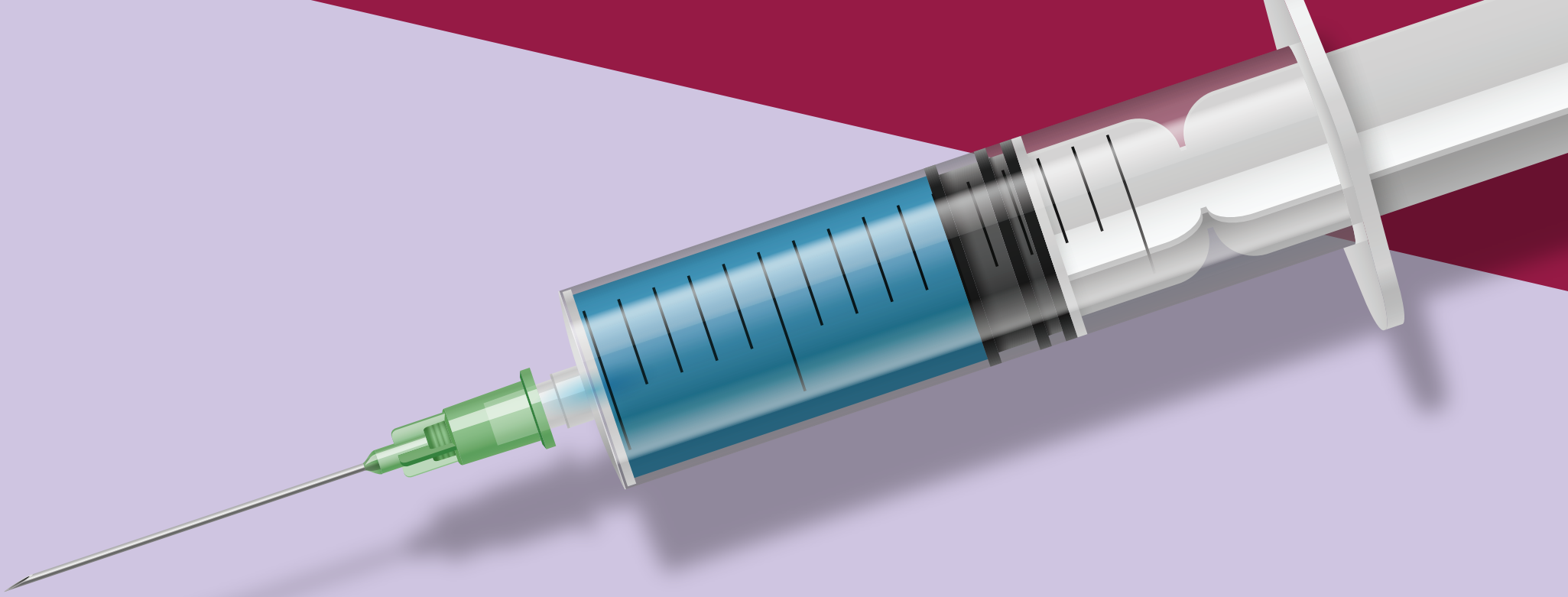

IMMUNIZATION
REFERENCE GUIDE

2020 – 2021

APhA
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Executive Summary

This Immunization Guide was created for current certified immunizing pharmacists and student pharmacists to utilize as a quick reference in the field, to stay up to date on current vaccinations and guidelines, and to answer questions from patients and other practitioners that may not present frequently.

This guide is created and updated by APhA's Academy of Pharmacy Practice and Management (APPM) Immunizing Pharmacists Special Interest Group (SIG). The information presented within this guide correlates to the Vaccine Recommendations of the Advisory Committee on Immunization Practices (ACIP) and is current according to the date established on the cover page. This guide is meant to be used as a reference only, and pharmacists and student pharmacists are encouraged to review current ACIP guidelines for full, up-to-date information.

This quick reference guide includes the following information for each vaccine: brand name(s) and manufacturer(s) for available vaccines; dose and route of administration; common adverse effects; storage and handling of the vaccine; additional comments pertaining to the vaccine; and the most current version of the CDC Immunization Schedules.

Quick Reference Charts – Vaccine

Vaccine Chart	Hepatitis A	Hepatitis B	Hepatitis A&B combo	Human Papillomavirus	Measles, Mumps & Rubella
Acronym	**HepA**	**HepB**	**HepA-HepB**	**HPV**	**MMR**
Brand name	VAQTA HAVRIX	RECOMBIVAX-HB ENGERIX-B HEPLISAV-B	TWINRIX	GARDASIL-9	M-M-R II ProQuad (MMR-V)
Indications: **Please refer to VIS or ACIP immunization schedule for more complete indications	All children and adolescents ages 1-18 yrs who have not been previously vaccinated. Any person with HIV age ≥ 1 yr Any person seeking protection from HAV infection or persons with any of the following indications: 1. Men who have sex with men 2. Persons who use injection and noninjection drugs 3. Homelessness 4. Working with HAV-infected primates or in a HAV laboratory setting 5. Chronic liver disease 6. Traveling or working in countries with high/ intermediate risk of HAV 7. Anticipating contact with international adoptee during first 60 days of arrival to U.S. from high or intermediate HAV-endemic areas 8. Postexposure and preexposure prophylaxis for international travel.	Any person seeking protection from HBV infection or persons with any of the following indications: 1. Persons whose sex partners have HBV 2. Sexually active persons not in mutually monogamous relationships 3. Men who have sex with men 4. HIV infection 5. Hepatitis C virus infection 6. Chronic liver disease 7. Persons seeking evaluation or treatment for an STI 8. Current or recent injection drug use 9. Household contact with HBV-infected persons 10. Workers at risk of exposure to blood/ body fluids 11. Traveling to locations with high or intermediate endemic HBV 12. Persons with diabetes 19-59 years, and at the discretion of treating clinician for >60 years or older 13. Residents/staff of facilities for developmentally disabled persons 14. Incarcerated persons	Adults 18 years or older needing both HAV and HBV vaccinations Use TWINRIX for all 3 doses of series	Females and males 9–26 years (per ACIP) Recommended age is 11–12 years, may administer at 9 years per provider's discretion Adults age 27-45 years if appropriate based on shared clinical decision making	MMR is a live vaccine indicated for patients 12 months of age and older seeking protection from measles, mumps, and rubella. Adults (>18 years) born after 1957 with no evidence of immunity should be vaccinated with one or two doses depending on risk. High risk persons: college students, health care workers, and international travelers. Measles outbreaks: Local health departments may provide additional recommendations, including a second adult dose or second dose for 1 to 4 year olds.

Quick Reference Charts – Vaccine

Vaccine Chart	Hepatitis A	Hepatitis B	Hepatitis A&B combo	Human Papillomavirus	Measles, Mumps & Rubella
Acronym	**HepA**	**HepB**	**HepA-HepB**	**HPV**	**MMR**
Number and schedule of doses:	2 doses: 0, 6–12 months (HAVRIX) 0, 6–18 months (VAQTA) • Post-exposure prophylaxis within 2 weeks of exposure	2 doses: 0, 1 month (HEPLISAV-B for ≥18 years) OR 3 doses: 0, 1, 6 months (ENGERIX-B or RECOMBIVAX HB) OR 4 doses: 0, 1, 2, 6 months (ENGERIX-B for adults on hemodialysis) • Alternate and accelerated regimens available (see Hepatitis B section for additional information)	3 doses: 0, 1, 6 months OR 4 doses: 0, 7, 21–30 days, followed by booster dose at month 12	2 doses: 0, 6-12 months if starting series before 15th birthday 3 doses (15-45 years and/or	2 doses: 12–15 months and 4–6 years of age (2nd dose must be given at least 4 weeks after 1st dose) International travel: May administer 1 dose at 6–11 months, but then must also complete routine schedule of 2 doses starting at age minimum age of 12 months (2nd dose must be given at least 4 weeks after 1st dose) Note: PROQUAD only approved for ≥12 months thru 12 years of age
Route of admin:	Intramuscular	Intramuscular	Intramuscular	Intramuscular	Subcutaneous
Common Adverse Effects:	• Soreness, tenderness or redness at injection site • Low-grade fever • Headache • Fatigue	• Soreness at injection site • Low-grade fever, fatigue	• Soreness or redness at injection site • Headache • Fever	• Soreness, swelling, or redness at injection site • Fever • Headache	• Mild rash • Fever • Pain or redness at injection site, sore/tender arm • Swelling of glands in the cheek/neck

