Immunizations for travel

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INTRODUCTION

Travelers are frequently at risk of exposure to infectious pathogens and should seek advice about immunizations and other necessary prophylaxis prior to departure [1,2]. Individuals should arrange a pretravel consultation with a specialized travel clinic or a primary care practice with expertise in travel medicine [3]. The traveler should bring a record of prior immunizations and an itinerary.

Issues related to immunizations for travelers are reviewed here. Other travel-related issues are discussed separately. (See "Travel advice" and "Prevention of malaria infection in travelers" and "Travelers' diarrhea: Treatment and prevention", section on 'Guidance for prevention'.)

RESOURCES FOR ADDITIONAL GUIDANCE

- **United States Centers for Disease Control and Prevention (CDC)** – Information on the indications, dosing, side effects, timing, and contraindications for immunizations in travelers are provided by the CDC in a biennial, Health Information for International Travel [2], with ongoing updates in an online version.
- **World Health Organization (WHO)** – The WHO also has online information that includes vaccines or dosing regimens approved outside the United States [4]. Information may be found on the CDC website and the WHO website. Guidance may also be found via GlobalTravEpiNet (GTEN), which has web-based tools for providers and patients based on CDC recommendations.

GENERAL PRINCIPLES

Immunizations for travelers may be divided into the following categories [1]:

- **Travel immunizations** – Travel immunizations include (table 1) (see 'Immunizations for travel' below):
  - Immunization required under international health regulations (eg, yellow fever)
  - Immunization to reduce risk of infection guided by travel plans (destination[s] and activities)

  Guidance for destination-specific immunizations can be found at the CDC website.

  Vaccine availability and guidelines for vaccine use differ between countries. A broad international perspective has been published by the World Health Organization (WHO) [4].
- **Routine immunizations** – Pretravel visits offer an opportunity to update routine vaccinations for travelers. (See 'Routine immunizations' below.).

  These are discussed further separately. (See "Standard immunizations for nonpregnant adults" and "Immunizations during pregnancy" and "Standard immunizations for children and adolescents: Overview".)

Timing of the pretravel visit — Ideally, pretravel consultation should occur at least one month before travel, to allow time for thorough evaluation and for immunizations (some of which require more than one dose). For immunocompromised travelers, pretravel consultation as early as six months before travel may be beneficial because immune response may take longer to develop.

If this is not feasible, beneficial preventive measures and advice can be delivered even immediately before departure.

When a traveler presents with insufficient time to complete a vaccination series, starting the series should be considered, with the understanding that only short-term or incomplete immunity may be achieved before travel.

Review medical history and travel plans — Immunization needs are based on the traveler's medical history, travel plans, and prior immunizations. Guidance for destination-specific immunizations can be found at CDC website. (See "Travel advice", section on 'Review

medical history and travel plans'.)

Vaccine coadministration — Any combination of vaccines can be administered at a single appointment.

In general, coadministration of the most widely used vaccines (live and inactivated) produces similar rates of seroconversion and adverse reactions relative to separate vaccine administration; exceptions are outlined below [5]:

- **Live vaccines**
  - **Timing of live virus parenteral vaccines** – These vaccines include chikungunya vaccine, measles, mumps, and rubella (MMR), varicella vaccine, yellow fever vaccine, and zoster vaccine live (ZVL; may be available in some areas; recombinant zoster vaccine is favored over ZVL if available).
  - All live vaccines given by the same route may be coadministered on the same day or at least four weeks apart. This is important to avoid interference with the immune response to the vaccine administered second.

    If travel plans preclude waiting four weeks between two different live vaccines administered by the same route, the second vaccine may be given, but the immune response may be blunted and the vaccine doesn't "count." As an example, if a patient receives intramuscular MMR then seeks yellow fever vaccine prior to departure, the yellow fever vaccine should be administered (and may confer some protection), but subsequently should be repeated.
  - **Timing of live oral or intranasal vaccines** – Live virus oral or intranasal vaccines include oral typhoid vaccine, oral cholera vaccine, oral polio vaccine, and nasal influenza vaccine.

    For coadministration of oral typhoid vaccine (Ty21a) and oral cholera vaccine (CVD 103-HgR; Vaxchora), the first dose of oral typhoid vaccine should be administered >8 hours after administration of oral live attenuated cholera vaccine due to interference by the CVD 103-HgR buffer.

    Interference is not a potential problem for other live vaccines administered by these routes; these may be administered at any time relative to parenteral live vaccines.
  - **Timing of live vaccines relative to inactivated vaccines** – Any live vaccine administered by any route may be administered at any time relative to inactivated vaccines.
  - **Timing of live vaccines relative to immune globulin** – Live vaccines should be administered at least two weeks before or at least six months after immune globulin, due to the presence of interfering antibodies in the plasma derived immune globulin preparations.
- **Adjuvanted vaccines** – Adjuvanted vaccines include Heplisav-B [recombinant hepatitis B vaccine], Shingrix [recombinant zoster vaccine], Fluad [influenza vaccine], COVID vaccines, and Arexvy [recombinant respiratory syncytial virus vaccine]. Administration of adjuvanted vaccines may be associated with greater side effects; therefore, if more than one adjuvanted vaccine is needed, we suggest administration of adjuvanted vaccines on different days or at least in different arms.
- **COVID-19 vaccine** – In general, simultaneous administration of any COVID-19 vaccine with other vaccines is acceptable. For individuals who warrant both Mpox and COVID-19 vaccination, no interval is mandated but it is reasonable to wait four weeks between these vaccines due to increased risk of myocarditis and pericarditis after each vaccine [6].

Vaccine documentation — A standard immunization form should be part of the patient's medical record; the dedicated immunization history available in electronic medical records should be complete for all patients. Details to be recorded include vaccine type, dose, date of administration, manufacturer, lot number, and site of administration. It is also important to document if a patient declines to receive any recommended vaccine.

IMMUNIZATIONS FOR TRAVEL

Chikungunya vaccine — Chikungunya virus infection is a mosquito-borne illness characterized by acute febrile polyarthralgia and arthritis. (See "Chikungunya fever: Epidemiology, clinical manifestations, and diagnosis".)

- **Available vaccines** – Recombinant virus-like particle vaccine (VIMKUNYA) is a recombinant vaccine approved by the US Food & Drug Association (FDA) and the European Medicines Agency (EMA) in February 2025 for use in individuals ≥12 years of age. It is administered as a single intramuscular dose; the need for booster doses is unknown [7].

  Live-attenuated virus vaccine (IXCHIQ) is a live-attenuated vaccine that was suspended by the US FDA in 2025 due to reports of serious safety concerns.
- **Indications** – We are in agreement with the United States Advisory Committee on Immunization Practices (ACIP) which recommends chikungunya vaccination for people traveling to a region where there is a chikungunya outbreak. Chikungunya vaccine is also reasonable

for people planning extended travel (≥6 months) or taking up residence in a region with no outbreak but with elevated risk for travelers; these regions are outlined on the United States Centers for Disease Control and Prevention (CDC) website.

- **Dosing and administration** – VIMKUNYA is administered as a single intramuscular dose; the need for booster doses is unknown [7].

Chikungunya vaccination is discussed further separately. (See "Chikungunya fever: Treatment and prevention", section on 'Vaccination'.)

Cholera vaccine

- **General principles** – Cholera is a severe diarrheal illness caused by infection with the gram-negative bacterium *Vibrio cholerae*; it is transmitted through fecal contamination of water or food and can rapidly lead to dehydration and death. It is extremely rare among travelers [8]. (See "Cholera: Epidemiology, clinical features, and diagnosis".)

- **Indications** – CVD 103-HgR (Vaxchora) is a live attenuated oral cholera vaccine approved by the FDA and recommended by the ACIP for prevention of cholera caused by serogroup O1 in individuals 2 through 64 years of age traveling to an area of active cholera transmission [9,10]. Vaccination is not recommended in areas where only rare imported or sporadic cases have been reported. (See "Cholera: Treatment and prevention", section on 'Vaccination'.).

  Groups that most warrant vaccination include aid, refugee, and health care workers in endemic and epidemic areas in proximity to displaced populations, especially in crowded camps and urban areas with unsanitary conditions.

  Most people do not travel to areas of active cholera transmission, and most travelers are at extremely low risk for cholera infection.

- **Contraindications and precautions** – The safety and effectiveness of live attenuated oral cholera vaccine has not been established in immunocompromised individuals. The vaccine strain may be shed in the stool of recipients for at least seven days, with potential for transmission to nonvaccinated household contacts.

- **Dosing and administration** – CVD 103-HgR is administered as a single oral dose at least 10 days before travel to a cholera-affected area. It should be administered in the provider's office. It should not be reconstituted with tap water since chlorine kills the vaccine. Eating and drinking should be avoided for one hour before and after vaccine administration.

  CVD 103-HgR should not be administered within two weeks of systemic antibiotics, which may be active against the vaccine strain. The vaccine should be administered at least 10 days prior to use of antimalarial prophylaxis with chloroquine.

  For coadministration of oral typhoid vaccine (Ty21a) and oral cholera vaccine (CVD 103-HgR; Vaxchora), the first dose of oral typhoid vaccine should be administered >8 hours after administration of oral live attenuated cholera vaccine due to interference by the CVD 103-HgR buffer.

  The duration of protection is unknown but is at least three months.

Dengue vaccine — Dengue virus infection is a mosquito-borne febrile illness that occurs in many regions around the world. There are no dengue vaccines available in the United States for travelers.

- **Available vaccines**
  - TAK-003 (Qdenga; Takeda) is a live attenuated vaccine based on a mix of a DENV-2 backbone with three recombinant DENV-2 strains expressing surface proteins for DENV-1, DENV-3, and DENV-4. Qdenga can be given to dengue-naive individuals; it is approved and commercially available for travelers >4 years of age in Europe, the United Kingdom, Brazil, Argentina, Indonesia, and Thailand.
  - CYD-TDV (Dengvaxia) was discontinued in 2024 and was never commercially available for travelers.

- **Indications** – National guidelines in non-endemic countries where TAK-003 is commercially available are likely to remain permissive rather than prescriptive pending further data. For travelers 17 to 60 years of age, the strongest indication consists of long-stay or frequent travel to the highest risk destinations in a previously infected (any serotype) traveler; the highest benefit is during an ongoing DENV1 or DENV2 epidemic at the travel destination. For seronegative travelers, the benefits of vaccination are lower; any protection against DENV3 and DENV4 is uncertain.

- **Dosing and Administration** – Dengue tetravalent vaccine (live, attenuated) 0.5 mL dose at a two-dose (0 and 3 months). Protection starts 14 days after the first dose. No safety data >60 years of age but equivalent efficacy inferred from immunobridging of antibody titers. No data on boosters.

  Live vaccine is contraindicated in pregnancy, HIV, and immunosuppression.

Dengue vaccination is discussed further separately. (See "Dengue virus infection: Prevention and treatment", section on 'Prevention'.)

Hepatitis A vaccine — Hepatitis A is a viral infection transmitted via the fecal-oral route that can lead to liver failure in rare cases. It is common in areas where sanitation and personal hygiene may be poor, and it is one of the most common vaccine-preventable diseases. (See "Hepatitis A virus infection in adults: Epidemiology, clinical manifestations, and diagnosis".)

- **Indications** – Vaccination is warranted for travelers to countries with intermediate to high endemicity of hepatitis A. A list of countries is available on the CDC website. Some experts advise hepatitis A vaccination regardless of destination, given the potential risk of hepatitis A even in countries with low endemicity and the complexity of interpreting risk maps [11,12].

  The ACIP recommends routine vaccination of children aged 12 to 23 months and catch-up vaccination for children and adolescents aged 2 to 18 years who have not previously received hepatitis A vaccine, irrespective of travel [13].

- **Contraindications and precautions** – Hypersensitivity to hepatitis A vaccine or any component of the formulation is a contraindication to vaccination. The hepatitis A vaccines are acceptable for use in pregnancy and for immunocompromised individuals [14,15].

- **Dosing and administration**

  - **Formulations** – Two monovalent hepatitis A vaccines (HAVRIX or VAQTA) and one bivalent vaccine (hepatitis A and B; Twinrix) are available in the United States.

    There is a combined hepatitis A virus and typhoid vaccine (Viatim, Vivaxim; not available in the United States).

  - **Dosing for adults**

    - **Monovalent vaccine** – The monovalent vaccines are administered as a single dose any time prior to departure travel, with a second dose 6 to 12 months later for lifelong immunity [16]. If the immunization schedule is interrupted, the second dose can be given without restarting the series. A series started with one brand of vaccine may be completed with the same or other brand of hepatitis A vaccine.

    - **Bivalent vaccine** – The bivalent vaccine requires two doses before travel, with completion of the third dose 6 months after the first.

