Volume 27 – Number 1

April 2017
(content current as of March 31)

NEEDLE TIPS

from the Immunization Action Coalition — www.immunize.org

What's In This Issue

16-Year-Old Immunization Platform Highlighted in 2017 U.S. Child/Teen Schedule

On February 10, the Centers for Disease Control and Prevention (CDC) posted its 6-page "Recommended Immunization Schedule for Children and Adolescents Aged 18 Years or Younger" at www.cdc.gov/vaccines/schedules/downloads/child/0-18yrs-child-combined-schedule.pdf. The publication of this new schedule was accompanied by an article in the *Morbidity and Mortality Weekly Report* (*MMWR*) titled "ACIP Recommended Immunization Schedule for Children and Adolescents Aged 18 Years or Younger – US, 2017" (www.cdc.gov/mmwr/volumes/66/wr/pdfs/mm6605e1.pdf) describing the changes implemented in the 2017 immunization schedule compared to the 2016 version.

The first change highlighted in the *MMWR* article is the addition of a "16 yrs" age column to Figure 1. (Note: Figure 1 is the multicolored child/teen immunization schedule showing vaccine names along the left side and age columns listed across the top.) Previously, a single column covered the broader "16–18 years" age group. The new "16 yrs" column is further emphasized on the schedule with the addition of a gray background color in the column heading, identical to what exists for two other important vaccination age platforms, i.e., "4–6 years" and "11–12 years." So we now have three immunization platform visits indicated on the child/teen schedule: 4–6 years, 11–12 years, and 16 years.

Why the 16-Year-Old Column Is Important

The new "16 yrs" column brings much needed attention to the fact that several CDC-recommended vaccinations due to be administered at 16 years of age are being overlooked by many providers. These include:

- **MenACWY dose #2** – recommended at age 16
- **MenB dose #1** – recommended (category B) at age 16
- **HPV "catch-up"** – needed for those who have not yet completed their series
- **Tdap** – for those who have not yet received the 11–12 year-old dose
- **Influenza vaccine** – recommended seasonally
- **Other vaccines** – the 16-year-old platform provides a "catch-up" opportunity for patients who have fallen behind on other recommended vaccines (e.g., HepA, HepB, varicella).

According to CDC's recently published National Immunization Survey for Adolescents Ages 13–17 Years (www.cdc.gov/mmwr/volumes/65/wr/mm6533a4.htm), only 33% of teens (through age 17 years) have completed MenACWY dose #2, a vaccine recommended at age 16. Our nation has unacceptably low coverage rates for many vaccines recommended for adolescents, including the HPV vaccine series completion. The addition of a 16-year-old platform column provides a distinctive, visible reminder to healthcare professionals (and perhaps their patients/parents) that 16-year-olds are due for the important vaccinations listed above.

This new platform has created a perfect opportunity to consider establishing a 16-year-old vaccination visit in your medical practice. It can serve as an impetus for your staff to improve vaccination rates for 16-year-olds, a reminder to 16-year-olds (and their parents) who look at the schedule to check their need for vaccinations, and as a perfect opportunity to help bring teens in for a visit to receive other essential healthcare services they may be missing.

Ask the Experts

The Immunization Action Coalition extends thanks to our experts, medical officers Andrew T. Kroger, MD, MPH; Candice L. Robinson, MD, MPH; Raymond A. Strikas, MD, MPH, FACP, FIDSA; Jessie Wing, MD, MPH; and nurse educator Donna L. Weaver, RN, MN, all with the National Center for Immunization and Respiratory Diseases at the Centers for Disease Control and Prevention (CDC).

Influenza vaccines

I have a patient who is now 12 weeks pregnant. In September 2016, she received quadrivalent inactivated influenza vaccination (before she was pregnant). Should we give her another dose of 2016–17 influenza vaccine since she was not pregnant at the time of her first dose?

The Advisory Committee on Immunization Practices (ACIP) does not recommend more than one dose of influenza vaccine per season, except for certain children being vaccinated for the first time. The 2017–18 influenza vaccine may be available near the end of her pregnancy so she can be given a dose of next year's formulation at that time.

A nursing home resident was admitted to the hospital with influenza and treated with oseltamivir. The person is now returned to the nursing home. The residents in the facility are being treated prophylactically with oseltamivir. Should the person who was hospitalized also receive oseltamivir prophylactically?

This is a complicated issue and the exact situation you describe is not addressed in the most recent ACIP recommendations on the use of influenza antiviral drugs. Whether to continue the antiviral drug depends on why the rest of the people in the facility are being treated. Oseltamivir for treatment of influenza is usually a 5-day course. If there is continued risk of exposure in the facility, it seems reasonable to continue the prophylactic treatment accordingly. The ACIP influenza antiviral guidelines are available at www.cdc.gov/mmwr/pdf/rr/rr6001.pdf.

Ask the Experts… *continued on page 2* ▶

Immunization questions?

- Email nipinfo@cdc.gov
- Call your state health department (phone numbers at www.immunize.org/coordinators)

Needle Tips

online at www.immunize.org/nt

Immunization Action Coalition

2550 University Ave. W., Suite 415 North
Saint Paul, MN 55114
Phone: (651) 647-9009
Email: admin@immunize.org
Websites: www.immunize.org
www.vaccineinformation.org
www.immunizationcoalitions.org
www.give2mcv4.org

Needle Tips is a publication of the Immunization Action Coalition (IAC) for healthcare professionals. Content is reviewed by the Centers for Disease Control and Prevention (CDC) for technical accuracy. This publication is supported in part by CDC Grant No. 6NH23IP922550. Content is solely the responsibility of IAC and does not necessarily represent the official views of CDC. ISSN 1526-1816.

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The Immunization Action Coalition is also supported by

Pfizer Inc., Merck Sharp & Dohme Corp., Sanofi Pasteur, GlaxoSmithKline, Seqirus, AstraZeneca, American Pharmacists Association, Mark and Muriel Wexler Foundation, Herbert and Jeanne Mayer Foundation, and many other generous donors.

IAC maintains strict editorial independence in its publications.

Ask the Experts… *continued from page 1*

Pneumococcal vaccines

A child with selective IgA deficiency was sent by her physician to the health department to receive a dose of pneumococcal polysaccharide vaccine (PPSV23, Pneumovax; Merck). Does her illness fall under the criteria for administering PPSV23?
Selective IgA deficiency is a B-cell immunodeficiency, so PPSV23 is indicated if the child is age 2 years or older.

We have a 19-year-old patient with a history of vasculitis, nephritis, and asthma. She is on azathioprine (Imuran) and is immunosuppressed. Her rheumatologist recommends she receive pneumococcal conjugate vaccine (PCV13, Prevnar 13, Pfizer) and meningococcal B vaccine. How often should these vaccines be given? Will she require a series of PCV13 doses or just a booster?
For people with iatrogenic immunosuppression, ACIP recommends 1 dose of PCV13 followed by a dose of PPSV23 at least 8 weeks later (see www.cdc.gov/mmwr/pdf/wk/mm6434.pdf, pages 944–7). Meningococcal serogroup B vaccine (MenB) is not specifically recommended for immunosuppressed people. However, people age 16 through 23 years who are not at increased risk may receive routine MenB vaccination (a category B recommendation) of either a 2-dose series of Bexsero (GSK) 4 weeks apart, or a 2-dose series of Trumenba (Pfizer) 6 months apart.

Meningococcal ACWY vaccine

The 2013 ACIP meningococcal ACWY recommendations (www.cdc.gov/mmwr/pdf/rr/rr6202.pdf) list household crowding and both active and passive smoking as risk factors for meningococcal disease. Should I recommend MenACWY vaccine for a nonsmoker living in a crowded household of smokers?
Although second-hand smoke and other environmental conditions have been identified as risk factors for meningococcal disease, ACIP does not include them as indications for MenACWY vaccination. Providers are always free to use their clinical judgment in situations not addressed by ACIP.

We run immunization clinics at the local jail, which has a living arrangement comparable to a college residential hall. In this setting, would you recommend vaccinating incarcerated individuals who are younger than age 22, as is recommended for people living in a college dormitory?
ACIP does not identify incarceration as an indication for meningococcal vaccination. Providers are always free to use their clinical judgment in situations not addressed by ACIP.

If someone received meningococcal polysaccharide (MPSV4, Menomune; Sanofi) or MenACWY at age 9 years, will two additional doses of MenACWY be needed?
Yes. Doses of quadrivalent meningococcal vaccine (either MPSV4 or MenACWY) given before 10 years of age should not be counted as part of the series. If a child received a dose of either MPSV4 or MenACWY before age 10 years, they should receive a dose of MenACWY at 11 or 12 years and a booster dose at age 16.

If someone received MPSV4 or MenACWY vaccine at age 10 years and a dose of MenACWY before the 16th birthday, will they still need a booster dose at age 16?
Yes, they should receive a booster dose. A booster dose of MenACWY is recommended at 16 through 18 years even if 2 (or more) doses of meningococcal vaccine were received before age 16 years. People age 19 through 21 years who are entering college or are first-year students living in a residence hall, and who have not received a dose of MenACWY on or after age 16 years, should also be vaccinated.

Sanofi is discontinuing the production of Menomune (MPSV4) this year. I administer a lot of travel vaccine doses. Should I now give MenACWY (Menactra or Menveo) off-label to travelers age 56 years and older?
In its 2013 meningococcal recommendations, ACIP recommended off-label use of MenACWY vaccine (not MPSV4) for people age 56 years or older who were vaccinated previously with MenACWY and are recommended for revaccination or for whom multiple doses are anticipated (for example, people with asplenia and microbiologists). The situation of unavailability of MPSV4 is not addressed, but the use of MenACWY vaccine is appropriate when MPSV4 is not available.

In its 2016 recommendations for use of meningococcal conjugate vaccines in HIV-infected persons, ACIP states not to use MenACWY-D

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IAC's "Ask the Experts" team from the Centers for Disease Control and Prevention

Andrew T. Kroger, MD, MPH

Candice L. Robinson, MD, MPH

Raymond A. Strikas, MD, MPH, FACP, FIDSA

Donna L. Weaver, RN, MN

Jessie Wing, MD, MPH

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(Menactra, Sanofi) in children younger than age 2 years. However, in Table 3 of these recommendations (page 1192), MenACWY-D is listed as an option for children 9 through 23 months of age. This seems to be a discrepancy. Please clarify.

CDC meningococcal experts prefer MenACWY-D not be used before two years of age in children at increased risk of meningococcal disease (such as those with HIV infection or asplenia) because of possible interference with the response to pneumococcal conjugate (PCV13) vaccine. However, they recognize that vaccine supply or other constraints may require its use before age two years and provided permissive language with important guidance in the Table 3 footnote. These recommendations are published in *MMWR*, Nov 4, 2016, at www.cdc.gov/mmwr/volumes/65/wr/pdfs/mm6543a3.pdf, pages 1189–94.

Meningococcal B vaccine

I have a 9-year-old patient traveling to Kenya for one week. In addition to MenACWY vaccine, should she be offered meningococcal serogroup B (MenB) vaccine?

ACIP does not recommend routine MenB vaccination for travel to countries in sub-Saharan Africa or to other countries for which MenACWY vaccine is recommended. Meningococcal disease in these areas is generally not caused by serogroup B.

Varicella and zoster vaccines

Recently we had a one-year-old with congenital heart disease and who is on chronic aspirin therapy in for a well-child check and routine vaccination. Are there any recommendations regarding varicella vaccine being given to children who are on chronic aspirin therapy?

The ACIP's varicella vaccine recommendations state that no adverse events associated with the use of salicylates after varicella vaccination have been reported, however, the vaccine manufacturer recommends that vaccine recipients avoid using salicylates for 6 weeks after receiving varicella vaccines because of the association between aspirin use and Reye syndrome after varicella disease (chickenpox). Vaccination with subsequent close monitoring should be considered for children who have rheumatoid arthritis or other conditions requiring therapeutic aspirin. The risk for serious complications associated with aspirin is likely to be greater in children in whom natural varicella develops than it is in children who receive the vaccine containing attenuated varicella zoster virus. In other words, the benefit of varicella vaccine likely outweighs the theoretical risk of Reye syndrome. See the ACIP varicella recommendations at www.cdc.gov/mmwr/PDF/rr/rr5604.pdf, page 29.

A healthcare worker with no history of chickenpox, and unknown serologic immunity, was exposed to a patient with zoster. She received varicella vaccine two days later. She developed a pruritic maculopapular rash 11 days after vaccination. Is the rash from the vaccine or from her zoster exposure?

The only way to determine whether the rash is caused by wild-type varicella or vaccine virus is to try to isolate virus from the rash and send it to a laboratory that is capable of differentiating wild and vaccine-type virus. This is generally not practical. Given the history, the conservative approach is to assume she has an active case of chickenpox and act according to your infection control guidelines.

I was told by a coworker that varicella vaccine can be stored at refrigerator temperature for up to three days and still be used. Is this true?

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According to the manufacturer, unreconstituted varicella vaccine may be stored at refrigerator temperature (2°C to 8°C, 36°F to 46°F) for up to 72 continuous hours prior to reconstitution. Vaccine stored at 2°C to 8°C that is not used within 72 hours of removal from +5°F (−15°C) storage should be discarded. See www.merck.com/product/usa/pi_circulars/v/varivax/varivax_pi.pdf.

MMR vaccine

Due to outbreaks of mumps in our state, I have been asked about college students getting a third dose of the MMR vaccine, even if there was not a mumps outbreak on their campus. My understanding is that a third dose of MMR is only recommended for students attending colleges that are experiencing an outbreak. Although I have advised families that this is the case, would there be any issues with proceeding with the third dose preemptively?

You are correct that administration of a third dose of MMR vaccine has been used as a possible mumps outbreak control strategy. To date, the evidence that this strategy is effective in mumps outbreak control is insufficient to recommend it as a routine measure for college students. However, some states experiencing mumps outbreaks may recommend a third dose of MMR for students in certain situations. There is no problem giving a third dose of MMR to a person who may already be immune to one or more of the vaccine components. Insurance is unlikely to pay for a third dose since this is not routinely recommended by CDC.

Hepatitis B vaccine

We give hepatitis B vaccine to newborns in the hospital followed by DTaP-IPV-HepB (Pediarix, GSK) at 2, 4, and 6 months of age, so our patients get 4 doses of hepatitis B vaccine. For some children, the Pediarix dose #3 is delayed and given closer to 5 months of age, so the interval is less than 8 weeks between dose #3 and #4 of the hepatitis B component of Pediarix. We are receiving conflicting information about whether their HepB dose #4 is a valid final dose because of the shortened interval between dose #3 and #4. Our electronic health record says dose #4 is valid (regardless of the short interval from dose #3) but the health department says it is not. Which is correct?

According to subject matter experts at CDC, your electronic health record is correct. The CDC website states that hepatitis B vaccine dose #4, if given, must be at 24 weeks of age or later, and at least 16 weeks from dose #1. There is no minimum interval requirement between dose #4 and the previous dose. This information is not published in any current ACIP statement but it can be found under "Hepatitis B" at www.cdc.gov/vaccines/programs/cocasa/reports/algorithm-ref.html.

Some nephrologists give a high dose (40 mcg) of hepatitis B vaccine (2 adult doses of Engerix-B, GSK, or Recombivax HB Dialysis Formulation, Merck) to all patients with renal failure with glomerular filtration rates (GFRs) of less than 30 ml/min even if the patient is not on dialysis. Is this practice advisable?

A higher dose hepatitis B vaccine is recommended for hemodialysis and other immunocompromised persons, so to the extent these patients are immunocompromised, this is within ACIP recommendations (note that "immunocompromised" is not defined in the recommendations). Regardless, this practice is appropriate for several reasons, including that these patients may be starting hemodialysis soon, and because use of the higher dose is not harmful. This is somewhat of a gray area but the clinician can use his/her clinical judgment.

DTap/Tdap/Td vaccine

The tetanus and diphtheria toxoid Tenivac (Td, Sanofi) is not currently available from the manufacturer and may not be available until later in 2017. What are we to do when someone is in need of a Td booster dose?

Although there is a shortage of Tenivac, there is another Td product available. It is produced by MassBiologics and distributed by Grifols USA LLC. More information, including prescribing information for Grifols Td vaccine, can be found at www.GrifolsTdvaccine.com.

If Td is unavailable in the work setting, Tdap should be used in its place whenever Td is indicated (e.g., for 10-year booster dose or wound management). If a person has previously received a dose of Tdap, it is acceptable to give another Tdap dose in place of Td when Td is not available.

Ask the Experts

About IAC's Question of the Week

Each week, *IAC Express* highlights a new, topical, or important-to-reiterate Q&A. This feature is a cooperative venture between IAC and CDC. William L. Atkinson, MD, MPH, IAC's associate director for immunization education, chooses a new Q&A to feature every week from a set of Q&As prepared by experts at CDC's National Center for Immunization and Respiratory Diseases.

