

IMMUNIZATION

REFERENCE GUIDE 2021 – 2022

Acknowledgement

We would like to thank the following 2021-2022 APhA-APPM Immunizing Pharmacists Special Interest Group Immunization Reference Guide Task Force members for their contribution in reviewing and updating the toolkit:

Bethany Babinski PharmD, BCPS..... Baptist Health Louisville

Julio A. Rebolledo Pharm.D.,BCPS, BC-ADM, AE-C.....Midwestern University College of Pharmacy

Jasmine Cessna, PharmDJB Pharmacy

Claire Espanol, PharmD Albertsons/Sav-On Pharmacy

Jallena Roberts,PharmD Atlantis Pharmacy

Connor Rowan, PharmD..... West Virginia University School of Pharmacy

Deanna Tran, PharmD, BCACP University of Maryland School of Pharmacy

Monnica Trivedi, PharmD.Marshall B Ketchum University College of Pharmacy

Table of Contents

Acknowledgments	2
Quick Reference Chart	5
Influenza	10
Pneumococcal	13
Meningococcal	16
Tetanus, Diphtheria Toxoid, and Acellular Pertussis	21
Hepatitis A	25
Hepatitis B	27
Hepatitis A & B	30
Human Papillomavirus (HPV)	31
Measles, Mumps, Rubella (MMR)	33
Varicella	35
Herpes Zoster	37
COVID-19	38
References	38
Immunizations for Children from Birth–6 years	39
Immunizations for Children 7–18 years	40
Immunizations for Adults By Age	41
Immunizations for Adults By Health Conditions	42

Executive Summary

This Immunization Reference 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 (APhA-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 Chart	Hepatitis A	Hepatitis B	Hepatitis A&B combo	Human Papillomavirus	Measles, Mumps & Rubella
Acronym	HepA	HepB	HepA-HepB	HPV	MMR, MMR-V
Brand name	VAQTA HAVRIX	RECOMBIVAX-HB ENGRIX-B HEPLISAV-B PREHEVBRIQ	TWINRIX	GARDASIL-9	M-M-R II ProQuad (MMR-V)
Indications:	All children and adolescents ages 1-18 yrs who have not been previously vaccinated.	All people infant through age 59 and adults 60 years of age and older with risk factors for hepatitis B should receive vaccination (per ACIP recommendations).	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 aged 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.
**Please refer to VIS or ACIP immunization schedule for more complete indications	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 non injection 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.	Risk factors available at https://www.cdc.gov/hepatitis/hbv/vaccadults.htm Adults 60 years of age and older without known risk factors for hepatitis B may receive vaccination.			

Quick Reference Charts

Vaccine Chart	Hepatitis A	Hepatitis B	Hepatitis A&B combo	Human Papillomavirus	Measles, Mumps & Rubella
Acronym	HepA	HepB	HepA-HepB	HPV	MMR, MMR-V
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, RECOMBIVAX HB, or PREHEVBRIO) 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 immunocompromised): 0, 1–2 months, 6 months	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:	<ul style="list-style-type: none"> • Soreness, tenderness or redness at injection site • Low-grade fever • Headache • Fatigue 	<ul style="list-style-type: none"> • Soreness at injection site • Low-grade fever, fatigue 	<ul style="list-style-type: none"> • Soreness or redness at injection site • Headache • Fever 	<ul style="list-style-type: none"> • Soreness, swelling, or redness at injection site • Fever • Headache 	<ul style="list-style-type: none"> • 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 polyvalent	Pneumococcal-13 conjugate	Pneumococcal 15- conjugate	Pneumococcal 20- conjugate
Acronym	MenACWY or MCV4	MenB	PPSV23	PCV13	PCV15	PCV20
Brand name	MENACTRA MENVEO MENQUADF	BEXSERO TRUMENBA	PNEUMOVAX 23	PREVNAR 13	Vaxneuvance	Prevnar 20
Indications: **Please refer to VIS or ACIP immunization schedule for more complete indications	<p>Adolescents aged 11–18 years</p> <ul style="list-style-type: none"> • 1 dose at 11–12 years • Booster at 16 years <p>Additionally:</p> <ol style="list-style-type: none"> 1. At risk from an outbreak 2. Splenectomy/damaged spleen 3. Patients taking complement inhibitor (e.g., eculizumab, ravulizumab) 4. Microbiologists who work with <i>Neisseria meningitidis</i> 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 	<p>Patients aged ≥10 years who are at increased risk for serogroup B infections:</p> <ol style="list-style-type: none"> 1. At risk from an outbreak 2. Splenectomy/damaged spleen 3. Patients taking complement inhibitor (e.g., eculizumab, ravulizumab) 4. Microbiologists who work with <i>Neisseria meningitidis</i> <p>May also be given to anyone aged 16–23 years, not at increased risk for meningococcal disease, to provide short-term protection</p> <p>The same vaccine must be used for all doses</p> <ul style="list-style-type: none"> • Booster doses are recommended for high risk patients (see Meningococcal B section for additional information) 	Patients aged 2 years and older	Patients aged 6 weeks and older	Patients aged 6 weeks and older	Patients aged 18 years and older