  - **Patients at increased risk for infection** – Ideally, adults who are ≥40 years, are immunocompromised, or have chronic medical conditions (including liver disease), should make efforts to receive two doses of vaccine over a six-month period prior to travel. In select studies, administering a second vaccine dose at least four weeks after the first dose (for travelers who can get both doses before travel) has also been effective [14,17].

    For patients in the above categories who are departing in less than two weeks, immune globulin could be administered with the first dose of HAV vaccine. However, enthusiasm for this approach is limited because of the large volume of intramuscular injection this entails. The IG dose varies according to planned duration of travel (0.1 mL/kg for travel up to one month, 0.2 mL/kg for travel up to two months, and, for travel duration more than two months, repeat doses of 0.2 mL/kg every two months) [18].

  - **Dosing for children** – Children traveling outside the United States should receive hepatitis A vaccination sooner than the standard immunization schedule. Children aged 6 to 11 months should receive one dose (not countable toward routine vaccination schedule) of hepatitis A vaccine before departure. After this dose, routine vaccination with hepatitis A vaccine (two additional age-appropriate doses) should occur. (See "Standard immunizations for children and adolescents: Overview".)

Hepatitis B vaccine

- **General principles** – Hepatitis B is a viral infection transmitted by bodily fluid exposure that can lead to hepatic failure and/or hepatocellular carcinoma. It is estimated that there are more than 350 million hepatitis B virus (HBV) carriers in the world, of whom roughly one million die annually from HBV-related liver disease. (See "Epidemiology, transmission, and prevention of hepatitis B virus infection" and "Hepatitis B virus immunization in adults".)

- **Indications** – Vaccination against hepatitis B virus is universally recommended in the United States for all individuals <60 years and can be considered in older individuals as well. The vaccine should be considered for all nonimmune travelers since it may be difficult to assess risk during the pretravel consultation.

  Vaccination is warranted for travelers to countries with intermediate to high endemicity of HBV (ie, with hepatitis B surface antigen [HBsAg] prevalence ≥2 percent); a list of countries is available on the CDC website. In addition, vaccination should be considered for travelers with potential contact with blood or bodily secretions, potential sexual contact, or potential need for medical or dental procedures while traveling. Risk groups include health care workers, adventure travelers, Peace Corps volunteers, missionaries, military personnel, and medical tourists [12].

- **Contraindications and precautions** – Hypersensitivity to hepatitis B vaccine or any component of the formulation is a contraindication to vaccination.

  Hepatitis B vaccine can be administered to immunocompromised patients, although vaccine immunogenicity is lower in these groups [15]. For individuals with comorbidities that may interfere with seroconversion, antibody titers can be checked to ensure adequate vaccine response has occurred.

- **Formulations, dosing and administration** – Hepatitis B vaccines available in the United States include:

- Conventional recombinant hepatitis B vaccines (Recombivax HB, Engerix-B)
- CpG-adjuvanted recombinant hepatitis B vaccine (Heplisav-B)
- A combination hepatitis A-hepatitis B vaccine (Twinrix)

For travelers who are not traveling for one month, many experts favor adjuvanted Heplisav-B since it is induces a robust long-lasting immune response; it is administered in two doses one month apart.

For individuals with more time before travel, alternative vaccines include Recombivax HB or Engerix-B. These are unadjuvanted vaccines administered in three intramuscular doses; the initial dose is followed by repeat doses at one and six months later. The third dose should be given ≥2 months after the second dose and ≥4 months after the first dose. In infants, the third dose should not be administered before age 24 weeks. Ideally, immunization with these vaccines should begin six months prior to travel. Alternatively, an accelerated regimen (with doses on days 0, 7, and 21) can be administered to travelers who cannot complete the full series prior to departure. Travelers who receive an accelerated regimen should receive a booster at least six months later to optimize long-term immunity. (See "Hepatitis B virus immunization in adults".)

For immunocompromised patients, adjuvanted Heplisav-B is favored by many experts, given diminished humoral immune response to unadjuvanted vaccine. Alternatively, limited data suggest that modified dosing regimens of unadjuvanted vaccine can also increase response rates. A three-dose series of Recombivax HB (40 mcg at zero, one, and six months) or a four-dose series of Engerix-B (40 mcg at zero, one, two, and six months) may be used. (See "Hepatitis B virus immunization in adults".)

The combination vaccine can be used to complete immunizations series started with monovalent hepatitis A and B vaccines [12].

Japanese encephalitis vaccine

- **General principles** – Japanese encephalitis (JE) is an mosquito-borne viral encephalitis endemic throughout most of Asia and parts of the western Pacific. The highest risk of JE exposure occurs in rural agricultural areas. The likelihood of JE transmission to travelers is low, but the outcome is potentially severe. (See "Japanese encephalitis".)

- **Indications** – JE vaccination is appropriate for travelers visiting endemic areas during periods of JE transmission [19]. Indications for JE vaccination are summarized in the table (table 2) [20]. A list of countries can be found on the CDC website.

- **Contraindications and precautions** – Hypersensitivity to JE virus vaccine or any component of the formulation is a contraindication to vaccination. Since licensure of JE-VC in 2009, no pattern of severe adverse systemic or neurologic adverse events observed.

- **Formulations, dosing and administration**

  - **Within the United States** – Within the United States, one JE vaccine is available: an inactivated Vero cell culture-derived vaccine (JE-VC; IXIARO). JE-VC protects against all five JE virus genotypes. An inactivated mouse brain-derived vaccine (JE-MB; JE-VAX) was discontinued in 2009.

    - **Dosing** – For adults and children ≥3 years, each dose is 0.5 mL; for children aged two months to two years of age, each dose is 0.25 mL (one-half of the supplied prefilled adult syringe) [21].

      For adults 18 to 65 years of age, the primary immunization schedule for JE-VC is two doses administered intramuscularly administered on day 0 and then any time between day 7 and day 28 [12,22]. Seroprotection rates after primary vaccination approach 100 percent.

      For children <18 years of age and for adults >65 years of age, the primary immunization schedule is two doses administered intramuscularly on days 0 and 28. The two-dose series should be completed at least one week prior to travel.

    - **Boosters** – For individuals with ongoing risk, a booster (third) dose should be administered >1 year after completion of the primary series [20]. Data demonstrate seroprotection for at least six years after the booster, and antibody decay models suggest seroprotection for at least 10 years or more [23].

      Data regarding the need for subsequent booster doses are not available; a booster dose at 10 years may be considered for travelers wanting to ensure prolonged protection [23].

      Following previous immunization with a complete three-dose series of JE-MB or other mouse brain vaccine, booster with JE-VC may be given; data suggest JE-VC effectively boosts immunity in travelers primed with mouse brain-derived JE vaccines [24].

  - **Outside the United States** – Outside the United States, a live attenuated YF-JE chimeric viral vaccine (IMOJEV) has been licensed in Australia and in some Asian countries as a single 0.5 mL subcutaneous dose for primary immunization of individuals ≥12 months of age.

    For individuals 12 months to 17 years of age, a booster dose should be given one to two years after the first dose to provide long-term protection. For individuals ≥18 years, there is no need for a booster dose for at least five years after the first vaccination.

    Since IMOJEV is a live attenuated vaccine, it should not be used in immunocompromised individuals; its safety in pregnancy has not been evaluated.

Meningococcal vaccine

- **General principles** – Meningococcal meningitis is a devastating bacterial infection with high mortality; epidemics occur in the "meningitis belt" of sub-Saharan Africa, which extends from Senegal to Ethiopia (figure 1). (See "Epidemiology of *Neisseria meningitidis* infection".).

  Historically, most meningitis belt outbreaks were due to serogroup A; after local introduction of a serogroup A meningococcal vaccine (MenAfriVac) in 2010, subsequent outbreaks have been caused primarily by serogroups C and W. There is no specific travel-related risk for type B meningococcal infection.

- **Indications** – Meningococcal ACWY vaccine is recommended for nonimmune travelers to the meningitis belt in Africa, especially during the dry season (December to June), as well as for health care workers (year-round). Proof of vaccination is required for travel to Mecca during the annual Hajj and Umrah pilgrimages.

  Other (non-traveler) groups for whom meningococcal vaccine is warranted are outlined separately. (See "Meningococcal vaccination in children and adults", section on 'Immunization of persons at increased risk'.)

- **Contraindications and precautions** – Hypersensitivity to other meningococcal-containing vaccines is a contraindication to vaccination.

  Immunization is safe in immunocompromised hosts and is specifically indicated for patients with deficiencies of terminal complement components or functional or anatomic asplenia. Previous Guillain-Barré syndrome is not a contraindication to vaccination.

- **Formulations, dosing, and administration** – Quadrivalent meningococcal conjugate vaccine formulations (MenACWY-CRM [Menveo] and MenACWY-TT [MenQuadfi]) have replaced quadrivalent meningococcal polysaccharide vaccine (MPSV4/Menomune) and MenACWY-DT (Menactra).

  MenABCWY (Penbraya; Penmenvy; GSK; Pfizer) combination vaccine is an option when both MenB and MenACWY are indicated.

  Menveo (MenACWY-CRM) may be administered concomitantly with serogroup B vaccine (MenB-FHbp [Trumenba] or MenB-4C [Bexsero]).

  The schedules for the primary meningococcal vaccine series and for revaccination are presented separately. (See "Meningococcal vaccination in children and adults".)

  Boosters are warranted every five years if travelers plan to remain in or return to endemic areas [25].

Mpox vaccine

- **General principles** – Mpox is a viral zoonotic that causes a rash similar to smallpox virus. Primary routes of transmission include direct contact and indirect contact through fomites; other potential routes include respiratory transmission, vertical transmission, and percutaneous inoculation. (See "Epidemiology, clinical manifestations, and diagnosis of mpox (formerly monkeypox)".)

  Clade Ia (previously Congo Basin Clade) is the original mpox strain (discovered in 1970). Clade II (previously West African Clade) and Clade IIb are the causes of 2022 global outbreak and almost all current cases occurring outside of Africa. Clade Ib is the cause of ongoing outbreak (beginning in 2023) in eastern Democratic Republic of the Congo and neighboring countries, with >30,000 cases to date.

- **Indications** – In September 2024, the CDC recommended the two-dose JYNNEOS vaccine series for travelers to Central and Eastern Africa (ideally at least six weeks before departure), if they anticipate sexual activity while traveling [26]. At the time of the advisory, countries with clade I mpox outbreaks included the Democratic Republic of the Congo, along with neighboring countries as such as Burundi, Central African Republic, Rwanda, and Uganda. Health care workers and responders traveling to the outbreak without sexual risk factors are not recommended for vaccination.

  Other indications for mpox vaccine are discussed separately. (See "Treatment and prevention of mpox (formerly monkeypox)", section on 'Vaccination to prevent disease'.)

- **Contraindications and precautions** – Vaccination is contraindicated for individuals with vaccine or vaccine-component allergies.

  None of the contraindications for replicating vaccinia-based vaccines (such as cardiac disease, eczema, HIV, or immunosuppression) are applicable to MVA-BN; cardiac toxicity (myocarditis or pericarditis) and other adverse effects observed with replicating vaccinia-based vaccines (eg, eczema vaccinatum, postvaccinial encephalitis, or vaccinia necrosum) have not been reported with MVA-BN.

- **Formulation, dosing, and administration**

  - Modified vaccinia Ankara-Bavarian Nordic (MVA-BN) vaccine is a live but non-replicating smallpox and mpox vaccine (JYNNEOS in the United States, IMVANEX in the European Union, and IMVAMUNE in Canada).

  - MVA-BN is administered via subcutaneous injection with a regular syringe needle; there is no need for the special bifurcated needle used for traditional replicating smallpox vaccines. Two doses (0.5 mL each) are administered four weeks apart.

- ACAM2000 – ACAM2000 is a replication-competent (live) smallpox and mpox vaccine that is not commercially available. It can be used only in select patients and is associated with more adverse events than the MVA vaccine. The FDA approved ACAM2000 for the mpox indication in 2024. No doses have been released to date from the United States Strategic National Stockpile for mpox prevention.

Rabies vaccine

- **General principles** – Rabies is a viral disease transmitted by dogs, bats, and other animals that leads to encephalopathy and death. Rabies is endemic in most countries of Asia, Africa, and Central and South America [12].

- **Indications** – Preexposure vaccination is indicated for travelers to destinations with moderate or high risk for rabies, those working with animals, and those whose travel plans may preclude timely postexposure prophylaxis.

  Children are at increased risk as they are more likely than adults to play with animals and they may not reliably report exposures. A list of countries is available on the CDC website.

- **Contraindications and precautions** – Hypersensitivity to rabies vaccine or any component of the formulation is a contraindication to vaccination. The rabies vaccines are acceptable for use in pregnancy and for immunocompromised individuals.

- **Formulations, dosing and administration**

  - **Formulations** – There are two formulations of rabies vaccine available in the United States:

    - Human diploid cell vaccine (HDCV; Imovax)
    - Purified chick embryo cell vaccine (PCECV; RabAvert)

    Additional vaccines are available outside the United States.