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Summary of Recommendations for Child/Teen Immunization (Age birth through 18 years)

Vaccine name and route	Schedule for routine vaccination and other guidelines (any vaccine can be given with another, unless otherwise noted)	Schedule for catch-up vaccination and related issues	Contraindications and precautions (mild illness is not a contraindication)
Hepatitis B (HepB) *Give IM*	• Give HepB dose #1 within 24hrs of birth to all medically stable infants weighing ≥2000g and born to HBsAg-negative mothers. Give dose #2 at age 1–2m and the final dose at age 6–18m (the last dose in the infant series should not be given earlier than age 24wks). After the birth dose, the series may be completed using 2 doses of single-antigen vaccine (ages 1–2m, 6–18m) or with 3 doses of Pediarix (ages 2m, 4m, 6m), which may result in giving a total of 4 doses of HepB vaccine. • **If mother is HBsAg-positive:** Give HBIG and HepB dose #1 within 12hrs of birth; complete series by age 6m. • **If mother's HBsAg status is unknown:** Give HepB dose #1 within 12 hrs of birth. If low birth weight (less than 2000g), also give HBIG within 12hrs. For infants weighing 2000g or more whose mother is subsequently found to be HBsAg positive, give the infant HBIG ASAP (no later than age 7d) and follow HepB immunization schedule for infants born to HBsAg-positive mothers. • Vaccinate all other children and teens who have not completed a series of HepB vaccine.	• Do not restart series, no matter how long since previous dose. • 3-dose series can be started at any age. • Minimum intervals between doses: 4wks between #1 and #2, 8wks between #2 and #3, and at least 16wks between #1 and #3 (and give dose #3 no earlier than age 24wks).	**Contraindication** Previous severe allergic reaction (e.g., anaphylaxis) to this vaccine or to any of its components, including hypersensitivity to yeast. **Precautions** • Moderate or severe acute illness, with or without fever. • For infants who weigh less than 2000g, see ACIP recommendations at www.cdc.gov/mmwr/PDF/rr/rr5416.pdf.
DTaP, DT (Diphtheria, tetanus, acellular pertussis) *Give IM*	• Give to children at ages 2m, 4m, 6m, 15–18m, and 4–6yrs. • May give dose #1 as early as age 6wks. • May give #4 as early as age 12m if 6m have elapsed since #3. • Do not give DTaP/DT to children age 7yrs and older. • If possible, use the same DTaP product for all doses.	• Dose #2 and #3 may be given 4wks after previous dose. • Dose#4 may be given 6m after #3. • If dose #4 is given before 4th birthday, wait at least 6m for #5 (age 4–6yrs). • If dose #4 is given after 4th birthday, #5 is not needed.	**Contraindications** • Previous severe allergic reaction (e.g., anaphylaxis) to this vaccine or to any of its components, with or without fever. • For all pertussis-containing vaccines: Encephalopathy not attributable to an identifiable cause, within 7d after DTP/DTaP/Tdap. **Precautions** • Moderate or severe acute illness. • History of Arthus reaction following a prior dose of tetanus or diphtheria toxoid-containing vaccine (including MenACWY); defer vaccination until at least 10yrs have elapsed since the last tetanus toxoid-containing vaccine. • Guillain-Barré syndrome (GBS) within 6wks after previous dose of tetanus toxoid-containing vaccine. • For DTaP only: Any of these events following a previous dose of DTP/DTaP: 1) temperature of 105°F (40.5°C) or higher within 48hrs; 2) continuous crying for 3hrs or more within 48hrs; 3) collapse or shock-like state within 48hrs; 4) seizure within 3d. • For all pertussis-containing vaccines: Progressive or unstable neurologic disorder, uncontrolled seizures, or progressive encephalopathy until a treatment regimen has been established and the condition has stabilized.
Td, Tdap (Tetanus, diphtheria, acellular pertussis) *Give IM*	• For children and teens lacking previous Tdap: Give Tdap routinely at age 11–12yrs and vaccinate older teens on a catch-up basis; then boost every 10yrs with Td. • Make special efforts to give Tdap to children and teens who are 1) in contact with infants younger than age 12m and, 2) healthcare workers with direct patient contact. • Give Tdap to pregnant adolescents during each pregnancy (preferred during the early part of gestational weeks 27 through 36wks), regardless of interval since prior Td or Tdap.	• DTaP and DT should not be used for children age 7yrs and older; use Td and Tdap instead. • Children as young as age 7yrs and teens who are unvaccinated or behind schedule should complete a primary Td series (3 doses, with an interval of 1–2m between dose #1 and #2, and an interval of 6–12m between dose #2 and #3); substitute Tdap for any dose in the series, preferably as dose #1. • Tdap should be given regardless of interval since previous Td.	

Special Notes on Hepatitis B Vaccine (HepB)

Dosing of HepB: Monovalent vaccine brands are interchangeable. For people age 0 through 19yrs, give 0.5 mL of either Engerix-B or Recombivax HB.

Alternative dosing schedule for unvaccinated adolescents age 11 through 15yrs: Give 2 doses Recombivax HB 1.0 mL (adult formulation) spaced 4–6m apart. (Engerix-B is not licensed for a 2-dose schedule.)

This document was adapted from the recommendations of the Advisory Committee on Immunization Practices (ACIP). To obtain copies of these recommendations, visit CDC's website at www.cdc.gov/vaccines/hcp/ACIP-recs/index.html or visit the Immunization Action Coalition (IAC) website at www.immunize.org/acip.

This table is revised periodically. Visit IAC's website at www.immunize.org/childrules to make sure you have the most current version.

For the purposes of calculating intervals between doses, 4 weeks = 28 days. Intervals of 4 months or greater are determined by calendar months.

A vaccine series does not need to be restarted, regardless of the time that has elapsed between doses.

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Technical content reviewed by the Centers for Disease Control and Prevention
www.immunize.org/catg.d/p2010.pdf • Item #P2010 (3/17)

Summary of Recommendations for Child/Teen Immunization (Age birth through 18 years)

Vaccine name and route	Schedule for routine vaccination and other guidelines (any vaccine can be given with another, unless otherwise noted)	Schedule for catch-up vaccination and related issues	Contraindications and precautions (mild illness is not a contraindication)
Rotavirus (RV) *Give orally*	• Rotarix (RV1): Give at ages 2m, 4m. • RotaTeq (RV5): Give at ages 2m, 4m, 6m. • May give dose #1 as early as age 6wks. • Give final dose no later than age 8m–0d.	• Do not begin series in infants older than age 14wks 6d. • Intervals between doses may be as short as 4wks. • If prior vaccination included use of different or unknown brand(s), a total of 3 doses should be given.	**Contraindications** • Previous severe allergic reaction (e.g., anaphylaxis) to this vaccine or to any of its components. If allergy to latex, use RV5. • History of intussusception. • Diagnosis of severe combined immunodeficiency (SCID). **Precautions** • Moderate or severe acute illness, with or without fever. • Altered immunocompetence other than SCID. • Chronic gastrointestinal disease. • For RV1 only, spina bifida or bladder exstrophy.
Varicella (Var) (Chickenpox) *Give Subcut*	• Give dose #1 at age 12–15m. • Give dose #2 at age 4–6yrs. Dose #2 of Var or MMRV may be given earlier if at least 3m since dose #1. If dose #2 was given at least 4wks after dose #1, it can be accepted as valid. • Give a 2nd dose to all older children/teens with history of only 1 dose. • MMRV may be used in children age 12m through 12yrs (see note below).	• If younger than age 13yrs, space dose #1 and #2 at least 3m apart. If age 13yrs or older, space at least 4wks apart. • May use as postexposure prophylaxis if given within 5d. • If Var and either MMR, and/or yellow fever vaccine are not given on the same day, space them at least 28d apart. (If yellow fever vaccine, space by 30d.)	**Contraindications** • Previous severe allergic reaction (e.g., anaphylaxis) to this vaccine or to any of its components. • Pregnancy or possibility of pregnancy within 4wks. • Severe immunodeficiency (e.g., hematologic and solid tumors; receiving chemotherapy; congenital immunodeficiency; long-term immunosuppressive therapy, or severely symptomatic HIV) • Children on high-dose immunosuppressive therapy or who are immunocompromised because of malignancy and primary or acquired immunodeficiency, including HIV/AIDS (although vaccination may be considered if CD4+ T-lymphocyte percentages are 15% or greater in children age 1 through 8yrs or 200 cells/μL in children age 9yrs and older) **Precautions** • Moderate or severe acute illness, with or without fever. • If blood, plasma, and/or immune globulin (IG or VZIG) were given in past 11m, see ACIP's *General Recommendations on Immunization*[1] regarding time to wait before vaccinating. • Receipt of specific antivirals (i.e., acyclovir, famciclovir, or valacyclovir) 24hrs before vaccination, if possible; delay resumption of these antiviral drugs for 14d after vaccination. • For MMRV only, personal or family (i.e., sibling or parent) history of seizures. **NOTE:** For patients with humoral immunodeficiency or leukemia, see ACIP recommendations at www.cdc.gov/mmwr/pdf/rr/rr5604.pdf.
MMR (Measles, mumps, rubella) *Give Subcut*	**NOTE:** For the first dose of MMR and varicella given at age 12–47m, either MMR and Var or MMRV may be used. Unless the parent or caregiver expresses a preference for MMRV, CDC recommends that MMR and Var be used for the first doses in this age group. • Give dose #1 at age 12–15m. • Give MMR at age 6–11m if traveling internationally; revaccinate with 2 doses of MMR at age 12–15m and at least 4wks later. The dose given at younger than 12m does not count toward the 2-dose series. • Give dose #2 at age 4–6yrs. Dose #2 may be given earlier if at least 4wks since dose #1. For MMRV: dose #2 may be given earlier if at least 3m since dose #1. • Give a 2nd dose to all older children and teens with history of only 1 dose. • MMRV may be used in children age 12m through 12yrs (see note above).	• If MMR and either Var, and/or yellow fever vaccine are not given on the same day, space them at least 28d apart. (If yellow fever vaccine, space by 30d.) • When using MMR for both doses, minimum interval is 4wks. • When using MMRV for both doses, minimum interval is 3m. • May use as postexposure measles prophylaxis if given within 3d.	**Contraindications** • Previous severe allergic reaction (e.g., anaphylaxis) to this vaccine or to any of its components. • Pregnancy or possibility of pregnancy within 4wks. • Severe immunodeficiency (e.g., hematologic and solid tumors; receiving chemotherapy; congenital immunodeficiency; long-term immunosuppressive therapy, or severely symptomatic HIV). **NOTE:** HIV infection is NOT a contraindication to MMR for children who are not severely immunocompromised (see ACIP recommendations at www.cdc.gov/mmwr/pdf/rr/rr6204.pdf). Vaccination is recommended if indicated for 1) children age 12m through 5yrs whose CD4+ T-lymphocyte percentage has been greater than 15% for at least 6m or 2) for children age 6yrs and older whose CD4+ T-lymphocyte counts have been 200 cells/μL or greater for at least 6m. **Precautions** • Moderate or severe acute illness, with or without fever. • If blood, plasma, or immune globulin given in past 11m, see ACIP's *General Recommendations on Immunization*[1] regarding time to wait before vaccinating. • History of thrombocytopenia or thrombocytopenic purpura. • For MMRV only, personal or family (i.e., sibling or parent) history of seizures. • Need for tuberculin skin testing (TST). If TST needed, give TST before or on same day as MMR, or give TST 4wks following MMR.

1 CDC. General Recommendations on Immunization–Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR* 2011;60(No. RR-2):39.

Summary of Recommendations for Child/Teen Immunization (Age birth through 18 years)

Vaccine name and route	Schedule for routine vaccination and other guidelines (any vaccine can be given with another, unless otherwise noted)	Schedule for catch-up vaccination and related issues	Contraindications and precautions (mild illness is not a contraindication)
Pneumococcal conjugate (PCV13) *Give IM*	• Give at ages 2m, 4m, 6m, 12–15m (booster dose). • Dose #1 may be given as early as age 6wks. • For age 24 through 59m and healthy: If unvaccinated or any incomplete schedule of 3 doses of PCV 13 was received previously, give 1 supplemental dose of PCV13 at least 8 wks after the most recent dose. • For high-risk** children ages 2 through 5 yrs: Give 2 doses at least 8 wks apart if they previously received an incomplete schedule of fewer than 3 doses; give 1 dose at least 8 wks after the most recent dose if they previously received 3 doses. • For high-risk** children: All recommended PCV13 doses should be given prior to PPSV vaccination. • PCV13 is not routinely given to healthy children age 5yrs and older. ** **High-risk** *For both PCV13 and PPSV23,* those with sickle cell disease; anatomic or functional asplenia; chronic cardiac, pulmonary, or renal disease; diabetes; cerebrospinal fluid leaks; HIV infection; immunosuppression; diseases associated with immunosuppressive and/or radiation therapy; solid organ transplantation; or who have or will have a cochlear implant. *For PPSPV23 only in children ages 6–18yrs,* alcoholism and/or chronic liver disease.	• When children are behind on PCV13 schedule, minimum interval for doses given to children younger than age 12m is 4wks; for doses given at 12m and older, it is 8wks. • **For age 7 through 11m:** If history of 0 doses, give 2 doses of PCV13, 4wks apart, with a 3rd dose at age 12–15m; if history of 1 or 2 doses, give 1 dose of PCV13 with a 2nd dose at age 12–15m at least 8wks later. • **For age 12 through 23m:** If unvaccinated or history of 1 dose before age 12m, give 2 doses of PCV13 8wks apart; if history of 1 dose at or after age 12m or 2 or 3 doses before age 12m, give 1 dose of PCV13 at least 8wks after most recent dose. • **For age 2 through 5yrs** and at high risk**: If unvaccinated or any incomplete schedule of 1 or 2 doses, give 2 doses of PCV13, 1 at least 8wks after the most recent dose and another dose at least 8wks later; if any incomplete series of 3 doses, give 1 supplemental dose of PCV13 at least 8wks after the most recent dose. • **For children ages 6 through 18yrs** with functional or anatomic asplenia (including sickle cell disease), HIV infection or other immunocompromising condition, cochlear implant, or CSF leak, give 1 dose of PCV13 if no previous history of PCV13.	**Contraindication** Previous severe allergic reaction (e.g., anaphylaxis) to a PCV vaccine, to any of its components, or to any diphtheria toxoid-containing vaccine. **Precaution** Moderate or severe acute illness, with or without fever.
Pneumococcal polysaccharide (PPSV) *Give IM or Subcut*	• Give 1 dose at least 8wks after final dose of PCV13 to high-risk** children age 2yrs and older. • For children who have sickle cell disease, functional or anatomic asplenia, HIV infection, or other immunocompromising condition, give a 2nd dose of PPSV 5 yrs after previous PPSV. (See ACIP pneumococcal recommendations at www.cdc.gov/mmwr/pdf/rr/rr5911.pdf.)		**Contraindication** Previous severe allergic reaction (e.g., anaphylaxis) to this vaccine or to any of its components. **Precaution** Moderate or severe acute illness, with or without fever.
Human papillomavirus (HPV) (4vHPV or 9vHPV, Gardasil 9) *Give IM*	• Give a 2-dose series of either HPV4 or HPV9 to girls and boys at age 11–12yrs on a 0, 6–12m schedule. (May give as early as age 9yrs.) • Give a 3-dose series of 4vHPV or 9vHPV to girls and boys age 15yrs or older or who are immunocompromised on a 0, 1–2, 6m schedule. (May give as early as age 9yrs.) • Give a 3-dose series of either 4vHPV or 9vHPV to all older girls/women (through age 26yrs) and boys/men (through age 21yrs) who were not previously vaccinated.	• With the exception of immunocompromised persons, or persons with autoimmune disease, a 2-dose schedule may be followed for all persons intitiating the HPV vaccine series before age 15yrs. • A 3-dose schedule must be followed for all persons intitiating the series at age 15yrs or older, as well as for immunocompromised persons or persons with autoimmune disease ages 9 through 26yrs. • Minimum intervals between doses: 2-dose schedule: 5m; 3-dose schedule: 4wks between #1 and #2; 12wks between #2 and #3 and 5m between #1 and #3.	**Contraindication** Previous severe allergic reaction (e.g., anaphylaxis) to this vaccine or to any of its components. **Precautions** • Moderate or severe acute illness, with or without fever. • Pregnancy.

Summary of Recommendations for Child/Teen Immunization (Age birth through 18 years)

Vaccine name and route	**Schedule for routine vaccination and other guidelines** (any vaccine can be given with another, unless otherwise noted)	**Schedule for catch-up vaccination and related issues**	**Contraindications and precautions** (mild illness is not a contraindication)
Hepatitis A (HepA) *Give IM*	• Give 2 doses spaced 6–18m apart to all children at age 1yr (12–23m). • Vaccinate all previously unvaccinated children and adolescents age 2yrs and older who – Want to be protected from HAV infection and lack a specific risk factor. – Live in areas where vaccination programs target older children. – Travel anywhere except U.S., W. Europe, N. Zealand, Australia, Canada, or Japan. – Have chronic liver disease, clotting factor disorder, or are adolescent males who have sex with other males. – Use illicit drugs (injectable or non-injectable). – Anticipate close personal contact with an international adoptee from a country of high or intermediate endemicity during the first 60d following the adoptee's arrival in the U.S.	• Minimum interval between doses is 6m. • Children who are not fully vaccinated by age 2yrs can be vaccinated at a subsequent visit. • Administer 2 doses at least 6m apart to previously unvaccinated persons who live in areas where vaccination programs target older children, or who are at increased risk for infection. • Give 1 dose as postexposure prophylaxis to incompletely vaccinated children and teens age 12m and older who have recently (during the past 2wks) been exposed to hepatitis A virus.	**Contraindication** Previous severe allergic reaction (e.g., anaphylaxis) to this vaccine or to any of its components. **Precautions** • Moderate or severe acute illness, with or without fever.
Inactivated polio (IPV) *Give Subcut or IM*	• Give to children at ages 2m, 4m, 6–18m, 4–6yrs. • May give dose #1 as early as age 6wks. • Not routinely recommended for U.S. residents age 18yrs and older (except certain travelers). For information on polio vaccination for international travelers, see wwwnc.cdc.gov/travel/diseases.	• The final dose should be given on or after the 4th birthday and at least 6m from the previous dose. • If dose #3 is given after 4th birthday, dose #4 is not needed if dose #3 is given at least 6m after dose #2.	**Contraindication** Previous severe allergic reaction (e.g., anaphylaxis) to this vaccine or to any of its components. **Precautions** • Moderate or severe acute illness, with or without fever. • Pregnancy.
Influenza Inactivated influenza* vaccine (IIV) *Give IM* * includes recombinant influenza vaccine (RIV3) for teens ages 18yrs and older	• Vaccinate all children and teens age 6m and older. • For children age 6m through 8yrs, give 2 doses of age-appropriate vaccine, spaced 4 wks apart, who 1) are first-time vaccinees, or 2) have received only one lifetime dose previous to this current season (season runs July to June) • For IIV in children age 6–35m: Give either Fluzone 0.25 mL dose or FluLaval 0.5 mL dose. • For IIV in children age 3yrs and older: Give 0.5 mL dose of any age-appropriate influenza vaccine. • For teens age 18yrs and older, intradermal vaccine (Fluzone Intradermal) may be used.		**Contraindications** • Previous severe allergic reaction (e.g., anaphylaxis) to this vaccine, to any of its components, including egg protein. **NOTE:** People age 18yrs and older with egg allergy of any severity can receive any influenza vaccine, including the recombinant influenza vaccine (RIV3) (Flublok). RIV3 does not contain any egg protein. **Precautions** • Moderate or severe acute illness, with or without fever. • History of Guillain-Barré syndrome (GBS) within 6wks of a previous influenza vaccination. • Previous severe reaction to eggs involving symptoms other than hives. These people may receive any age-appropriate influenza vaccine. The vaccine should be administered in a medical setting (e.g., a health department or physician office) and should be supervised by a healthcare provider who is able to recognize and manage severe allergic conditions. • For children/teens who experience only hives with exposure to eggs, give any age-appropriate influenza vaccine.