Vaccine Chart	Meningococcal conjugate	Meningococcal Serogroup-B	Pneumococcal-23 valent	Pneumococcal-13 valent
Acronym	**MenACWY or MCV4**	**MenB**	**PPSV23**	**PCV13**
Brand name	MENACTRA MENVEO MENQUADF	BEXSERO TRUMENBA	PNEUMOVAX 23	PREVNAR 13
Indications: **Please refer to VIS or ACIP immunization schedule for more complete indications	Adolescents aged 11–18 years • 1 dose at 11–12 years • Booster at 16 years Additionally: 1. At risk from an outbreak 2. Splenectomy/damaged spleen 3. Patients taking complement inhibitor (e.g., eculizumab, ravulizumab) 4. Microbiologists who work with Neisseria meningitidis 5. Traveling or living where meningococcal disease is common 6. First-year college students living in dorms 7. U.S. military recruits 8. People with HIV 9. Anyone with complement component deficiency	Patients aged ≥10 years who are at increased risk for serogroup B infections: 1. At risk from an outbreak 2. Splenectomy/damaged spleen 3. Patients taking complement inhibitor (e.g., eculizumab, ravulizumab) 4. Microbiologists who work with Neisseria meningitidis May also be given to anyone aged 16–23 years, not at increased risk for meningococcal disease, to provide short-term protection The same vaccine must be used for all doses • Booster doses are recommended for high risk patients (see Meningococcal B section for additional information)	Patients aged 2–18 years with: 1. Cerebrospinal fluid leak, cochlear implant 2. Chronic heart/liver (alcoholism)/ lung (including asthma)/renal disease 3. Diabetes mellitus 4. Sickle cell disease and other hemoglobinopathies; anatomic or functional asplenia; congenital or acquired immunodeficiency; HIV infection; chronic renal failure; nephrotic syndrome; malignant neoplasms, leukemias, lymphomas, Hodgkin disease, and other diseases associated with treatment with immunosuppressive drugs or radiation therapy; solid organ transplantation; multiple myeloma: Adults 19–64 years with: 1. Chronic medical conditions, alcoholism, or cigarette smoking 2. Immunocompromising conditions 3. Cerebrospinal fluid leak or cochlear implant All adults aged ≥65 years	Children aged 2, 4, 6 and 12–15 months (minimum age of 6 weeks) Children aged 2-5 years with incomplete PCV13 series Patients aged 6-18 years with certain risk factors (see Pneumonia section below) with incomplete series Adults aged 19-64 years with: 1. Immunocompromising conditions 2. Cerebrospinal fluid leak or cochlear implant Adults aged ≥65 years *if appropriate* based on shared clinical decision-making in persons who do not have an immunocompromising condition, CSF leak, or cochlear implant

Vaccine Chart	Meningococcal conjugate	Meningococcal Serogroup-B	Pneumococcal-23 valent	Pneumococcal-13 valent
Acronym	**MenACWY or MCV4**	**MenB**	**PPSV23**	**PCV13**
Number and schedule of doses:	1 or 2 doses At least 8 weeks apart May need revaccination every 5 years	Bexsero: 2 doses, at least 4 weeks apart Trumenba: 2 doses (0, 6 months) or 3 doses (0, 2, 6 months) **Note:** Vaccines are NOT interchangeable; must use the same product for each dose **Note:** Trumenba should be given in 3 doses to anyone > 10 years of age who are at an increased risk for meningococcal B (outbreaks, immunocompromised persons, microbiologists working with serogroup B strains)	1, 2, or 3 doses based on indications and age At least 5 years apart • If patient is <65 years: PCV13 is given first, separate from PPSV23 by at least 8 weeks in patients with immunocompromising conditions, CSF leak, or cochlear implant; otherwise separate by at least 1 year in immunocompetent and healthy patients • If patient is ≥65 years: Separate PCV13 from PPSV23 by ≥1 year	4 doses, routine childhood series, 1 dose adult One adult booster dose in lifetime • If patient is <65 years: PCV13 is given first, then PPSV23 at least 8 weeks later in patients with immunocompromising conditions, CSF leak, or cochlear implants. • If patient is ≥65 years: Separate PCV13 from PPSV23 by ≥1 year
Route of admin:	Intramuscular	Intramuscular	Intramuscular or subcutaneously	Intramuscular
Common Adverse Effects:	• Soreness or redness at injection site • Mild fever	• Soreness or redness at injection site • Tiredness/fatigue • Headache • Fever/chills	• Injection-site pain/soreness/ tenderness	• Injection-site pain/soreness/ tenderness • Decreased appetite • Headache • Fatigue

Vaccine Chart	Varicella (Chicken pox)	Shingles (Zoster recombinant vaccine)	Tetanus, diphtheria & pertussis	Tetanus, diphtheria
Acronym	**VAR**	**RZV**	**Tdap**	**Td**
Brand name	VARIVAX	SHINGRIX	ADACEL BOOSTRIX	TENIVAC Td generic (TDVAX)
Indications: ** Please refer to VIS or ACIP immunization schedule for more complete indications.	Children who have never had chickenpox • First dose: 12–15 months • Second dose: 4–6 years, may be given earlier if at least 3 months after the first dose Persons aged ≥13 years who have never had chickenpox or received chickenpox vaccine: 2 doses at least 28 days apart	Adults aged ≥50 years regardless of prior episode of herpes zoster or receipt of VAR or ZVL	Persons aged ≥10 years Health care professionals Persons having close contact with a baby <12 months Pregnant women (every pregnancy at 27–36 weeks gestation)	Persons aged ≥7 years Given as a booster dose every 10 years Can be given earlier after a severe and dirty wound or burn
Number and schedule of doses:	2 doses	2 doses 2–6 months apart	1 adult booster Each pregnancy at 27-36 weeks gestation	Every 10 years
Route of admin:	Subcutaneous	Intramuscular	Intramuscular	Intramuscular
Common Adverse Effects:	• Soreness or redness at injection site • Mild fever • Mild rash	• Pain, redness, or swelling at injection site • Myalgias • Headache • Fatigue • Fever/chills	• Pain, soreness, or redness at injection site • Headache • Mild fever • Nausea, vomiting, diarrhea	• Pain, soreness, or redness at injection site • Headache • Mild fever • Fatigue

INFLUENZA (FLU)

For the prevention of: Seasonal influenza
Type of vaccine: Inactivated and live-attenuated are available
Brand names *(manufacturer)*

- Trivalent, inactivated, with adjuvant (aIIV3)
  - FLUAD (Seqirus)
- Quadrivalent, inactivated, with adjuvant (aIIV4)
  - FLUAD Quadrivalent (Seqirus)
- Quadrivalent, inactivated, high-dose (HD-IIV4)
  - Fluzone High-Dose Quadrivalent (Sanofi Pasteur)
- Quadrivalent, inactivated, standard dose (IIV4)
  - AFLURIA Quadrivalent (Seqirus)
  - FLUARIX Quadrivalent (GSK)
  - FLULAVAL Quadrivalent (ID Biomedical Corp—distributed by GSK)
  - Fluzone Quadrivalent (Sanofi Pasteur)
- Quadrivalent, recombinant, standard dose (RIV4)
  - Flublok (Protein Sciences)
- Quadrivalent, cell-cultured-based, standard dose (ccIIV4)
  - FLUCELVAX (Seqirus)
- Quadrivalent, live-attenuated, standard dose (LAIV4)
  - FluMist (AstraZeneca)

Dose and route of administration

Product	Indicated age	Dose and route of administration	Adverse Effects
AFLURIA Quadrivalent	≥6 months via needle	• **6–35 months: 1-2 doses of 0.25 mL IM. If 2 doses needed, must be ≥4 weeks apart*** • **36 months–8 years: 1-2 doses of 0.5 mL IM. If 2 doses needed, must be ≥4 weeks apart*** • **≥9 years: 0.5 mL IM**	
Fluarix Quadrivalent	≥6 months	• **6 months–8 years: 1-2 doses of 0.5mL IM. If 2 doses needed, must be ≥4 weeks apart*** • **≥9 years: 0.5 mL IM**	
FluLaval Quadrivalent	≥6 months	• **6 months–8 years: 1-2 doses of 0.5mL IM. If 2 doses are needed, must be≥4 weeks apart*** • **≥9 years: 0.5 mL IM**	
Fluzone Quadrivalent	≥6 months	• **6–35 months: 1-2 doses of 0.25 mL or 0.5 mL IM. If 2 doses needed, must be ≥4 weeks apart*** • 36 months–8 years: 1-2 doses of 0.5 mL IM. If 2 doses needed, must be ≥4 weeks apart • ≥9 years: 0.5 mL IM	**Injection site: Pain, erythema, tenderness** **Systemic: Irritability (children), myalgia, headache, fever**
FLUCELVAX Quadrivalent	≥4 years	• **4–8 years: 1-2 doses of 0.5 mL IM. If 2 doses needed, must be ≥4 weeks apart*** • **≥9 years: 0.5 mL IM**	
Flublok Quadrivalent	≥18 years	0.5 mL IM	
Fluzone-High Dose Quadrivalent	≥65 years	0.7 mL IM	
Fluad	≥65 years	0.5 mL IM	
FluMist Quadrivalent	2-49 years	• **2–9 years: 1 spray (0.1 mL) intranasally into each nostril. If 2 doses needed must be ≥4 weeks apart*** • **≥9 years: 1 spray (0.1 mL) intranasally into each nostril**	**Systemic:** Rhinorrhea, nasal congestion, fever, sore throat

*Children aged 6 months through 8 years require 2 doses of influenza vaccine (administered ≥4 weeks apart) during their first season of vaccination to optimize response. ACIP recommends that children aged 6 months through 8 years who have previously received ≥2 total doses of trivalent or quadrivalent influenza vaccine within the same season need only receive 1 dose.