  - **Initial regimen** – The CDC and the WHO have endorsed a preexposure prophylaxis regimen consisting of two doses on days 0 and 7 [27,28]; previously, the regimen (initial and subsequent priming) consisted of three doses. The CDC and WHO recommend that preexposure prophylaxis be given intramuscularly; the WHO also endorses an intradermal regimen [28]. (See "Rabies immune globulin and vaccine".).

    Preexposure vaccination does not eliminate the need for medical attention if exposure occurs, but it simplifies postexposure prophylaxis. (See "Rabies immune globulin and vaccine".)

    For short-stay travelers departing in less than one week, we administer a single dose of vaccine even if the second dose is not possible; in one study including travelers age 18 to 50 years, a single rabies vaccination effectively primed an effective anamnestic response to a single booster dose (simulated postexposure prophylaxis) for at least six months [29].

  - **Subsequent priming regimens**

    - International guidelines regarding the durability of two doses of preexposure prophylaxis vary. The WHO considers two doses sufficient, whereas CDC considers two doses to be protective for three years. Individuals at risk for ongoing exposure beyond this time period should proceed in one of the following ways:

      I. Check a titer during years one to three years after completing the initial regimen; boost if titer is <0.5 international units/mL.

      II. Receive a third vaccine dose between 21 days and three years after completion of the initial two-dose regimen.

      Thereafter, no further titers are needed, and no further vaccine doses are needed unless postexposure prophylaxis is warranted following an exposure.

  - **Role of postexposure vaccination** – Pre-exposure immunization (priming) does not eliminate the need for postexposure administration of two booster doses spaced by three days. The approach to rabies postexposure prophylaxis is discussed separately. (See "Indications for post-exposure rabies prophylaxis".)

Tick-borne encephalitis vaccine

- **General principles** – Tick-borne encephalitis (TBE) is a viral infection of the central nervous system that occurs in Europe and eastern Asia [30]. The disease is primarily transmitted by ticks between April and November; transmission may also occur after ingestion of unpasteurized dairy products from infected cows, sheep, or goats. (See "Arthropod-borne encephalitides", section on 'Tick-borne encephalitis virus'.)

- **Indications**

  - TBE vaccine is recommended for individuals who are travelling or moving to an area where TBE is endemic and will have extensive exposure to ticks because of their planned outdoor activities and itinerary. Extensive exposure can be considered based on the duration

of travel and frequency of exposure and might include shorter-term (eg, <1 month) travelers with daily or frequent exposure or longer-term travelers with regular (eg, a few times a month) exposure to environments that might harbor infected ticks [31].

- TBE vaccine may be considered for individuals who are travelling or moving to an area where TBE is endemic and might engage in outdoor activities in areas where ticks are likely to be found. Consider their planned activities and itinerary and likely extent of exposure to ticks, risk factors for a poor medical outcome (eg, aged ≥60 years), and personal perception and tolerance of risk.

- **Contraindications and precautions** – Severe allergic reaction (eg, anaphylaxis) to any vaccine component.

- **Formulations, dosing, and administration**

  - **Formulations** – TBE vaccines are available in Europe (FSME-IMMUN/Ticovac and Encepur; including Russia) and Australia [32,33].

    In the United States, tick-borne encephalitis vaccine (Ticovac) for adults and children ≥1 year was approved in 2021 [31,34]. (See "Arthropod-borne encephalitides", section on 'Tick-borne encephalitis virus'.)

  - **Dosing and administration** – For individuals ≥16 years, the dose is 0.5 mL intramuscularly. The vaccine is administered as three doses (first dose on day 0, second dose 14 days to 3 months after the first dose, third dose 5 to 12 months after the second dose). Short-stay travelers are protected a week after the second dose, but should receive the third dose if further exposure is expected [35].

    For children 1 to 15 years, the dose is 0.25 mL intramuscularly. The vaccine is administered as three doses; the first two doses are administered 1 to 3 months apart, and the third dose is administered 5 to 12 months after the second dose.

    A booster dose (fourth dose) may be given at least three years after completion of the primary series if ongoing exposure or re-exposure to tick-borne encephalitis virus is expected.

Typhoid vaccine

- **General principles** – Typhoid fever is a water and food-borne infection caused by *Salmonella enterica* serotype Typhi. It is prevalent in many areas of Asia, Africa, and Latin America. Drug-resistant strains of *S.* Typhi are increasingly prevalent globally.

- **Indications** – Typhoid vaccination is recommended for travelers to areas with risk of exposure to *S.* Typhi. Individuals at highest risk include traveling to resource-limited settings, long-term travelers, travelers visiting friends and relatives, and those traveling to South Asia.

  The risk of infection increases with the duration of stay, although travelers have become ill during visits to endemic areas of less than one week. A list of countries is available on the CDC website.

- **Contraindications and precautions** – The oral typhoid vaccine is a live attenuated vaccine so should not be administered to individuals with immunodeficiency, acute febrile illness, or acute gastrointestinal illness. Many experts avoid its use in pregnancy and in individuals with chronic intestinal issues including irritable bowel syndrome.

- **Formulations, dosing, and administration** – Two typhoid vaccines are available in the United States:

  - Vi polysaccharide vaccine (Typhim Vi; a parenteral vaccine), administered in a single 0.5 mL intramuscular injection (age ≥2 years). A booster dose is recommended two years later in the United States and three years later in Canada and many other countries.

  - Ty21a vaccine (Vivotif; a live oral vaccine), administered as a four-dose course (days 1, 3, 5, and 7) for age ≥6 years; it is supplied as a packet of enteric-coated capsules that must be kept refrigerated.

  Ty21a should not be administered within 72 hours of antibiotics [36]; it may be given with antimalarial drugs at doses used for malaria chemoprophylaxis [37]. It provides protection for five years.

  For coadministration of Ty21a and oral cholera vaccine (CVD 103-HgR; Vaxchora), the first dose of oral typhoid vaccine should be administered >8 hours after administration of oral live attenuated cholera vaccine due to interference by the CVD 103-HgR buffer.

  The above vaccines provide 50 to 59 percent protection against typhoid fever [38].

  In addition, Vi-TT typhoid conjugate vaccine (TCV) is a parenteral vaccine available in India, Nepal, and a number of endemic locations outside the United States and Europe [39]. (See "Enteric (typhoid and paratyphoid) fever: Treatment and prevention", section on 'Typhoid vaccine'.)

Yellow fever vaccine

- **General principles**

  - **Yellow fever** – Yellow fever (YF) is a mosquito-borne viral infection endemic in equatorial Africa and areas of South America, but not in Asia [12,40]. There is no specific treatment, and mortality can exceed 20 to 50 percent. Fatalities due to YF acquired by unvaccinated tourists have occurred [41-44]. (See "Yellow fever: Epidemiology, clinical manifestations, and diagnosis".)

- **Vaccine characteristics** – The YF vaccine (YF-Vax) is a live virus vaccine grown in chick embryos. Following vaccine administration, a low-level viremia with the vaccine virus often develops within three to seven days and persists for one to three weeks [40].

- **Vaccination certificate** – Some countries require proof of YF vaccination before entry, usually if the traveler is arriving from an endemic country. However, many countries with YF transmission do not have a legal requirement for vaccination; travelers to those countries need YF vaccination for their own protection.

  To meet entry requirements (for countries that have them), the YF vaccination certificate is valid beginning 10 days after administration of YF vaccine for primary vaccine recipients; this corresponds to the time at which most vaccine recipients demonstrate immunity. A YF vaccination certificate for international travel is valid for the life of the recipient.

  YF vaccine may be administered only through registered clinics and sites.

- **Indications** – Travelers age ≥9 months who are traveling to or living in areas at risk for YF transmission in South America and Africa should be vaccinated. In addition, the International Health Regulations allow countries (with or without local disease) to require proof of YF vaccination as a condition of entry for travelers arriving from certain countries, to prevent importation and indigenous transmission of YF virus. YF vaccine recommendations can be found on the WHO website and the United States Centers for Disease Control and Prevention (CDC) website .

- **Major adverse events** – Three well-characterized serious adverse events occur following YF vaccine administration (see "Yellow fever: Treatment and prevention", section on 'Adverse effects'):

  - **YF vaccine-associated neurologic disease (YEL-AND)**

    - **Clinical manifestations** – YEL-AND is a serious but rarely fatal adverse event. YEL-AND manifests as several distinct clinical syndromes, including meningoencephalitis, Guillain-Barré syndrome (GBS), acute disseminated encephalomyelitis (ADEM), and bulbar palsy. Meningoencephalitis occurs due to direct viral invasion of the central nervous system; the other syndromes are autoimmune manifestations [40].

    - **Incidence** – The overall incidence of YEL-AND is 0.4 to 0.8 cases per 100,000 doses distributed [45].

      The incidence among 60 to 69-year-olds is 1.6 cases per 100,000 doses distributed [40].

      The incidence among patients ≥70 years is 1.1 to 2.3 cases per 100,000 doses distributed [40].

      The incidence among very young infants has been estimated to be 50 to 400 cases per 100,000 population.

      These estimates are likely low given underreporting.

  - **YF vaccine-associated viscerotropic disease (YEL-AVD)**

    - **Clinical manifestations** – YEL-AVD mimics naturally acquired YF disease, with proliferation and dissemination of the vaccine virus throughout the host tissues. This syndrome was first reported in 2001, and >100 cases have been described worldwide [12,46]. The median time from vaccination to symptom onset is three days (range one to eight days); death has occurred in 65 percent of cases. All known cases of YEL-AVD have occurred following a recipient's first YF vaccination, with no reported cases following booster doses.

    - **Incidence** – The overall incidence of YEL-AVD is 0.3 to 0.4 cases per 100,000 doses distributed [45].

      The incidence among 60 to 69-year-olds is 1.0 to 1.1 cases per 100,000 doses distributed [40].

      The incidence among patients ≥70 years is 2.3 to 3.2 cases per 100,000 doses distributed [40].

  - **Immediate hypersensitivity or anaphylactic reactions** – These are uncommon (1.4 per 100,000 doses administered) and principally occur among persons with histories of allergies to egg or other substances [45,47]. The YF vaccine package insert contains a desensitization regimen that can be considered. (See "Allergic reactions to vaccines".)

- **Contraindications** – YF vaccine is a live attenuated vaccine; therefore, it should not be given to the following individuals:

  - Patients with primary immunodeficiencies
  - Transplant recipients
  - Patients on immunosuppressive and immunomodulatory therapies
  - Patients with human immunodeficiency virus (HIV) whose CD4 count is <200/mL
  - Patients with history of thymus disease or thymectomy
  - Individuals age <6 months
  - Individuals with allergy to a vaccine component

  For individuals planning travel to an area for which YF vaccine is recommended to avoid risk of infection in the unvaccinated traveler, serious consideration to a change in itinerary should be advised. For situations in which YF vaccine administration is contraindicated but YF

vaccine documentation must be presented to international customs officials according to International Health Regulations, a Medical Letter of Waiver can be provided; however, this does not guarantee entry to all countries with yellow fever vaccine entry requirements.

- **Precautions**
  - **By age** – Age-related for precautions for YF vaccination include:
    - Travelers ≥60 years of age
    - Infants aged 6 to 8 months

    For these patients, the risk of severe illness and death due to YF infection should be balanced against the risk of serious vaccine adverse effects [48].
  - **Pregnancy** – Pregnancy is a precaution for YF vaccine administration (in contrast with most other live vaccines, which are contraindicated in pregnancy). If travel is unavoidable and the risks for YF virus exposure are felt to outweigh the risks of vaccination, a pregnant patient should be vaccinated. If the risks for vaccination are felt to outweigh the risks for YF virus exposure, pregnant patients should be issued a medical waiver to fulfill any international health regulation requirement [40].
- **Dosing and administration**
  - **Dosing**
    - Standard dosing consists of a single 0.5 mL subcutaneous injection.
    - Booster vaccination - A single primary dose of yellow fever vaccine is adequate for most travelers [49]. Issues related to yellow fever booster vaccination for travelers are discussed separately. (See "Yellow fever: Treatment and prevention", section on 'Travelers'.)
    - Fractional dosing (a single 0.1 mL [one-fifth of the normal dose] subcutaneous injection) has been used in emergency situations to control outbreaks; thus far, data are complex and insufficient for most national and international authorities to support the use of fractional dosing in travelers [50]. A fractional dose does not meet the criteria for proof of vaccination to be documented on an International Certificate of Vaccination or Prophylaxis. (See "Yellow fever: Treatment and prevention", section on 'Fractional vaccine dosing'.).
  - **Administration** – YF vaccine should be administered either simultaneously or four weeks apart from other live injectable viral vaccines. Other inactivated vaccines and oral live vaccines can be administered either simultaneously or at any time before or after YF vaccination.

    Vaccination must occur at least 10 days before entry into a country with a yellow fever entry requirement; travelers are not considered immune until 10 days after vaccination.