Summary of Recommendations for Child/Teen Immunization (Age birth through 18 years)

Vaccine name and route	Schedule for routine vaccination and other guidelines (any vaccine can be given with another, unless otherwise noted)	Schedule for catch-up vaccination and related issues	Contraindications and precautions (mild illness is not a contraindication)
Hib (*Haemophilus influenzae* type b) *Give IM*	• ActHib (PRP-T), Menhibrix, Hiberix, or Pentacel: Give at age 2m, 4m, 6m, 12–15m (booster dose). • PedvaxHIB (containing PRP-OMP): Give at age 2m, 4m, 12–15m (booster dose). • Dose #1 of Hib vaccine should not be given earlier than age 6wks. • Give final dose (booster dose) no earlier than age 12m and a minimum of 8wks after the previous dose. • Hib vaccines are interchangeable; however, if different brands of Hib vaccines are administered for dose #1 and dose #2, a total of 3 doses is necessary to complete the primary series in infants, followed by a booster after age 12m. • For vaccination of children 12 through 59m who are immunocompromised (immunoglobulin deficiency, complement component deficiency, HIV infection, receipt of chemotherapy or radiation therapy for cancer) or asplenic: if previously received no doses or only 1 dose before age 12m, give 2 additional doses at least 8wks apart; if previously received 2 or more doses before age 12m, give 1 additional dose. • Hib is not routinely given to healthy children age 5yrs and older. • 1 dose of Hib vaccine should be administered to children age 5yrs and older who have anatomic or functional asplenia (including sickle cell disease) and who have not received a primary series and booster dose or at least 1 dose of Hib vaccine after age 14m. • 1 dose of Hib vaccine should be administered to unvaccinated persons 5 through 18yrs of age with HIV infection.	**All Hib vaccines:** • If dose #1 was given at 12–14m, give booster in 8wks. • Give only 1 dose to unvaccinated children ages 15–59m. **ActHib:** • Dose #2 and #3 may be given 4wks after previous dose. • If dose #1 was given at age 7–11m, only 3 doses are needed; #2 is given at least 4wks after #1, then final dose at age 12–15m (wait at least 8wks after dose #2). **PedvaxHIB:** • Dose #2 may be given 4wks after #1. Recipients of hematopoietic stem cell transplant should receive 3 doses of Hib vaccine at least 4wks apart beginning 6–12m after transplant, regardless of Hib vaccination history.	**Contraindications** • Previous severe allergic reaction (e.g., anaphylaxis) to this vaccine or to any of its components. • Age younger than 6wks. **Precaution** Moderate or severe acute illness, with or without fever.
Meningococcal conjugate, quadrivalent (MenACWY) Menactra and Menveo *Give IM* MenHibrix (contains Hib vaccine) *Give IM* **Meningococcal polysaccharide** (MPSV4) Menomune *Give Subcut*	• Give a 2-dose series of MenACWY with dose #1 at age 11–12yrs and dose #2 at age 16yrs. • If unvaccinated at 11–12yrs, give dose #1 at age 13 through 15yrs. Give dose #2 at 16 through 18yrs with a minimum interval of at least 8wks between doses. • If unvaccinated at 11 through 15yrs, give dose #1 at 16 through 18yrs. • For college students, give 1 (initial) dose to unvaccinated first-year students age 19 through 21yrs who live in a residence hall; give dose #2 if most recent dose given when younger than age 16yrs. • Give MenHibrix or Menveo to children age 2–18m with persistent complement component deficiency, HIV infection, or anatomic/functional asplenia; give at ages 2, 4, 6, 12–15m. • For unvaccinated or partially vaccinated children age 7–23m with persistent complement component deficiency: 1) if age 7–23m and using Menveo, give a 2-dose series at least 3m apart with dose #2 given after age 12m or, 2) if age 9–23m and using Menactra, give a 2-dose series at least 3m apart. Give either brand of MenACWY to unvaccinated children age 24m and older with persistent complement component deficiency or anatomic or functional asplenia; give 2 doses, 2m apart. If Menactra is given, it must be separated by 4wks from the final dose of PCV13. • Give age-appropriate series of meningococcal conjugate vaccine (brand must be licensed for age of child) to 1) children age 2m and older at risk during a community outbreak attributable to a vaccine serogroup and 2) children age 2m and older travelling to or living in countries with hyperendemic or epidemic meningococcal disease. Prior receipt of MenHibrix is not sufficient for children traveling to the meningitis belt or the Hajj.	• If previously vaccinated and risk of meningococcal disease persists, revaccinate with MenACWY in 3yrs (if previous dose given when younger than age 7yrs) or in 5 yrs (if previous dose given at age 7yrs or older). Then, give additional booster doses every 5 yrs if risk continues. • Minimum ages for MCV: 6wks Men-Hibrix; 2m Menveo; 9m Menactra. See ACIP schedule footnotes for additional information on catch-up vaccination of high-risk persons and for MenHibrix. • If using Menactra in a high-risk child, it should be given before or at the same visit as DTaP is administered.	**Contraindication** Previous severe allergic reaction (e.g., anaphylaxis) to this vaccine or to any of its components. **Precaution** Moderate or severe acute illness, with or without fever.
Meningococcal serogroup B (MenB) Bexsero and Trumenba *Give IM*	• Teens age 16 through 18yrs may be vaccinated routinely as a Category B recommendation (provider-patient discussion). Give 2 doses of either MenB vaccine: Bexsero, spaced 1m apart; Trumenba, spaced 6m apart. MenB brands are not interchangeable. • For children age 10yrs and older with persistent complement component deficiencies, functional or anatomic asplenia, including sickle cell disease, or who are at risk during a community outbreak of serotype B, give either 2 doses of Bexsero, 1m apart, or 3 doses of Trumenba on a 0, 2, and 6m schedule. MenB brands are not interchangeable. • MenB vaccine may be given concomitantly with MCV4 vaccine.		

Summary of Recommendations for Adult Immunization (Age 19 years and older)

Vaccine name and route	People for whom vaccination is recommended	Schedule for vaccination administration (any vaccine can be given with another unless otherwise noted)	Contraindications and precautions (mild illness is not a contraindication)
Influenza Inactivated Influenza vaccine (IIV*) *Give IM or ID (intradermally)* * includes recombinant influenza vaccine (RIV3)	For people through age 18yrs, consult "Summary of Recommendations for Child/Teen Immunization" at www.immunize.org/catg.d/p2010.pdf. • Vaccination is recommended for all adults. • Adults age 18 through 64yrs may be given any intramuscular IIV product (Fluzone, Fluvirin, Afluria, Flucelvax, Fluarix, FluLaval), or the intradermal IIV product (Fluzone Intradermal), or RIV3 (FluBlok). • Adults age 18 through 64yrs may be given intramuscular IIV (Afluria) with a needle and syringe or using a jet injector (Stratis). • Adults age 65yrs and older may be given any standard-dose IIV referenced in the second bullet above, Fluad, or high-dose IIV (Fluzone High-Dose), or RIV3 • Live attenuated influenza vaccine (LAIV) should not be used during the 2016–17 influenza season.	• Give 1 dose every year in the fall or winter. • Begin vaccination services as soon as vaccine is available and continue until the supply is depleted. • Continue to give vaccine to unvaccinated adults throughout the influenza season (including when influenza activity is present in the community) and at other times when the risk of influenza exists.	**Contraindications** • Previous severe allergic reaction (e.g., anaphylaxis) to this vaccine, to any of its components, including egg protein. • Adults who have experienced a severe reaction to eggs involving symptoms other than hives may receive any age-appropriate influenza vaccine, including RIV3 which does not contain egg protein. The vaccine should be administered in a medical setting (e.g., a health department or physician office) and should be supervised by a healthcare provider who is able to recognize and manage severe allergic conditions. **Precautions** • Moderate or severe acute illness with or without fever. • History of Guillain-Barré syndrome (GBS) within 6 wks following previous influenza vaccination. • For adults who experience only hives with exposure to eggs, give any age-appropriate influenza vaccine.
Td, Tdap (Tetanus, diphtheria, pertussis) *Give IM*	For people through age 18yrs, consult "Summary of Recommendations for Child/Teen Immunization" at www.immunize.org/catg.d/ p2010.pdf. • All people who lack written documentation of a primary series consisting of at least 3 doses of tetanus- and diphtheria-toxoid-containing vaccine. • A booster dose of Td or Tdap may be needed for wound management, so consult ACIP recommendations.[1] **For Tdap only** • Adults who have not already received Tdap or whose Tdap history is not known. • Healthcare personnel of all ages. • Give Tdap to pregnant women during each pregnancy (preferred during the early part of gestational weeks 27 through 36), regardless of the interval since prior Td or Tdap.	• For people who are unvaccinated or behind, complete the primary Td series (3 doses with an interval of 1–2m between dose #1 and #2, and an interval of 6–12m between dose #2 and #3); substitute a one-time dose of Tdap for one of the doses in the series, preferably the first. • Give Td booster every 10yrs after the primary series has been completed. • Tdap should be given regardless of interval since previous Td.	**Contraindications** • Previous severe allergic reaction (e.g., anaphylaxis) to this vaccine or to any of its components. • For Tdap only, history of encephalopathy not attributable to an identifiable cause, within 7d following DTP/DTaP, or Tdap. **Precautions** • Moderate or severe acute illness with or without fever. • History of Guillain-Barré syndrome within 6wks following previous dose of tetanus-toxoid-containing vaccine. • History of Arthus-type reaction following a prior dose of tetanus- or diphtheria-toxoid-containing vaccine (including MenACWY); defer vaccination until at least 10yrs have elapsed since the last tetanus toxoid-containing vaccine. • For pertussis-containing vaccines only, progressive or unstable neurologic disorder, uncontrolled seizures, or progressive encephalopathy until a treatment regimen has been established and the condition has stabilized.

1 CDC. Preventing Tetanus, Diphtheria, and Pertussis Among Adults: Use of Tetanus Toxoid, Reduced Diphtheria Toxoid and Acellular Pertussis Vaccine. Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR* 2006;55(RR-17):25.

This document was adapted from the recommendations of the Advisory Committee on Immunization Practices (ACIP). To obtain copies of these recommendations, visit CDC's website at www.cdc.gov/vaccines/hcp/ACIP-recs/index.html or visit the Immunization Action Coalition (IAC) website at www.immunize.org/acip.

This table is revised periodically. Visit IAC's website at www.immunize.org/adultrules to make sure you have the most current version.

For the purposes of calculating intervals between doses, 4 weeks = 28 days. Intervals of 4 months or greater are determined by calendar months.

A vaccine series does not need to be restarted, regardless of the time that has elapsed between doses.

Summary of Recommendations for Adult Immunization (Age 19 years and older)

Vaccine name and route	People for whom vaccination is recommended	Schedule for vaccination administration (any vaccine can be given with another unless otherwise noted)	Contraindications and precautions (mild illness is not a contraindication)
MMR (Measles, mumps, rubella) *Give Subcut*	For people through age 18yrs, consult "Summary of Recommendations for Child/Teen Immunization" at www.immunize.org/catg.d/p2010.pdf. • People born in 1957 or later (especially those born outside the U.S.) should receive at least 1 dose of MMR if they have no laboratory evidence of immunity to each of the 3 diseases or documentation of a dose given on or after the first birthday. • People in high-risk groups, such as healthcare personnel (paid, unpaid, or volunteer), students entering college and other post-high school educational institutions, and international travelers, should receive a total of 2 doses. • People born before 1957 are usually considered immune, but evidence of immunity (serology or documented history of 2 doses of MMR) should be considered for healthcare personnel. • Women of childbearing age who do not have acceptable evidence of rubella immunity or vaccination.	• Give 1 or 2 doses (see criteria in 1st and 2nd bullets in box to left). • If dose #2 is recommended, give it no sooner than 4wks after dose #1. • If woman of childbearing-age is found to be rubella susceptible and is not pregnant, give 1 dose of MMR; if she is pregnant, the dose should be given postpartum. This includes women who have already received 1 or 2 doses of rubella-containing vaccine. • If 2 or more of the following live virus vaccines are to be given – MMR, Var, HZV, and/or yellow fever – they should be given on the same day. If they are not given on the same day, space them by at least 28d. May use as post-exposure prophylaxis if given within 3d of exposure.	**Contraindications** • Previous severe allergic reaction (e.g., anaphylaxis) to this vaccine or to any of its components. • Pregnancy or possibility of pregnancy within 4wks. • Severe immunodeficiency (e.g., hematologic and solid tumors; receiving chemotherapy; congenital immunodeficiency; long-term immunosuppressive therapy; people with human immunodeficiency virus (HIV) infection who are severely immunocompromised. **NOTE:** HIV infection is NOT a contraindication to MMR for those who are not severely immunocompromised (i.e., CD4+ T-lymphocyte counts are greater than or equal to 200 cells/μL) for 6m.[1] **Precautions** • Moderate or severe acute illness with or without fever. • If blood, plasma, and/or immune globulin were given in past 11m, see ACIP's *General Recommendations on Immunization*[2] regarding time to wait before vaccinating. • History of thrombocytopenia or thrombocytopenic purpura. **NOTE:** If TST (tuberculosis skin test) and MMR are both needed but not given on same day, delay TST for at least 4wks after MMR.
Varicella (chickenpox) (Var) *Give Subcut*	For people through age 18yrs, consult "Summary of Recommendations for Child/Teen Immunization" at www.immunize.org/catg.d/p2010.pdf. • All adults without evidence of immunity. **NOTE:** Evidence of immunity is defined as written documentation of 2 doses of varicella vaccine; a history of varicella disease or herpes zoster (shingles) based on healthcare-provider diagnosis; laboratory evidence of immunity or confirmation of disease; and/or birth in the U.S. before 1980, with the exceptions that follow. – Healthcare personnel (HCP) born in the U.S. before 1980 who do not meet any of the criteria above should be tested or given the 2-dose vaccine series. If testing indicates they are not immune, give the 1st dose of varicella vaccine immediately. Give the 2nd dose 4–8 wks later. – Pregnant women born in the U.S. before 1980 who do not meet any of the criteria above should either 1) be tested for susceptibility during pregnancy and if found susceptible, given the 1st dose of varicella vaccine postpartum before hospital discharge, or 2) not be tested for susceptibility and given the 1st dose of varicella vaccine post-partum before hospital discharge. Give the 2nd dose 4–8wks later.	• Give 2 doses. • Dose #2 is given 4–8wks after dose #1. • If dose #2 is delayed, do not start over. Just give dose #2. • If 2 or more of the following live virus vaccines are to be given – MMR, Var, HZV, and/or yellow fever – they should be given on the same day. If they are not given on the same day, space them by at least 28d. • May use as postexposure prophylaxis if given within 5d of exposure.	**Contraindications** • Previous severe allergic reaction (e.g., anaphylaxis) anaphylactic reaction to this vaccine or to any of its components. • Pregnancy or possibility of pregnancy within 4wks. • People on long-term immunosuppressive therapy or who are immunocompromised because of malignancy and primary or acquired immunodeficiency, including HIV/AIDS (although vaccination may be considered if CD4+ T-lymphocyte counts are greater than or equal to 200 cells/μL.[3]). • People with isolated B-lymphocyte deficiency may receive varicella vaccine. **Precautions** • Moderate or severe acute illness with or without fever. • If blood, plasma, and/or immune globulin (IG or VZIG) were given in past 11m, see ACIP's *General Recommendations on Immunization*[2] regarding time to wait before vaccinating. • Receipt of specific antivirals (i.e., acyclovir, famciclovir, or valacyclovir) 24hrs before vaccination, if possible; delay resumption of these antiviral drugs for 14d after vaccination.

1 CDC. Prevention of Measles, Rubella, Congenital Rubella Syndrome, and Mumps, 2013. Summary Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR* 2013;62 (No. RR-4):23.

2 CDC. General Recommendations on Immunization – Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR* 2011;60 (No. RR-2):39.

3 CDC. Prevention of Varicella. Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR* 2007;56(No. RR-4):24–25.

Summary of Recommendations for Adult Immunization (Age 19 years and older)

Vaccine name and route	People for whom vaccination is recommended	Schedule for vaccination administration (any vaccine can be given with another unless otherwise noted)	Contraindications and precautions (mild illness is not a contraindication)
Hepatitis A (HepA; Havrix, Vaqta) *Give IM* Brands may be used interchangeably.	For people through age 18yrs, consult "Summary of Recommendations for Child/Teen Immunization" at www.immunize.org/catg.d/ p2010.pdf. • All adults who want to be protected from hepatitis A virus (HAV) infection. • People who travel or work anywhere EXCEPT the U.S., Western Europe, New Zealand, Australia, Canada, and Japan. • People with chronic liver disease; injecting and non-injecting drug users; men who have sex with men; people who receive clotting-factor concentrates; people who work with HAV in lab settings; food handlers when health authorities or private employers determine vaccination to be appropriate. • People who anticipate close personal contact with an international adoptee from a country of high or intermediate endemicity during the first 60d following the adoptee's arrival in the U.S. • Postexposure: adults age 40yrs or younger with recent (within 2wks) exposure to HAV, give HepA. For people older than age 40yrs with recent (within 2wks) exposure to HAV, immune globulin is preferred over HepA vaccine.	• Give 2 doses, spaced 6–18m apart (depending on brand). • If dose #2 is delayed, do not repeat dose #1. Just give dose #2. For Twinrix (hepatitis A and B combination vaccine [GSK]) for patients age 18yrs and older only: give 3 doses on a 0, 1, 6m schedule. There must be at least 4wks between doses #1 and #2, and at least 5m between doses #2 and #3. An alternative schedule can also be used at 0, 7d, 21–30d, and a booster at 12m.	**Contraindication** Previous severe allergic reaction (e.g. anaphylaxis) to this vaccine or to any of its components. **Precautions** Moderate or severe acute illness with or without fever.
Hepatitis B (HepB; Engerix-B, Recombivax HB) *Give IM* Brands may be used interchangeably.	For people through age 18yrs, consult "Summary of Recommendations for Child/Teen Immunization" at www.immunize.org/catg.d/p2010.pdf. • All adults who want to be protected from hepatitis B virus infection. • Household contacts and sex partners of HBsAg-positive people; injecting drug users; sexually active people not in a long-term, mutually monogamous relationship; men who have sex with men; people with HIV; people seeking STD evaluation or treatment; hemodialysis patients and those with renal disease that may result in dialysis; diabetics younger than age 60yrs (diabetics age 60yrs and older may be vaccinated at the clinician's discretion[1]; healthcare personnel and public safety workers who are exposed to blood; clients and staff of institutions for the developmentally disabled; inmates of long-term correctional facilities; certain international travelers; and people with chronic liver disease. Adults with chronic liver disease include, but are not limited to, those with hepatitis C virus infection, cirrhosis, fatty liver disease, alcoholic liver disease, autoimmune hepatitis, and an alanine aminotransferase (ALT) or aspartate aminotransferase (AST) level greater than twice the upper limit of normal. **NOTE:** Provide serologic screening for immigrants from endemic areas. If patient is chronically infected, assure appropriate disease management. For sex partners and household contacts of HBsAg-positive people, provide serologic screening and administer initial dose of HepB vaccine at same visit.	Give 3 doses on a 0, 1, 6m schedule. • Alternative timing options for vaccination include 0, 2, 4m; 0, 1, 4m; and 0, 1, 2, 12m (Engerix brand only). • There must be at least 4wks between doses #1 and #2, and at least 8wks between doses #2 and #3. Overall, there must be at least 16wks between doses #1 and #3. • Give adults on hemodialysis or with other immunocompromising conditions 1 dose of 40 µg/mL (Recombivax HB) at 0, 1, 6m or 2 doses of 20 µg/mL (Engerix-B) given simultaneously at 0, 1, 2, 6m. • **Schedule for those who have fallen behind:** If the series is delayed between doses, DO NOT start the series over. Continue from where the schedule was interrupted.	**Contraindication** Previous severe allergic reaction (e.g. anaphylaxis) to this vaccine or to any of its components. **Precaution** Moderate or severe acute illness with or without fever.