Storage

- Protect from light and store refrigerated between 36°F and 46°F (2°C and 8°C). Do not freeze.
- Discard vaccine if frozen, past beyond use date, or past expiration date.

Additional Information

- Annual vaccination against influenza is recommended for all persons aged ≥6 months without contraindications.
  - Vaccination should occur before the end of October, but providers should continue to offer the vaccine as long as there is unexpired vaccine available and influenza viruses are still circulating locally.
  - Particularly among older adults, vaccination in July or August may lead to suboptimal later-season immunity.
- Persons aged ≥6 months, including pregnant women, can receive IIV4. An age-appropriate IIV4 formulation should be used.
- LAIV4 should not be used in pregnancy, in immunocompromised persons, or in persons with certain chronic medical conditions.
  - If not given simultaneously, wait at least 4 weeks after administering LAIV4 before administering another live vaccine.
  - Additionally, do not use if the antiviral medications olestamavir or zanamvir were received within the previous 48 hours, peramivir within previous 5 days, or baloxavir within the previous 17 days.
- HD-IIV4, aIIV3, and aIIV4 are additional options for persons aged ≥65 years; vaccination in this population should not be delayed if one of these vaccines is not available.
- For persons with suspected or confirmed acute COVID-19 infection, clinicians should consider delaying influenza vaccine until the person is no longer acutely ill.
- Refer to CDC Pink Book at http://www.cdc.gov/vaccines/pubs/pinkbook/appendix/appdx-b.html for components of vaccines (excipients, thimerosal, latex, etc.).
- Egg allergy:
  - Persons with a history of only hives following egg exposure may receive any licensed, recommended influenza vaccine.
  - Persons experiencing symptoms other than hives (angioedema, respiratory distress, etc.) should receive any licensed, recommended vaccine in an inpatient or outpatient medical setting under the supervision of a healthcare provider able to manage allergic reactions.
    - aRIV4 and ccIIV4 do not contain egg and may require fewer safety precautions in persons allergic to eggs.
- History of severe allergic reaction to influenza vaccine (regardless of suspected reaction-causing component) is a contraindication to receiving future influenza vaccines.
- Health care personnel who care for severely immunocompromised persons who require care in a protected environment should receive IIV4 or RIV4.

PNEUMOCOCCAL

For the prevention of: Pneumococcal disease
Type of vaccine: Inactivated
Brand names *(manufacturer)*

- Inactivated, polysaccharide vaccine
  - **Pneumovax 23** (PPSV23) (Merck)
- Inactivated, conjugated vaccine
  - **Prevnar 13** (PCV13) (Pfizer)

Dose and route of administration

Product	Indicated age	Dose and route of administration	Adverse Effects
Prevnar 13	• All children aged 6 weeks to 5 years • All aged ≥6 years with risk factors, only if no history of PCV13 • Adults ≥19 years with an immunocompromising condition, CSF leak or cochlear implant • Adults aged ≥65 years based on shared clinical decision-making* who do not have an immunocompromising condition, CSF leak, or cochlear implant and who have not previously received PCV13	• **6 weeks–5 years:** 0.5 mL IM at 2, 4, 6, and 12–15 months • **6–17 years:** 0.5 mL single dose • **≥18 years:** 0.5 mL single dose	**Injection site:** Redness, swelling, pain, or tenderness **Systemic:** Fever, loss of appetite, (infants/children-fussiness,irritability, feeling tired), headache, and chills Young children may be at a small increased risk for seizures caused by fever after PCV13 if it is administered at the same time as inactivated influenza vaccine.
Pneumovax 23	All adults aged ≥65 years 2–64 years with risk factors	0.5 mL IM or or SubQ	

*Shared clinical decision between clinician and adults ≥65 years without cerebrospinal fluid leak, cochlear implant or an immunocompromising condition entails a discussion of benefits/risks and appropriateness of PCV13 vaccination. Providers may consider the following when offering PCV13 in patients ≥65 years who have not previously received PCV13:

- Patients residing in nursing homes or long-term care facilities, patients residing in areas with low pediatric PCV13 vaccination coverage or patients traveling to areas with no pediatric PCV13 program.
- Patients with chronic heart, liver, or lung disease, diabetes, alcoholism, patients who smoke cigarettes or who have more than one chronic medical condition

Providers caring for patients with these medical conditions listed above may consider offering PCV13 to such patients who are aged ≥65 years and who have not previously received PCV13 as the residual PCV13-type disease burden remains higher in these groups.

Schedule for adults older than 65 years with no medical indication:

- Vaccine naive
  - **PCV13:** 1 dose ***if determined to be appropriate based on shared clinical decision-making.***
  - **PPSV23:** 1 dose; if PCV13 has been given, then administer PPSV23 ≥ 1 year after PCV13.
- If PPSV23 received at age ≥ 65 years
  - **PCV13:** 1 dose ***if determined to be appropriate based on shared clinical decision-making.*** If the decision to administer PCV13 is made, administer PCV13 at least one year after PPSV23.
  - **PPSV23:** No additional doses of PPSV23 should be administered following the dose administered at age ≥65 years.
- If PPSV23 received at age < 65 years and now are ≥ 65 years
  - **PCV13:** 1 dose ***if determined to be appropriate based on shared clinical decision-making.*** If the decision to administer PCV13 is made, administer PCV13 at least one year after PPSV23.
  - **PPSV23:** administer second PPSV23 at least one year after PCV13 **and** at least 5 years after the last PPSV23 vaccine.

High-risk patients

- 19–64 years with presence of specific underlying medical condition(s) including: **chronic heart disease, chronic lung disease (including COPD, emphysema, and asthma), chronic liver disease, alcoholism, asthma, diabetes mellitus, cigarette smoking**
  - **PCV13:** no recommendation
  - **PPSV23:** administer 1 dose of PPSV23. No additional pneumococcal recommended until ≥65 years.
- ≥ 65 years with presence of: chronic heart disease, chronic lung disease (including COPD, emphysema, and asthma), chronic liver disease, alcoholism, diabetes mellitus, cigarette smoking
  - **PCV13:** administer 1 dose ***if determined to be appropriate based on shared clinical decision-making.***
  - **PPSV23:** administer 1 dose; if PCV 13 has been given, then administer PPSV23 ≥ 1 year after PCV13 & ≥ 5 years after any PPSV23 administered at age <65 years
- 19–64 years with presence of: **cochlear implants, cerebrospinal fluid leaks (CSF leak)**
  - **PCV13:** administer 1 dose of PCV13
  - **PPSV23:** administer 1 dose of PPSV23 ≥ 8 weeks after PCV13. No additional pneumococcal recommended until ≥ 65 years.
- ≥65 years with presence of: **cochlear implants, cerebrospinal fluid leaks**
  - **PCV13:** administer PCV13 if no previous PCV13 vaccination
  - **PPSV23:** 1 dose ≥8 weeks after PCV13 and ≥5 years after any PPSV23 dose at <65 years
- 19–64 years old with presence of immunocompromising conditions: **congenital or acquired asplenia, chronic renal failure, HIV infection, leukemia, lymphoma, multiple myeloma, generalized malignancy, sickle cell disease/other hemoglobinopathies, Hodgkin Disease, solid organ transplant, iatrogenic immunosuppression (diseases requiring treatment with immunosuppressive drugs, including long-term systemic corticosteroids and or radiation therapy), congenital or acquired immunodeficiencies (includes B- or T-lymphocyte deficiency, complement deficiencies, or phagocytic disorders excluding chronic granulomatous disease), nephrotic syndrome**

- Vaccine naïve (never received PPSV23 or PCV13):
  - **PCV13:** administer 1 dose of PCV13, then;
  - **PPSV23:** administer 1 dose of PPSV23 ≥ 8 weeks after PCV13, then revaccinate with 1 dose of PPSV23 at least 5 years after first PPSV23 dose.
- Received only one dose of PPSV23 previously:
  - **PCV13:** administer PCV13 ≥ 1 year after PPSV23.
  - **PPSV23:** re-vaccinate with PPSV23 ≥ 8 weeks after PCV13 and at least 5 years after first PPSV23.
- Received two doses of PPSV23 previously:
  - **PCV13:** administer PCV13 ≥ 1 year after most recent PPSV23
  - **PPSV23:** administer 1 more PPSV23 at ≥ 65, and at least 5 years after last PPSV23
- Received PCV13 previously
  - **PPSV23:** administer PPSV23 ≥ 8 weeks after PCV13 and re-vaccinate with PPSV23 in 5 years