    Vaccine recipients should be instructed to report symptoms of any kind within one week of vaccination. Any vaccine recipient with flu-like or febrile illnesses should return for clinical evaluation.

ROUTINE IMMUNIZATIONS

The pretravel visit provides an opportunity to ensure that routine immunizations (including COVID, influenza, MMR [measles, mumps, and rubella], poliovirus, and Tdap [tetanus, diphtheria, and pertussis]) are current, as discussed in the following sections.

COVID vaccine — Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the cause of coronavirus disease 2019 (COVID-19), spreads via respiratory transmission. Travelers should be up-to-date with COVID-19 vaccinations before travel. Due to the rapid waning of protection after a dose of COVID vaccine, travelers may consider obtaining booster doses within a few months prior to travel, if feasible. Formulations and additional guidance are discussed further separately (see "COVID-19: Vaccines").

Influenza vaccine — Travelers likely play an important role in global spread of influenza [1]. The viruses circulate predominantly in the Northern Hemisphere from October through March and in the Southern Hemisphere from April through September; in the tropics they circulate year-round. Infection may be acquired outside of a traveler's home epidemic season.

Influenza vaccination is appropriate for all travelers to destinations during a time of influenza transmission. Formulations and additional guidance are discussed further separately. (See "Seasonal influenza vaccination in adults" and "Seasonal influenza in children: Prevention with vaccines", section on 'Travelers'.)

Measles, mumps, and rubella vaccine (MMR)

- **General principles** – Measles, mumps, and rubella are contagious viral illnesses that occur worldwide. Measles is characterized by fever, cough, coryza, and conjunctivitis, followed by exanthem; complications include pneumonia and encephalitis. Mumps causes an acute illness characterized by parotid swelling; complications include orchitis, oophoritis, meningitis, and encephalitis. Rubella causes a mild

illness with characteristic rash; it is generally a self-limiting illness in children but can have devastating effects on the fetus when acquired during pregnancy.

Many international travelers are inadequately vaccinated against these infections, and outbreaks have been associated with imported infection [51].

- **Indications** – All travelers are at risk for measles and mumps infection (regardless of destination). The pretravel visit is an important opportunity to reduce the likelihood of measles transmission [51,52].
- **Contraindications and precautions** – MMR is a live attenuated virus vaccine; it should not be given to pregnant or immunocompromised individuals.
- **Administration** – Unless the vaccine is contraindicated, all international travelers older than 12 months require two doses of MMR vaccine one month apart, or evidence of immunity.
  - **Children** – Children traveling outside the United States should receive MMR vaccination sooner than the standard immunization schedule. Prior to departure, children 12 months of age or older should have received two doses of MMR vaccine separated by at least 28 days, with the first dose administered on or after the first birthday. Children aged 6 to 11 months should receive one dose of MMR before departure. (See "Measles, mumps, and rubella immunization in infants, children, and adolescents", section on 'International travel and outbreaks'.)
  - **Adults** – MMR vaccination for adults is indicated for individuals born in 1957 or later in the United States (born in 1970 or later in Canada; born in 1966 or later in Australia) without evidence of immunity or without evidence of two doses of an adequate live vaccine at any time after age 12 months.

    Individuals born before 1957 in the United States are presumed to be immune (exceptions include health care workers and women of childbearing age). Nonetheless, for unvaccinated individuals without other evidence of immunity who were born before 1957 (in the United States) and are traveling for purposes of health care or humanitarian work (potentially entailing close contact with ill individuals), two doses of MMR vaccine spaced by one month should be considered. (See "Measles, mumps, and rubella immunization in adults".)

Poliovirus vaccine

- **General principles** – Poliomyelitis is a viral infection transmitted via the fecal-oral route that can affect the central nervous system, leading to muscle weakness and flaccid paralysis.

  As of 2024, wild-type polio viruses persist in two countries: Pakistan and Afghanistan. Vaccine-derived polio viruses circulate in more than 20 countries in Asia and Africa. Information about recent cases can be found on the Global Polio Eradication Initiative website. (See "Global poliomyelitis eradication".)

  Some countries require proof of recent polio vaccination for travelers arriving from areas with circulating wild-type or vaccine-derived polio viruses. For information on the status of polio vaccine recommendations, refer to the CDC website.
- **Indications** – All travelers should have received an age-appropriate primary series of polio vaccination.

  The CDC recommends that travelers ≥18 years of age who are traveling to areas with risk for poliomyelitis receive a one-time adult booster vaccination.

  The WHO recommends that residents and long-term visitors (≥4 weeks) to these areas show proof of polio vaccination before exiting; such immunity is defined as receipt of a polio vaccine within 12 months prior to exiting [53].
- **Formulations** – There are two types of polio vaccine: an oral polio vaccine (OPV), containing live attenuated polioviruses, and an inactivated polio vaccine (IPV); only IPV is available in the United States.

  Poliovirus vaccination is discussed in further separately. (See "Poliovirus vaccination".)

Tetanus, diphtheria, and pertussis vaccine (Tdap)

- **General principles** – Tetanus is a nervous system disorder characterized by muscle spasms caused by the toxin-producing anaerobe *Clostridium tetani*; infection typically occurs following traumatic injury. Diphtheria is caused by the gram-positive bacillus *Corynebacterium diphtheriae*; infection may lead to respiratory or cutaneous disease. Pertussis is a communicable respiratory infection caused by *Bordetella pertussis*.
- **Indications** – All travelers should have received an age-appropriate primary vaccination series. All adults should receive at least one tetanus, diphtheria, and pertussis (Tdap) vaccination, followed by a Tdap (ideally) or Td booster if more than 10 years have elapsed. Pregnant individuals should receive a Tdap vaccine during each pregnancy.

  Tdap and Td vaccination are discussed further separately. (See "Pertussis infection in adolescents and adults: Treatment and prevention", section on 'Vaccination' and "Tetanus-diphtheria toxoid vaccination in adults".)

Other vaccines — A pretravel health assessment is an opportunity to ensure that an individual has received all appropriate vaccinations (figure 2). These may include:

- Pneumococcal vaccine (See "Pneumococcal vaccination in adults".)
- Respiratory syncytial virus (RSV) vaccine (See "Respiratory syncytial virus infection in adults", section on 'Vaccination'.)
- Varicella vaccine (See "Vaccination for the prevention of chickenpox (primary varicella infection)".)
- Zoster vaccine (See "Vaccination for the prevention of shingles (herpes zoster) in adults".)

General information on immunizations is presented separately. (See "Standard immunizations for nonpregnant adults" and "Immunizations during pregnancy" and "Standard immunizations for children and adolescents: Overview".)

IMMUNOCOMPROMISED PATIENTS

In general, severely immunocompromised patients should not receive live vaccines.

Live parenteral vaccines include:

- Chikungunya vaccine
- Dengue vaccine (Qdenga; available outside the United States)
- Live Japanese encephalitis vaccine (IMOJEV; available outside the United States)
- Measles, mumps, and rubella (MMR)
- Varicella vaccine
- Yellow fever vaccine
- Zoster vaccine live (ZVL; available outside the United States)

- Live oral or nasal vaccines include:

- Oral cholera vaccine (Vaxchora)
- Nasal influenza vaccine
- Oral polio vaccine (OPV; available outside the United States)
- Oral typhoid vaccine

Inactivated vaccines include:

- COVID-19 vaccines
- Hepatitis A and B vaccines
- Inactivated influenza vaccine
- Inactivated Japanese encephalitis vaccine (IXIARO)
- Meningococcal vaccines
- Mpox (Jynneos) vaccine (live but non-replicating)
- Pneumococcal vaccines
- Inactivated polio vaccine (IPV)
- Rabies vaccine
- Respiratory syncytial virus (RSV) vaccine
- Tdap (tetanus, diphtheria, and pertussis) and Td (tetanus, diphtheria) vaccine
- Tickborne encephalitis vaccine
- Parenteral typhoid vaccine
- Recombinant zoster vaccine (RZV)

Issues related to immunizations in immunocompromised patients are discussed in detail separately, as are issues related to immunizations in individuals with HIV infection and in pregnancy. (See "Travel advice for immunocompromised hosts" and "Immunizations in patients with inborn errors of immunity" and "Immunizations in persons with HIV" and "Immunizations during pregnancy".)

SOCIETY GUIDELINE LINKS

Links to society and government-sponsored guidelines from selected countries and regions around the world are provided separately. (See "Society guideline links: Rabies" and "Society guideline links: Travel medicine".)

INFORMATION FOR PATIENTS

UpToDate offers two types of patient education materials, "The Basics" and "Beyond the Basics." The Basics patient education pieces are written in plain language, at the 5th to 6th grade reading level, and they answer the four or five key questions a patient might have about a

given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials. Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are written at the 10th to 12th grade reading level and are best for patients who want in-depth information and are comfortable with some medical jargon.

Here are the patient education articles that are relevant to this topic. We encourage you to print or e-mail these topics to your patients. (You can also locate patient education articles on a variety of subjects by searching on "patient info" and the keyword(s) of interest.)

- Basics topics (see "Patient education: Vaccines for travel (The Basics)" and "Patient education: Vaccines for adults (The Basics)" and "Patient education: What you should know about vaccines (The Basics)")
- Beyond the Basics topic (see "Patient education: General travel advice (Beyond the Basics)")

SUMMARY AND RECOMMENDATIONS

- **General principles** – Immunizations for travelers may be divided into the following categories:
  - **Travel immunizations** – Travel immunizations include (table 1) (see 'Immunizations for travel' above):
    - Immunization required under international health regulations (eg, yellow fever)
    - Immunization to reduce risk of infection guided by travel plans (destination[s] and activities)

    Guidance for destination-specific immunizations can be found at www.cdc.gov/travel.
  - **Routine immunizations** – Pretravel visits offer an opportunity to update routine vaccinations for travelers. (See 'Routine immunizations' above.).
- **Review medical history and travel plans** – Immunization needs are based on the traveler's medical history, travel plans, and prior immunizations. Guidance for destination-specific immunizations can be found at www.cdc.gov/travel. (See "Travel advice", section on 'Review medical history and travel plans'.)
- **Immunizations for travel** – Vaccine indications, contraindications, precautions, formulations, dosing, and administration are described above. (See 'Immunizations for travel' above.)
- **Vaccine coadministration** – Any combination of vaccines can be administered at a single appointment. Additional guidance regarding administration of live vaccines is discussed above. (See 'Vaccine coadministration' above.)
- **Immunocompromised patients** – In general, severely immunocompromised patients should not receive live vaccines. These include chikungunya vaccine, oral cholera vaccine, nasal influenza vaccine, MMR, oral polio vaccine (OPV), oral typhoid vaccine, varicella vaccine, yellow fever vaccine, and zoster vaccine live (ZVL). (See 'Immunocompromised patients' above.)