Vaccine Chart	Meningococcal conjugate	Meningococcal Serogroup-B	Pneumococcal-23 polyvalent	Pneumococcal-13 conjugate	Pneumococcal 15- conjugate	Pneumococcal 20- conjugate
Acronym	MenACWY or MCV4	MenB	PPSV23	PCV13	PCV15	PCV20
Brand name	MENACTRA MENVEO MENQUADF	BEXSERO TRUMENBA	PNEUMOVAX 23	PREVNAR 13	Vaxneuvance	Prevnar 20
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 or 2 doses based on indication and pneumococcal vaccine history <ul style="list-style-type: none">If adult patient received PCV15, give PPSV23 at least 1 year laterIf adult patient received PCV13, give PPSV23 at least 1 year laterIf second dose of PPSV23 recommended, give second PPSV23 dose at least 5 years following first PPSV23 dose See https://www.cdc.gov/vaccines/vpd/pneumo/downloads/pneumo-vaccine-timing.pdf for additional guidance in adults.	4 doses, routine childhood series <ul style="list-style-type: none">If adult patient receives PCV15, give PPSV23 at least 1 year later See https://www.cdc.gov/vaccines/vpd/pneumo/downloads/pneumo-vaccine-timing.pdf for additional guidance in adults.	4 doses, routine childhood series 1 dose in adults >19 years <ul style="list-style-type: none">If adult patient receives PCV15, give PPSV23 at least 1 year later See https://www.cdc.gov/vaccines/vpd/pneumo/downloads/pneumo-vaccine-timing.pdf for additional guidance in adults.	1 dose in adults >19 years See https://www.cdc.gov/vaccines/vpd/pneumo/downloads/pneumo-vaccine-timing.pdf for additional guidance in adults.
Route of admin:	Intramuscular	Intramuscular	Intramuscular or subcutaneously	Intramuscular		
Common Adverse Effects:	<ul style="list-style-type: none">Soreness or redness at injection siteMild fever	<ul style="list-style-type: none">Soreness or redness at injection siteTiredness/fatigueHeadacheFever/chills	<ul style="list-style-type: none">Injection-site pain/soreness/tenderness	<ul style="list-style-type: none">Injection-site pain/soreness/tendernessDecreased appetiteHeadacheFatigue		

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 dose with boosters of tetanus-containing vaccine every 10 years (Tdap or Td) Each pregnancy at 27–36 weeks gestation	Every 10 years (Tdap or Td)
Route of admin:	Subcutaneous	Intramuscular	Intramuscular	Intramuscular
Common Adverse Effects:	<ul style="list-style-type: none"> Soreness or redness at injection site Mild fever Mild rash 	<ul style="list-style-type: none"> Pain, redness, or swelling at injection site Myalgias Headache Fatigue Fever/chills 	<ul style="list-style-type: none"> Pain, soreness, or redness at injection site Headache Mild fever Nausea, vomiting, diarrhea 	<ul style="list-style-type: none"> 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 (aIV3)
 - FLUAD (Seqirus)
- Quadrivalent, inactivated, with adjuvant (aIV4)
 - 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	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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 an age-appropriate IIV4 formulation.
- 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 osetamavir 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 in patients who have not received vaccine in the past:
 - Hives only: may receive any licensed, recommended influenza vaccine
 - Any symptoms other than hives (angioedema, respiratory distress, etc): May receive licensed, recommended vaccine in an inpatient or outpatient medical setting under the supervision of a healthcare provider able to manage allergic reactions.
 - aRIV4 and cclIV4 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)
 - **Vaxneuvance** (PCV15) (Merck)
 - **Prevnar 20** (PCV20) (Pfizer)

