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

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

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
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

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
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
  - 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

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 Figure 2**

**Draft Redesigned Table 2**
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
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

---

*Figure 2. Recommended Immunization schedule for adults aged 19 years or older by This figure should be reviewed with the accompanying footnotes. The figure and the footnotes describe indications for which vaccines are recommended, including the number of doses, timing, and administration method.*
### Table 1. Summary of Maternal Immunization Recommendations

<table>
<thead>
<tr>
<th>Vaccine*</th>
<th>Indicated During Every Pregnancy</th>
<th>May Be Given During Pregnancy in Certain Populations</th>
<th>Contraindicated During Pregnancy</th>
<th>Can Be Initiated Postpartum or When Breastfeeding or Both</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inactivated influenza</td>
<td>✗</td>
<td>✗</td>
<td></td>
<td>✗</td>
</tr>
<tr>
<td>Tetanus toxoid, reduced diphtheria toxoid and acellular pertussis (Tdap)</td>
<td>✗</td>
<td>✗</td>
<td></td>
<td>✗</td>
</tr>
<tr>
<td><strong>Pneumococcal vaccines</strong></td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Meningococcal conjugate (MenACWY) and Meningococcal serogroup B</td>
<td>✗</td>
<td>✗</td>
<td></td>
<td>✗</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>✗</td>
<td>✗</td>
<td></td>
<td>✗</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Human papillomavirus (HPV)**</td>
<td></td>
<td></td>
<td></td>
<td>✗</td>
</tr>
<tr>
<td>Measles–mumps–rubella</td>
<td>✗</td>
<td></td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Varicella</td>
<td>✗</td>
<td></td>
<td>✗</td>
<td>✗</td>
</tr>
</tbody>
</table>

*An “✗” indicates that the vaccine can be given in this window. See the corresponding numbered footnote for details.*
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**

---

#### 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 frequency and co-schedule**

---

#### Vaccines in the Adult Immunization Schedule*

<table>
<thead>
<tr>
<th>Vaccines</th>
<th>Abbreviations</th>
<th>Trade Names</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haemophilus influenza type b vaccine</td>
<td>Hib</td>
<td>ActHib, Hibrix</td>
</tr>
<tr>
<td>Hepatitis A vaccine</td>
<td>HepA</td>
<td>Havrix, Vaqta</td>
</tr>
<tr>
<td>Haemophilus b and hepatitis B vaccine</td>
<td>MenB, HepB</td>
<td>Twinrix</td>
</tr>
<tr>
<td>Meningococcal serogroup A, C, W, Y vaccine</td>
<td>MenACWY</td>
<td>Menactra, Menevox</td>
</tr>
<tr>
<td>Meningococcal serogroup B vaccine</td>
<td>MenB-4C</td>
<td>Bexsero, Trumenova</td>
</tr>
<tr>
<td>Pneumococcal 13-valent conjugate vaccine</td>
<td>PCV13</td>
<td>Prevnar 13</td>
</tr>
<tr>
<td>Pneumococcal 23-valent polysaccharide vaccine</td>
<td>PPV23</td>
<td>Pneumovax</td>
</tr>
<tr>
<td>Tetanus and diphtheria toxoids</td>
<td>Td</td>
<td>Tenivac, Td vaccine</td>
</tr>
<tr>
<td>Tetanus and diphtheria toxoids and acellular pertussis vaccine</td>
<td>Tdap</td>
<td>Adacel, Boostrix</td>
</tr>
<tr>
<td>Varicella vaccine</td>
<td>VAR</td>
<td>Varivax</td>
</tr>
<tr>
<td>Zoster vaccine, recombinant</td>
<td>RZV</td>
<td>Shingrix</td>
</tr>
<tr>
<td>Zoster vaccine live</td>
<td>ZVL</td>
<td>Zostavax</td>
</tr>
</tbody>
</table>

---

### Instructions on how to use

- **Check for updated information**
- **Verify vaccine efficacy and safety**

---

### Compartmentalized information

- **List of vaccines, abbreviations, and trade names**
- **Added resource on disease case identification and outbreak response**

---

### Shortened title

- **Instructions on how to use**
- **Assessment of need for additional recommended vaccinations**
- **Review of frequency and co-scheduling**

---

### Additional resources

- **General Best Practice Guidelines for Immunization**
- **Vaccination information statements**
- **Contact CDC**

---

### Report

- **Suspected cases of reportable vaccine-preventable diseases or outbreaks**
- **Clinically significant post-vaccination reactions**
  - Vaccine Adverse Event Reporting System at [www.vaers.hhs.gov](http://www.vaers.hhs.gov) or 800-822-7967

### Injury claims

- **Report all vaccine injuries**
  - Vaccine Injury Compensation Program
  - Vaccine injury claim is available at 1-800-338-2382

### Questions or comments

- **Contact CDC** at [www.cdc.gov/cdcinfo 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](http://www.cdc.gov/vaccines/schedules/hcp/schedule-app.html)

---

### Helpful information

- **ACP recommendations**
  - [www.acp.org](http://www.acp.org)
  - [www.acog.org](http://www.acog.org)

---

### Centers for Disease Control and Prevention

**United States**

**2019**

---

*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 ACP or CDC.*
Table 1
Recommended Adult Immunization Schedule by Age Group
### Table 1