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Topic 3890 Version 88.0

GRAPHICS

Table 1: **Some immunizations for travel**

Vaccines	Adult dose	Pediatric age/dose	Standard primary schedule	Duration of protection
Chikungunya vaccine[*]				
Vimkunya (recombinant vaccine)	0.8 mL IM	Age ≥12 years: Same as for adults.	Single dose.	No specific recommendation.
Cholera vaccine				
Vaxchora (live vaccine)	Aged 18 to 64: 100 mL PO (lyophilized *Vibrio cholerae* CVD 103-HgR)	Age 2 to <6: 50 mL by mouth (lyophilized *V. cholerae* CVD 103-HgR). Age ≥6 years: Same as for adults.	Single dose.	No specific recommendation; consider booster every 6 months if at continued risk.
Hepatitis A				
Havrix (inactivated vaccine)	1 mL IM (1440 EU)	1 to 18 years: 0.5 mL IM (720 EU).	0 and 6 to 12 months.	Probably lifelong after completion of primary series.[¶]
Vaqta (inactivated vaccine)	1 mL IM (50 units)	1 to 18 years: 0.5 mL IM (25 units).	0 and 6 to 18 months.	
Hepatitis B				
Engerix-B (inactivated vaccine)	1 mL IM (20 mcg)	Birth to 19 years: 0.5 mL IM (10 mcg).	0, 1, and 6 months.[Δ◇]	Probably lifelong after completion of primary series.
Recombivax-HB (inactivated vaccine)	1 mL IM (10 mcg)	Birth to 19 years: 0.5 mL IM (5 mcg).	0, 1, and 6 months.[◇§]	
Heplisav-B (inactivated vaccine)	0.5 mL IM (20 mcg)	Not approved for <18 years.	0, 28 days.	
Hepatitis A/B				
Twinrix (inactivated vaccine)	1 mL IM (720 EU/20 mcg)	Not approved for <18 years.	0, 1, and 6 months (alternative: 0, 7, and 21 to 30 days).	Booster recommended at 12 months with accelerated schedule; otherwise, probably lifelong after completion of primary series.
Japanese encephalitis				
Ixiaro (JE-VC; inactivated vaccine)	Age 18 to 65: 0.5 mL IM/dose; 2 doses (first dose on day 0; second dose any time between day 7 and day 28) Age >65: 0.5 mL IM/dose; 2 doses given on days 0 and 28	Age 2 months to <3 years: 0.25 mL IM/dose; 2 doses given on days 0 and 28. Age ≥3 years: Same as for adults >65.	Schedule varies with age (refer to preceding columns).	A single booster >1 year after completion of primary series if ongoing risk.[¥]
Meningococcus				
Menveo (MenACWY-CRM; inactivated vaccine)	0.5 mL IM (10 mcg serogroup A, 5 mcg serogroup C, Y, W135, CRM^{197} conjugate)	Age ≥2 months: 0.5 mL IM (10 mcg serogroup A, 5 mcg serogroup C, Y, W135).	≥2 to 55 years: Single dose.[‡] (For immunocompromised patients: 2 doses spaced 8 weeks apart.)	Repeat every 5 years[†] if ongoing risk due to travel or immunocompromise.
MenQuadfi (MenACWY-TT; inactivated vaccine)	0.5 mL IM	Age ≥2 years: 0.5 mL IM. Repeat every 5 years[**] if ongoing risk due to travel or immunocompromise.	Single dose.[‡] (For immunocompromised: 2 doses spaced by 8 weeks). Not approved for <2 years.	Repeat every 5 years[†] if ongoing risk due to travel or immunocompromise.
Mpox				
Modified vaccinia Ankara-Bavarian Nordic (JYNNEOS; live vaccine but non-replicating)	0.5 mL SC	Not approved for <18 years.	0, 28 days.	Booster dose recommended every 2 years.
Rabies				
Imovax (HDCV; inactivated vaccine)	1 mL IM (≥2.5 international units of rabies antigen)	All ages: 1 mL IM (≥2.5 international units of rabies antigen).	0 and 7 days. Empiric third dose between day 21 and 3 years.[**,¶¶]	Third dose unnecessary if titer check at 1 to 3 years shows protective levels.[¶¶]

RabAvert (PCECV; inactivated vaccine)	1 mL IM (≥2.5 international units of rabies antigen)	All ages: 1 mL IM (≥2.5 international units of rabies antigen).	0 and 7 days. Empiric third dose between day 21 and 3 years.**,¶¶	
Tick-borne encephalitis				
Ticovac (known as FSME/IMMUN in some European countries; inactivated vaccine)	Age 16 years and older: 0.5 mL IM/dose; 3 doses (first dose on day 0, second dose 14 days$^{\Delta\Delta}$ to 3 months after the first dose, third dose 5 to 12 months after the second dose)	Age 1 to 15 years: 0.25 mL IM/dose; 3 doses (first dose on day 0, second dose 1 to 3 months after the first dose, third dose 5 to 12 months after the second vaccination).	Schedule varies with age (refer to preceding columns).	A booster dose (fourth dose) may be given at least 3 years after completion of the primary series if ongoing exposure or re-exposure to tickborne encephalitis virus is expected.
Typhoid				
Vivotif (live vaccine)	1 cap PO (contains 2 to 6 × 10** viable colony-forming units of *S.* Typhi Ty21a)	≥6 years: 1 cap PO (contains 2 to 6 × 10** viable colony-forming units of *S.* Typhi Ty21a).	1 cap every other day × 4 doses.	Repeat every 5 years if ongoing risk.
Typhim Vi (inactivated vaccine)	0.5 mL IM (25 mcg)	≥2 years: 0.5 mL IM (25 mcg).	Single dose.	Repeat every 2 years (3 years in Canada) if ongoing risk.
Yellow fever				
YF-Vax (live vaccine)	0.5 mL SC (4.74 log$^{\diamond\diamond}$ plaque forming units of 17D204 attenuated YF virus)	≥9 months: 0.5 mL SC (4.74 log$^{\diamond\diamond}$ plaque forming units of 17D204 attenuated YF virus).	Single dose.	Booster dose every 10 years if ongoing risk.

ACIP: Advisory Committee on Immunization Practices; HDCV: human diploid cell vaccine; IM: intramuscular; JE-VC: Vero cell culture-derived Japanese encephalitis; MMWR: Morbidity and Mortality Weekly Report; PCECV: purified chick embryo cell vaccine; PO: by mouth; PrEP: pre-exposure prophylaxis; SC: subcutaneous.

* IXCHIQ, a live-attenuated chikungunya vaccine, was suspended by the US Food and Drug Administration in 2025 due to reports of serious safety concerns.

¶ Protection likely lasts at least 12 months after a single dose.

Δ An alternate schedule is 3 doses given at 0, 1, and 2 months, followed by a fourth dose at 12 months.

◇ An accelerated schedule of 0, 7, and 14 days followed by a booster dose at 6 months has been used but is not US Food and Drug Administration-approved.

§ An alternate schedule for adolescents 11 to 15 years old is 0 and 4 to 6 months.

¥ Adults previously vaccinated with JE Vax should receive a primary series of Ixiaro.[1]

‡ For children 2 to 5 years old at continued high risk, a second dose may be administered 2 months after the first.

† Repeat after 3 years for children vaccinated at <7 years of age. Considerable published data indicates that protection significantly wanes after 3 years; travelers to the meningitis belt should consider a booster after 3 years due to the high risk of infection compared to risk at home.[2]

** Regimen for PrEP. If a previously vaccinated traveler is exposed to a potentially rabid animal, postexposure prophylaxis with 2 additional vaccine doses separated by 3 days should be initiated as soon as possible.

¶¶ For immunocompetent individuals with short-term risk for rabies (such as travelers), the World Health Organization and the United States Centers for Disease Control and Prevention endorse a 2-dose PrEP regimen.[3,4] For those at ongoing risk, such as long-stay or frequent travelers, an empiric booster (third) dose may be given between day 21 and 3 years; alternatively, such individuals may have antibody levels checked at 1 to 3 years postvaccination, with booster (third) dose if antibody titer is <0.5 international units/mL. Thereafter, no further titers are needed, and no further vaccine doses are needed unless postexposure prophylaxis is warranted following an exposure.

ΔΔ Short-stay travelers are protected a week after a second dose given at day 14 but should receive either the third dose or a titer check at 1 to 3 years is further exposure is expected.

◇◇ Minimal acceptable antibody level is complete virus neutralization at a 1:5 serum dilution by the rapid fluorescent focus inhibition test.

References:

1. *Centers for Disease Control and Prevention. Recommendations for use of a booster dose of inactivated vero cell culture-derived Japanese encephalitis vaccine: Advisory committee on immunization practices, 2011. MMWR Morb Mortal Wkly Rep 2011; 60:661.*
2. *Cohn AC, MacNeil JR, Harrison LH. Effectiveness and duration of protection of 1 dose of a meningococcal conjugate vaccine. Pediatrics 2017; 139:e20162193.*
3. *World Health Organization. Rabies vaccine: WHO position paper - April 2018. Wkly Epidemiol Rec 2018; 93:201. http://apps.who.int/iris/bitstream/handle/10665/272371/WER9316.pdf?ua=1 (Accessed on October 11, 2021).*
4. *Rabies: Rabies pre-exposure prophylaxis. Centers for Disease Control and Prevention. https://www.cdc.gov/rabies/hcp/prevention-recommendations/pre-exposure-prophylaxis.html (Accessed on November 22, 2024).*

Adapted from: Advice for travelers. Treat Guidel Med Lett 2012; 10:45.

Graphic 82688 Version 23.0

Table 2: **An approach to Japanese encephalitis vaccination**

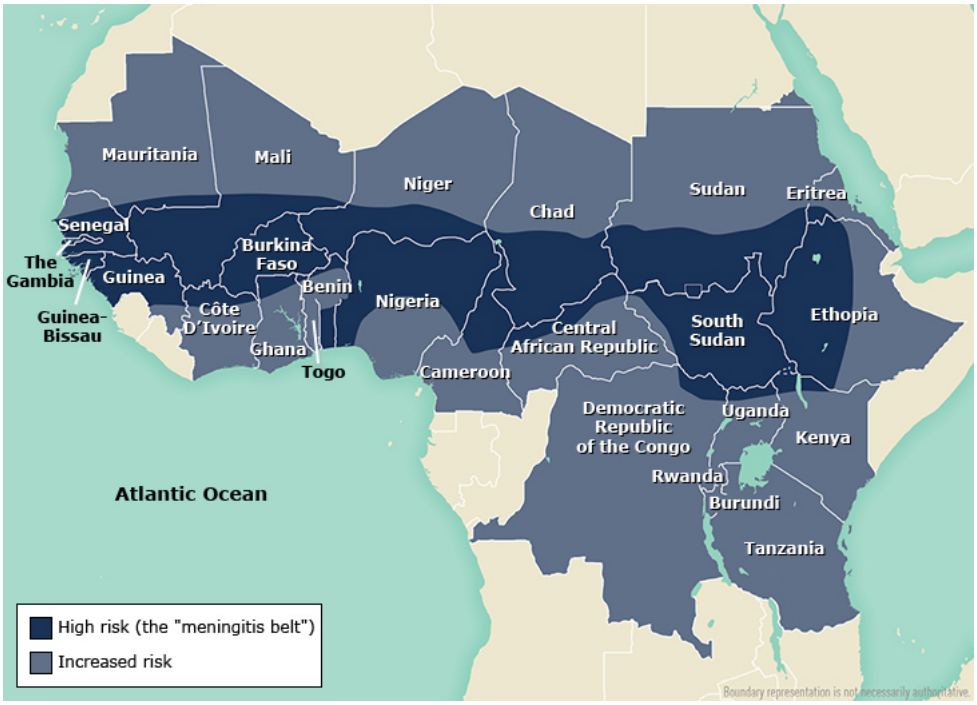
Preliminary considerations:
▪ Health care providers should assess each traveler's risk for mosquito exposure and JE virus infection based on their planned itinerary and discuss ways to reduce their risk. All travelers to JE-endemic countries should be advised to take precautions to avoid mosquito bites to reduce the risk for JE and other vector-borne diseases. These precautions include using insect repellent, permethrin-impregnated clothing, and bed nets and staying in accommodations with screened or air-conditioned rooms. ▪ For some individuals who might be at increased risk for JE based on travel duration, season, location, activities, and accommodations, JE vaccine can further reduce the risk for infection. The decision whether to vaccinate should be individualized and consider the risks related to the specific travel itinerary, the likelihood of future travel to JE-endemic countries, the high morbidity and mortality of JE, the availability of an effective vaccine, the possibility (but low probability) of serious adverse events after vaccination, and the traveler's personal perception and tolerance of risk.
JE vaccine is recommended for:
▪ Individuals moving to a JE-endemic country to take up residence ▪ Longer-term travelers (eg, ≥1 month) to JE-endemic areas ▪ Frequent travelers to JE-endemic areas ▪ Laboratory workers with potential for exposure to JE viruses (other than SA14-14-2 JE vaccine virus)*
JE vaccine also should be considered for:
▪ Shorter-term travelers (eg, <1 month) with an increased risk for JE based on planned travel duration, season, location, activities, and accommodations[1] ▪ Travelers to JE-endemic areas who are uncertain of specific duration of travel, destinations, or activities
JE vaccine is not recommended for:
▪ Travelers with very low-risk itineraries, such as shorter-term travel limited to urban areas or travel that occurs outside of a well-defined JE virus transmission season

JE: Japanese encephalitis.
* In general, vaccination is not required for those who work with SA14-14-2 JE vaccine virus only; however, for those working with SA14-14-2 JE vaccine virus at high concentrations or volumes, or passaging virus, individual risk assessments with consideration of biosafety level and vaccination should be undertaken by a local biosafety committee. Vaccination is not required for workers handling routine clinical samples.

Reference:
1. Hills SL, Walter EB, Atmar RL, et al. Japanese Encephalitis Vaccine: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recomm Rep 2019; 68:1.