Dose and route of administration

Product	Recommended age	Dose and route of administration	Adverse Effects
Prevnar 13	<ul style="list-style-type: none"> ▪ Individuals 6 weeks of age and older 	<ul style="list-style-type: none"> ▪ 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 	<p>Injection site: Redness, swelling, pain, or tenderness</p> <p>Systemic: Fever, loss of appetite, (infants/children-fussiness, irritability, feeling tired), headache, and chills</p>
Pneumovax 23	<p>All adults aged ≥65 years</p> <p>2–64 years with risk factors</p>	0.5 mL IM or or SubQ	<p>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.</p>

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

- Vaccine naive
 - **PCV 15** followed by **PPSV23** ≥ 1 year later **OR**
 - **PCV 20 ONLY** (no PPSV 23 dose indicated at this time)
- If PCV13 previously received
 - Do NOT need to give **PCV 15** or **PCV 20** at this time
 - **PPSV23:** Given ≥ 1 year after **PCV13** dose
- If PPSV23 received previously
 - May give **PCV 15** or **PCV 20:** Give ≥ 1 year after **PPSV23** dose
 - Do NOT need another dose of PPSV 23

Adults 19-64

- For those with underlying medical conditions (alcoholism, chronic heart disease, chronic liver disease, chronic lung disease, cigarette smoking, diabetes mellitus, cochlear implant, CSF leak, Congenital or acquired asplenia, sickle cell disease or other hemoglobinopathies, chronic renal failure, congenital or acquired immunodeficiencies, generalized malignancy, HIV infection, Hodgkin disease, iatrogenic immunosuppression, leukemia, lymphoma, multiple myeloma, nephrotic syndrome, solid organ transplant):
 - Give one dose of **PCV20** OR
 - Give one dose of **PCV 15** followed by **PPSV 23** \geq 1 year later
- For those specifically with immunocompromising condition, cochlear implant, or cerebrospinal fluid leak
 - Interval between **PCV 15** and **PPSV23**: can consider a minimum of 8 weeks between doses to minimize the risk of invasive pneumococcal disease

Special Situations in Children

- 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)
- 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 the same visit.
 - Vaccine naïve (never received PPSV23 or PCV13):
 - PCV13: administer PCV13
 - PPSV23: administer PPSV23 \geq 8 weeks after PCV13

- Received PCV13 previously
 - **PPSV23:** administer PPSV23 \geq 8 weeks after most recent PCV13
- Received PPSV23
 - **PCV13:** administer PCV13 \geq 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 \geq 8 weeks after PCV13, then revaccinate with dose 2 PPSV23 \geq 5 years after first dose of PPSV23
 - Received PCV13 previously
 - **PPSV23:** administer PPSV23 \geq 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 \geq 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 \geq 8 weeks after most recent PCV13 (if not given earlier in childhood)
 - *Incomplete series= not having received all doses in either the recommended series or an age appropriate series

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	Injection site: pain, myalgia, erythema, swelling Systemic: headache, fatigue
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 three MenACWY conjugate vaccines (Menactra, Menveo, MenQuadfi) licensed for use in the United States.

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

- o Menactra must be administered at least 4 weeks after completion of PCV13 series.
 - MedQuadfi
 - Dose 1 at age 24 months or older: 2-dose series at least 8 weeks apart
- **Travel in countries with hyperendemic or epidemic meningococcal disease, including countries in the African meningitis belt or during the Hajj:**
 - o 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)
 - o Children age 2 years or older: 1 dose Menveo, Menactra, or MenQuadfi
- **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, Menactra, or MedQuadfi
- **Adolescent vaccination of children who received MenACWY prior to age 10 years:**
 - o 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>.
 - o 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**
 - o 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, or MenQuadfi) at least 8 weeks apart and revaccinate every 5 years if risk remains
 - o Travel in countries with hyperendemic or epidemic meningococcal disease, microbiologists routinely exposed to *Neisseria meningitidis*: 1 dose MenACWY (Menactra, MENVEO, or MedQuadfi) and revaccinate every 5 years if risk remains
 - o 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, or MedQuadfi)