1 CDC. Use of Hepatitis B Vaccination for Adults with Diabetes Mellitus: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR* 2011;60(50):1709.

Summary of Recommendations for Adult Immunization (Age 19 years and older)

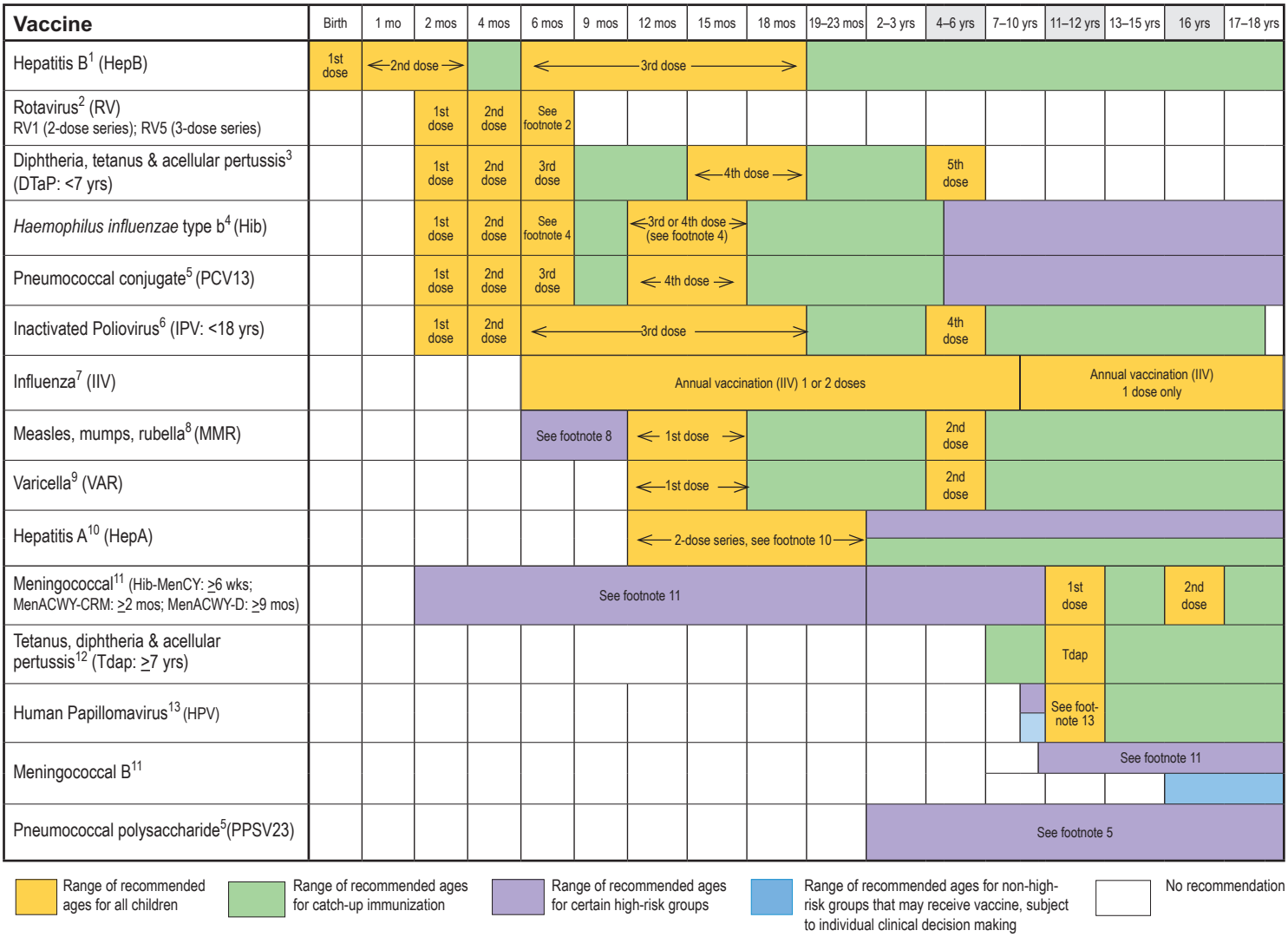
Vaccine name and route	People for whom vaccination is recommended	Schedule for vaccination administration (any vaccine can be given with another unless otherwise noted)	Contraindications and precautions (mild illness is not a contraindication)
Zoster (shingles) (HZV) *Give Subcut*	• People age 60yrs and older. **NOTE:** Do not test people age 60yrs or older for varicella immunity prior to zoster vaccination. Persons born in the U.S. prior to 1980 can be presumed to be immune to varicella for the purpose of zoster vaccination, regardless of their recollection of having had chickenpox.	• Give 1-time dose if unvaccinated, regardless of previous history of herpes zoster (shingles) or chickenpox. • If 2 or more of the following live virus vaccines are to be given – MMR, Var, HZV, and/or yellow fever – they should be given on the same day. If they are not, space them by at least 28d.	**Contraindications** • Previous severe allergic reaction (e.g., anaphylaxis) to any component of zoster vaccine. • Primary cellular or acquired immunodeficiency. • Pregnancy. **Precautions** • Moderate or severe acute illness with or without fever. • Receipt of specific antivirals (i.e., acyclovir, famciclovir, or valacyclovir) 24hrs before vaccination, if possible; delay resumption of these antiviral drugs for 14d after vaccination.
Hib (*Haemophilus influenzae* type b) *Give IM*	For people through age 18yrs, consult "Summary of Recommendations for Child/Teen Immunization" at www.immunize.org/catg.d/p2010.pdf. • Not routinely recommended for healthy adults. • Those adults at highest risk of serious Hib disease include people who 1) have anatomic or functional asplenia, 2) are undergoing an elective splenectomy, or 3) are recipients of hematopoietic stem cell transplant (HSCT).	• Give 1 dose of any Hib conjugate vaccine to adults in categories 1 or 2 (see 2nd bullet in column to left) if no history of previous Hib vaccine. • For HSCT patients, regardless of Hib vaccination history, give 3 doses, at least 4wks apart, beginning 6–12m after transplant.	**Contraindication** Previous severe allergic reaction (e.g., anaphylaxis) to this vaccine or to any of its components. **Precautions** Moderate or severe acute illness with or without fever.
Human papillomavirus (HPV) (4vHPV or 9vHPV) (Gardasil9) *Give IM*	For people through age 18yrs, consult "Summary of Recommendations for Child/Teen Immunization" at www.immunize.org/catg.d/p2010.pdf. • For unvaccinated or partially vaccinated females through age 26yrs: Complete a 3-dose series of 4vHPV or 9vHPV. • For unvaccinated or partially vaccinated males through age 21yrs: Complete a 3-dose series of 4vHPV or 9vHPV. • For unvaccinated or partially vaccinated males age 22 through 26yrs: Complete a 3-dose series of 4vHPV or 9vHPV for those who 1) have sex with men or 2) are immunocompromised as a result of infection (including HIV), disease, or medications, or 3) want to be protected from HPV.	• Give 3 doses on a 0, 1–2, 6m schedule. Use either 4vHPV or 9vHPV for both women and men. • There must be at least 4wks between doses #1 and #2 and at least 12wks between doses #2 and #3. Overall, there must be at least 5mos between doses #1 and #3. • If the type of HPV vaccine previously given is not known or not available, any available HPV vaccine may be used to complete the series.	**Contraindication** Previous severe allergic reaction (e.g., anaphylaxis) to this vaccine or to any of its components. **Precautions** • Moderate or severe acute illness with or without fever. • Pregnancy.
	Adult females through age 26yrs and adult males through age 21 yrs (and males age 22 through 26yrs who receive HPV vaccine) who initiated the HPV vaccination series before age 15yrs and received 2 doses at least 5m apart are considered adequately vaccinated and do not need an additional dose of HPV vaccine.		
Inactivated Polio (IPV) *Give IM or Subcut*	For people through age 18yrs, consult "Summary of Recommendations for Child/Teen Immunization" at www.immunize.org/catg.d/p2010.pdf. • Not routinely recommended for U.S. residents age 18yrs and older. **NOTE:** Adults living in the U.S. who never received or completed a primary series of polio vaccine need not be vaccinated unless they intend to travel to areas where exposure to wild-type virus is likely. Adults with documented prior vaccination can receive 1 booster dose if traveling to polio endemic areas or to areas where the risk of exposure is high.	For unique situations, schedules, and dosing information, see ACIP inactivated polio vaccine recommendations on pages 829–830 at www.cdc.gov/mmwr/PDF/wk/mm5830.pdf.	**Contraindication** Previous severe allergic reaction (e.g., anaphylaxis) to this vaccine or to any of its components. **Precautions** • Moderate or severe acute illness with or without fever. • Pregnancy.

Summary of Recommendations for Adult Immunization (Age 19 years and older)

Vaccine name and route	People for whom vaccination is recommended	Schedule for vaccination administration (any vaccine can be given with another unless otherwise noted)	Contraindications and precautions (mild illness is not a contraindication)
Pneumococcal conjugate (PCV13; Prevnar13) *Give IM* **Pneumococcal polysaccharide** (PPSV23; Pneumovax 23) *Give IM or Subcut*	For people through age 18yrs, consult "Summary of Recommendations for Child/Teen Immunization" www.immunize.org/catg.d/p2010.pdf. **All people age 65yrs or older should receive** • 1-time dose of PCV13 (if previously unvaccinated) and 1 dose of PPSV23, separated by 1 yr; if possible, give PCV13 first. **People younger than age 65yrs should receive** • 1-time dose of PCV13 and 1st dose of PPSV23 if they have functional or anatomic asplenia, immunocompromising condition (see below), CSF leak, or are a candidate for or recipient of a cochlear implant, • 2nd dose of PPSV23 if at highest risk of serious pneumococcal infection, including those who – Have anatomic or functional asplenia, including sickle cell disease. – Have an immunocompromising condition, including HIV infection, leukemia, lymphoma, Hodgkin's disease, multiple myeloma, generalized malignancy, chronic renal failure, or nephrotic syndrome. – Are receiving immunosuppressive chemotherapy (including high-dose corticosteroids). – Have received an organ or bone marrow transplant. • PPSV23 only (not PCV13) if younger than 65 yrs and they have chronic cardiac or pulmonary disease (including asthma), chronic liver disease, alcoholism, diabetes, smoke cigarettes, or live in special environments or social settings (including American Indian/Alaska Natives age 50 through 64yrs if recommended by local public health authorities).	• When recommended (see column at left), give PCV13 and/or PPSV23 if unvaccinated or if previous vaccination history is unknown. • For healthy people age 65yrs and older, give PCV13 first followed by PPSV23 in 1yr. • When both PCV13 and PPSV23 are indicated, give PCV13 first followed by PPSV23 in 1yr. If previously vaccinated with PPSV23, give PCV13 at least 12m after PPSV23. For people at highest risk of serious pneumococcal infection, if not previously vaccinated with PPSV23, give PCV13 first, followed by PPSV23 in 8wks. • Give another dose of PPSV23 to people – Age 65 yrs and older if 1st dose was given prior to age 65yrs and 5yrs have elapsed since previous dose of PPSV23. – Age 19–64yrs who are at highest risk of pneumococcal infection or rapid antibody loss (see 3rd bullet in the box to left for listing of people at highest risk) and 5yrs have elapsed since dose #1.	**Contraindication** Previous severe allergic reaction (e.g., anaphylaxis) to this vaccine, including (for PCV13) to any diphtheria toxoid-containing vaccine, or to any of its components. **Precaution** Moderate or severe acute illness with or without fever.
Meningococcal conjugate (MenACWY; Menactra, Menveo) *Give IM* **Meningococcal polysaccharide** (MPSV4; Menomune) *Give Subcut*	For people through age 18yrs, consult "Summary of Recommendations for Child/Teen Immunization" at www.immunize.org/catg.d/ p2010.pdf. • People with anatomic or functional asplenia, HIV infection, or persistent complement component deficiency. • People who travel to or reside in countries in which meningococcal disease is hyperendemic or epidemic (e.g., the "meningitis belt" of Sub-Saharan Africa). • Microbiologists routinely exposed to isolates of *N. meningitidis*. • First-year college students through age 21yrs who live in residence halls and who have not been previously vaccinated or who received their first dose prior to age 16yrs.; see the 5th bullet in the box to the right for details.	• Give 2 initial doses of MenACWY separated by 2m to adults with risk factors listed in 1st bullet in column to left. • Give 1 initial dose of MenACWY to all other adults with risk factors (see 2nd–4th bullets in column to left). • Give booster doses of MenACWY every 5yrs to adults with continuing risk (see the 1st–3rd bullets in column to left). • MenACWY is preferred over MPSV4 for people age 55yrs and younger. For people age 56yrs and older who anticipate multiple doses (see the 1st–3rd bullets in column to left) or who have received MenACWY previously, use MenACWY. For all others, give 1 dose of MPSV4. • For first-year college students age 19–21yrs living in residence halls, give 1 initial dose of MenACWY if unvaccinated. Give dose #2 if most recent dose was given when younger than 16yrs.	**Contraindication** Previous severe allergic reaction (e.g., anaphylaxis) to this vaccine or to any of its components. **Precaution** Moderate or severe acute illness with or without fever.
Meningococcal serogroup B (MenB; Bexsero, Trumenba) *Give IM*	• Young adults through age 23yrs may be vaccinated routinely as a Category B recommendation (provider-patient discussion). • People with anatomic or functional asplenia or persistent complement component deficiency. • Microbiologists routinely exposed to isolates of *N. meningitidis*. • People identified as at increased risk because of a serogroup B meningococcal disease outbreak.	• Give 2 doses of either MenB vaccine: Bexsero, spaced 1m apart; Trumenba, spaced 6mapart. MenB products are not interchangeable. • For people with risk (see 2nd–4th bullets in column to left), give either 2 doses of Bexsero, 1m apart, or 3 doses of Trumenba on a 0, 2, and 6m schedule. • MenB vaccine may be given concomitantly with MenACWY vaccine.	

Figure 1. Recommended Immunization Schedule for Children and Adolescents Ages18 Years or Younger, United States, 2017

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



This schedule includes recommendations in effect as of January 1, 2017. Any dose not administered at the recommended age should be administered at a subsequent visit, when indicated and feasible. The use of a combination vaccine generally is preferred over separate injections of its equivalent component vaccines. Vaccination providers should consult the relevant Advisory Committee on Immunization Practices (ACIP) statement for detailed recommendations, available online at www.cdc.gov/vaccines/hcp/acip-recs/index.html. Clinically significant adverse events that follow vaccination should be reported to the Vaccine Adverse Event Reporting System (VAERS) online (www.vaers.hhs.gov) or by telephone (800-822-7967). Suspected cases of vaccine-preventable diseases should be reported to the state or local health department. Additional information, including precautions and contraindications for vaccination, is available from CDC online (www.cdc.gov/vaccines/hcp/admin/contraindications.html) or by telephone (800-CDC-INFO [800-232-4636]).

Additional Information

- For information on contraindications and precautions for the use of a vaccine and for additional information regarding that vaccine, vaccination providers should consult the ACIP General Recommendations on Immunization and the relevant ACIP statement, available online at www.cdc.gov/vaccines/hcp/acip-recs/index.html.
- For the purposes of calculating intervals between doses, 4 weeks = 28 days. Intervals of 4 months or greater are determined by calendar months.
- Vaccine doses administered 4 days or less before the minimum interval are considered valid. Doses of any vaccine administered ≥5 days earlier than the minimum interval or minimum age should not be counted as valid doses and should be repeated as age-appropriate. The repeat dose should be spaced after the invalid dose by the recommended minimum interval. For further details, see Table 1, Recommended and minimum ages and intervals between vaccine doses in *MMWR,* General Recommendations on Immunization and Reports/Vol.60/No.2; available online at www.cdc.gov/mmwr/pdf/rr/rr6002.pdf.
- Information on travel vaccine requirements and recommendations is available at wwwnc.cdc.gov/travel.
- For vaccination of persons with primary and secondary immunodeficiencies, see Table 13, "Vaccination of persons with primary and secondary immunodeficiencies," in General Recommendations on Immunization (ACIP), available at www.cdc.gov/mmwr/pdf/rr/rr6002.pdf; and Immunization in Special Clinical Circumstances, (American Academy of Pediatrics) in Kimberlin DW, Brady MT, Jackson MA, Long SS, eds. *Red Book: 2015 Report of the Committee on Infectious Disease.* 30th ed. Elk Grove Village, IL: American Academy of Pediatrics, 2015:68–107.
- The National Vaccine Injury Compensation Program (VICP) is a no-fault alternative to the traditional legal system for resolving vaccine injury petitions. Created by the National Childhood Vaccine Injury Act of 1986, it provides compensation to people found to be injured by certain vaccines. All vaccines within the recommended childhood immunization schedule are covered by VICP except for pneumococcal polysaccharide vaccine (PPSV23). For more information, see www.hrsa.gov/vaccinecompensation/index.html.