Graphic 54113 Version 10.0

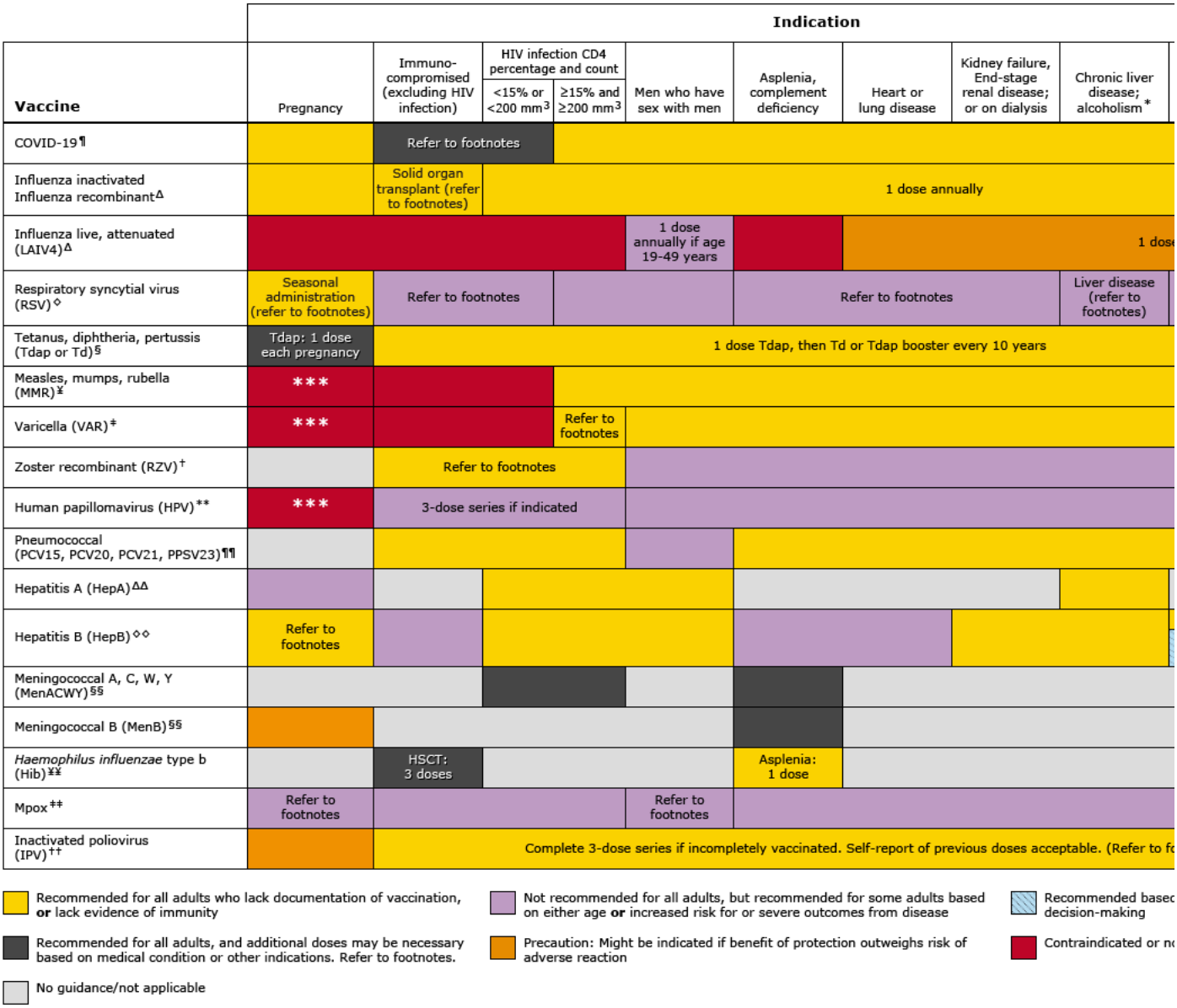
Figure 1: **The meningitis belt and other areas at risk for meningococcal meningitis epidemics**



Data from: World Health Organization 2015. Reproduced from: McNamara L, Blain A. Meningococcal disease. In: CDC Yellow Book 2024, Nemhauser JB (Ed), Oxford University Press 2023. https://wwwnc.cdc.gov/travel/yellowbook/2024/infections-diseases/meningococcal-disease (Accessed on November 15, 2024).

Graphic 147049 Version 1.0

Figure 2: **Adult immunization schedule by medical condition and other indication – Recommendations for ages 19 years or older, United States, 2025**



Administer recommended vaccines if vaccination history is incomplete or unknown. Do not restart or add doses to vaccine series if there are extended intervals between doses. The use of trade names is for identification purposes only and does not imply endorsement by the ACIP or CDC.

NOTES

For vaccine recommendations for persons 18 years of age or younger, refer to the Recommended Child and Adolescent Immunization Schedule.

Additional information

- For calculating intervals between doses, 4 weeks = 28 days. Intervals of ≥4 months are determined by calendar months.
- Within a number range (eg, 12-18), a dash (–) should be read as "through."
- Vaccine doses administered ≤4 days before the minimum age or interval are considered valid. Doses of any vaccine administered ≥5 days earlier than the minimum age or minimum interval should not be counted as valid and should be repeated. **The repeat dose should be spaced after the invalid dose by the recommended minimum interval.** For further details, refer to Table 3-2, Recommended and minimum ages and intervals between vaccine doses, in Timing and Spacing of Immunobiologics.
- Information on travel vaccination requirements and recommendations is available at cdc.gov/travel/.
- For vaccination of persons with immunodeficiencies, refer to Table 8-1, Vaccination of persons with primary and secondary immunodeficiencies, in Altered Immunocompetence.
- For information about vaccination in the setting of a vaccine-preventable disease outbreak, contact your state or local health department.
- The National Vaccine Injury Compensation Program (VICP) is a no-fault alternative to the traditional legal system for resolving vaccine injury claims. All vaccines included in the adult immunization schedule except PPSV23, RSV, RZV, mpox, and COVID-19 vaccines are covered by the National Vaccine Injury Compensation Program (VICP). Mpox and COVID-19 vaccines are covered by the Countermeasures Injury Compensation Program (CICP). For more information, refer to www.hrsa.gov/vaccinecompensation or www.hrsa.gov/cicp.

HSCT: hematopoietic stem cell transplant.

* Precaution for LAIV4 does not apply to alcoholism.

¶ **COVID-19 vaccination**

- **Routine vaccination:**
  - **Age 19-64 years.**
    - **Unvaccinated:**
      - 1 dose 2024-25 Moderna or Pfizer-BioNTech.
      - 2 doses 2024-25 Novavax at 0, 3-8 weeks.
    - **Previously vaccinated before 2024-25 vaccine with:**
      - **1 or more doses Moderna or Pfizer-BioNTech:** 1 dose 2024-25 Moderna or Novavax or Pfizer-BioNTech at least 8 weeks after the most recent dose.
      - **1 dose Novavax:** 1 dose 2024-25 Novavax 3-8 weeks after most recent dose. If more than 8 weeks after the most recent dose, administer 1 dose 2024-25 Moderna or Novavax or Pfizer-BioNTech.
      - **2 or more doses Novavax:** 1 dose 2024-25 Moderna or Novavax or Pfizer-BioNTech at least 8 weeks after the most recent dose.
      - **1 or more doses Janssen:** 1 dose 2024-25 Moderna or Novavax or Pfizer-BioNTech.
  - **Age 65 years and older.**
    - **Unvaccinated:** Follow recommendations above for unvaccinated persons ages 19-64 years **and** administer dose 2 of 2024-25 Moderna or Novavax or Pfizer-BioNTech 6 months later (minimum interval 2 months).
    - **Previously vaccinated before 2024-25 vaccine:** Follow recommendations above for previously vaccinated persons ages 19-64 years **and** administer dose 2 of 2024-25 Moderna or Novavax or Pfizer-BioNTech 6 months later (minimum interval 2 months).
- **Special situations:**
  - **Persons who are moderately or severely immunocompromised. Use vaccine from the same manufacturer for all doses in the initial vaccination series.**
    - **Unvaccinated:**
      - 4 doses (3-dose initial series 2024-25 Moderna at 0, 4 weeks, and at least 4 weeks after dose 2, followed by 1 dose 2024-25 Moderna or Novavax or Pfizer-BioNTech 6 months later [minimum interval 2 months]). May administer additional doses.¶¶¶
      - 4 doses (3-dose initial series 2024-25 Pfizer-BioNTech at 0, 3 weeks, and at least 4 weeks after dose 2, followed by 1 dose 2024-25 Moderna or Novavax or Pfizer-BioNTech 6 months later [minimum interval 2 months]). May administer additional doses.¶¶¶
      - 3 doses (2-dose initial series 2024-25 Novavax at 0, 3 weeks, followed by 1 dose Moderna or Novavax or Pfizer-BioNTech 6 months later [minimum interval 2 months]). May administer additional doses.¶¶¶
    - **Incomplete initial vaccination series before 2024-25 vaccine:**
      - **Previous vaccination with Moderna**
        - **1 dose Moderna:** Complete initial series with 2 doses 2024-25 Moderna at least 4 weeks apart (administer dose 1 4 weeks after most recent dose), followed by 1 dose 2024-25 Moderna or Novavax or Pfizer-BioNTech 6 months later (minimum interval 2 months). May administer additional doses.¶¶¶
        - **2 doses Moderna:** Complete initial series with 1 dose 2024-25 Moderna at least 4 weeks after most recent dose, followed by 1 dose 2024-25 Moderna or Novavax or Pfizer-BioNTech 6 months later (minimum interval 2 months). May administer additional doses.¶¶¶
      - **Previous vaccination with Pfizer-BioNTech**
        - **1 dose Pfizer-BioNTech:** Complete initial series with 2 doses 2024-25 Pfizer-BioNTech at least 4 weeks apart (administer dose 1 3 weeks after most recent dose), followed by 1 dose 2024-25 Moderna or Novavax or Pfizer-BioNTech 6 months later (minimum interval 2 months). May administer additional doses.¶¶¶
        - **2 doses Pfizer-BioNTech:** Complete initial series with 1 dose 2024-25 Pfizer-BioNTech at least 4 weeks after most recent dose, followed by 1 dose 2024-25 Moderna or Novavax or Pfizer-BioNTech 6 months later (minimum interval 2 months). May administer additional doses.¶¶¶
      - **Previous vaccination with Novavax**
        - **1 dose Novavax:** Complete initial series with 1 dose 2024-25 Novavax at least 3 weeks after most recent dose, followed by 1 dose 2024-25 Moderna or Novavax or Pfizer-BioNTech 6 months later (minimum interval 2 months). May administer additional doses.¶¶¶
    - **Completed the initial vaccination series before 2024-25 vaccine with:**
      - **3 or more doses Moderna or 3 or more doses Pfizer-BioNTech:** 2 doses 2024-25 Moderna or Novavax or Pfizer-BioNTech 6 months apart (minimum interval 2 months). Administer dose 1 at least 8 weeks after the most recent dose. May administer additional doses.¶¶¶
      - **2 or more doses Novavax:** 2 doses 2024-25 Moderna or Novavax or Pfizer-BioNTech 6 months apart (minimum interval 2 months). Administer dose 1 at least 8 weeks after the most recent dose. May administer additional doses.¶¶¶
    - **¶¶¶ Additional doses of 2024-25 COVID-19 vaccine for moderately or severely immunocompromised:**
      - Based on shared clinical decision-making and administered at least 2 months after the most recent dose (refer to Table 2 at www.cdc.gov/vaccines/covid-19/clinical-considerations/interim-considerations-us.html#table-02). For description of moderate and severe immunocompromising conditions and treatment, refer to www.cdc.gov/vaccines/covid-19/clinical-considerations/interim-considerations-us.html#immunocompromising-conditions-treatment.
      - Unvaccinated persons have never received any COVID-19 vaccine doses. There is no preferential recommendation for the use of one COVID-19 vaccine over another when more than one recommended age-appropriate vaccine is available. Administer an age-appropriate COVID-19 vaccine product for each dose.
      - For more information about the interchangeability of COVID-19 vaccines, refer to https://www.cdc.gov/vaccines/covid-19/clinical-considerations/interim-considerations-us.html#Interchangeability.
      - Current COVID-19 schedule and dose formulation available at www.cdc.gov/covidschedule.
- **Contraindications and precautions:**
  - For contraindications and precautions to COVID-19 vaccination, refer to COVID-19 Appendix.

Δ **Influenza vaccination**

- **Routine vaccination:**
  - **Age 19 years or older:** 1 dose any influenza vaccine appropriate for age and health status annually.
    - **Solid organ transplant recipients aged 19 through 64 years receiving immunosuppressive medications:** HD-IIV3 and aIIV3 are acceptable options. No preference over other age-appropriate IIV3 or RIV3.
    - **Age 65 years or older:** Any one of HD-IIV3, RIV3, or aIIV3 is preferred. If none of these three vaccines are available, then any other age-appropriate influenza vaccine should be used.
  - For the 2024-25 season, refer to www.cdc.gov/mmwr/volumes/73/rr/rr7305a1.htm.
  - For the 2025-26 season, refer to the 2025-26 ACIP influenza vaccine recommendations.
- **Special situations:**

- **Close contacts (eg, caregivers, health care workers) of severely immunosuppressed persons who require a protected environment:** Should not receive LAIV3. If LAIV3 is given, they should avoid contact with/caring for such immunosuppressed persons for 7 days after vaccination.
- **NOTE:** Persons with an egg allergy can receive any influenza vaccine (egg-based and non-egg-based) appropriate for age and health status.

▪ **Contraindications and precautions:**
- For contraindications and precautions to influenza vaccination, refer to IIV3 Appendix, LAIV3 Appendix, ccIIV3 Appendix, and RIV3 Appendix.