- ≥65 years with presence of immunocompromising conditions: congenital or acquired asplenia, chronic renal failure, HIV infection, leukemia, lymphoma, multiple myeloma, generalized malignancy, sickle cell disease/other: hemoglobinopathies, Hodgkin Disease, solid organ transplant, iatrogenic immunosuppression (diseases requiring treatment with immunosuppressive drugs, including long-term systemic corticosteroids and radiation therapy), congenital or acquired immunodeficiencies (includes B- or T-lymphocyte deficiency, complement deficiencies, or phagocytic disorders excluding chronic granulomatous disease), nephrotic syndrome
  - **PCV13:** administer PCV13 if no previous dose given
  - **PPSV23:** administer 1 dose of PPSV23 ≥8 weeks after PCV13 and ≥5 years after any PPSV23 dose at <65 years
- 6–18 years with presence of: cochlear implants, cerebrospinal fluid leaks
  - When both PCV13 and PPSV23 are indicated, administer PCV13 first. PCV13 and PPSV23 should not be administered during same visit.
  - Vaccine naïve (never received PPSV23 or PCV13):
    - **PCV13:** administer PCV13
    - **PPSV23:** administer PPSV23 ≥ 8 weeks after PCV13
  - Received PCV13 previously
    - PPSV23: administer PPSV23 ≥ 8 weeks after most recent PCV13
  - Received PPSV23
    - **PCV13:** administer PCV13 ≥ 8 weeks after most recent PPSV23
- 6–18 years old with presence of: **sickle cell disease and other hemoglobinopathies, anatomical or functional asplenia, congenital or acquired immunodeficiencies, HIV infection, leukemias, lymphomas, multiple myeloma, Hodgkin Disease, chronic renal failure, nephrotic syndrome, malignant neoplasms, solid organ transplant, treatment with immunosuppressive drugs or radiation therapy**
  - Vaccine naïve (never received PPSV23 or PCV13):
    - **PCV13:** administer 1 dose of PCV13
    - **PPSV23:** 2 doses; administer 1 dose of PPSV23 ≥ 8 weeks after PCV13, then revaccinate with dose 2 PPSV23 ≥5 years after first dose of PPSV23

- Received PCV13 previously
  - **PPSV23:** administer PPSV23 ≥ 8 weeks after PCV13 and re-vaccinate with PPSV23 in 5 years
- Received only one dose of PPSV23 previously:
  - **PCV13:** administer 1 dose of PCV13 ≥ 8 weeks after most recent PPSV23 and re-vaccinate with PPSV23 in 5 years

- 6–18 years old with **chronic liver disease, heart disease, lung disease, diabetes mellitus, and/or alcoholism**
  - Never received PPSV23
    - **PCV13:** no recommendation
    - **PPSV23:** 1 dose PPSV23 ≥ 8 weeks after most recent PCV13 (if not given earlier in childhood)
- 2–5 years old with presence of: **sickle cell disease and other hemoglobinopathies; anatomic or functional asplenia; congenital or acquired immunodeficiency; HIV infection; chronic renal failure; nephrotic syndrome; malignant neoplasms, leukemias, lymphomas, Hodgkin disease, and other diseases associated with treatment with immunosuppressive drugs or radiation therapy; solid organ transplantation; multiple myeloma**
  - Any incomplete* series with:
    - Three PCV13 doses: 1 dose PCV13 (at least 8 weeks after any prior PCV13 dose)
    - Less than Three PCV13 doses: 2 doses PCV13 (8 weeks after the most recent dose and administered 8 weeks apart)
  - No history of PPSV23: 1 dose PPSV23 (at least 8 weeks after any prior PCV13 dose) and a 2nd dose of PPSV23 5 years later
- 2–5 years old with presence of: **cerebrospinal fluid leak, cochlear implant**
  - Any incomplete series with:
    - Three PCV13 doses: 1 dose PCV13 (at least 8 weeks after any prior PCV13 dose)
    - Less than Three PCV13 doses: 2 doses PCV13, 8 weeks after the most recent dose and administered 8 weeks apart
  - No history of PPSV23: 1 dose PPSV23 (at least 8 weeks after any prior PCV13 dose)
- 2–5 years with presence of: **chronic heart disease (particularly cyanotic congenital heart disease and cardiac failure); chronic lung disease (including asthma treated with high-dose, oral corticosteroids); diabetes mellitus**
  - Any incomplete* series with:
    - Three PCV13 doses: 1 dose PCV13 (at least 8 weeks after any prior PCV13 dose)
    - Less than Three PCV13 doses: 2 doses PCV13 (8 weeks after the most recent dose and administered 8 weeks apart)
  - No history of PPSV23: 1 dose PPSV23 (at least 8 weeks after any prior PCV13 dose)

Storage

- Refrigerate at temperature between 36°F and 46°F (2°C and 8°C). Do not freeze.

MENINGOCOCCAL

For the prevention of: Meningococcal disease
Type of vaccine: Inactivated
Brand names *(manufacturer)*

- MenACWY
  - **MENVEO** (GlaxoSmithKline)
  - **Menactra** (Sanofi Pasteur)
  - **MenQuadfi** (Sanofi Pasteur)
- MenB
  - **BEXSERO** (GlaxoSmithKline)
  - **TRUMENBA** (Wyeth Pharmaceuticals, a subsidiary of Pfizer)

MENINGOCOCCAL CONJUGATE VACCINE (MenACWY or MCV4)			
Product	**Indicated age**	**Dose and route of administration**	**Adverse Effects**
Menveo	2 months–55 years	0.5 mL IM *See below for vaccine schedule	Age Specific
Menactra	9 months–55 years	0.5 mL IM *See below for vaccine schedule	
MenQuadfi	2 years and older	0.5 mL IM *See below for vaccine schedule	

MENINGOCOCCAL GROUP B			
Product	**Indicated age**	**Dose and route of administration**	**Adverse Effects**
Bexsero	10–25 years	0.5mL IM *See below for vaccine schedule	**Injection site:** pain, myalgia, erythema, induration **Systemic:** fatigue, headache, nausea, and arthralgia
Trumenba	10–25 years	0.5mL IM *See below for vaccine schedule	**Injection site:** pain, myalgia **Systemic:** fatigue, headache

Recommendations for meningococcal group (MenACWY) Vaccines:

Licensed Products

There are two MenACWY conjugate vaccines (Menactra, Menveo, MenQuadfi) licensed for use in the United States. **Note: MenQuadfi recommendations are not mentioned below as the vaccine will be released in 2021.

Minimum Intervals

The minimum interval between doses of MenACWY is 8 weeks.

ACIP Recommendations

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

- **Routine vaccination 2-dose series; 1 dose at 11-12 years, booster at age 16 years**
  - Catch-up vaccination
    - Age 13–15 years: 1 dose now and booster at age 16-18 years (minimum interval: 8 weeks)
    - Age 16-18 years: 1 dose
- **Anatomic or functional asplenia (including sickle cell disease), HIV infection, persistent complement component deficiency, complement inhibitor (e.g., eculizumab, ravulizumab) use:**
  - MENVEO
    - Dose 1 at age 8 weeks: 4-dose series at 2, 4, 6, 12 months
    - Dose 1 at age 7–23 months: 2-dose series (dose 2 at least 12 weeks after dose 1 and after age 12 months)
    - Dose 1 at age 24 months or older: 2-dose series at least 8 weeks apart
  - Menactra
    - Persistent complement component deficiency or complement inhibitor use:
      - Age 9–23 months: 2 doses at least 12 weeks apart
      - Age 24 months or older: 2 doses at least 8 weeks apart
    - Anatomic or functional asplenia, sickle cell disease, or HIV infection:
      - Age 9–23 months: Not recommended

        - 24 months or older: 2 doses at least 8 weeks apart
        - Menactra must be administered at least 4 weeks after completion of PCV13 series.

- **Travel in countries with hyperendemic or epidemic meningococcal disease, including countries in the African meningitis belt or during the Hajj:**
    - Children age less than 24 months:
        - MENVEO (age 2–23 months):
            - Dose 1 at 8 weeks: 4-dose series at 2, 4, 6, 12 months
            - Dose 1 at 7–23 months: 2-dose series (dose 2 at least 12 weeks after dose 1 and after age 12 months)
        - Menactra (age 9–23 months):
            - 2-dose series (dose 2 at least 12 weeks after dose 1; dose 2 may be administered as early as 8 weeks after dose 1 in travelers)
    - Children age 2 years or older: 1 dose Menveo or Menactra
- **First-year college students who live in residential housing (if not previously vaccinated at age 16 years or older) or military recruits:** 1 dose of MENVEO or Menactra
- **Adolescent vaccination of children who received MenACWY prior to age 10 years:**
    - Children for whom boosters are recommended because of an ongoing increased risk of meningococcal disease (e.g., those with complement deficiency, HIV, or asplenia): Follow the booster schedule for persons at increased risk https://www.cdc.gov/vaccines/programs/vfc/downloads/resolutions/mening-508.pdf.
    - Children for whom boosters are not recommended (e.g., those who received a single dose for travel to a country where meningococcal disease is endemic): Administer MenACWY according to the recommended adolescent schedule with dose 1 at age 11–12 years and dose 2 at age 16 years.