Figure 2. Catch-up Immunization Schedule for Persons Ages 4 Months through 18 Years Who Start Late or Who Are More Than 1 Month Behind—United States, 2017

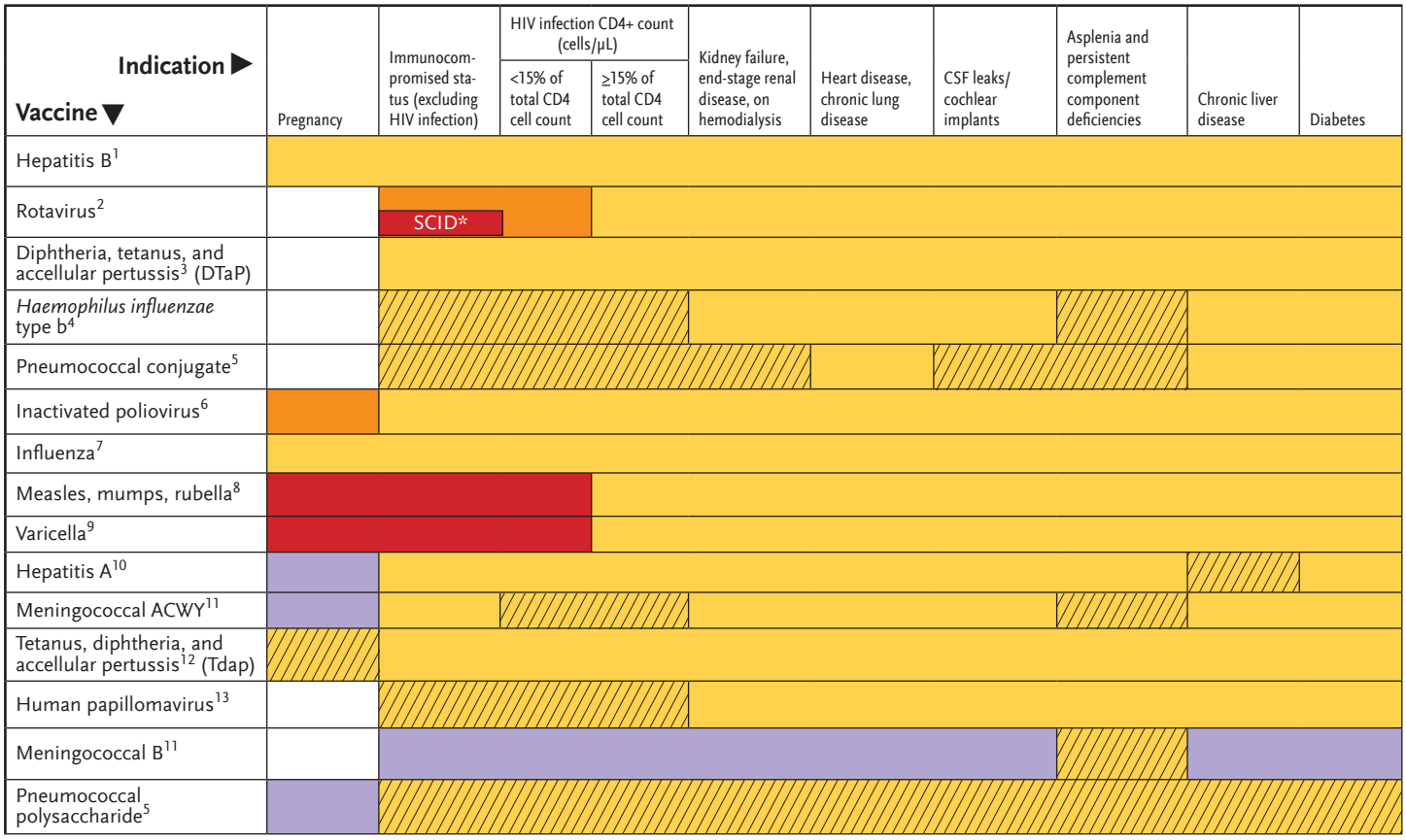
The figure below provides catch-up schedules and minimum intervals between doses for children whose vaccinations have been delayed. A vaccine series does not need to be restarted, regardless of the time that has elapsed between doses. Use the section appropriate for the child's age. Always use this table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

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

These schedules are approved by the Advisory Committee on Immunization Practices (www.cdc.gov/vaccines/acip), the American Academy of Pediatrics (www.aap.org), the American Academy of Family Physicians (www.aafp.org), and the American College of Obstetricians and Gynecologists (www.acog.org).

(continued)

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



*Severe Combined Immunodeficiency

Footnotes: Recommended Immunization Schedule for Children and Adolescents Ages 18 Years or Younger, United States, 2017

For further guidance on the use of the vaccines mentioned below, see www.cdc.gov/vaccines/hcp/acip-recs/index.html.
For vaccine recommendations for persons ages 19 years and older, see the Recommended Adult Immunization Schedule.

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

Routine vaccination:

At birth:

- Administer monovalent HepB vaccine to all newborns within 24 hours of birth.
- For infants born to hepatitis B surface antigen (HBsAg)-positive mothers, administer HepB vaccine and 0.5 mL of hepatitis B immune globulin (HBIG) within 12 hours of birth. These infants should be tested for HBsAg and antibody to HBsAg (anti-HBs) at age 9 through 12 months (preferably at the next well-child visit) or 1 to 2 months after completion of the HepB series if the series was delayed.
- If mother's HBsAg status is unknown, within 12 hours of birth, administer HepB vaccine regardless of birth weight. For infants weighing less than 2,000 grams, administer HBIG in addition to HepB vaccine within 12 hours of birth. Determine mother's HBsAg status as soon as possible and, if mother is HBsAg positive, also administer HBIG to infants weighing 2,000 grams or more as soon as possible, but no later than age 7 days.

Doses following the birth dose:

- The second dose should be administered at age 1 or 2 months. Monovalent HepB vaccine should be used for doses administered before age 6 weeks.
- Infants who did not receive a birth dose should receive 3 doses of a HepB-containing vaccine on a schedule of 0, 1 to 2 months, and 6 months, starting as soon as feasible (see Figure 2).
- Administer the second dose 1 to 2 months after the first dose (minimum interval of 4 weeks); administer the third dose at least 8 weeks after the second dose and at least 16 weeks after the **first** dose. The final (third or fourth) dose in the HepB vaccine series should be administered **no earlier than age 24 weeks**.
- Administration of a total of 4 doses of HepB vaccine is permitted when a combination vaccine containing HepB is administered after the birth dose.

Catch-up vaccination:

- Unvaccinated persons should complete a 3-dose series.
- A 2-dose series (doses separated by at least 4 months) of adult formulation Recombivax HB is licensed for use in children age 11 through 15 years.
- For other catch-up guidance, see Figure 2.

2. Rotavirus (RV) vaccines. (Minimum age: 6 weeks for both RV1 [Rotarix] and RV5 [RotaTeq])

Routine vaccination:

- Administer a series of RV vaccine to all infants as follows:
  1. If Rotarix is used, administer a 2-dose series at ages 2 and 4 months.
  2. If RotaTeq is used, administer a 3-dose series at ages 2, 4, and 6 months.
  3. If any dose in the series was RotaTeq or vaccine product is unknown for any dose in the series, a total of 3 doses of RV vaccine should be administered.

Catch-up vaccination:

- The maximum age for the first dose in the series is 14 weeks, 6 days; vaccination should not be initiated for infants ages 15 weeks, 0 days, or older.
- The maximum age for the final dose in the series is 8 months, 0 days.
- For other catch-up guidance, see Figure 2.

3. Diphtheria and tetanus toxoids and acellular pertussis (DTaP) vaccine. (Minimum age: 6 weeks. Exception: DTaP-IPV [Kinrix, Quadracel]: 4 years)

Routine vaccination:

- Administer a 5-dose series of DTaP vaccine at ages 2, 4, 6, 15 through 18 months, and 4 through 6 years. The fourth dose may be administered as early as age 12 months, provided at least 6 months have elapsed since the third dose.
- Inadvertent administration of fourth DTaP dose early: If the fourth dose of DTaP was administered at least 4 months after the third dose of DTaP and the child was age 12 months or older, it does not need to be repeated.

Catch-up vaccination:

- The fifth dose of DTaP vaccine is not necessary if the fourth dose was administered at age 4 years or older.
- For other catch-up guidance, see Figure 2.

4. *Haemophilus influenzae* type b (Hib) conjugate vaccine. (Minimum age: 6 weeks for PRP-T [ActHIB, DTaP-IPV/Hib (Pentacel), Hiberix, and Hib-MenCY (MenHibrix)], PRP-OMP [PedvaxHIB])

Routine vaccination:

- Administer a 2- or 3-dose Hib vaccine primary series and a booster dose (dose 3 or 4, depending on vaccine used in primary series) at age 12 through 15 months to complete a full Hib vaccine series.

(continued)

- The primary series with ActHIB, MenHibrix, Hiberix, or Pentacel consists of 3 doses and should be administered at ages 2, 4, and 6 months. The primary series with PedvaxHib consists of 2 doses and should be administered at ages 2 and 4 months; a dose at age 6 months is not indicated.
- One booster dose (dose 3 or 4, depending on vaccine used in primary series) of any Hib vaccine should be administered at age 12 through 15 months.
- For recommendations on the use of MenHibrix in patients at increased risk for meningococcal disease, refer to the meningococcal vaccine footnote and also to *MMWR* 2014;63(RR01):1–13, available at www.cdc.gov/mmwr/pdf/rr/rr6301.pdf.

Catch-up vaccination:

- If dose 1 was administered at ages 12 through 14 months, administer a second (final) dose at least 8 weeks after dose 1, regardless of Hib vaccine used in the primary series.
- If both doses were PRP-OMP (PedvaxHIB or Comvax) and were administered before the first birthday, the third (and final) dose should be administered at age 12 through 59 months and at least 8 weeks after second dose.
- If the first dose was administered at age 7 through 11 months, administer the second dose at least 4 weeks later and a third (and final) dose at age 12 through 15 months or 8 weeks after the second dose, whichever is later.
- If first dose was administered before the first birthday and second dose administered at younger than 15 months, a third (and final) dose should be administered 8 weeks later.
- For unvaccinated children ages 15 through 59 months, administer only 1 dose.
- For other catch-up guidance, see Figure 2. For catch-up guidance related to MenHibrix, see the meningococcal vaccine footnotes and also *MMWR* 2014;63(RR01):1–13, available at www.cdc.gov/mmwr/pdf/rr/rr6301.pdf.

Vaccination of persons with high-risk conditions:

- Children ages 12 through 59 months who are at increased risk for Hib disease, including chemotherapy recipients and those with anatomic or functional asplenia (including sickle cell disease), human immunodeficiency virus (HIV) infection, immunoglobulin deficiency, or early component complement deficiency, who have received either no doses or only 1 dose of Hib vaccine before age 12 months, should receive 2 additional doses of Hib vaccine, 8 weeks apart; children who received 2 or more doses of Hib vaccine before age 12 months should receive 1 additional dose.
- For patients younger than age 5 years undergoing chemotherapy or radiation treatment who received a Hib vaccine dose(s) within 14 days of starting therapy or during therapy, repeat the dose(s) at least 3 months following therapy completion.
- Recipients of hematopoietic stem cell transplant (HSCT) should be revaccinated with a 3-dose regimen of Hib vaccine starting 6 to 12 months after successful transplant, regardless of vaccination history; doses should be administered at least 4 weeks apart.
- A single dose of any Hib-containing vaccine should be administered to unimmunized* children and adolescents age 15 months and older undergoing an elective splenectomy; if possible, vaccine should be administered at least 14 days before procedure.
- Hib vaccine is not routinely recommended for patients ages 5 years or older. However, 1 dose of Hib vaccine should be administered to unimmunized* persons ages 5 years or older who have anatomic or functional asplenia (including sickle cell disease) and unimmunized* persons ages 5 through 18 years with HIV infection.

**Patients who have not received a primary series and booster dose or at least 1 dose of Hib vaccine after age 14 months are considered unimmunized.*

5. Pneumococcal vaccines. (Minimum age: 6 weeks for PCV13, 2 years for PPSV23)

Routine vaccination with PCV13:

- Administer a 4-dose series of PCV13 vaccine at ages 2, 4, and 6 months and at age 12 through 15 months.

Catch-up vaccination with PCV13:

- Administer 1 dose of PCV13 to all healthy children ages 24 through 59 months who are not completely vaccinated for their age.
- For other catch-up guidance, see Figure 2.

Vaccination of persons with high-risk conditions with PCV13 and PPSV23:

- All recommended PCV13 doses should be administered prior to PPSV23 vaccination if possible.
- For children ages 2 through 5 years with any of the following conditions: chronic heart disease (particularly cyanotic congenital heart disease and cardiac failure); chronic lung disease (including asthma if treated with high-dose oral corticosteroid therapy); diabetes mellitus; cerebrospinal fluid leak; cochlear implant; sickle cell disease and other hemoglobinopathies; anatomic or functional asplenia; HIV infection; chronic renal failure; nephrotic syndrome; diseases associated with treatment with immunosuppressive drugs or radiation therapy, including malignant neoplasms, leukemias, lymphomas, and Hodgkin disease; solid organ transplantation; or congenital immunodeficiency:
  1. Administer 1 dose of PCV13 if any incomplete schedule of 3 doses of PCV13 was received previously.
  2. Administer 2 doses of PCV13 at least 8 weeks apart if unvaccinated or any incomplete schedule of fewer than 3 doses of PCV13 was received previously.
  3. The minimum interval between doses of PCV13 is 8 weeks.
  4. For children with no history of PPSV23 vaccination, administer PPSV23 at least 8 weeks after the most recent dose of PCV13.
- For children ages 6 through 18 years who have cerebrospinal fluid leak; cochlear implant; sickle cell disease and other hemoglobinopathies; anatomic or functional asplenia; congenital or acquired immunodeficiencies; HIV infection; chronic renal failure; nephrotic syndrome; diseases associated with treatment with immunosuppressive drugs or radiation therapy, including malignant neoplasms, leukemias, lymphomas, and Hodgkin disease; generalized malignancy; solid organ transplantation; or multiple myeloma:
  1. If neither PCV13 nor PPSV23 has been received previously, administer 1 dose of PCV13 now and 1 dose of PPSV23 at least 8 weeks later.
  2. If PCV13 has been received previously but PPSV23 has not, administer 1 dose of PPSV23 at least 8 weeks after the most recent dose of PCV13.
  3. If PPSV23 has been received but PCV13 has not, administer 1 dose of PCV13 at least 8 weeks after the most recent dose of PPSV23.
- For children ages 6 through 18 years with chronic heart disease (particularly cyanotic congenital heart disease and cardiac failure), chronic lung disease (including asthma if treated with high-dose oral corticosteroid therapy), diabetes mellitus, alcoholism, or chronic liver disease, who have not received PPSV23, administer 1 dose of PPSV23. If PCV13 has been received previously, then PPSV23 should be administered at least 8 weeks after any prior PCV13 dose.
- A single revaccination with PPSV23 should be administered 5 years after the first dose to children with sickle cell disease or other hemoglobinopathies; anatomic or functional asplenia; congenital or acquired immunodeficiencies; HIV infection; chronic renal failure; nephrotic syndrome; diseases associated with treatment with immunosuppressive drugs or radiation therapy, including malignant neoplasms, leukemias, lymphomas, and Hodgkin disease; generalized malignancy; solid organ transplantation; or multiple myeloma.

6. Inactivated poliovirus vaccine (IPV). (Minimum age: 6 weeks)

Routine vaccination:

- Administer a 4-dose series of IPV at ages 2, 4, 6 through 18 months, and 4 through 6 years. The final dose in the series should be administered on or after the fourth birthday and at least 6 months after the previous dose.

Catch-up vaccination:

- In the first 6 months of life, minimum age and minimum intervals are only recommended if the person is at risk of imminent exposure to circulating poliovirus (i.e., travel to a polio-endemic region or during an outbreak).
- If 4 or more doses are administered before age 4 years, an additional dose should be administered at age 4 through 6 years and at least 6 months after the previous dose.
- A fourth dose is not necessary if the third dose was administered at age 4 years or older and at least 6 months after the previous dose.
- If both oral polio vaccine (OPV) and IPV were administered as part of a series, a total of 4 doses should be administered, regardless of the child's current age. If only OPV was administered, and all doses were given prior to age 4 years, 1 dose of IPV should be given at age 4 years or older, and at least 4 weeks after the last OPV dose.
- IPV is not routinely recommended for U.S. residents ages 18 years or older.
- For other catch-up guidance, see Figure 2.

7. Influenza vaccines. (Minimum age: 6 months for inactivated influenza vaccine [IIV], 18 years for recombinant influenza vaccine [RIV])

Routine vaccination:

- Administer influenza vaccine annually to all children beginning at age 6 months. For the 2016–17 season, use of live attenuated influenza vaccine (LAIV) is not recommended.

For children ages 6 months through 8 years:

- For the 2016–17 season, administer 2 doses (separated by at least 4 weeks) to children who are receiving influenza vaccine for the first time or who have not previously received ≥2 doses of trivalent or quadrivalent influenza vaccine before July 1, 2016. For additional guidance, follow dosing guidelines in the 2016–17 ACIP influenza vaccine recommendations (see *MMWR* 2016;65(5):1–54, available at www.cdc.gov/mmwr/volumes/65/rr/pdfs/rr6505.pdf.)
- For the 2017–18 season, follow dosing guidelines in the 2017–18 ACIP influenza vaccine recommendations.

For persons ages 9 years and older:

- Administer 1 dose.

8. Measles, mumps, and rubella (MMR) vaccine. (Minimum age: 12 months for routine vaccination)

Routine vaccination:

- Administer a 2-dose series of MMR vaccine at ages 12 through 15 months and 4 through 6 years. The second dose may be administered before age 4 years, provided at least 4 weeks have elapsed since the first dose.
- Administer 1 dose of MMR vaccine to infants ages 6 through 11 months before departure from the United States for international travel. These children should be revaccinated with 2 doses of MMR vaccine, the first at age 12 through 15 months (12 months if the child remains in an area where disease risk is high), and the second dose at least 4 weeks later.
- Administer 2 doses of MMR vaccine to children ages 12 months and older before departure from the United States for international travel. The first dose should be administered on or after age 12 months and the second dose at least 4 weeks later.

Catch-up vaccination:

- Ensure that all school-aged children and adolescents have had 2 doses of MMR vaccine; the minimum interval between the 2 doses is 4 weeks.

9. Varicella (VAR) vaccine. (Minimum age: 12 months)

Routine vaccination:

- Administer a 2-dose series of VAR vaccine at ages 12 through 15 months and 4 through 6 years. The second dose may be administered before age 4 years, provided at least 3 months have elapsed since the first dose. If the second dose was administered at least 4 weeks after the first dose, it can be accepted as valid.

Catch-up vaccination:

- Ensure that all persons ages 7 through 18 years without evidence of immunity (see *MMWR* 2007;56[No. RR-4], available at www.cdc.gov/mmwr/pdf/rr/rr5604.pdf) have 2 doses of varicella vaccine. For children ages 7 through 12 years, the recommended minimum interval between doses is 3 months (if the second dose was administered at least 4 weeks after the first dose, it can be accepted as valid); for persons ages 13 years and older, the minimum interval between doses is 4 weeks.

10. Hepatitis A (HepA) vaccine. (Minimum age: 12 months)

Routine vaccination:

- Initiate the 2-dose HepA vaccine series at ages 12 through 23 months; separate the 2 doses by 6 to 18 months.
- Children who have received 1 dose of HepA vaccine before age 24 months should receive a second dose 6 to 18 months after the first dose.