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***

- o 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** (age 16 through 18 years preferred) not at increased risk for meningococcal disease:

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 recommended 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**
 - o Supplied in 2 vials (MenCYW grey cap; MenA orange cap) that must be combined prior to administration.
 - o 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
 - o After reconstitution, clear, colorless appearance, free from visible foreign particles.
- **Menactra**
 - o Supplied as a single-dose vial.
 - o Supplied as a clear to slightly turbid solution.
 - o The vial stopper is not made with natural rubber latex.
- **MenQuadfi**
 - o Supplied as a single-dose vial.
 - o Supplied as a clear solution.
 - o The vial stopper is not made with natural rubber latex.
- **BEXSERO (MenB-4C)**
 - o Supplied as a prefilled syringe.
 - o The tip caps of the prefilled syringes contain natural rubber latex; the plungers are not made with natural rubber latex.
 - o Shake the syringe immediately before use to form a homogeneous suspension.
 - o Not interchangeable with Trumenba; same product must be used for all doses.
- **TRUMENBA (MenB-FHbp)**
 - o Supplied as a prefilled syringe.
 - o The tip caps do not contain natural rubber latex
 - o Shake the syringe vigorously to ensure that a homogenous white suspension of Trumenba is obtained.
 - o 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
Boostrix (Tdap)	≥10 years	0.5 mL IM	Systemic: Fever, headache, fatigue, nausea, vomiting, diarrhea, stomach ache, chills, body aches, rash, swollen glands
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

Product	Indicated age	Dose and route of administration	Adverse Effects
(Daptacel DTaP)	6wks-6years	0.5mL IM	Injection Site: Tenderness, redness, increase arm circumference Systemic: Fever, irritability, lethargy
Infanrix (DTaP)	6wks-6years	0.5mL IM	Injection site: Pain, redness, swelling Systemic: Fever, drowsiness, irritability, loss of appetite
Pediarix (DTaP/IPV/HepB)	6wks-6 years	0.5mL IM	
Pentacel (DTaP/IPV/HiB)	6wks-4 years	0.5mL IM	Injection site: Tenderness and increase arm circumference Systemic: Fussiness/irritability, fever
Kinrix (DTaP/IPV)	4-7 years	0.5mL IM	Injection site: Pain, redness, swelling, increase in arm circumference Systemic: Drowsiness, fever, loss of appetite
Quadracel (DTaP/IPV)	4-6 years	0.5mL IM	Injection Site: Pain, redness, swelling, increased arm circumference Systemic: Myalgia, headache, tiredness

Storage

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

Additional Information:

- **DTap is indicated for:**
 - Children 6 weeks old should receive a 5 dose series at 2,4,6,15-18 months, and 4-6 years
 - The 4th dose can be administered at least 6 months after 3rd dose but not to children < 12 months
 - Children who had their 4th dose of DTaP at 4 years old or greater, and it was administered 6 months after the 3rd dose, do not have to receive the 5th dose
 - PEDIARIX is approved for infants born from mothers who are hepatitis B surface antigen (HBsAg) negative.
 - Can be used to complete series in children who received 1-2 doses of INFANRIX
- **DTaP vaccine dosing recommendations**
 - DAPTACEL/INFANRIX: 5 dose series: 2,4,6 months, 15-20 months, 4-6 years
 - INFANRIX may be used to complete a DTaP series started with PEDIARIX
 - PEDIARIX: 3 dose series: 2,4, 6 months.
 - Pentacel: 4 dose series: 2,4,6, and 15-18 months
 - ACIP recommends a booster at age 4-6 months
 - Kinrix: 5th dose in the DTaP series and 4th dose in the IPV series in children 4-6 years who received INFANRIX or PEDIARIX
 - Quadracel: 5th dose in DTaP series and 4th or 5th dose in IPV series in children who received Pentacel or DAPTACEL.
- **Tdap is indicated for:**
 - Adolescents aged 11-18 years, who have completed initial vaccination series against pertussis, tetanus, and diphtheria, should receive a Tdap dose, and then Td or Tdap every 10 years thereafter.
 - Persons aged 7 years + who have never been vaccinated against pertussis, tetanus, and diphtheria, should receive a 3 dose series.
 - 1 dose of Tdap, 4 weeks later Td or Tdap, and Td or Tdap at 6-12 months later.
 - Adults who have not received Tdap should have a one-time dose, then boost with Td or Tdap 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: If tetanus toxoid containing vaccine is indicated:
 - Tdap or Td if more than 5 years have passed since last dose
 - Tdap is preferred for persons who have not previously received Tdap or with unknown history
 - If the patient is pregnant, Tdap is preferred
 - Children less than 7 who have had 3 doses of DTaP, and 5 years since the last dose, can receive a dose of DTaP for wound management.
- Td is indicated for:
 - Any person who is 7 years+ and is just starting their primary immunization series and have received at least one dose of Tdap
 - Can also be used for routine decennial booster immunization and wound management
- **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
 - Administration for Pentacel
 - Consists of liquid vaccine component (DTaP-IPV) and a lyophilized component (ActHIB).
 - After gently shaking the vial of DTaP-IPV, withdraw the entire contents and inject into the vial of ActHIB.
 - Swirl the vial until a cloudy white-off white suspension occurs. Can have a yellow tinge.
 - Should be used immediately after reconstitution

Additional Information:

- The tip caps of prefilled syringes may contain latex.
- Do not inject tetanus toxoid containing vaccines in the gluteal.
- Except for Pentacel, all other vaccines do not require mixing before injection.
- Vaccine solutions should be shaken to obtain a homogenous white/opaque suspension.
- Preferred administration site for children < 1 year is the anterolateral thigh.
- Preferred administration site for children 1 year + is the deltoid muscle.
- For children at increased risk for seizures, an antipyretic may be administered at the time of vaccination and for 24 hours after to reduce the possibility of fever after vaccination.

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 (including HBV, HCV, cirrhosis, fatty liver disease, alcoholic liver disease, autoimmune hepatitis, persistent elevated AST and ALT twice above the upper limit of normal)
- 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

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)
 - **PreHevbrio** (VBI Vaccines)

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
PreHevbrio (10 mcg)	≥18 years	1 mL IM 3-dose series: 0, 1, 6 months	Injection site: Pain, tenderness Systemic: Headache, fatigue, and myalgia

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
 - Unvaccinated children aged <19 years
 - All adults aged 19-59 years
 - Adults aged 60 years and older with risk factors for hepatitis B

Risk Factors

- Sexually active persons who are at risk for infection
 - Sex partners of persons who test positive for hepatitis B surface antigen (HBsAg)
 - 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
- Persons at risk for infection by percutaneous or mucosal exposure to blood
 - Persons with current or recent injection use
 - Household contacts of persons who tested positive for HBsAg
 - Residents and staff of facilities for persons with developmental disabilities
 - Health care and public safety personnel with reasonably anticipated risk for exposure to blood or blood-contaminated body fluids
 - Persons on maintenance dialysis, including in-center or home hemodialysis and peritoneal dialysis, and persons who are predialysis
 - Persons with diabetes at the discretion of the treating clinician

- Others
 - International travelers to countries with high or intermediate levels of endemic hepatitis B (HBV) infection (HBsAg prevalence of >2%)
 - Persons with hepatitis C virus infection
 - Persons with chronic liver disease (including, but not limited to, persons with cirrhosis, fatty liver disease, alcoholic liver disease, autoimmune hepatitis, or an alanine aminotransferase [ALT] or aspartate aminotransferase [AST] level greater than twice the upper limit of normal)
 - Persons with HIV infection
 - Incarcerated persons
- 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 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
	≥18 years accelerated schedule	1 mL IM 4-dose series: 0,7, 21–30 days with booster in 12 months	Systemic: Headache and fatigue

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
PROQUAD (contains MMR and varicella)	≥12 months thru 12 years	2-dose series for children: 12–15 months and 4–6 years	Systemic: Fever, swelling in cheeks or neck, mild rash

