Non-pregnant women of childbearing age with no evidence of immunity to rubella**: 1 dose MMR
- **HIV infection with CD4 count ≥200 cells/µL for at least 6 months and no evidence of immunity to measles, mumps, or rubella**: 2-dose series MMR at least 4 weeks apart; MMR contraindicated in HIV infection with CD4 count <200 cells/µL
- **Severe immunocompromising conditions**: MMR contraindicated
- **Students in postsecondary educational institutions, international travelers, and household or close personal contacts of immunocompromised persons with no evidence of immunity to measles, mumps, or rubella**: 1 dose MMR if previously received 1 dose MMR, or 2-dose series MMR at least 4 weeks apart if previously did not receive any MMR
- **Health care personnel born in 1957 or later with no evidence of immunity to measles, mumps, or rubella**: 2-dose series MMR at least 4 weeks apart for measles or mumps, or at least 1 dose MMR for rubella; if born before 1957, consider 2-dose series MMR at least 4 weeks apart for measles or mumps, or 1 dose MMR for rubella

Meningococcal vaccination

Special situations for MenACWY

- **First-year college students who live in residential housing (if not previously vaccinated at age 16 years or older) and military recruits**: 1 dose MenACWY

Special situations for MenB

- **Anatomical or functional asplenia (including sickle cell disease), persistent complement component deficiency, eculizumab use, microbiologists routinely exposed to *Neisseria meningitidis***: 2-dose series MenB-4C (Bexsero) at least 1 month apart, or 3-dose series MenB-FHbp (Trumenba) at 0, 1–2, 6 months (if dose 2 was administered at least 6 months after dose 1, dose 3 not needed); MenB-4C and MenB-FHbp are not interchangeable (use same product for all doses in series)

Pregnancy: Delay MenB until after pregnancy unless at increased risk and vaccination benefit outweighs potential risks

- **Healthy adolescents and young adults age**

Added "precaution" for MenB use in pregnancy

1, administer dose 3 at least 4 months after dose 2); MenB-4C and MenB-FHbp are not interchangeable (use same product for all doses in series)

Notes

Recommended Adult Immunization Schedule United States, 2019

Pneumococcal vaccination

Routine vaccination

- **Age 65 years or older** (immunocompetent): 1 dose PCV13 if previously did not receive PCV13, followed by 1 dose PPSV23 at least 1 year after PCV13 and at least 5 years after last dose PPSV23
  - Previously received PPSV23 but not PCV13 at age 65 years or older: 1 dose 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 same visit)

Special situations

- **Age 19 through 64 years with chronic medical conditions (chronic heart [excluding hypertension], lung, or liver disease; diabetes), alcoholism, or cigarette smoking**: 1 dose PPSV23
- **Age 19 years or older with immunocompromising conditions (congenital or acquired immunodeficiency [including B- and T-lymphocyte deficiency, complement deficiencies, phagocytic disorders, HIV infection], chronic renal failure, nephrotic syndrome, leukemia, lymphoma, Hodgkin disease, generalized malignancy, iatrogenic immunosuppression [e.g., drug or radiation therapy], solid organ transplant, multiple myeloma) or anatomical or functional asplenia (including sickle cell disease and other hemoglobinopathies)**: 1 dose PCV13 followed by 1 dose PPSV23 at least 8 weeks later, then another dose PPSV23 at least 5 years after previous PPSV23; at age 65 years or older, administer 1 dose PPSV23 at least 5 years after most recent PPSV23 (note: only 1 dose PPSV23 recommended at age 65 years or older)
- **Age 19 years or older with cerebrospinal fluid leak or cochlear implant**: 1 dose PCV13 followed by 1 dose PPSV23 at least 8 weeks later; at age 65 years or older, administer another dose PPSV23 at least 5 years after PPSV23 (note: only 1 dose PPSV23 recommended at age 65 years or older)

Tetanus, diphtheria, and pertussis vaccination

Routine vaccination

- **Previously did not receive Tdap at or after age 11 years**: 1 dose Tdap, then Td booster every 10 years

Special situations

- **Previously did not receive primary vaccination series for tetanus, diphtheria, and pertussis**: 1 dose Tdap followed by 1 dose Td at least 4 weeks after Tdap, and another dose Td 6–12 months after last Td (Tdap can be substituted for any Td dose, but preferred as first dose); Td booster every 10 years thereafter
- **Pregnancy**: 1 dose Tdap during each pregnancy, preferably in early part of gestational weeks 27–36
- For information on use of Tdap or Td as tetanus prophylaxis in wound management, see www.cdc.gov/mmwr/volumes/67/rr/rr6702a1.htm

Varicella vaccination

Routine vaccination

- **No evidence of immunity to** VAR 4–8 weeks apart if previou varicella-containing vaccine (V mumps-rubella-varicella vacci previously received 1 dose var vaccine: 1 dose VAR at least 4 w
  - Evidence of immunity: U.S.-born before 1980 (except for pregnant women and health care personnel [see below]), documentation of 2 doses 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 situations

- **Pregnancy with no evidence of immunity to varicella**: VAR contraindicated during pregnancy; after pregnancy (before discharge from health care facility), 1 dose VAR if previously received 1 dose varicella-containing vaccine, or dose 1 of 2-dose series VAR (dose 2: 4–8 weeks later) if previously did not receive any varicella-containing vaccine, regardless of whether U.S.-born before 1980
- **Health care personnel with no evidence of immunity to varicella**: 1 dose VAR if previously received 1 dose varicella-containing vaccine, or 2-dose series VAR 4–8 weeks apart if previously did not receive any varicella-containing vaccine, regardless of whether U.S.-born before 1980
- **HIV infection with CD4 count ≥200 cells/μL with no evidence of immunity**: Consider 2-dose series VAR 3 months apart based on individual clinical decision; VAR contraindicated in HIV infection with CD4 count <200 cells/μL
- **Severe immunocompromising conditions**: VAR contraindicated

Zoster vaccination

Routine vaccination

- **Age 50 years or older**: 2-dose series RZV 2–6 months

Updated use of RZV in pregnancy and status of RZV recommendations in severely immunocompromised

Special situations

Pregnancy: ZVL contraindicated; consider delaying RZV until after pregnancy if RZV is otherwise indicated
Severe immunocompromising conditions (including HIV infection with CD4 count <200 cells/μL): ZVL contraindicated; recommended use of RZV under review

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Updates in Child and Adolescent Immunization Schedule