Recommended Adult Immunization Schedule for ages 19 years or older

- **Adults should receive 1 or 2 doses depending on indication, then booster every 5 years if risk remains**
    - Anatomical or functional asplenia (including sickle cell disease), HIV infection, persistent complement component deficiency, or complement inhibitor (e.g., eculizumab, ravulizumab) use: 2-dose series MenACWY (Menactra, MENVEO) at least 8 weeks apart and revaccinate every 5 years if risk remains
    - Travel in countries with hyperendemic or epidemic meningococcal disease, microbiologists routinely exposed to Neisseria meningitidis: 1 dose MenACWY (Menactra, MENVEO) and revaccinate every 5 years if risk remains
    - 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 (Menactra, MENVEO)

Recommendations for Serogroup B Meningococcal (MenB) Vaccines:

Licensed Products and Interchangeability

There are two MenB vaccines (BEXSERO, TRUMENBA) licensed for use in the United States among persons aged 10–25 years. Either MenB vaccine can be used when indicated; ACIP does not state a product preference. The two MenB vaccines are not interchangeable; the same vaccine product must be used for all doses in a series.

Minimum Intervals and Co-administration with other vaccines

The minimum interval between any 2 doses of MenB vaccine is 4 weeks. On the basis of available data and expert opinion, MenB-FHbp or MenB-4C may be administered concomitantly with other vaccines indicated for this age, but at a different anatomic site, if feasible.

ACIP Recommendations

- **Persons aged ≥10 years at increased risk for serogroup B meningococcal disease***
  - 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)

    *Persons at increased risk for meningococcal disease include:
    - Persons with persistent complement component deficiencies (including inherited or chronic deficiencies in C3, C5–C9, properdin, factor D, factor H, or who are taking eculizumab [Solaris])
    - Persons with anatomic or functional asplenia (including sickle cell disease)
    - Microbiologists routinely exposed to isolates of Neisseria meningitidis
    - Persons identified as at increased risk because of a serogroup B meningococcal disease outbreak.
- **Adolescents and young adults aged 16–23 years**

  Based on shared clinical decision-making, may receive 2-dose series MenB-4C (BEXSERO) at least 1 month apart, or 2-dose series MenB-FHbp (TRUMENBA) at 0, 6 months (if dose 2 was administered less than 6 months after dose 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)

Booster doses

- For persons ≥10 years at increased risk due to complement deficiency, complement inhibitor use, or functional or anatomic asplenia, or who are microbiologists:
  - A booster is recommend if it has been at least one year since primary series; repeat every 2-3 years as long as risk remains
- For persons ≥10 years determined by public health officials to be at increased risk during an outbreak
  - ACIP recommends a one-time booster dose if it has been ≥1 year since completion of a MenB primary series.
  - A booster dose interval of ≥6 months may be considered by public health officials depending on the specific outbreak, vaccination strategy, and projected duration of elevated risk.
- Booster doses are not recommended for adolescents 10-18 years who are not at increased risk for meningococcal disease.

Storage:

- **MENVEO:** Store refrigerated, away from freezer compartment, at 36°F and 46°F (2°C and 8°C). Protect from light. Vaccine must be maintained at 36°F and 46°F (2°C and 8°C) during transport. The reconstituted vaccine should be used immediately, but may be held at 36°F to 77°F (2°C to 25°C) for up to 8 hours. Do not freeze. Discard reconstituted vaccine if it has been frozen or not used within 8 hours.
- **Menactra:** Store at 35°F and 46°F (2°C and 8°C). Do not freeze. Frozen/previously frozen product should not be used.
- **MenQuadfi:** Store at 35°F and 46°F (2°C and 8°C). Do not freeze. Do not use vaccine that has been frozen.
- **BEXSERO:** Store refrigerated between 36°F and 46°F (2°C and 8°C). Do not freeze. Discard if the vaccine has been frozen. Protect from light.

- **TRUMENBA:** Upon receipt, store refrigerated at 36°F and 46°F (2°C and 8°C). Store syringes in the refrigerator horizontally (lying flat on the shelf) to minimize the re-dispersion time. Do not freeze. Discard if the vaccine has been frozen.

Additional Information:

- MENVEO
  - Supplied in 2 vials (MenCYW grey cap; MenA orange cap) that must be combined prior to administration.
  - Use the MenCYW-135 liquid conjugate vaccine component (Vial 1) to reconstitute the MenA lyophilized conjugate vaccine component (Vial 2) to form MENVEO. Invert the vial and shake well until powder is complete dissolved
  - After reconstitution, clear, colorless appearance, free from visible foreign particles.

- Menactra
  - Supplied as a single-dose vial.
  - Supplied as a clear to slightly turbid solution.
  - The vial stopper is not made with natural rubber latex.

- MenQuadfi
  - Supplied as a single-dose vial.
  - Supplied as a clear solution.
  - The vial stopper is not made with natural rubber latex.

- BEXSERO (MenB-4C)
  - Supplied as a prefilled syringe.
  - The tip caps of the prefilled syringes contain natural rubber latex; the plungers are not made with natural rubber latex.
  - Shake the syringe immediately before use to form a homogeneous suspension.
  - Not interchangeable with Trumenba; same product must be used for all doses.

- TRUMENBA (MenB-FHbp)
  - Supplied as a prefilled syringe.
  - The tip caps do not contain natural rubber latex
  - Shake the syringe vigorously to ensure that a homogenous white suspension of Trumenba is obtained.
  - Not interchangeable with Bexsero; same product must be used for all doses.

TETANUS, DIPHTHERIA TOXOID and ACELLULAR PERTUSSIS

For the prevention of: Diphtheria, tetanus, +/- pertussis (whooping cough)
Type of vaccine: Inactivated
Brand names *(manufacturer)*:

- **Tetanus, diphtheria, and pertussis:**
  - **Tdap**
    - **Boostrix** (GSK)
    - **Adacel** (Sanofi Pasteur)
  - **DTaP**
    - **Daptacel** (Sanofi Pasteur)
    - **Infanrix** (GSK)
    - **Kinrix** (GSK)
    - **Pediarix** (GSK)
    - **Pentacel** (Sanofi Pasteur)
    - **Quadracel** (Sanofi Pasteur)
- **Tetanus and diphtheria:**
  - **Td**
    - **Td generic (TDVAX)** (MassBiologics)
    - **Tenivac** (Sanofi Pasteur)
  - **DT**
    - **DT generic** (Sanofi Pasteur)

Dose and Route of Administration:

Product	Indicated age	Dose and route of administration	Adverse Effects
Adacel (Tdap)	10–64 years	0.5 mL IM	**Injection site:** Pain, swelling, redness **Systemic:** Fever, headache, fatigue, nausea, vomiting, diarrhea, stomach ache, chills, body aches, rash, swollen glands
Boostrix (Tdap)	≥10 years	0.5 mL IM	
Td generic (TDVAX) (Td)	≥7 years	0.5 mL IM	**Injection site:** Pain, redness, swelling
Tenivac (Td)	≥7 years	0.5 mL IM	**Systemic:** Headache, malaise, muscle weakness, joint pain, fever, nausea

Storage

- Refrigerate at temperature between 36° and 46°F (2° and 8°C). Do not freeze.

Additional Information:

- Indicated for:
  - Children aged 7–10 years who are not fully vaccinated against pertussis should receive Tdap. These children should receive their routine dose of Tdap at 11-12 years.
  - Adolescents aged 11–12 years—1 dose of Tdap to all adolescents
  - Adolescents aged 11–18 years who have not received Tdap should receive a dose followed by a Td or Tdap booster dose every 10 years thereafter
  - Adults with unknown or incomplete history of completing a 3-dose primary series with Td vaccines should begin or complete a primary series including a Tdap dose
  - Adults who have not received Tdap should have a one-time dose, then boost with Td every 10 years
  - Adults aged ≥65 years who have or anticipate having close contact with an infant less than 12 months of age
    - BOOSTRIX preferred for ≥65 years
  - All pregnant women should receive one dose of Tdap vaccine during each pregnancy regardless of interval since prior Td or Tdap vaccination. The optimal time for administration is between 27- and 36-weeks' gestation, although Tdap may be given at any time during the pregnancy.
  - Wound management:
    - For clean and minor wounds, administer Tdap or Td if more than 10 years since last dose
    - For all other wounds, administer Tdap or Td if more than 5 years since last dose
    - Tdap is preferred for persons who have not previously received Tdap or with unknown history
  - Td vaccine dosing recommendations:
    - TDVAX: 3-dose series: 0, 1–2, 6–12 months. Booster at age 11–12, then every 10 years
    - TENIVAC: 3-dose series: 0, 2, 6–8 months. Booster at age 11–12, then every 10 years
- Shake well before use
- Contents should be white and opaque
- The tip caps of prefilled syringes may contain latex

HEPATITIS A

For the prevention of: Hepatitis A
Type of vaccine: Inactivated
Brand names *(manufacturer)*:

- Inactivated vaccines
  - **Havrix** (GSK)
  - **Vaqta** (Merck)

Dose and route of administration

Product	Indicated age	Dose and route of administration	Adverse Effects
Havrix (720 EL. U) Pediatric Formulation	1–18 years	0.5 mL IM 2-dose series: 0, 6–12 months	**Injection site:** Pain, erythema, or swelling
Havrix (1440 EL. U) Adult Formulation	≥19 years	1 mL IM 2-dose series: 0, 6–12 month	**Systemic:** Malaise, fatigue, low-grade fever, irritability, headache, drowsiness, syncope, loss of appetite
Vaqta (25 U) Pediatric Formulation	1–18 years	0.5 mL IM 2-dose series: 0, 6–18 months	
Vaqta (50 U) Adult Formulation	≥19 years	1 mL IM 2-dose series: 0, 6–18 months	

Storage

- Store at temperatures between 36°F and 46°F (2°C and 8°C). Do not freeze.