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 To maintain potency, store at temperatures between 36°F and +46°F (2°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), HIV infection with CD4 percentages <15% or CD4 count <200 cells/mm³, pregnancy, severe fever (>101.3 °F), 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, active tuberculosis).
- Patients of child-bearing age should avoid pregnancy for 3 months after vaccination per manufacturer labeling; pregnancy should be avoided for 1 month following vaccination per ACIP.
- Postpartum vaccination in patients without evidence of immunity does not need to be delayed due to breastfeeding. Patients who have received the vaccine may continue to breastfeed.
- 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.
 - 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 <20 mg/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. If less than four weeks occur between the two doses, the second dose should be repeated.
- There is currently no ACIP recommendation for RZV use in pregnancy. Consider delaying RZV until after pregnancy.
- 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 conditions (including HIV):** RZV recommended for use in persons aged 19 years or older who are or will be immunodeficient or immunosuppressed because of disease or therapy.

COVID-19 (Coronavirus Disease 2019)

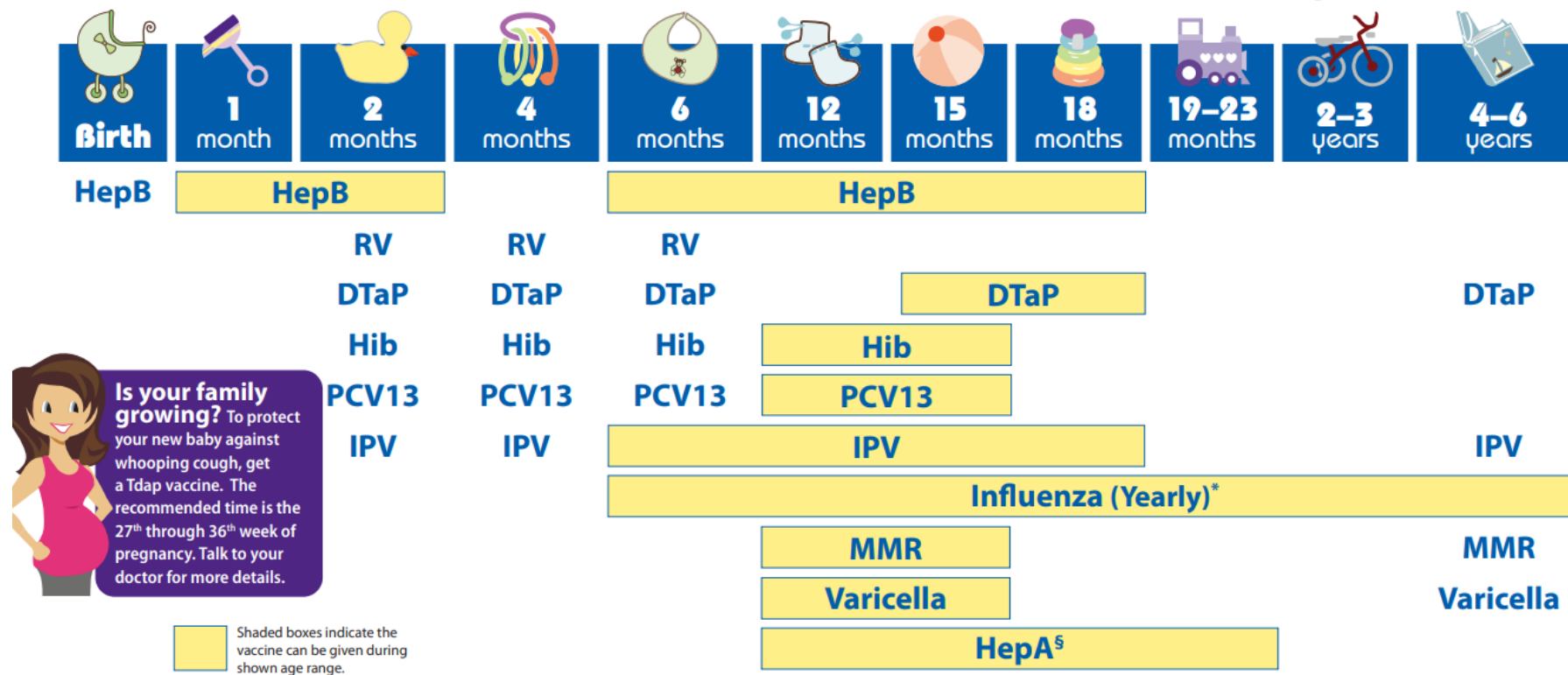
For the most up to date information, please visit the following site: <https://www.cdc.gov/vaccines/covid-19/clinical-considerations/interim-considerations-us.html>