◇ **Respiratory syncytial virus vaccination**

▪ **Routine vaccination:**
- **Pregnant persons of any age.**
  - **Pregnant at 32 weeks 0 days through 36 weeks and 6 days gestation from September through January in most of the continental United States** (NOTE: Providers in jurisdictions with RSV seasonality that differs from most of the continental United States [eg, Alaska, jurisdiction with tropical climate] should follow guidance from public health authorities on timing of administration. Refer to the 2025 Child and Adolescent Immunization Schedule for considerations regarding nirsevimab administration to infants)**:** 1 dose Abrysvo. Administer RSV vaccine regardless of previous RSV infection.
  - Either maternal RSV vaccination with Abrysvo or infant immunization with nirsevimab (RSV monoclonal antibody) is recommended to prevent severe respiratory syncytial virus disease in infants.
  - **All other pregnant persons:** RSV vaccine not recommended.
  - **Subsequent pregnancies:** Additional doses not recommended. No data are available to inform whether additional doses are needed in subsequent pregnancies. Infants born to pregnant persons who received RSV vaccine during a previous pregnancy should receive nirsevimab.
- **Age 75 years or older.**
  - **Unvaccinated:** 1 dose (Arexvy or Abrysvo or mResvia). Additional doses not recommended.
  - **Previously vaccinated:** Additional doses not recommended. No data are available to inform whether additional doses are needed.

▪ **Special situations:**
- **Age 60-74 years.**
  - **Unvaccinated and at increased risk of severe RSV disease**ΔΔΔ**:** 1 dose (Arexvy or Abrysvo or mResvia). Additional doses not recommended.
  - **Previously vaccinated:** Additional doses not recommended. No data are available to inform whether additional doses are needed.
- Persons 60 years and older can get RSV vaccine at any time but best to administer in late summer and early fall before RSV spreads in communities—ideally August through October in most of continental United States. For further guidance, refer to www.cdc.gov/mmwr/volumes/73/wr/mm7332e1.htm.
- ΔΔΔ **People can self-attest to the presence of a risk factor. The following medical and other conditions increase the risk of severe RSV disease:**
  - Chronic cardiovascular disease (eg, heart failure, coronary artery disease, congenital heart disease). Excludes isolated hypertension.
  - Chronic lung or respiratory disease (eg, chronic obstructive pulmonary disease, emphysema, asthma, interstitial lung disease, cystic fibrosis).
  - End-stage renal disease, dependence on hemodialysis, or other renal replacement therapy.
  - Diabetes mellitus complicated by chronic kidney disease, neuropathy, retinopathy, or other end-organ damage.
  - Diabetes mellitus requiring treatment with insulin or sodium-glucose cotransporter 2 (SGLT2) inhibitor.
  - Neurologic or neuromuscular conditions causing impaired airway clearance or respiratory muscle weakness (eg, post-stroke dysphagia, amyotrophic lateral sclerosis, muscular dystrophy). Excludes history of stroke without impaired airway clearance.
  - Chronic liver disease (eg, cirrhosis).
  - Chronic hematologic conditions (eg, sickle cell disease, thalassemia).
  - Severe obesity (body mass index ≥40 kg/m^2).
  - Moderate or severe immune compromise.
  - Residence in a nursing home.
  - Other chronic medical conditions or risk factors that a health care provider determines would increase the risk of severe disease due to viral respiratory infection (eg, frailty, concern for presence of undiagnosed chronic medical conditions, residence in a remote or rural community where escalation of medical care is challenging).

▪ **Contraindications and precautions:**
- For contraindications and precautions to RSV vaccine, refer to RSV Appendix.

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§ **Tetanus, diphtheria, and pertussis vaccination**

▪ **Routine vaccination:**
- **Completed primary series and received at least 1 dose Tdap at age 10 years or older:** Td or Tdap every 10 years thereafter.
- **Completed primary series and did NOT receive Tdap at age 10 years or older:** 1 dose Tdap, then Td or Tdap every 10 years thereafter.
- **Unvaccinated or incomplete primary vaccination series for tetanus, diphtheria, or pertussis:** Administer remaining doses (1, 2, or 3 doses) to complete 3-dose primary series. 1 dose Tdap followed by 1 dose Td or Tdap at least 4 weeks later, and a third dose of Td or Tdap 6-12 months later (Tdap is preferred as first dose and can be substituted for any Td dose), then Td or Tdap every 10 years thereafter.

▪ **Special situations:**
- **Pregnancy:** 1 dose Tdap during each pregnancy, preferably in early part of gestational weeks 27-36.
- **Wound management:** Persons with 3 or more doses of tetanus-toxoid-containing vaccine: For clean and minor wounds, administer Tdap or Td if more than 10 years since last dose of tetanus-toxoid-containing vaccine; for all other wounds, administer Tdap or Td if more than 5 years since last dose of tetanus-toxoid-containing vaccine. Tdap is preferred for persons who have not previously received Tdap or whose Tdap history is unknown. If a tetanus-toxoid-containing vaccine is indicated for a pregnant person, use Tdap. For detailed information, refer to www.cdc.gov/mmwr/volumes/69/wr/mm6903a5.htm.

▪ **Contraindications and precautions:**
- For contraindications and precautions to tetanus, diphtheria, and acellular pertussis (Tdap), refer to Tdap Appendix.

¥ **Measles, mumps, and rubella vaccination**

▪ **Routine vaccination:**
- **No evidence of immunity to measles, mumps, or rubella:** 1 dose.
  - **Evidence of immunity:** Born before 1957 (except for health care personnel, refer below), documentation of receipt of MMR vaccine, laboratory evidence of immunity or disease (diagnosis of disease without laboratory confirmation is not evidence of immunity).

▪ **Special situations:**
- **Pregnancy with no evidence of immunity to rubella:** MMR contraindicated during pregnancy; after pregnancy (before discharge from health care facility), 1 dose.

- **Nonpregnant persons of childbearing age with no evidence of immunity to rubella:** 1 dose.
- **Human immunodeficiency virus (HIV) infection with CD4 percentages ≥15% and CD4 count ≥200 cells/mm^3 for at least 6 months and no evidence of immunity to measles, mumps, or rubella:** Complete 2-dose series at least 4 weeks apart; MMR contraindicated for HIV infection with CD4 percentage <15% or CD4 count <200 cells/mm^3.
- **Severe immunocompromising conditions:** MMR contraindicated.
- **Students in postsecondary educational institutions, international travelers, and household or close, personal contacts of immunocompromised persons with no evidence of immunity to measles, mumps, or rubella:** Complete 2-dose series at least 4 weeks apart if previously did not receive any doses of MMR or 1 dose if previously received 1 dose MMR.
- **In mumps outbreak settings,** for information about additional doses of MMR (including 3rd dose of MMR), refer to www.cdc.gov/mmwr/volumes/67/wr/mm6701a7.htm.
- **Health care personnel:**
  - **Born before 1957 with no evidence of immunity to measles, mumps, or rubella:** Consider 2-dose series at least 4 weeks apart for protection against measles or mumps or 1 dose for protection against rubella.
  - **Born in 1957 or later with no evidence of immunity to measles, mumps, or rubella:** Complete 2-dose series at least 4 weeks apart for protection against measles or mumps or at least 1 dose for protection against rubella.

▪ **Contraindications and precautions:**
- For contraindications and precautions to measles, mumps, rubella (MMR) vaccine, refer to MMR Appendix.

‡ **Varicella vaccination**
▪ **Routine vaccination:**
- **No evidence of immunity to varicella:** 2-dose series 4-8 weeks apart if previously did not receive varicella-containing vaccine (VAR or measles-mumps-rubella-varicella vaccine [MMRV] for children); if previously received 1 dose varicella-containing vaccine, 1 dose at least 4 weeks after first dose.
  - **Evidence of immunity:** United States-born before 1980 (except for pregnant persons and health care personnel [refer below]), documentation of 2 doses varicella-containing vaccine at least 4 weeks apart, diagnosis or verification of history of varicella or herpes zoster by a health care provider, laboratory evidence of immunity or disease.

▪ **Special situations:**
- **Pregnancy with no evidence of immunity to varicella:** VAR contraindicated during pregnancy; after pregnancy (before discharge from health care facility), 1 dose if previously received 1 dose varicella-containing vaccine or dose 1 of 2-dose series (dose 2: 4 to 8 weeks later) if previously did not receive any varicella-containing vaccine, regardless of whether United States-born before 1980.
- **Health care personnel with no evidence of immunity to varicella:** 1 dose if previously received 1 dose varicella-containing vaccine; 2-dose series 4-8 weeks apart if previously did not receive any varicella-containing vaccine, regardless of whether United States-born before 1980.
- **HIV infection with CD4 percentages ≥15% and CD4 count ≥200 cells/mm^3 with no evidence of immunity:** Vaccination may be considered (2 doses 3 months apart); VAR contraindicated for HIV infection with CD4 percentage <15% or CD4 count <200 cells/mm^3.
- **Severe immunocompromising conditions:** VAR contraindicated.

▪ **Contraindications and precautions:**
- For contraindications and precautions to varicella (VAR) vaccine, refer to VAR Appendix.

† **Zoster vaccination**
▪ **Routine vaccination:**
- **Age 50 years or older** (NOTE: Serologic evidence of prior varicella is not necessary for zoster vaccination. However, if serologic evidence of varicella susceptibility becomes available, providers should follow ACIP guidelines for varicella vaccination first. RZV is not indicated for the prevention of varicella, and there are limited data on the use of RZV in persons without a history of varicella or varicella vaccination)**:** 2-dose series recombinant zoster vaccine (RZV; Shingrix) 2-6 months apart (minimum interval: 4 weeks; repeat dose if administered too soon), regardless of previous herpes zoster or history of zoster vaccine live (ZVL; Zostavax) vaccination.

▪ **Special situations:**
- **Pregnancy:** There is currently no ACIP recommendation for RZV use in pregnancy. Consider delaying RZV until after pregnancy.
- **Immunocompromising conditions (including persons with HIV regardless of CD4 count;** NOTE: If there is no documented history of varicella, varicella vaccination, or herpes zoster, providers should refer to the clinical considerations for use of RZV in immunocompromised adults aged ≥19 years and the ACIP varicella vaccine recommendations for further guidance: www.cdc.gov/mmwr/volumes/71/wr/mm7103a2.htm)**:** 2-dose series recombinant zoster vaccine (RZV; Shingrix) 2-6 months apart (minimum interval: 4 weeks; repeat dose if administered too soon). For detailed information, refer to www.cdc.gov/shingles/vaccination/immunocompromised-adults.html.

▪ **Contraindications and precautions:**
- For contraindications and precautions to zoster recombinant vaccine (RZV), refer to RZV Appendix.

** **Human papillomavirus vaccination**
▪ **Routine vaccination:**
- **All persons through age 26 years:** Complete 2- or 3-dose series depending on age at initial vaccination or condition.
  - **Age 9-14 years at initial vaccination and received 1 dose or 2 doses less than 5 months apart:** 1 additional dose.
  - **Age 9-14 years at initial vaccination and received 2 doses at least 5 months apart:** HPV vaccination series complete, no additional dose needed.
  - **Age 15 years or older at initial vaccination:** 3-dose series at 0, 1-2 months, 6 months (minimum intervals: dose 1 to dose 2: 4 weeks; dose 2 to dose 3: 12 weeks; dose 1 to dose 3: 5 months; repeat dose if administered too soon).
- No additional dose recommended when any HPV vaccine series of any valency has been completed using the recommended dosing intervals.

▪ **Shared clinical decision-making:**
- **Adults age 27-45 years:** Based on shared clinical decision-making, complete a 2-dose series (if initiated age 9-14 years) or 3-dose series (if initiated ≥15 years).
- For additional information on shared clinical decision-making for HPV; refer to www.cdc.gov/vaccines/hcp/admin/downloads/isd-job-aid-scdm-hpv-shared-clinical-decision-making-hpv.pdf.

▪ **Special situations:**
- **Age ranges recommended above for routine and catch-up vaccination or shared clinical decision-making also apply in special situations.**
  - **Immunocompromising conditions, including HIV infection:** Complete 3-dose series, even for those who initiate vaccination at age 9 through 14 years.

- **Pregnancy:** Pregnancy testing is not needed before vaccination. HPV vaccination is not recommended until after pregnancy. No intervention needed if inadvertently vaccinated while pregnant.

- **Contraindications and precautions:**
  - For contraindications and precautions to human papillomavirus (HPV) vaccination, refer to HPV Appendix.