Additional Information:

- Recommended for:
  - All children and adolescents ages 1-18 yrs who have not been previously vaccinated.
  - Any person with HIV age ≥ 1 yr
  - Persons not at risk but want protection from hepatitis A
  - Persons in direct contact with persons who have hepatitis A
  - Men who have sex with men

- Persons who use injection or non-injection drugs
- Persons traveling to or working in countries that have high or immediate endemicity of hepatitis A virus (HAV)
- Persons experiencing homelessness
- Persons working with HAV-infected primates or with HAV in a research laboratory setting
- Persons with chronic liver disease and persons with clotting factor disorders
- Unvaccinated persons who anticipate close contact with an international adoptee during the first 60 days after arrival in the US from a country with high or intermediate endemicity

- Minimum interval between 2 doses is 6 months
- Hepatitis A vaccine may be used for post-exposure prophylaxis when administered within 2 weeks after exposure for ages 1 year and older.
- Series should be completed with the same product. If the original product is unknown or unavailable, may be completed with another brand.
  - Booster dose of VAQTA may be given 6–12 months after the primary dose of HAVRIX.
- Prefilled syringes may contain latex, but they are preservative free.
  - Booster dose of Vaqta may be given 6–12 months after primary dose of Havrix
- Prefilled syringes may contain latex, but they are preservative free

HEPATITIS B

For the prevention of: Hepatitis B
Type of vaccine: Inactivated
Brand names *(manufacturer)*:

- Inactivated vaccines
  - **Recombivax HB** (Merck)
  - **Engerix-B** (GSK)
  - **Heplisav-B** (Dynavax)

Dose and route of administration

Product	Indicated age	Dose and route of administration	Adverse Effects
Recombivax HB (5 mcg) **Pediatric/Adolescent** Formulation	0–19 years	0.5 mL IM 3-dose series: 0, 1, 6 months	**Injection site:** Pain **Systemic:** Irritability, fever, diarrhea, fatigue/ weakness, diminished appetite, and rhinitis.
Recombivax HB (10 mcg) **Adult** Formulation	≥20 years	1 mL IM 3-dose series: 0, 1, 6 months	
Recombivax HB (40 mcg) **Dialysis** Formulation	≥20 years	1 mL IM 3-dose series: 0, 1, 6 months	
Engerix B (10 mcg)	0–19 years	0.5 mL IM 3-dose series: 0, 1, 6 months	**Injection site:** Soreness **Systemic:** Fatigue
Engerix-B (20 mcg)	≥20 years	1 mL IM 3-dose series: 0, 1, 6 months	
Engerix-B (20 mcg) **Adult dialysis** patients	≥ 20 years	2 mL IM 4-dose series: 0, 1, 2, 6 months	
Heplisav-B (20 mcg)	≥ 18 years	0.5 mL IM 2-dose series: 0, 1 month	**Injection site:** Pain **Systemic:** Fatigue, headache

Storage

- Store at temperatures between 36°F and 46°F (2°C and 8°C). Do not freeze.

Additional Information

- Alternative and accelerated dosing series for infants born of HBsAg-positive mothers, children (birth through 10 years), and adolescents (aged 11 through 19 years), travelers in immediate need of vaccination, and adults (aged 20 years and older) are available.
- Vaccine recommended for the following:
  - All infants
  - All children and adolescents aged ≤ 19 years who have not been vaccinated
  - Persons not at risk but want protection from hepatitis B
  - Sexually active persons who are at risk for infection
    - People who are not in long-term, mutually monogamous relationships
    - People seeking evaluation/treatment for a sexually transmitted infection
    - Men who have sex with men
  - Injection drug users or people who share syringes
  - Health care and public safety workers at reasonably anticipated risk for infection by exposure to blood or blood-contaminated body fluids
  - Incarcerated persons
  - Residents and staff of facilities for developmentally disabled persons
  - Household contacts of HBsAg-positive persons
  - International travelers to areas where hepatitis B infection is common
  - Persons with end-stage renal disease, with chronic liver disease, or who receive dialysis
  - Persons with HIV infection or hepatitis C infection
  - Immunocompromised persons
  - Unvaccinated adults aged 19–59 years with diabetes mellitus; ≥60 years at clinician's discretion

- Allergy to yeast is a contraindication to administration of all hepatitis B vaccines.
- If vaccination is started with HEPLISAV-B (recombinant, adjuvanted), dose 2 must be completed using HEPLISAV-B, if the vaccination series is started with a Recombivax HB or Engerix-B (recombinant) a 3-dose series would be needed to complete vaccination. The same type of vaccine recombinant, adjuvanted OR recombinant should be used for all doses in the series.
- All vaccines are preservative free.
- RECOMBIVAX HB vial stopper, syringe plunger stopper, and tip cap contain dry natural latex rubber.
- ENGERIX-B prefilled syringe tip caps contain natural rubber latex.
- HEPLISAV-B prefilled syringe tip caps do not contain natural rubber latex.

HEPATITIS A & B

For the prevention of: Hepatitis A and B
Type of vaccine: Inactivated vaccine
Brand names *(manufacturer)*:

- **Twinrix** (GSK)

Dose and route of administration

Product	Indicated age	Dose and route of Administration	Adverse Effects
Twinrix	≥18 years	1 mL IM 3-dose series: 0, 1, 6 months	**Injection site:** Soreness and redness **Systemic:** Headache and fatigue
	≥18 years accelerated schedule	1 mL IM 4-dose series: 0,7, 21–30 days with booster in 12 months	

Storage

- Store at temperatures between 36°F and 46°F (2°C and 8°C). Do not freeze.

Additional Information:

- This is a combination of both the HAVRIX and ENGERIX.
- Prefilled syringe tip caps contain natural rubber latex.
- Vigorously shake prefilled syringe by tipping it upside down and back upright again for at least 15 seconds before use.

HUMAN PAPILLOMAVIRUS (HPV)

For the prevention of: Human Papillomavirus (HPV)
Type of vaccine: Inactivated vaccine
Brand names *(manufacturer)*:

- **Gardasil 9 (HPV9)** (Merck)

Dose and route of administration

Product	Indicated age	Dose and route of administration	Adverse Effects
Gardasil 9 (HPV9)	9–26 years (ACIP recommendation) Recommendations for children and adults aged 9-26 years and adults >26 years apply to all persons, regardless of behavioral or medical risk factors for HPV infection or disease FDA Approved: 9–45 years***	0.5 mL IM **2-dose series (<15 years old)*:** 0, 6-12 months; may start at 9 years old **3-dose series (≥15 years):** 0, 1-2 months, 6 months**	**Injection site:** Pain, swelling, and erythema. **Systemic:** Headache, fever

*CDC recommendation: 2-dose series—the minimum interval is 5 months. If shorter than 5 months, must administer a third dose at least 12 weeks after the second dose and a minimum of 5 months after the first dose.

**CDC recommendation: 3-dose series—the minimum interval is 4 weeks between the first and second dose and 12 weeks between the second and third dose, with 5 months between the first and third dose. If interval is less than minimal interval allowed, must re-administer dose. If the vaccination schedule is interrupted, vaccine doses do not need to be repeated (no maximum interval).

***Catch-up HPV vaccination is not recommended for all adults aged >26 years. Instead, shared clinical decision-making regarding HPV vaccination is recommended for adults aged 27 through 45 years who are not adequately vaccinated. Catch-up HPV vaccination is recommended for all persons through age 26 who are not adequately vaccinated.

Storage

- Store at temperatures between 36°F and 46°F (2°C and 8°C). Do not freeze.