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- For any person age 2 years and older who has not already received the HepA vaccine series, 2 doses of HepA vaccine separated by 6 to 18 months may be administered if immunity against hepatitis A virus infection is desired.

Catch-up vaccination:

- The minimum interval between the 2 doses is 6 months.

Special populations:

- Administer 2 doses of HepA vaccine at least 6 months apart to previously unvaccinated persons who live in areas where vaccination programs target older children, or who are at increased risk for infection. This includes persons traveling to or working in countries that have high or intermediate endemicity of infection; men having sex with men; users of injection and non-injection illicit drugs; persons who work with HAV-infected primates or with HAV in a research laboratory; persons with clotting-factor disorders; persons with chronic liver disease; and persons who anticipate close, personal contact (e.g., household or regular babysitting) with an international adoptee during the first 60 days after arrival in the United States from a country with high or intermediate endemicity. The first dose should be administered as soon as the adoption is planned, ideally, 2 or more weeks before arrival of the adoptee.

11. Meningococcal vaccines. (Minimum age: 6 weeks for Hib-MenCY [MenHibrix], 2 months for MenACWY-CRM [Menveo], 9 months for MenACWY-D [Menactra], 10 years for serogroup B meningococcal [MenB] vaccines: MenB-4C [Bexsero] and MenB-FHbp [Trumenba])

Routine vaccination:

- Administer a single dose of Menactra or Menveo vaccine at age 11 through 12 years, with a booster dose at age 16 years.
- For children ages 2 months through 18 years with high-risk conditions, see "Meningococcal conjugate ACWY vaccination of persons with high-risk conditions and other persons at increased risk" and "Meningococcal B vaccination of persons with high-risk conditions and other persons at increased risk of disease" below.

Catch-up vaccination:

- Administer Menactra or Menveo vaccine at age 13 through 18 years if not previously vaccinated.
- If the first dose is administered at age 13 through 15 years, a booster dose should be administered at age 16 through 18 years with a minimum interval of at least 8 weeks between doses.
- If the first dose is administered at age 16 years or older, a booster dose is not needed.
- For other catch-up guidance, see Figure 2.

Clinical discretion:

- Young adults ages 16 through 23 years (preferred age range is 16 through 18 years) who are not at increased risk for meningococcal disease may be vaccinated with a 2-dose series of either Bexsero (0, ≥1 month) or Trumenba (0, 6 months) vaccine to provide short-term protection against most strains of serogroup B meningococcal disease. The two MenB vaccines are not interchangeable; the same vaccine product must be used for all doses.
- If the second dose of Trumenba is given at an interval of <6 months, a third dose should be given at least 6 months after the first dose; the minimum interval between the second and third doses is 4 weeks.

Meningococcal conjugate ACWY vaccination of persons with high-risk conditions and other persons at increased risk of disease:

Children with anatomic or functional asplenia (including sickle cell disease), children with HIV infection, or children with persistent complement component deficiency (includes persons with inherited or chronic deficiencies in C3, C5–9, properdin, factor D, factor H, or taking eculizumab (Soliris]):

- Menveo
  - Children who initiate vaccination at age 8 weeks: Administer doses at ages 2, 4, 6, and 12 months.
  - Unvaccinated children who initiate vaccination at 7 through 23 months: Administer 2 primary doses, with the second dose at least 12 weeks after the first dose AND after the first birthday.
  - Children 24 months and older who have not received a complete series: Administer 2 primary doses at least 8 weeks apart.
- MenHibrix
  - Children who initiate vaccination at age 6 weeks: Administer doses at ages 2, 4, 6, and 12 through 15 months.
  - If the first dose of MenHibrix is given at or after age 12 months, a total of 2 doses should be given at least 8 weeks apart to ensure protection against serogroups C and Y meningococcal disease.
- Menactra
  - Children with anatomic or functional asplenia or HIV infection:
    - Children 24 months or older who have not received a complete series: Administer 2 primary doses at least 8 weeks apart. If Menactra is administered to a child with asplenia (including sickle cell disease) or HIV infection, do not administer Menactra until age 2 years and at least 4 weeks after the completion of all PCV13 doses.
  - Children with persistent complement component deficiency:
    - Children 9 through 23 months: Administer 2 primary doses at least 12 weeks apart.
    - Children 24 months and older who have not received a complete series: Administer 2 primary doses at least 8 weeks apart.
  - All high-risk children:
    - If Menactra is to be administered to a child at high risk for meningococcal disease, it is recommended that Menactra be given either before or at the same time as DTaP.

Meningococcal B vaccination of persons with high-risk conditions and other persons at increased risk of disease:

Children with anatomic or functional asplenia (including sickle cell disease) or children with persistent complement component deficiency (includes persons with inherited or chronic deficiencies in C3, C5–9, properdin, factor D, factor H, or taking eculizumab [Soliris]):

- Bexsero or Trumenba
  - Persons 10 years or older who have not received a complete series: Administer a 2-dose series of Bexsero, with doses at least 1 month apart, or a 3-dose series of Trumenba, with the second dose at least 1–2 months after the first and the third dose at least 6 months after the first. The two MenB vaccines are not interchangeable; the same vaccine product should be used for all doses.
- For children who travel to or reside in countries in which meningococcal disease is hyperendemic or epidemic, including countries in the African meningitis belt or the Hajj:
  - Administer an age-appropriate formulation and series of Menactra or Menveo for protection against serogroups A and W meningococcal disease. Prior receipt of MenHibrix is not sufficient for children traveling to the meningitis belt or the Hajj because it does not contain serogroups A or W.
- For children at risk during a community outbreak attributable to a vaccine serogroup:
  - For serogroup A, C, W, or Y: Administer or complete an age- and formulation-appropriate series of MenHibrix, Menactra, or Menveo.
  - For serogroup B: Administer a 2-dose series of Bexsero, with doses at least 1 month apart, or a 3-dose series of Trumenba, with the second dose at least 1–2 months after the first and the third dose at least 6 months after the first. The two MenB vaccines are not interchangeable; the same vaccine product should be used for all doses.

For MenACWY booster doses among persons with high-risk conditions, refer to *MMWR* 2013;62(RR02):1–22, at www.cdc.gov/mmwr/pdf/rr/rr6202.pdf; *MMWR* 2014;63(24):527–30 at www.cdc.gov/mmwr/pdf/wk/mm6324.pdf; and *MMWR* 2016;65(43):1189–94, at www.cdc.gov/mmwr/volumes/65/wr/pdfs/mm6543a.pdf.

For other catch-up recommendations for these persons, and complete information on use of meningococcal vaccines, including guidance related to vaccination of persons at increased risk of infection, see meningococcal *MMWR* publications, available at: www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/mening.html.

12. Tetanus and diphtheria toxoids and acellular pertussis (Tdap) vaccine. (Minimum age: 10 years for both Boostrix and Adacel).

Routine vaccination:

- Administer 1 dose of Tdap vaccine to all adolescents ages 11 through 12 years.
- Tdap may be administered regardless of the interval since the last tetanus and diphtheria toxoid-containing vaccine.
- Administer 1 dose of Tdap vaccine to pregnant adolescents during each pregnancy (preferably during the early part of gestational weeks 27 through 36 weeks) regardless of time since prior Td or Tdap vaccination.

Catch-up vaccination:

- Persons ages 7 years and older who are not fully immunized with DTaP vaccine should receive Tdap vaccine as 1 dose (preferably the first) in the catch-up series; if additional doses are needed, use Td vaccine. For children age 7 through 10 years who receive a dose of Tdap as part of their catch-up series, an adolescent Tdap vaccine dose at age 11 through 12 years may be administered.
- Persons ages 11 through 18 years who have not received Tdap vaccine should receive a dose, followed by tetanus and diphtheria toxoids (Td) booster doses every 10 years thereafter.
- Inadvertent doses of DTaP vaccine:
  - If administered inadvertently to a child ages 7 through 10 years, the dose may count as part of the catch-up series. This dose may count as the adolescent Tdap dose, or the child may receive a Tdap booster dose at age 11 through 12 years.
  - If administered inadvertently to an adolescent ages 11 through 18 years, the dose should be counted as the adolescent Tdap booster.

For other catch-up guidance, see Figure 2.

13. Human papillomavirus (HPV) vaccines. (Minimum age: 9 years for 4vHPV [Gardasil] and 9vHPV [Gardasil 9])

Routine and catch-up vaccination:

- Administer a 2-dose series of HPV vaccine on a schedule of 0, 6–12 months to all adolescents ages 11 or 12 years. The vaccination series can start at age 9 years.
- Administer HPV vaccine to all adolescents through age 18 years who were not previously adequately vaccinated. The number of recommended doses is based on age at administration of the first dose.
- For persons initiating vaccination before age 15 years, the recommended immunization schedule is 2 doses of HPV vaccine at 0, 6–12 months
- For persons initiating vaccination at age 15 years or older, the recommended immunization schedule is 3 doses of HPV vaccine at 0, 1–2, 6 months.
- A vaccine dose administered at a shorter interval should be readministered at the recommended interval.
  - In a 2-dose schedule of HPV vaccine, the minimum interval is 5 months between the first and second dose. If the second dose is administered at a shorter interval, a third dose should be administered a minimum of 12 weeks after the second dose and a minimum of 5 months after the first dose.
  - In a 3-dose schedule of HPV vaccine, the minimum intervals are 4 weeks between the first and second dose, 12 weeks between the second and third dose, and 5 months between the first and third dose. If a vaccine dose is administered at a shorter interval, it should be readministered after another minimum interval has been met since the most recent dose.

Special populations:

- For children with history of sexual abuse or assault, administer HPV vaccine beginning at age 9 years.
- Immunocompromised persons*, including those with human immunodeficiency virus (HIV) infection, should receive a 3-dose series at 0, 1–2, and 6 months, regardless of age at vaccine initiation.
- Note: HPV vaccination is not recommended during pregnancy, although there is no evidence that the vaccine poses harm. If a woman is found to be pregnant after initiating the vaccination series, no intervention is needed; the remaining vaccine doses should be delayed until after the pregnancy. Pregnancy testing is not needed before HPV vaccination.

* See *MMWR* 2016;65(49):1405-08, available at www.cdc.gov/mmwr/volumes/65/wr/pdfs/mm6549a5.pdf.

Recommended Adult Immunization Schedule – United States, 2017

Note: These recommendations *must* be read with the footnotes that follow containing number of doses, intervals between doses, and other important information.

Figure 1. Recommended immunization schedule for adults ages 19 years or older by age group

Vaccine	19–21 years	22–26 years	27–59 years	60–64 years	≥65 years
Influenza[1]	1 dose annually				
Tetanus, diphtheria, pertussis (Td/Tdap)[2]	Substitute Tdap for Td once, then Td booster every 10 yrs				
Measles, mumps, rubella (MMR)[3]	1 or 2 doses depending on indication				
Varicella (VAR)[4]	2 doses				
Herpes zoster (HZV)[5]				1 dose	
Human papillomavirus (HPV) Female[6]	3 doses				
Human papillomavirus (HPV) Male[6]	3 doses				
Pneumococcal 13-valent conjugate (PCV13)[7]	1 dose				
Pneumococcal polysaccharide (PPSV23)[7]	1 or 2 doses depending on indication				1 dose
Hepatitis A[8]	2 or 3 doses depending on vaccine				
Hepatitis B[9]	3 doses				
Meningococcal 4-valent conjugate (MenACWY) or polysaccharide (MPSV4)[10]	1 or more doses depending on indication				
Meningococcal B (MenB)[10]	2 or 3 doses depending on vaccine				
Haemophilus influenzae type b (Hib)[11]	1 or 3 doses depending on indication				

Figure 2. Recommended immunization schedule for adults ages 19 years or older by medical and other indications

Indication ▶ / Vaccine ▼	Pregnancy[1–6,9]	Immuno-compromised (excluding HIV infection)[3–7,9–11]	HIV infection CD4+ count (cells/μL)[3–7,9–11] <200	HIV infection CD4+ count (cells/μL)[3–7,9–11] ≥200	Asplenia, persistent complement deficiencies[7,10,11]	Kidney failure, end-stage renal disease, on hemodialysis[7,9]	Heart or lung disease, chronic alcoholism[7]	Chronic liver disease[7–9]	Diabetes[7,9]	Healthcare personnel[3,4,9]	Men who have sex with men[6,8,9]
Influenza[1]	I dose annually										
Td/Tdap[2]	1 dose Tdap each pregnancy	Substitute Tdap for Td once, then Td booster every 10 yrs									
MMR[3]	Contraindicated	1 or 2 doses depending on indication									
Varicella[4]	Contraindicated	2 doses									
Zoster[5]	Contraindicated				1 dose						
HPV–Female[6]		3 doses through age 26 yrs									
HPV–Male[6]		3 doses through age 26 yrs			3 doses through age 21 yrs						3 doses through age 26 yrs
PCV13[7]		1 dose									
PPSV23[7]		1, 2, or 3 doses depending on indication									
Hepatitis A[8]	2 or 3 doses depending on vaccine										
Hepatitis B[9]	3 doses										
MenACWY or MPSV4[10]	1 or more doses depending on indication										
MenB[10]	2 or 3 doses depending on vaccine										
Hib[11]	3 doses post-HSCT recipients only				1 dose						

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

Recommended for adults with additional medical conditions or other indications

Contraindicated

No recommendation

Consider the following information when reviewing the above schedules:

- When indicated, administer recommended vaccines to adults whose vaccination history is incomplete or unknown.
- Increased interval between doses of a multi-dose vaccine does not diminish vaccine effectiveness; therefore, it is not necessary to restart the vaccine series or add doses to the series because of an extended interval between doses.
- Adults with immunocompromising conditions should generally avoid live vaccines (e.g., measles, mumps, and rubella vaccine). Inactivated vaccines (e.g., pneumococcal or inactivated influenza vaccines) are generally acceptable.
- Combination vaccines may be used when any component of the combination is indicated and when the other components of the combination vaccine are not contraindicated.
- The use of trade names in the adult immunization schedule is for identification purposes only and does not imply endorsement by the ACIP or CDC.

The recommendations in this schedule were approved by the Centers for Disease Control and Prevention's (CDC) Advisory Committee on Immunization Practices (ACIP), the American Academy of Family Physicians (AAFP), the American College of Physicians (ACP), American College of Obstetricians and Gynecologists (ACOG), and American College of Nurse-Midwives (ACNM).

Footnotes

1. Influenza vaccination

General information

- All persons ages 6 months and older who do not have a contraindication should receive annual influenza vaccination with an age-appropriate formulation of inactivated influenza vaccine (IIV) or recombinant influenza vaccine (RIV).
- In addition to standard-dose IIV, available options for adults in specific age groups include: high-dose or adjuvanted IIV for adults age 65 years or older, intradermal IIV for adults age 18 through 64 years, and RIV for adults ages 18 years or older.
- Notes: Live attenuated influenza vaccine (LAIV) should not be used during the 2016–2017 influenza season. A list of currently available influenza vaccines is available at www.cdc.gov/flu/protect/vaccine/vaccines.htm.

Special populations

- Adults with a history of egg allergy who have only hives after exposure to egg should receive age-appropriate IIV or RIV.
- Adults with a history of egg allergy other than hives (e.g., angiodema, respiratory distress, lightheadedness, or recurrent emesis), or who required epinephrine or another emergency medical intervention, may receive age-appropriate IIV or RIV. The selected vaccine should be administered in an inpatient or outpatient medical setting and under the supervision of a healthcare provider who is able to recognize and manage severe allergic conditions.
- Pregnant women and women who might become pregnant in the upcoming influenza season should receive IIV.

2. Tetanus, diphtheria, and acellular pertussis vaccination

General information

- Adults who have not received tetanus and diphtheria toxoids and acellular pertussis vaccine (Tdap) or for whom pertussis vaccination status is unknown should receive 1 dose of Tdap followed by a tetanus and diphtheria toxoids (Td) booster every 10 years. Tdap should be administered regardless of when a tetanus or diphtheria toxoid-containing vaccine was last received.
- Adults with an unknown or incomplete history of a 3-dose primary series with tetanus and diphtheria toxoid-containing vaccines should complete the primary series that includes 1 dose of Tdap. Unvaccinated adults should receive the first 2 doses at least 4 weeks apart and the third dose 6–12 months after the second dose.
- Notes: Information on the use of Td or Tdap as tetanus prophylaxis in wound management is available at www.cdc.gov/mmwr/preview/mmwrhtml/rr5517a1.htm.

Special populations

- Pregnant women should receive 1 dose of Tdap during each pregnancy, preferably during the early part of gestational weeks 27–36, regardless of prior history of receiving Tdap.

3. Measles, mumps, and rubella vaccination.

General information

- Adults born in 1957 or later without acceptable evidence of immunity to measles, mumps, or rubella (defined below) should receive 1 dose of measles, mumps, and rubella vaccine (MMR) uinless they have a medical contraindication to the vaccine (e.g., pregnancy or severe immunodeficiency).
- Notes: Acceptable evidence of immunity to measles, mumps, or rubella in adults is: born before 1957, documentation of receipt of MMR, or laboratory evidence of immunity or disease. Documentation of healthcare provider-diagnosed disease without laboratory confirmation is not acceptable evidence of immunity.

Special populations

- Pregnant women who do not have evidence of immunity to rubella should receive 1 dose of MMR uppon completion or terminaton of pregnancy and before discharge from the healthcare facility; non-pregnant women of childbearing age without evidence of rubella immunity should receive 1 dose of MMR.
- Adults with primary or acquired immunodeficiency including malignant conditions affecting the bone marrow or lymphatic system, systemic immunosuppressive therapy, or cellular immunodeficiency should not receive MMR.
- Adults with human immunodeficiency virus (HIV) infection and CD4+ T-lymphocyte count >200 cells/µl for at least 6 months who do not have evidence of measles, mumps, or rubella immunity should receive 2 doses of MMR at least 28 days apart. Adults with HIV infection and CD4+ T-lymphocyte count <200 cells/µl should not receive MMR.
- Adults who work in healthcare facilities should receive 2 doses of MMR at least 28 days apart; healthcare personnel born before 1957 who are unvaccinated or lack laboratory evidence of measles, mumps, or rubella immunity, or laboratory confirmation of disease should be considered for vaccination with 2 doses of MMR at least 28 days apart for measles or mumps, or 1 dose of MMR for rubella.
- Adults who are students in postsecondary educational institutions or plan to travel internationally should receive 2 doses of MMR at least 28 days apart.
- Adults who received inactivated (killed) measles vaccine or measles vaccine of unknown type during years 1963–1967 should be revaccinated with 1 or 2 doses of MMR.
- Adults who were vaccinated before 1979 with either inactivated mumps vaccine or mumps vaccine of unknown type who are at high risk for mumps infection (e.g., work in a healthcare facility) should be considered for revaccination with 2 doses of MMR at least 28 days apart.