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, 2021.
- Centers for Disease Control and Prevention. Vaccines. <http://www.cdc.gov/vaccines/>. Accessed January 10th, 2022.
- Centers for Disease Control and Prevention. Adult Immunization Schedule. <https://www.cdc.gov/vaccines/schedules/hcp/imz/adult.html>. Accessed June 22, 2022.
- Centers for Disease Control and Prevention. Child and Adolescent Immunization Schedule. <https://www.cdc.gov/vaccines/schedules/hcp/imz/child-adolescent.html>. Accessed June 22, 2022.
- 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, 2021.
- 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.mm6846a5> external icon.

2022 Recommended Vaccinations for Infants and Children (from birth through 6 years) Parent-Friendly Format

2022 Recommended Immunizations for Children from Birth Through 6 Years Old



2022 Recommended Vaccinations for Children (Age 7–18 Years)

Parent-Friendly Format

INFORMATION FOR PARENTS

2022 Recommended Immunizations for Children 7–18 Years Old

	Flu Influenza	Tdap Tetanus, diphtheria, pertussis	HPV Human papillomavirus	Meningococcal		Pneumococcal	Dengue	Hepatitis B	Hepatitis A	Polio	MMR Measles, mumps, rubella	Chickenpox Varicella
				MenACWY	MenB							
7-8 Years												
9-10 Years												
11-12 Years												
13-15 Years												
16-18 Years												

More information:

Everyone 6 months and older should get a flu vaccine every year if they do not have contraindications

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.

Ages 10 years and older at increased risk **should** receive a serogroup B meningococcal (MenB) vaccine. Ages 16–18 years old who are not at increased risk **may** be vaccinated with a MenB vaccine.

Ages 9-16 years who live in dengue endemic areas AND have laboratory confirmation of previous dengue infection

Table 1 Recommended Adult Immunization Schedule by Age Group, United States, 2022

Vaccine	19–26 years	27–49 years	50–64 years	≥65 years
Influenza inactivated (IIV4) or Influenza recombinant (RIV4)	1 dose annually			
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 for immunocompromising conditions (see notes)		2 doses	
Human papillomavirus (HPV)	2 or 3 doses depending on age at initial vaccination or condition	27 through 45 years		
Pneumococcal (PCV15, PCV20, PPSV23)	1 dose PCV15 followed by PPSV23 OR 1 dose PCV20 (see notes)			1 dose PCV15 followed by PPSV23 OR 1 dose PCV20
Hepatitis A (HepA)	2 or 3 doses depending on vaccine			
Hepatitis B (HepB)	2, 3, or 4 doses depending on vaccine or condition			
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 or Other Indication, United States, 2022

Vaccine	Pregnancy	Immuno-compromised (excluding HIV infection)	HIV infection CD4 percentage and 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	
			<15% or <200 mm ³	≥15% and ≥200 mm ³								
IIV4 or RIV4 or LAIV4	1 dose annually											
	Contraindicated					Precaution			or 1 dose annually			
Tdap or Td	1 dose Tdap each pregnancy	1 dose Tdap, then Td or Tdap booster every 10 years										
MMR	Contraindicated*	Contraindicated	1 or 2 doses depending on indication									
VAR	Contraindicated*	Contraindicated		2 doses								
RZV		2 doses at age ≥19 years			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							
Pneumococcal (PCV15, PCV20, PPSV23)		1 dose PCV15 followed by PPSV23 OR 1 dose PCV20 (see notes)										
HepA					2 or 3 doses depending on vaccine							
HepB	3 doses (see notes)	2, 3, or 4 doses depending on vaccine or condition										
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

Recommended vaccination based on shared clinical decision-making

Precaution—vaccination might be indicated if benefit of protection outweighs risk of adverse reaction

Contraindicated or not recommended—vaccine should not be administered.
*Vaccinate after pregnancy.

No recommendation/Not applicable