Additional Information

- Dosing Schedule:
  - 2 doses: 0, 6-12 months if starting series before 15th birthday
  - 3 doses (15-45 years and/or immunocompromised): 0, 1-2 months, 6 months
- Vaccine is preservative free.
- Shake vaccine well prior to withdrawal and administration.
- If the series was started with a different HPV vaccine product, may complete with this product.
- Observe patients for 15 minutes after administration due to possible syncopal events.
- Vaccine is for prophylaxis only, not for treatment.
- Vaccination should be initiated in all adolescents aged 11–12 years, but can be administered as young as 9 years.
- Patients who have not been previously vaccinated or who have not completed the vaccine series should be vaccinated.
- If the vaccine schedule is interrupted, the vaccination series does not need to be restarted.
- Counsel women to continue cervical cancer screenings per standard of care.
- Recipients of vaccine should continue anal cancer screenings, if recommended by provider.
- For persons who are pregnant, HPV vaccination should be delayed until after pregnancy; however, pregnancy testing is not needed before vaccination.
- Patients who are breastfeeding or lactating can receive the HPV vaccine.
- Severe allergy to yeast is a contraindication to administration.

MEASLES, MUMPS, RUBELLA (MMR) (+/- varicella)

For the prevention of: Measles, Mumps, and Rubella)
Type of vaccine: Live vaccine
Brand names (manufacturer):

- **MMR-II** (Merck)
- **PROQUAD** (Merck)

Dose and route of administration

Product	Indicated age	Dose and route of administration	Adverse Effects
M-M-R-II	≥12 months	0.5 mL SubQ	**Injection site:** Redness, stinging, burning, and pain **Systemic:** Fever, swelling in cheeks or neck, mild rash
PROQUAD (contains MMR and varicella)	≥12 months thru 12 years	2-dose series for children: 12–15 months and 4–6 years	

Storage and Reconstitution

- Protect the vaccines from light at all times.
- The vaccines must be reconstituted with sterile diluent supplied with the vaccines. Diluent can be refrigerated or stored at room temperature. Do not freeze the diluent.
- M-M-R II
  - o Store at temperatures between -58°F and +46°F (-50°C to +8°C).
  - o Use the vaccine as soon as possible after reconstitution. May store reconstituted vaccine in the vaccine vial in a dark place at 36°F to 46°F (2°C to 8°C) and discard if not used within 8 hours.
- ProQuad
  - o Store frozen at temperatures between -58°F and +5°F (-50°C to -15°C).
  - o May be stored in the refrigerator for up to 72 hours prior to reconstitution. Discard if not used within 72 hours of removal from freezer.
  - o Use the vaccine as soon as possible after reconstitution. May store reconstituted vaccine at room temperature, protected from light, for up to 30 minutes, then discarded if not used. Do not freeze reconstituted vaccine.

Additional Information

- Can be administered on the same day as other live vaccines. If not given on the same day, live vaccines must be separated by at least 4 weeks.
- **Contraindications:** anaphylactic reaction to neomycin, hypersensitivity to previous MMR or MMRV vaccine or gelatin, severe immunosuppression (including AIDS/leukemia/lymphomas/blood dyscrasias), pregnancy, severe fever, or active untreated tuberculosis.
- **Catch-up vaccination:** Ensure all school-aged children and adolescents have had 2 doses of MMR; the minimum interval between 2 doses is 4 weeks.
- **Pregnancy:** Do not give either vaccine to pregnant patients. Women of child-bearing age should avoid pregnancy for 1 month after receiving MMR.
- **PPD tests:** if a patient requires a tuberculin skin test (TST), it should be done before or on the same day as MMR or MMRV. If either vaccine has already been given, wait at least 4 to 6 weeks after vaccination to do TST.
- **International travel:** following CDC recommendations, may administer one dose to children 6–11 months old prior to international travel, but then must also complete the routine schedule of 2 doses after 12 months of age.
- **Outbreaks:** Local health departments may provide additional recommendations, including a second dose for children 1 through 4 years of age and for adults who have only received one dose.
- M-M-R II
  - Adults born before 1957 are considered immune.
  - Adults born after 1957 without documented evidence of immunity should receive at least one dose of vaccine.
  - **High-risk groups:** health care workers, college students, and international travelers.
- ProQuad
  - Maximum age to receive MMRV is 12 years.
  - For patients 12-23 months old who have not been previously vaccinated with measles, mumps, rubella, or varicella: dose 1 of MMRV is associated with higher rates of fever and febrile seizures 5-12 days after MMRV vs. children who receive MMR and varicella vaccines separately.
    - If the separate MMR and varicella vaccines are used for the 1st dose, then the 2nd dose can be completed with ProQuad
  - Use caution when administering to children with cerebral injury or seizures.
  - Avoid use of salicylates for 6 weeks following administration.

VARICELLA

For the prevention of: Chickenpox
Type of vaccine: Live vaccine
Brand names *(manufacturer)*:

- **Varivax** (Merck)

Dose and route of administration

Product	Indicated age	Dose and route of administration	Adverse Effects
Varivax	≥12 months	0.5 mL SubQ 2-dose series for children: 12–15 months and 4–6 years Minimal interval between varicella doses is 3 months if <13 years of age 2-dose series for persons ≥13 years: 2 doses at least 4 weeks apart [if have extended interval (>8 weeks) between first and second dose, no need to repeat first dose]	**Injection site:** Redness, soreness, swelling, itching **Systemic:** Fever (≥102°F for age 1–12 years; ≥100°F for age ≥13 years), mild varicella-like rash

Storage

- Prior to reconstitution, store the lyophilized vaccine in a freezer at a temperature between -58°F and 5°F (-50°C and -15°C).
- Before reconstitution, protect from light.
- May be stored at refrigerator temperature (36°F to 46°F; 2°C to 8°C) for up to 72 continuous hours prior to reconstitution. Vaccine stored at temperatures between 36°F and 46°F (2°C and 8°C) that is not used within 72 hours of removal from 5°F (-15°C) storage should be discarded.
- The diluent should be stored separately at room temperature (68°F to 77°F; 20°C to 25°C) or in the refrigerator.
- Reconstitute the lyophilized vaccine immediately after removing from the freezer. Discard the reconstituted vaccine if not used within 30 minutes due to loss of potency. Do not freeze the reconstituted vaccine.
- When reconstituted, the vaccine is a clear, colorless to pale yellow liquid.

Additional Information

- Administer to all persons aged ≥13 years without evidence of varicella immunity.
- ACIP strongly recommends VARIVAX to be administered with other recommended vaccines at 12–15 months, regardless of prior history of varicella disease.
- If simultaneous administration is not possible, administer VARIVAX at any time before or after an inactivated vaccine.
- Administer VARIVAX at least 4 weeks before or after another live-attenuated vaccine unless given on the same day (oral typhoid-no time lapse needed).
- FDA approved for the prevention of varicella, not the treatment in individuals 12 months and older.
- The duration of protection from a varicella infection after vaccination is unknown.
- Contraindications: severe allergy to gelatin or neomycin, severe reaction to a previous varicella-containing vaccine, pregnancy, primary or acquired immunodeficiency states, moderate-to-severe febrile illness or active infection (including untreated tuberculosis).
- Women of child-bearing age should avoid pregnancy for 3 months after vaccination.
- TB skin testing can be performed before vaccination with VARIVAX, on the same day, or 4 weeks post administration.
- Avoid use of salicylates for 6 weeks following administration of VARIVAX to children and adolescents due to risk of Reye's Syndrome during wild-type varicella infections.
- Persons with moderate or severe cellular immunodeficiency resulting from HIV, including those with an AIDS diagnosis, should not receive a varicella vaccine.
- HIV-infected children with CD4 T-lymphocyte percentage of 15% or higher and older children and adults with a CD4 count of 200 per microliter or higher may be considered for vaccination.
    - o May receive single-antigen varicella vaccines but not combination MMR + varicella vaccine (ProQuad).
- Administration of blood products (whole blood, packed red blood cells) and varicella vaccine should be separated by 3–11 months after receipt of antibody-containing blood products.
- Persons with immunosuppression due to leukemia, lymphoma, generalized malignancy, or immunosuppressive therapy should not receive varicella vaccine.
- Low-dose (<2 mg/kg/day or <20mg/day for less than 2 weeks), alternate day, topical, replacement, inhaled steroid products, and steroid therapy discontinued for 1 month are not contraindications to vaccination.
- Chemotherapy discontinued for 3 months is not a contraindication to vaccination.
- Vaccination of those with moderate or severe acute illness should be avoided until recovered.

HERPES ZOSTER

For the prevention of: Herpes zoster (Shingles)
Type of vaccine: inactivated
Brand names *(manufacturer)*:

- **Live-attenuated vaccine:**
  - **ZOSTAVAX (Merck): Product discontinued as of July 1st, 2020**
- **Inactivated, recombinant, adjuvanted vaccine:**
  - **Shingrix** (GSK)

Dose and route of administration

Product	Indicated age	Dose and route of administration	Adverse Effects
Shingrix	≥50 years	0.5 mL IM 2-dose series: 0, 2–6 months	**Injection site:** Pain, redness, swelling, muscle pain **Systemic:** Myalgia, fatigue, headache, fever, shivering

Storage and Handling

- Refrigerate both lyophilized vaccine and adjuvant suspension between 36°F and 46°F (2°C and 8°C). Once reconstituted, it may be stored in the refrigerator for up to 6 hours.
- Do not freeze; discard if adjuvant suspension, antigen component, or reconstituted vaccine have been frozen. Protect from light.