**Recommended Adult Immunization Schedule by Age Group**

**United States, 2019**

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>19–21 years</th>
<th>22–26 years</th>
<th>27–49 years</th>
<th>50–64 years</th>
<th>≥65 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza inactivated (IIV) or Influenza recombinant (RV)</td>
<td>1 dose annually</td>
<td>1 dose annually</td>
<td>1 dose annually</td>
<td>1 dose annually</td>
<td>1 dose annually</td>
</tr>
<tr>
<td>Influenza live attenuated (LAIV)</td>
<td>OF</td>
<td>OF</td>
<td>OF</td>
<td>OF</td>
<td>OF</td>
</tr>
<tr>
<td>Tetanus, diphtheria, pertussis</td>
<td>1 dose Tdap, then Td booster every 10 yrs</td>
<td>1 dose Tdap, then Td booster every 10 yrs</td>
<td>1 dose Tdap, then Td booster every 10 yrs</td>
<td>1 dose Tdap, then Td booster every 10 yrs</td>
<td>1 dose Tdap, then Td booster every 10 yrs</td>
</tr>
<tr>
<td>Varicella (VAR)</td>
<td>2 doses (if born in 1980 or later)</td>
<td>2 doses (if born in 1980 or later)</td>
<td>2 doses (if born in 1980 or later)</td>
<td>2 doses (if born in 1980 or later)</td>
<td>2 doses (if born in 1980 or later)</td>
</tr>
<tr>
<td>Zoster recombinant (ZDV) (preferred)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zoster live (ZVL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human papillomavirus (HPV)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human papillomavirus (HPV)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumococcal conjugate (PCV13)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 dose</td>
</tr>
<tr>
<td>Pneumococcal polysaccharide (PPSV23)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 dose</td>
</tr>
<tr>
<td>Hepatitis A (HepA)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis B (HepB)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meningococcal A, C, W, Y (MenACWY)</td>
<td>1 or 2 doses depending on indication, then booster every 5 yrs if risk remains</td>
<td>1 or 2 doses depending on indication, then booster every 5 yrs if risk remains</td>
<td>1 or 2 doses depending on indication, then booster every 5 yrs if risk remains</td>
<td>1 or 2 doses depending on indication, then booster every 5 yrs if risk remains</td>
<td>1 or 2 doses depending on indication, then booster every 5 yrs if risk remains</td>
</tr>
<tr>
<td>Meningococcal B (MenB)</td>
<td>2 or 3 doses depending on vaccine and indication</td>
<td>2 or 3 doses depending on vaccine and indication</td>
<td>2 or 3 doses depending on vaccine and indication</td>
<td>2 or 3 doses depending on vaccine and indication</td>
<td>2 or 3 doses depending on vaccine and indication</td>
</tr>
<tr>
<td><em>Haemophilus influenzae</em> type b (Hib)</td>
<td>1 or 3 doses depending on indication</td>
<td>1 or 3 doses depending on indication</td>
<td>1 or 3 doses depending on indication</td>
<td>1 or 3 doses depending on indication</td>
<td>1 or 3 doses depending on indication</td>
</tr>
</tbody>
</table>

- **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**

**LAIV listed separately from IIV and RIV**
# 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

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

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

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.

**Updated display for pregnancy**

**Updated key**

**LAIV listed separately from IIV and RIV**
Recommended Adult Immunization Schedule
Revised language on use of Hep A and Hep B in outbreaks

- Added “transgender persons” for HPV vaccination

- Added use of CpG-adjuvanted HepB

- Added “homelessness” for HepA vaccination

**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 (Twinline 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

**Homelessness**
- Work with hepatitis A virus in research laboratory or close personal contact with internationally adopted children (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, 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, or 3-dose series HepB-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, and those who have sex with men)

**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 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**
- Immuno-compromising 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 LAIV option, when not to use LAIV

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 LAIV or IV annually (LAIV not recommended).

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

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

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, eczulzumab 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).

• Pregnant: Delay MenB until after pregnancy unless there is increased risk and vaccination benefit outweighs potential risks.

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

### Varicella vaccination

**Routine vaccination**

- No evidence of immunity to varicella: 1 dose 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

---

### 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 (Td 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 varicella: 1 dose 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.
Adult Immunization Work Group

ACIP Members
Paul Hunter (Chair)
Laura Riley (Past Chair)
Kevin Ault

Ex Officio Members
Jane Kim (DVA)
Tammy Beckham (NVPO)

Consultants
Kathy Harriman (CA DOH)
Diane Peterson (IAC)
LJ Tan (IAC)
Carolyn Bridges (IAC)

CDC Staff

Liaison Representatives
John Epling (AAFP)
Sandra Fryhofer (AMA, ACP)
Robert Hopkins (ACP)
Molly Howell (AIM)
Laura Pinkston Koenigs (SAHM)
Maria Lanzi (AANP)
Marie-Michèle Léger (AAPA)
Susan Lett (CSTE)
Greg Poland (ACP)
Chad Rittle (ANA)
William Schaffner (NFID)
Ken Schmader (AGS)
Rhoda Sperling (ACOG)
David Weber (SHEA)
Updates in Child and Adolescent Immunization Schedule