4. Varicella vaccination

General information

- Adults without evidence of immunity to varicella (defined below) should receive 2 doses of single-antigen varicella vaccine (VAR) 4–8 weeks apart, or a second dose if they have received only 1 dose.
- Persons without evidence of immunity for whom VAR should be emphasiezed are: adults who have close contact with persons at high risk for serious complications (e.g., healthcare personnel and household contacts of immunocompromised persons); adults who live or work in an environment in which transmission of varicella zoster virus is likely (e.g., teachers; childcare workers; and residents and staff in institutional settings); adults who live or work in environments in which varicella transmission has been reported (e.g., college students; residents and staff members of correctional institutions, and military personnel); nonpregnant women of childbearing age; adolescents and adults living in households with children; and international travelers.
- Notes: Evidence of immunity to varicella in adults is: U.S.-born before 1980 (for pregnant women and healthcare personnel, U.S.-born before 1980 is not considered evidence of immunity); documentation of 2 doses of VAR at least 4 weeks apart; history of varicella or herpes zoster diagnosis or verification of varicella or herpes zoster disease by a healthcare provider; or laboratory evidence of immunity or disease.

Special populations

- Pregnant women should be assessed for evidence of varicella immunity. Pregnant women who do not have evidence of immunity should receive the first dose of VAR upon completion or termination of pregnancy and

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before discharge from the healthcare facility, and the second dose 4–8 weeks after the first dose.
- Healthcare institutions should assess and ensure that all healthcare personnel have evidence of immunity to varicella.
- Adults with malignant conditions, including those that affect the bone marrow or lymphatic system or who receive systemic immunosuppressive therapy, should not receive VAR.
- Adults with human immunodeficiency virus (HIV) infection and CD4+ T-lymphocyte count ≥200 cells/µl may receive 2 doses of VAR 3 months apart. Adults with HIV infection and CD4+ T-lymphocyte count <200 cells/µl should not receive VAR.

5. Herpes zoster vaccination

General information
- Adults age 60 years or older should receive 1 dose of herpes zoster vaccine (HZV), regardless of whether they had a prior episode of herpes zoster.

Special populations
- Adults age 60 years or older with chronic medical conditions may receive HZV unless they have a medical contraindication (e.g., pregnancy or severe immunodeficiency).
- Adults with malignant conditions, including those that affect the bone marrow or lymphatic system or who receive systemic immunosuppressive therapy, should not receive HZV.
- Adults with human immunodeficiency virus (HIV) infection and CD4+ T-lymphocyte count <200 cells/µl should not receive HZV.

6. Human papillomavirus vaccination

General information
- Adult females through age 26 years and adult males through age 21 years who have not received any human papillomavirus (HPV) vaccine should receive a 3-dose series of HPV vaccines at 0, 1–2, and 6 months. Males ages 22 through 26 years may be vaccinated with a 3-dose series of HPV vaccine at 0, 1–2, and 6 months.
- Adult females through age 26 years and adult males through age 21 years (and males ages 22 through 26 years who may receive HPV vaccination) who initiated the HPV vaccination series before age 15 years and received 2 doses at least 5 months apart are considered adequately vaccinated and do not need an additional dose of HPV vaccine.
- Adult females through age 26 years and adults males through age 21 years (and males ages 22 through 26 years who may receive HPV vaccination) who initiated the HPV vaccination series before age 15 years and received only 1 dose, or 2 doses less than 5 months apart, are not considered adequately vaccinated and should receive 1 additional dose of HPV vaccine.
- Notes: HPV vaccination is routinely recommended for children at age 11 or 12 years. For adults who had initiated but did not complete the HPV vaccination series, consider their age at first HPV vaccination (described above) and other factors (described below) to determine if they have been adequately vaccinated.

Special populations
- Men who have sex with men through age 26 years who have not received any HPV vaccine should receive a 3-dose series of HPV vaccine at 0, 1–2, and 6 months.
- Adult females and males through age 26 years with immunocompromising conditions (described below), including those with human immunodeficiency virus (HIV) infection, should receive a 3-dose series of HPV vaccine at 0, 1–2, and 6 months.
- Pregnant women are not recommended to receive HPV vaccine, although there is no evidence that the vaccine poses harm. If a woman is found to be pregnant after initiating the HPV vaccination series, delay the remaining doses until after the pregnancy. No other intervention is needed. Pregnancy testing is not needed before administering HPV vaccine.
- Notes: Immunocompromising conditions for which a 3-dose series of HPV vaccine is indicated are primary or secondary immunocompromising conditions that might reduce cell-mediated or humoral immunity (e.g., B-lymphocyte antibody deficiencies, complete or partial T-lymphocyte defects, HIV infection, malignant neoplasm, transplantation, autoimmune disease, and immunosuppressive therapy).

7. Pneumococcal vaccination

General information
- Adults who are immunocompetent and age 65 years or older should receive 13-valent pneumococcal conjugate vaccine (PCV13) followed by 23-valent pneumococcal polysaccharide vaccine (PPSV23) at least 1 year after PCV13.
- Notes: Adults are recommended to receive 1 dose of PCV13 and 1, 2, or 3 doses of PPSV23 depending on indication. When both PCV13 and PPSV23 are indicated, PCV13 should be administered first; PCV13 and PPSV23 should not be administered during the same visit. If PPSV23 has previously been administered, PCV13 should be administered at least 1 year after PPSV23. When two or more doses of PPSV23 are indicated, the interval between PPSV23 doses should be at least 5 years. Supplemental information on pneumococcal vaccine timing for adults ages 65 years or older and adults ages 19 years or older at high risk for pneumococcal disease (described below) is available at www.cdc.gov/vaccines/vpd-vac/pneumo/downloads/adult-vax-clinician-aid.pdf. No additional doses of PPSV23 are indicated for adults who received PPSV23 at age 65 years or older. When indicated, PCV13 and PPSV23 should be administered to adults whose pneumococcal vaccination history is incomplete or unknown.

Special populations
- Adults ages 19 through 64 years with chronic heart disease including congestive heart failure and cardiomyopathies (excluding hypertension); chronic lung disease (including chronic obstructive lung disease, emphysema, and asthma); chronic liver disease (including cirrhosis); alcoholism; or diabetes mellitus; or who smoke cigarettes should receive PPSV23. At age 65 years or older, they should receive PCV13 and another dose of PPSV23 at least 1 years after PCV13 and at least 5 years after the most recent dose of PPSV23.
- Adults age 19 years or older with immunocompromising conditions or anatomical or functional asplenia (described below) should receive PCV13 and a dose of PPSV 23 at least 8 weeks after PCV13, followed by a second dose of PPSV23 at least 5 years after the first dose of PPSV23. If the most recent dose of PPSV23 was administered before age 65 years, at age 65 years or older, administer another dose of PPSV23 at least 8 weeks after PCV13 and at least 5 years after the most recent dose of PPSV23.
- Adults age 19 years or older with cerebrospinal fluid leak or cochlear implant should receive PCV13 followed by PPSV23 at least 8 weeks after PCV13. If the most recent dose of PPSV23 was administered before age 65 years, at age 65 years or older, administer another dose of PPSV23 at least 8 weeks after PCV13 and at least 5 years after the most recent dose of PPSV23.

(continued)

- Notes: Immunocompromising conditions that are indications for pneumococcal vaccination are congenital or acquired immunodeficiency (including B- or T-lymphocyte deficiency, complement deficiencies, and phagocytic disorders excluding chronic granulomatous disease); human immunodeficiency virus (HIV) infection; chronic renal failure and nephrotic syndrome; leukemia, lymphoma, Hodgkin disease, generalized malignancy, and multiple myeloma; solid organ transplant; and iatrogenic immunosuppression (including long-term systemic corticosteroid and radiation therapy). Anatomical or functional asplenia that are indications for pneumococcal vaccination are sickle cell disease and other hemoglobinopathies, congenital or acquired asplenia, splenic dysfunction, and splenectomy. Pneumococcal vaccines should be given at least 2 weeks before immunosuppressive therapy or an elective splenectomy, and as soon as possible to adults who are diagnosed with HIV infection.

8. Hepatitis A vaccination

General information

- Adults who seek protection from hepatitis A virus infection may receive a 2-dose series of single antigen hepatitis A vaccine (HepA) at either 0 and 6–12 months (Havrix) or 0 and 6–18 months (Vaqta). Adults may also receive a combined hepatitis A and hepatitis B vaccine (HepA-HepB; Twinrix) as a 3-dose series at 0, 1, and 6 months. Acknowledgment of a specific risk factor by those who seek protection is not needed.

Special populations

- Adults with any of the following indications should receive a HepA series: have chronic liver disease, receiving clotting factor concentrates, men who have sex with men, use injection of non-injection drugs, or work with hepatitis A virus-infected primates or in a hepatitis A research laboratory setting.
- Adults who travel in countries with high or intermediate levels of endemic hepatitis A infection or anticipate close personal contact with an international adoptee (e.g., reside in the same household or regularly babysit) from a country with high or intermediate level of endemic hepatitis A infection within the first 60 days of arrival in the United States should receive a HepA series.

9. Hepatitis B vaccination

General information

- Adults who seek protection from hepatitis B virus infection may receive a 3-dose series of single-antigen hepatitis B vaccine (HepB; Engerix-B, Recombivax HB) at 0, 1, and 6 months. Adults may also receive a combined hepatitis A and hepatitis B vaccine (HepA-HepB; Twinrix) at 0, 1, and 6 months. Acknowledgment of a specific risk factor by those who seek protection is not needed.

Special populations

- Adults at risk for hepatitis B virus infection by sexual exposure should receive a HepB series, including sex partners of hepatitis B surface antigen (HBsAg)-positive persons, sexually active persons who are not in a mutually monogamous relationship, persons seeking evaluation or treatment for a sexually transmitted disease infection, and men who have sex with men (MSM).
- Adults at risk for hepatitis B virus infection by percutaneous or mucosal exposure to blood should receive a HepB series, including adults who are recent or current users of injection drugs, household contacts of HBsAg-positive persons, residents and staff of facilities for developmentally disabled persons, incarcerated, healthcare and public safety workers at risk for exposure to blood or blood-contaminated body fluids, younger than age 60 years with diabetes mellitus, and age 60 years or older with diabetes mellitus at the discretion of the treating clinician.
- Adults with chronic liver disease including, but not limited to, hepatitis C virus infection, cirrhosis, fatty liver disease, alcoholic liver disease, autoimmune hepatitis, and an alanine aminotransferase (ALT) or aspartate aminotransferase (AST) level greater than twice the upper limit of normal should receive a HepB series.
- Adults with end-stage renal disease including those on pre-dialysis care, hemodialysis, peritoneal dialysis, and home dialysis should receive HepB series. Adults on hemodialysis should receive a 3-dose series of 40 µg Recombivax HB at 0, 1, and 6 months or a 4-dose series of 40 µg Engerix-B at 0, 1, 2, and 6 months.
- Adults with human immunodeficiency virus (HIV) infection should receive a HepB series.
- Pregnant women who are at risk for hepatitis B virus infection during pregnancy (e.g., having more than one sex partner during the previous six months), been evaluated or treated for a sexually transmitted infection, recent or current injection drug use, or had an HBsAg-positive sex partner, should receive a HepB series.
- International travelers to regions with high or intermediate levels of endemic hepatitis B virus inection should receive a HepB series.
- Adults in following settings are assumed to be at risk for hepatitis B virus infection and should receive a HepB series: sexually transmitted disease treatment facilities, HIV testing and treatment facilities, facilities providing drug-abuse treatment and prevention services, healthcare settings targeting services to persons who inject drugs, correctional facilities, healthcare settings targeting services to MSM, hemodialysis facilities and end-stage renal disease programs, and institutions and nonresidential day care facilities for developmentally disabled persons.

10. Meningococcal vaccination

Special populations

- Adults who have anatomical or functional asplenia or persistent complement component deficiencies should receive a 2-dose primary series of serogroups A, C, W, and Y meningococcal conjugate vaccine (MenACWY) at least 2 months apart and revaccinate every 5 years. They should also receive a series of serogroup B meningococcal vaccine (MenB) with either a 2-dose series of MenB-4C (Bexsero) at least 1 month apart or a 3-dose series of MenB-FHbp (Trumenba) at 0, 1–2, and 6 months.
- Adults with human immunodeficiency virus (HIV) infection who have not been previously vaccinated should receive a 2-dose primary series of MenACWY vaccine at least 2 months apart and revaccinate every 5 years. Those who previously received 1 dose of MenACWY should receive a second dose at least 2 months after the first dose. Adults with HIV infection are not routinely recommended to receive MenB because meningococcal disease in the population is caused primarily by serogroups C, W, and Y.
- Microbiologists who are routinely exposed to isolates of *Neisseria meningitidis* should receive 1 dose of MenACWY vaccine and revaccinate every 5 years if the risk for infection remains, and either a 2-dose series of MenB-4C at least 1 month apart or a 3-dose series of MenB-FHbp at 0, 1–2, and 6 months.
- Adults at risk because of a meningococcal disease outbreak should receive 1 dose of MenACWY vaccine if the outbreak is attributable to serogroup A, C, W, or Y, or either a 2-dose series of MenB-4C at least 1 month apart or a 3-dose series of MenB-FHbp at 0, 1–2, and 6 months if the outbreak is attributable to serogroup B.
- Adults who travel to or live in countries with hyperendemic or epidemic meningococcal disease should receive 1 dose of MenACWY and revaccinate every 5 years if the risk for infection remains. MenB is not

(continued)

routinely indicated because meningococcal disease in these countries is generally not caused by serogroup B.

- Military recruits should receive 1 dose of MenACWY and revaccinate every 5 years if the increased risk for infection remains.
- First-year college students age 21 years or younger who live in residence halls should receive 1 dose of MenACWY vaccine if they have not received MenACWY vaccine at age 16 years or older.
- Young adults ages 16 through 23 years (preferred age range is 16 through 18 years) who are healthy and not at increased risk for serogroup B meningococcal disease (described above) may receive either a 2-dose series of MenB-4C at least 1 month apart or a 2-dose series of MenB-FHbp at 0 and 6 months for short-term protection against most strains of serogroup B meningococcal disease.
- For adults age 56 years or older who have not previously received serogroups A, C, W, and Y meningococcal vaccine and need only 1 dose, meningococcal polysaccharide serogroups A, C, W, and Y vaccine (MPSV4) is preferred. For adults who previously received MenACWY or anticipate receiving multiple doses of serogroups A, C, W, and Y meningococcal vaccine, MenACWY is preferred.
- Notes: MenB-4C and MenB-FHbp are not interchangeable (i.e., the same vaccine should be used for all doses to complete the series). There is no recommendation for MenB revaccination at this time. MenB may be administered at the same time as MenACWY but at a different anatomic site, if feasible.

11. *Haemophilus influenzae* type b vaccination

Special populations

- Adults who have anatomical or functional asplenia or sickle cell disease, or are undergoing elective splenectomy should receive 1 dose of *Haemophilus influenzae* type b conjugate vaccine (Hib) if they have not previously received Hib vaccine. HIb should be administered at least 14 days before splenectomy.
- Adults with a hematopoietic stem cell transplant (HSCT) should receive 3 doses of Hib vaccine in at least 4 week intervals 6–12 months after a transplant regardless of their Hib history.
- Notes: Hib is not routinely recommended for adults with human immunodeficiency virus infection because their risk for *Haemophilus influenzae* type B infection is low.

The following acronymns are used for vaccines recommended for adults:

HepA	hepatitis A vaccine
HepA-HepB	hepatitis A and hepatitis B vaccines
HepB	hepatitis B vaccine
Hib	*Haemophilus influenzae* type b conjugate vaccine
HPV vaccine	human papillomavirus vaccine
HZV	herpes zoster vaccine
IIV	inactivated influenza vaccine
LAIV	live attenuated influenza vaccine
MenACWY	serogroups A, C, W, and Y meningococcal conjugate vaccine
MenB	serogroup B meningococcal vaccine
MMR	measles, mumps, and rubella vaccine
MPSV4	serogroups A, C, W, and Y meningococcal polysaccaride vaccine
PCV13	13-valent pneumococcal conjugate vaccine
PPSV23	23-valent pneumococcal polysaccharide vaccine
RIV	recombinant influenza vaccine
Td	tetanus and diphtheria toxoids
Tdap	tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine
VAR	varicella vaccine

Details on vaccines recommended for adults and complete ACIP statements are available at www.cdc.gov/vaccines/hcp/acip-recs/index.html. Additional CDC resources include:

- A summary of information on vaccination recommendations, vaccinaton of persons with immunodeficiencies, preventing and managing adverse reactions, vaccination contraindications and precautions, and other information can be found in *General Recommendations on Immunization* at www.cdc.gov/mmwr/preview/mmwrhtml/rr60021.htm.
- Vaccine information Statements that explain benefits and risks of vaccines are available at www.cdc.gov/vaccines/hcp/vis/index.html.
- Information and resources regarding vaccination of pregnant women are available at www.cdc.gov/vaccines/adults/rec-vac/pregnant.html
- Information on travel vaccine requirements and recommendations is available at wwwnc.cdc.gov/travel/destinatons/list.
- CDC Vaccine Schedules App for clinicians and other immunization service providers to download is available at www.cdc.gov/vaccines/schedules/hcp/schedule-app.html.
- Recommended Immunization Schedule for Children and Adolescents Aged 18 Years or Younger is available at www.cdc.gov/vaccines/schedules/hcp/index.html.

Report suspected cases of reportable vaccine-preventable disease to the local or state health department.

Report all clinically significant postvaccination reactions to the Vaccine Adverse Event Reporting System at www.vaers.hhs.gov or by telephone, 800-822-7967. All vaccines included in the 2017 adult immunization schedule, except herpes zoster and 23-valent pneumococcal polysaccharide vaccines are covered by the Vaccine Injury Compensation Program. Information on how to file a vaccine injury claim is available at www.hrsa.gov/vaccinecompensation or by telephone, 800-338-2382.

Submit questions and comments regarding the 2017 adult immunization schedule to CDC through www.cdc.gov/cdc-info or by telephone, 800-CDC-INFO (800-232-4636), in English and Spanish, 8:00 a.m. – 8:00 p.m. ET, Monday – Friday, excluding holidays.