Additional Information

- SHINGRIX is FDA approved for the prevention, not treatment, of herpes zoster (shingles).
- Vaccination recommended with SHINGRIX for individuals who have previously received ZOSTAVAX (at least 8 weeks after ZOSTAVAX).
- Administer SHINGRIX in two doses 2–6 months apart. If it's been > 6 months since the first dose, give the vaccine as soon as feasible- do not restart the series.
- There is no human data available on the safety of SHINGRIX in pregnant women.
- There is no ACIP or CDC recommendation on a specific interval that a patient must wait to receive a herpes zoster vaccine after having shingles, but a general rule is to wait until the symptoms have resolved.
- **Immunocompromised Persons:**
  - Immunosuppressive therapies may reduce the effectiveness of Shingrix.

References

- Ahmed SS, Pondo T, Xing W, et al. Early impact of 13-valent pneumococcal conjugate vaccine use on invasive pneumococcal disease among adults with and without underlying medical conditions—United States. Clin Infect Dis 2019. Epub August 12, 2019.
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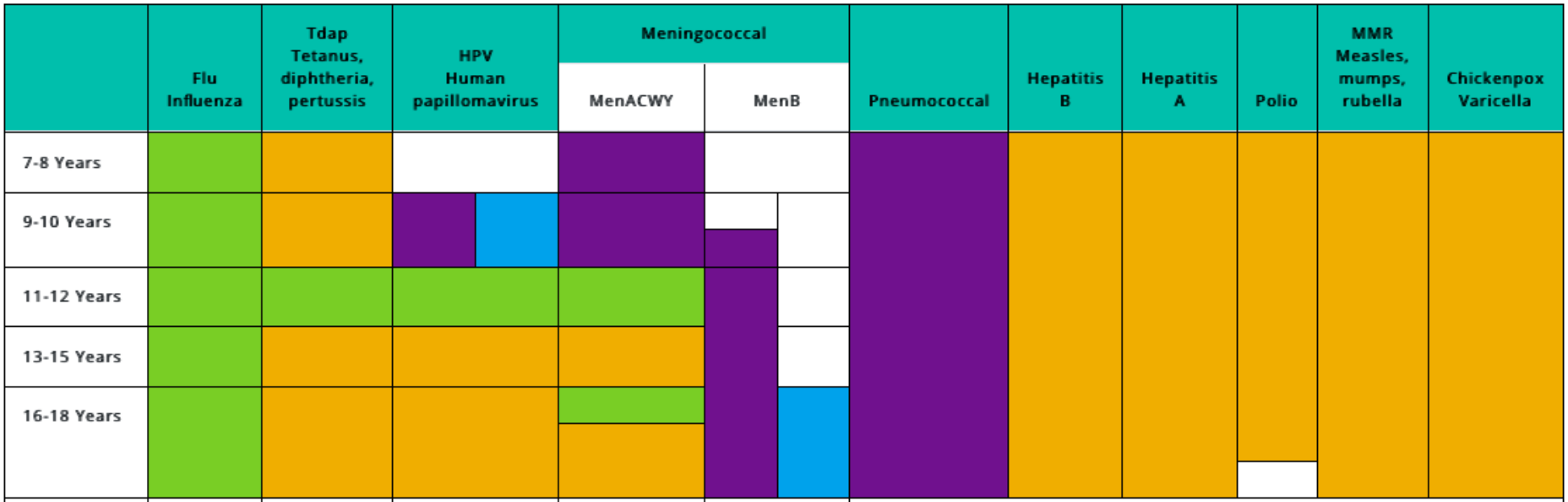
- Hamborsky J, Kroger A, Wolfe C. *Epidemiology and Prevention of Vaccine-Preventable Diseases*. 13th ed. 2015. Available at: https://www.cdc.gov/vaccines/pubs/pinkbook/index.html. Accessed December 19, 2019.
- Matanock A, Lee G, Gierke R, Kobayashi M, Leidner A, Pilishvili T. Use of 13-Valent Pneumococcal Conjugate Vaccine and 23-Valent Pneumococcal Polysaccharide Vaccine Among Adults Aged ≥65 Years: Updated Recommendations of the Advisory Committee on Immunization Practices. MMWR Morb Mortal Wkly Rep 2019;68:1069–1075. DOI: http://dx.doi.org/10.15585/mmwr.mm6846a5external icon.

2021 Recommended Vaccinations for Infants and Children (from birth through 6 years) Parent-Friendly Format

Birth	1 month	2 months	4 months	6 months	12 months	15 months	18 months	19-23 months	2-3 years	4-6 years
HepB	HepB			HepB						
		RV	RV	RV						
		DTaP	DTaP	DTaP		DTaP				DTaP
		Hib	Hib	Hib	Hib					
		PCV13	PCV13	PCV13	PCV13					
		IPV	IPV	IPV						IPV
				Influenza (Yearly)*						
					MMR					MMR
					Varicella					Varicella
					HepA§					

2021 Recommended Vaccinations for Children (Age 7–18 Years)
Parent-Friendly Format



More Information:	Everyone 6 months and older should get a flu vaccine every year.	All 11- through 12-year-olds should get one shot of Tdap.	All 11- through 12- year olds should get a 2-shot series of HPV vaccine. A 3-shot series is needed for those with weakened immune systems and those who start the series at 15 years or older.	All 11- through 12- year olds should get one shot of meningococcal conjugate (MenACWY). A booster shot is recommended at age 16.	Teens 16–18 years old **may** be vaccinated with a serogroup B meningococcal (MenB) vaccine.

Table 1 Recommended Adult Immunization Schedule by Age Group, United States, 2021

Vaccine	19–26 years	27–49 years	50–64 years	≥65 years
Influenza inactivated (IIV) or **Influenza recombinant** (RIV4)	1 dose annually			
or		or		
Influenza live, attenuated (LAIV4)	1 dose annually			
Tetanus, diphtheria, pertussis (Tdap or Td)	1 dose Tdap each pregnancy; 1 dose Td/Tdap for wound management (see notes)			
	1 dose Tdap, then Td or Tdap booster every 10 years			
Measles, mumps, rubella (MMR)	1 or 2 doses depending on indication (if born in 1957 or later)			
Varicella (VAR)	2 doses (if born in 1980 or later)		2 doses	
Zoster recombinant (RZV)			2 doses	
Human papillomavirus (HPV)	2 or 3 doses depending on age at initial vaccination or condition	27 through 45 years		
Pneumococcal conjugate (PCV13)	1 dose			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, see notes for booster recommendations			
Meningococcal B (MenB)	2 or 3 doses depending on vaccine and indication, see notes for booster recommendations			
	19 through 23 years			
***Haemophilus influenzae* type b** (Hib)	1 or 3 doses depending on indication			

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

Recommended vaccination for adults with an additional risk factor or another indication

Recommended vaccination based on shared clinical decision-making

No recommendation/ Not applicable

Table 2 Recommended Adult Immunization Schedule by Medical Condition and Other Indications, United States, 2021

Vaccine	Pregnancy	Immuno-compromised (excluding HIV infection)	HIV infection CD4 count		Asplenia, complement deficiencies	End-stage renal disease; or on hemodialysis	Heart or lung disease, alcoholism[1]	Chronic liver disease	Diabetes	Health care personnel[2]	Men who have sex with men
			<200 mm³	≥200 mm³							
IIV or RIV4	1 dose annually										
or										or	
LAIV4	Not Recommended							Precaution		1 dose annually	
Tdap or Td	1 dose Tdap each pregnancy	1 dose Tdap, then Td or Tdap booster every 10 years									
MMR	Not Recommended*	Not Recommended	1 or 2 doses depending on indication								
VAR	Not Recommended*	Not Recommended			2 doses						
RZV					2 doses at age ≥50 years						
HPV	Not Recommended*	3 doses through age 26 years			2 or 3 doses through age 26 years depending on age at initial vaccination or condition						
PCV13		1 dose									
PPSV23		1, 2, or 3 doses depending on age and indication									
HepA	2 or 3 doses depending on vaccine										
HepB	2, 3, or 4 doses depending on vaccine or condition								<60 years ≥60 years		
MenACWY	1 or 2 doses depending on indication, see notes for booster recommendations										
MenB	Precaution	2 or 3 doses depending on vaccine and indication, see notes for booster recommendations									
Hib		3 doses HSCT[3] recipients only			1 dose						

- Recommended vaccination for adults who meet age requirement, lack documentation of vaccination, or lack evidence of past infection
- Recommended vaccination for adults with an additional risk factor or another indication
- Precaution—vaccination might be indicated if benefit of protection outweighs risk of adverse reaction
- Recommended vaccination based on shared clinical decision-making
- Not recommended/ contraindicated—vaccine should not be administered.
- No recommendation/ Not applicable

*Vaccinate after pregnancy.