Guide to Contraindications and Precautions to Commonly Used Vaccines[1,*]

Vaccine	Contraindications	Precautions
Hepatitis B (HepB)	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component • Hypersensitivity to yeast	• Moderate or severe acute illness with or without fever • Infant weighing less than 2000 grams (4 lbs, 6.4 oz)[2]
Rotavirus (RV5 [RotaTeq], RV1 [Rotarix])	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component • Severe combined immunodeficiency (SCID) • History of intussusception	• Moderate or severe acute illness with or without fever • Altered immunocompetence other than SCID • Chronic gastrointestinal disease[3] • Spina bifida or bladder exstrophy[3]
Diphtheria, tetanus, pertussis (DTaP) **Tetanus, diphtheria, pertussis (Tdap)** **Tetanus, diphtheria (DT, Td)**	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component • For pertussis-containing vaccines: encephalopathy (e.g., coma, decreased level of consciousness, prolonged seizures) not attributable to another identifiable cause within 7 days of administration of a previous dose of DTP or DTaP (for DTaP); or of previous dose of DTP, DTaP, or Tdap (for Tdap)	• Moderate or severe acute illness with or without fever • Guillain-Barré syndrome (GBS) within 6 weeks after a previous dose of tetanus toxoid-containing vaccine • History of Arthus-type hypersensitivity reactions after a previous dose of tetanus or diphtheria toxoid-containing vaccine (including MenACWY); defer vaccination until at least 10 years have elapsed since the last tetanus-toxoid containing vaccine • For pertussis-containing vaccines: progressive or unstable neurologic disorder (including infantile spasms for DTaP), uncontrolled seizures, or progressive encephalopathy until a treatment regimen has been established and the condition has stabilized **For DTaP only:** • Temperature of 105° F or higher (40.5° C or higher) within 48 hours after vaccination with a previous dose of DTP/DTaP • Collapse or shock-like state (i.e., hypotonic hyporesponsive episode) within 48 hours after receiving a previous dose of DTP/DTaP • Seizure within 3 days after receiving a previous dose of DTP/DTaP • Persistent, inconsolable crying lasting 3 or more hours within 48 hours after receiving a previous dose of DTP/DTaP
***Haemophilus influenzae* type b (Hib)**	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component • Age younger than 6 weeks	• Moderate or severe acute illness with or without fever
Inactivated poliovirus vaccine (IPV)	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component	• Moderate or severe acute illness with or without fever • Pregnancy
Pneumococcal (PCV13 or PPSV23)	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component (including, for PCV13, to any diphtheria toxoid-containing vaccine)	• Moderate or severe acute illness with or without fever
Measles, mumps, rubella (MMR)[4]	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component • Severe immunodeficiency (e.g., hematologic and solid tumors, chemotherapy, congenital immunodeficiency or long-term immunosuppressive therapy[5]), or persons with human immunodeficiency virus [HIV] infection who are severely immunocompromised[6] • Pregnancy	• Moderate or severe acute illness with or without fever • Recent (within 11 months) receipt of antibody-containing blood product (specific interval depends on product)[7] • History of thrombocytopenia or thrombocytopenic purpura • Need for tuberculin skin testing[8]
Varicella (Var)[4]	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component • Severe immunodeficiency (e.g., hematologic and solid tumors, chemotherapy, congenital immunodeficiency or long-term immunosuppressive therapy[5]), or persons with HIV infection who are severely immunocompromised[6] • Pregnancy	• Moderate or severe acute illness with or without fever • Recent (within 11 months) receipt of antibody-containing blood product (specific interval depends on product)[7] • Receipt of specific antivirals (i.e., acyclovir, famciclovir, or valacyclovir) 24 hours before vaccination; avoid use of these antiviral drugs for 14 days after vaccination.

CONTINUED ON THE NEXT PAGE ▶

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Technical content reviewed by the Centers for Disease Control and Prevention

Saint Paul, Minnesota • 651-647-9009 • www.immunize.org • www.vaccineinformation.org

www.immunize.org/catg.d/p3072a.pdf • Item #P3072a (3/17)

Vaccine	Contraindications	Precautions
Hepatitis A (HepA)	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component	• Moderate or severe acute illness with or without fever
Influenza, inactivated injectable (IIV)[9,10]	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component	• Moderate or severe acute illness with or without fever • History of GBS within 6 weeks of previous influenza vaccination • Egg allergy other than hives (e.g., angioedema, respiratory distress, lightheadedness, or recurrent emesis); or required epinephrine or another emergency medical intervention (IIV may be administered in an inpatient or outpatient medical setting, under the supervision of a healthcare provider who is able to recognize and manage severe allergic conditions)[9]
Influenza, recombinant (RIV)[9,10]	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component. RIV does not contain any egg protein.[9]	• Moderate or severe acute illness with or without fever • History of GBS within 6 weeks of previous influenza vaccination
Human papillomavirus (HPV)	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component	• Moderate or severe acute illness with or without fever • Pregnancy
Meningococcal: conjugate (MenACWY), serogroup B (MenB), polysaccharide (MPSV4)	• Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component	• Moderate or severe acute illness with or without fever
Herpes zoster (HZV)[4]	• Severe allergic reaction (e.g., anaphylaxis) to a vaccine component • Severe cellular immunodeficiency (e.g., hematologic and solid tumors, chemotherapy, or long-term immunosuppressive therapy[5]) or persons with HIV infection who are severely immunocompromised. • Pregnancy	• Moderate or severe acute illness with or without fever • Receipt of specific antivirals (i.e., acyclovir, famciclovir, or valacyclovir) 24 hours before vaccination; avoid use of these antiviral drugs for 14 days after vaccination.

FOOTNOTES

1. The Advisory Committee on Immunization Practices (ACIP) recommendations and package inserts for vaccines provide information on contraindications and precautions related to vaccines. Contraindications are conditions that increase chances of a serious adverse reaction in vaccine recipients and the vaccine should not be administered when a contraindication is present. Precautions should be reviewed for potential risks and benefits for vaccine reipient. For a person with a severe allergy to latex (e.g., anaphylaxis), vaccines supplied in vials or syringes that contain natural rubber latex should not be administered unless the benefit of vaccinaton clearly outweighs the risk for a potential allergic reaction. For latex allergies other than anaphylaxis, vaccines supplied in vials or syringes that contain dry, natural rubber or natural rubber latex may be administered. Whether and when to administer DTaP to children with proven or suspected underlying neurologic disorders should be decided on a case-by-case basis.
2. Hepatitis B vaccination should be deferred for preterm infants and infants weighing less than 2000 g if the mother is documented to be hepatitis B surface antigen (HBsAg)-negative at the time of the infant's birth. Vaccination can commence at chronological age 1 month or at hospital discharge. For infants born to women who are HBsAg-positive, hepatitis B immunoglobulin and hepatitis B vaccine should be administered within 12 hours of birth, regardless of weight.
3. For details, see CDC. "Prevention of Rotavirus Gastroenteritis among Infants and Children: Recommendations of the Advisory Committee on Immunization Practices. (ACIP)" *MMWR* 2009; 58(No. RR–2), available at www.cdc.gov/vaccines/hcp/acip-recs/index.html.
4. MMR, varicella, or zoster vaccines can be administered on the same day. If not administered on the same day, these live vaccines should be separated by at least 28 days.
5. Immunosuppressive steroid dose is considered to be 2 or more weeks of daily receipt of 20 mg prednisone or equivalent. Vaccination should be deferred for at least 1 month after discontinuation of such therapy. Providers should consult ACIP recommendations for complete information on the use of specific live vaccines among persons on immune-suppressing medications or with immune suppression because of other reasons.
6. HIV-infected children may receive varicella and measles vaccine if CD4+ T-lymphocyte count is >15%. (Source: Adapted from American Academy of Pediatrics. Immunization in Special Clinical Circumstances. In: Pickering LK, ed. Red Book: 2015 Report of the Committee on Infectious Diseases. 30th ed. Elk Grove Village, IL: American Academy of Pediatrics: 2015.)
7. Vaccine should be deferred for the appropriate interval if replacement immune globulin products are being administered (see "Table 5. Recommended Intervals Between Administration of Antibody-Containing Products and Measles- or Varicella-Containing Vaccine, by Product and Indication for Vaccination" found in "General Recommendations on Immunization: Recommendations of the Advisory Committee on Immunization Practices (ACIP)" *MMWR* 2011;60(No. RR-2) available at www.cdc.gov/ vaccines/hcp/acip-recs/index.html.)
8. Measles vaccination might suppress tuberculin reactivity temporarily. Measles-containing vaccine may be administered on the same day as tuberculin skin testing, or should be postponed for at least 4 weeks after the vaccination.
9. For additional information on use of influenza vaccines among persons with egg allergy, see CDC. "Prevention and Control of Seasonal Influenza with Vaccines: Recommendations of the Advisory Committee on Immunization Practices (ACIP) – United States, 2016–17 Influenza Season. *MMWR* 2016;64(RR-5):1–54 available at www.cdc.gov/mmwr/volumes/65/rr/rr6505a1.htm.
10. Live attenuated influenza vaccine (LAIV) should not be used during the 2016–2017 influenza season.

* Adapted from "Table 6. Contraindications and Precautions to Commonly Used Vaccines" found in: CDC. "General Recommendations on Immunization: Recommendations of the Advisory Committee on Immunization Practices (ACIP)." *MMWR* 2011;60(No. RR-2), p. 40–41, and from Hamborsky J, Kroger A, Wolfe C, eds. Appendix A. *Epidemiology and Prevention of Vaccine-Preventable Diseases*, 13th.

Laminated U.S. Immunization Schedules

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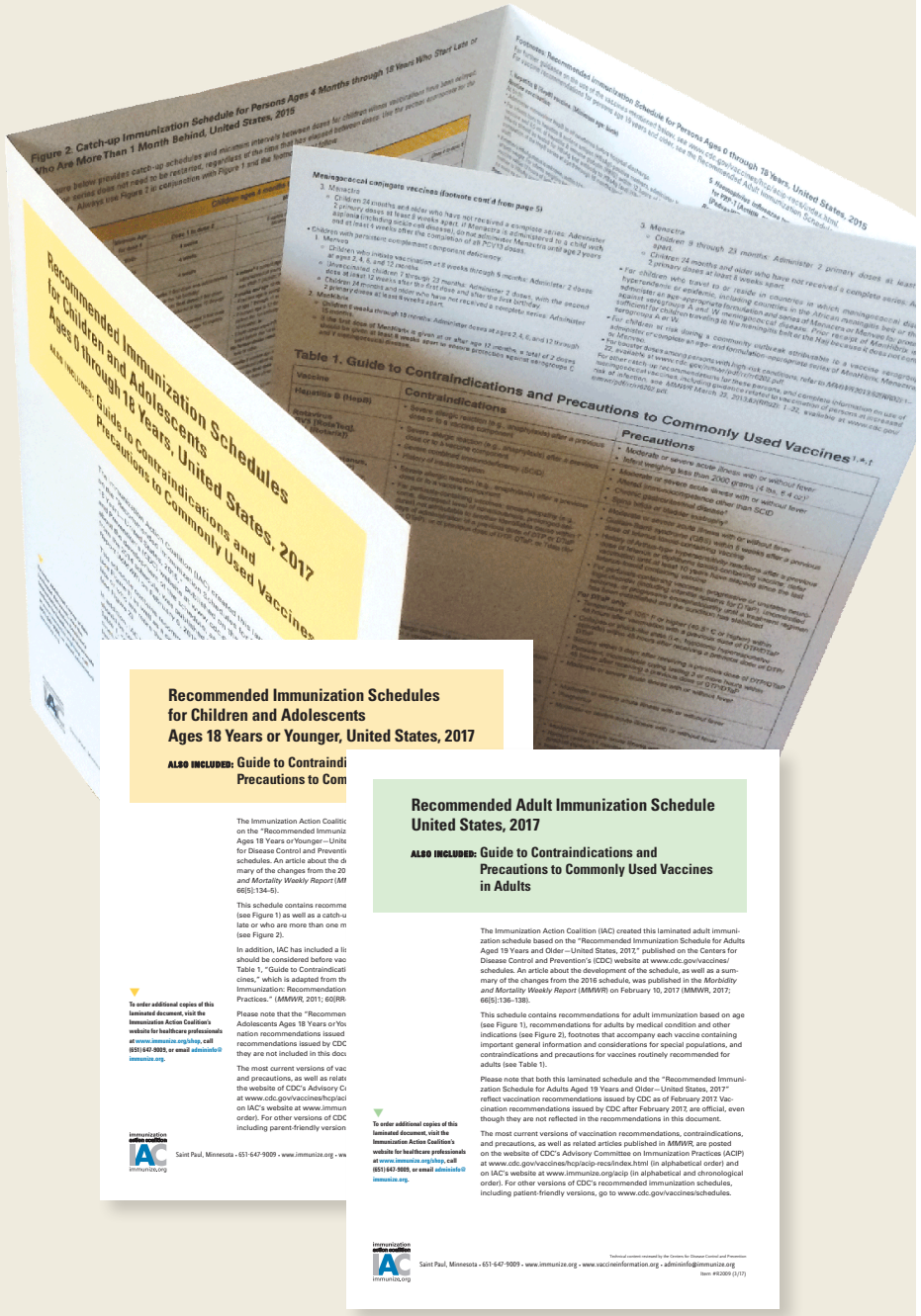

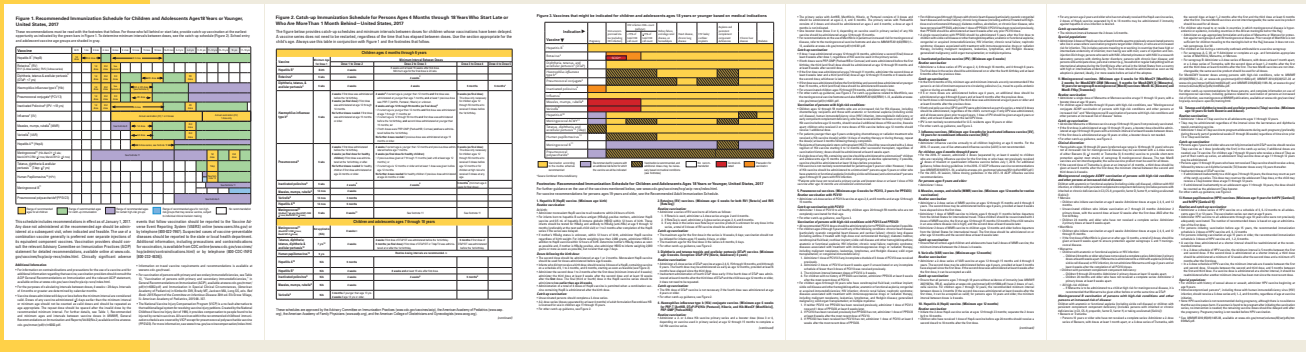

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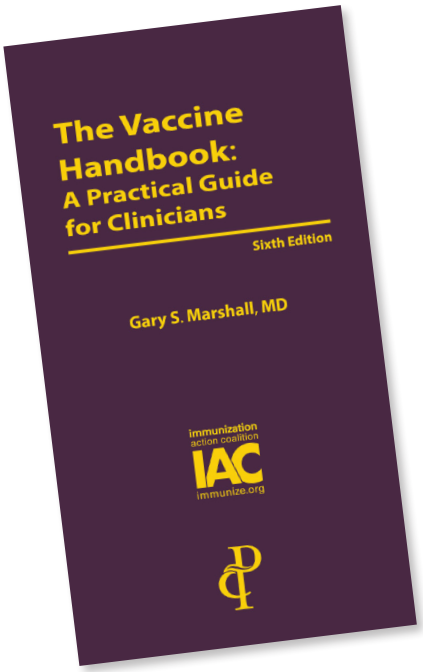
I am once again honored to present to you this newest, and best yet, iteration of ***The Vaccine Handbook: A Practical Guide for Clinicians****. Commonly referred to in immunization circles as "The Purple Book"… this highly respected guide belongs at the fingertips of everyone who has a role in vaccinating patients, including primary care providers, nurses, medical assistants, health sciences students, and those in advanced training.*

DEBORAH L. WEXLER, MD
Executive Director, IAC

About the Author

Gary S. Marshall, MD, professor of pediatrics, University of Louisville School of Medicine in Kentucky, serves as chief of the Division of Pediatric Infectious Diseases and director of the Pediatric Clinical Trials Unit. In addition to being a busy clinician, he is nationally known for his work in the areas of vaccine research, advocacy, and education.



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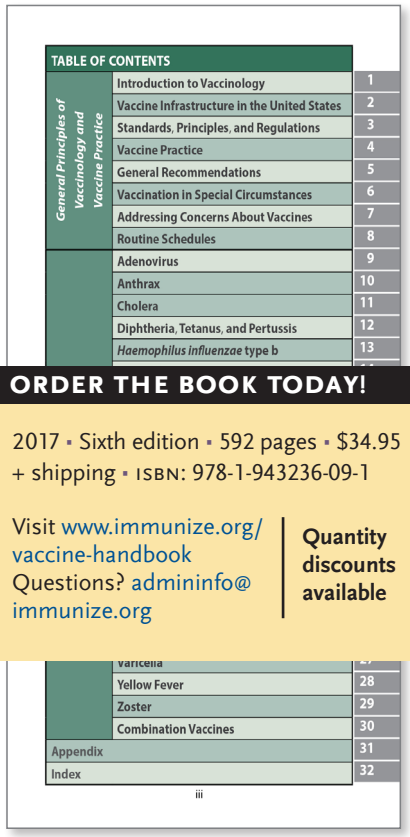
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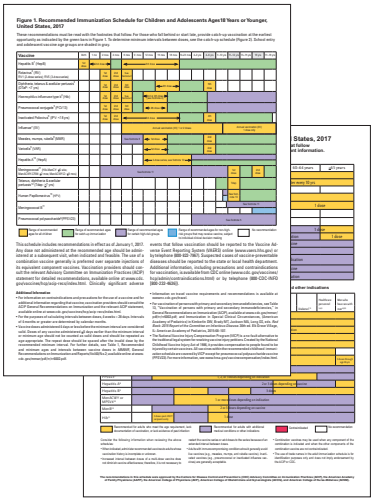

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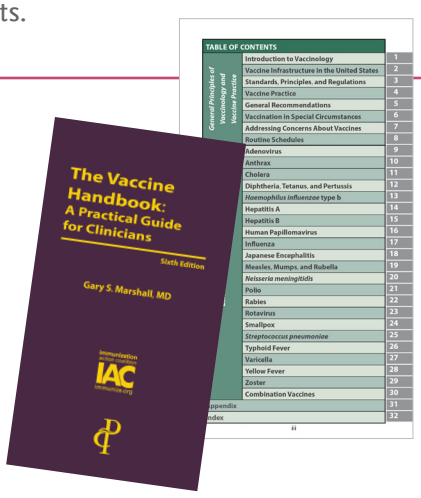

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