¶¶ **Pneumococcal vaccination**

- **Routine vaccination:**
  - **Age 50 years or older who have:**
    - **Not previously received a dose of PCV13, PCV15, PCV20, or PCV21 or whose previous vaccination history is unknown:** 1 dose PCV15 or 1 dose PCV20 or 1 dose PCV21.
      - If PCV15 is used, administer 1 dose PPSV23 at least 1 year after the PCV15 dose (may use minimum interval of 8 weeks for adults with an immunocompromising condition [NOTE: Immunocompromising conditions include chronic renal failure, nephrotic syndrome, immunodeficiencies, iatrogenic immunosuppression, generalized malignancy, HIV infection, Hodgkin disease, leukemia, lymphoma, multiple myeloma, solid organ transplant, congenital or acquired asplenia, or sickle cell disease or other hemoglobinopathies], cochlear implant, or cerebrospinal fluid [CSF] leak).
    - **Previously received only PCV7:** Follow the recommendation above.
    - **Previously received only PCV13:** 1 dose PCV20 or 1 dose PCV21 at least 1 year after the last PCV13 dose.
    - **Previously received only PPSV23:** 1 dose PCV15 or 1 dose PCV20 or 1 dose PCV21 at least 1 year after the last PPSV23 dose.
      - If PCV15 is used, no additional PPSV23 doses are recommended.
    - **Previously received both PCV13 and PPSV23 but NO PPSV23 was received at age 65 years or older:** 1 dose PCV20 or 1 dose PCV21 at least 5 years after the last pneumococcal vaccine dose.
    - **Previously received both PCV13 and PPSV23, AND PPSV23 was received at age 65 years or older:** Based on shared clinical decision-making, 1 dose of PCV20 or 1 dose of PCV21 at least 5 years after the last pneumococcal vaccine dose.
  - For guidance on determining which pneumococcal vaccines a patient needs and when, please refer to the mobile app which can be downloaded here: www.cdc.gov/pneumococcal/hcp/vaccine-recommendations/app.html.
- **Special situations:**
  - **Age 19-49 years with certain underlying medical conditions or other risk factors who have** (NOTE: Underlying medical conditions or other risk factors include alcoholism, chronic heart/liver/lung disease, chronic renal failure, cigarette smoking, cochlear implant, congenital or acquired asplenia, CSF leak, diabetes mellitus, generalized malignancy, HIV infection, Hodgkin disease, immunodeficiencies, iatrogenic immunosuppression, leukemia, lymphoma, multiple myeloma, nephrotic syndrome, solid organ transplant, or sickle cell disease or other hemoglobinopathies)**:**
    - **Not previously received a PCV13, PCV15, PCV20, or PCV21 or whose previous vaccination history is unknown:** 1 dose PCV15 or 1 dose PCV20 or 1 dose PCV21.
      - If PCV15 is used, administer 1 dose PPSV23 at least 1 year after the PCV15 dose (may use minimum interval of 8 weeks for adults with an immunocompromising condition [NOTE: Immunocompromising conditions include chronic renal failure, nephrotic syndrome, immunodeficiencies, iatrogenic immunosuppression, generalized malignancy, HIV infection, Hodgkin disease, leukemia, lymphoma, multiple myeloma, solid organ transplant, congenital or acquired asplenia, or sickle cell disease or other hemoglobinopathies], cochlear implant, or CSF leak).
    - **Previously received only PCV7:** Follow the recommendation above.
    - **Previously received only PCV13:** 1 dose PCV20 or 1 dose PCV21 at least 1 year after the last PCV13.
    - **Previously received only PPSV23:** 1 dose PCV15 or 1 dose PCV20 or PCV21, at least 1 year after the last PPSV23 dose.
      - If PCV15 is used, no additional PPSV23 doses are recommended.
    - **Previously received PCV13 and 1 dose of PPSV23:** 1 dose PCV20 or 1 dose PCV21 at least 5 years after the last pneumococcal vaccine dose.
  - **Adults aged 19 years and older who have received PCV20 or PCV21:** No additional pneumococcal vaccine dose recommended.
  - **Pregnancy:** No recommendation for PCV or PPSV23 due to limited data. Summary of existing data on pneumococcal vaccination during pregnancy can be found at www.cdc.gov/mmwr/volumes/72/rr/rr7203a1.htm.
  - **PPSV23 not available:** Adults aged 19 years or older who received PCV15, but have not yet completed PPSV23 series, can complete the series with either 1 dose of PCV20 or 1 dose of PCV21 if they no longer have access to PPSV23.
  - For guidance on determining which pneumococcal vaccines a patient needs and when, please refer to the mobile app which can be downloaded here: www.cdc.gov/pneumococcal/hcp/vaccine-recommendations/app.html.
- **Contraindications and precautions:**
  - For contraindications and precautions to Pneumococcal conjugate (PCV15 and PCV20), refer to PCV Appendix; and for Pneumococcal polysaccharide (PPSV23), refer to PPSV23 Appendix.

ΔΔ **Hepatitis A vaccination**

- **Routine vaccination:**
  - **Any person who is not fully vaccinated and requests vaccination** (identification of risk factor not required)**:** Complete 2-dose series HepA (Havrix 6-12 months apart or Vaqta 6-18 months apart [minimum interval: 6 months]) or 3-dose series HepA-HepB (Twinrix at 0, 1, 6 months [minimum intervals: dose 1 to dose 2: 4 weeks; dose 2 to dose 3: 5 months]).
- **Special situations:**
  - **Any person who is not fully vaccinated and who is at risk for hepatitis A virus infection or severe disease from hepatitis A virus infection:** Complete 2-dose series HepA or 3-dose series HepA-HepB as above. Risk factors include:
    - **Chronic liver disease** including persons with hepatitis B, hepatitis C, cirrhosis, fatty liver disease, alcoholic liver disease, autoimmune hepatitis, alanine aminotransferase (ALT) or aspartate aminotransferase (AST) level greater than twice the upper limit of normal.
    - **HIV infection**.
    - **Men who have sex with men (MSM)**.
    - **Injection or noninjection drug use**.
    - **Persons experiencing homelessness**.
    - **Work with hepatitis A virus** in research laboratory or with nonhuman primates with hepatitis A virus infection.
    - **Travel in countries with high or intermediate endemic hepatitis A:** HepA-HepB (Twinrix) may be administered on an accelerated schedule of 3 doses at 0, 7, and 21-30 days, followed by a booster dose at 12 months.
    - **Close, personal contact with international adoptee** (eg, household or regular babysitting) in first 60 days after arrival from country with high or intermediate endemic hepatitis A: Dose 1 as soon as adoption is planned; preferably at least 2 weeks before adoptee's arrival.
    - **Pregnancy** if at risk for infection or severe outcome from infection during pregnancy.
    - **Settings for exposure,** including health care settings serving persons who use injection or noninjection drugs, or group homes and nonresidential day care facilities for developmentally disabled persons (individual risk factor screening not required).

- **Contraindications and precautions:**
  - For contraindications and precautions to hepatitis A (HepA) vaccination, refer to HepA Appendix.

◇◇ **Hepatitis B vaccination**

- **Routine vaccination:**
  - **Age 19 through 59 years:** Complete a 2- or 3- or 4-dose series.
    - 2-dose series only applies when 2 doses of Heplisav-B are used at least 4 weeks apart.
    - 3-dose series Engerix-B, PreHevbrio (NOTE: PreHevbrio is not recommended in pregnancy due to lack of safety data in pregnant persons), or Recombivax HB at 0, 1, 6 months (minimum intervals: dose 1 to dose 2: 4 weeks; dose 2 to dose 3: 8 weeks; dose 1 to dose 3: 16 weeks).
    - 3-dose series HepA-HepB (Twinrix) at 0, 1, 6 months (minimum intervals: dose 1 to dose 2: 4 weeks; dose 2 to dose 3: 5 months).
    - 4-dose series HepA-HepB (Twinrix) accelerated schedule of 3 doses at 0, 7, and 21-30 days, followed by a booster dose at 12 months.
  - **Age 60 years or older without** known risk factors for hepatitis B virus infection **may** receive a HepB vaccine series.
  - **Age 60 years or older with** known risk factors for hepatitis B virus infection **should** receive a HepB vaccine series.
  - **Any adult age 60 years of age or older** who requests HepB vaccination **should** receive a HepB vaccine series.
    - **Risk factors for hepatitis B virus infection include:**
      - **Chronic liver disease** including persons with hepatitis C, cirrhosis, fatty liver disease, alcoholic liver disease, autoimmune hepatitis, ALT or AST level greater than twice the upper limit of normal.
      - **HIV infection**.
      - **Sexual exposure risk** (eg, sex partners of hepatitis B surface antigen [HBsAg]-positive persons, sexually active persons not in mutually monogamous relationships, persons seeking evaluation or treatment for a sexually transmitted infection, MSM).
      - **Current or recent injection drug use**.
      - **Percutaneous or mucosal risk for exposure to blood** (eg, household contacts of HBsAg-positive persons, residents and staff of facilities for developmentally disabled persons, health care and public safety personnel with reasonably anticipated risk for exposure to blood or blood-contaminated body fluids, persons on maintenance dialysis [including in-center or home hemodialysis and peritoneal dialysis], persons who are predialysis, and patients with diabetes [NOTE: **Age 60 years or older with diabetes:** Based on shared clinical decision making, 2-, 3-, or 4-dose series as above]).
      - **Incarceration**.
      - **Travel in countries with high or intermediate endemic hepatitis B**.
- **Special situations:**
  - **Patients on dialysis:** Complete a 3- or 4-dose series.
    - 3-dose series Recombivax HB at 0, 1, 6 months (NOTE: Use Dialysis Formulation 1 mL = 40 mcg).
    - 4-dose series Engerix-B at 0, 1, 2, and 6 months (NOTE: Use 2 mL dose instead of the normal adult dose of 1 mL).
  - **Age 20 years or older with an immunocompromising condition:** Complete a 2- or 3- or 4-dose series.
    - 3-dose series Recombivax HB at 0, 1, 6 months (NOTE: Use Dialysis Formulation 1 mL = 40 mcg).
    - 4-dose series Engerix-B at 0, 1, 2, and 6 months (NOTE: Use 2 mL dose instead of the normal adult dose of 1 mL).
    - 2-dose series Heplisav-B at 0, 1 months.
    - 3-dose series PreHevbrio at 0, 1, 6 months (NOTE: PreHevbrio is not recommended in pregnancy due to lack of safety data in pregnant persons).
- **Contraindications and precautions:**
  - For contraindications and precautions to hepatitis B (HepB) vaccination, refer to HepB Appendix.

§§ **Meningococcal vaccination**

- **Special situations for MenACWY:**
  - **Anatomical or functional asplenia (including sickle cell disease), HIV infection, persistent complement component deficiency, complement inhibitor (eg, eculizumab, ravulizumab) use:** 2-dose primary series Menveo or MenQuadfi at least 8 weeks apart; 1 booster dose 5 years after primary series and every 5 years if risk remains.
  - **Travel in countries with hyperendemic or epidemic meningococcal disease, or for microbiologists routinely exposed to *Neisseria meningitidis*:** 1 dose Menveo or MenQuadfi; 1 booster dose 5 years after primary series and every 5 years if risk remains.
  - **First-year college students who live in residential housing (if not previously vaccinated at age 16 years or older) or military recruits:** 1 dose Menveo or MenQuadfi.
  - MenACWY vaccines may be administered simultaneously with MenB vaccines if indicated, but at a different anatomic site, if feasible.
  - For MenACWY recommendations **in outbreak setting** (eg, in community or organizational settings, or among MSM) and **additional meningococcal vaccination** information, refer to www.cdc.gov/mmwr/volumes/69/rr/rr6909a1.htm.
- **Shared clinical decision-making for MenB:**
  - **Adolescents and young adults age 16-23 years (age 16-18 years preferred;** NOTE: To optimize rapid protection [eg, for students starting college in less than 6 months], a 3-dose series [0, 1-2, 6 months] may be administered**) not at increased risk for meningococcal disease:** Based on shared clinical decision-making.
    - **Bexsero or Trumenba (use same brand for all doses):** 2-dose series at least 6 months apart (if dose 2 is administered earlier than 6 months, administer dose 3 at least 4 months after dose 2)
  - MenB vaccines may be administered simultaneously with MenACWY vaccines if indicated, but at a different anatomic site, if feasible.
- **Special situations for MenB:**
  - **Anatomical or functional asplenia (including sickle cell disease), persistent complement component deficiency, complement inhibitor (eg, eculizumab, ravulizumab) use, or microbiologists routinely exposed to *Neisseria meningitidis*.**
    - **Bexsero or Trumenba (use same brand for all doses including booster doses):** 3-dose primary series at 0, 1-2, 6 months (if dose 2 was administered at least 6 months after dose 1, dose 3 not needed; if dose 3 is administered earlier than 4 months after dose 2, a 4th dose should be administered at least 4 months after dose 3).
    - **Booster doses:** 1 booster dose 1 year after primary series and every 2-3 years if risk remains.
  - **Pregnancy:** Delay MenB until after pregnancy due to lack of safety data in pregnant persons. May administer if at increased risk and vaccination benefits outweigh potential risks.
  - For MenB recommendations **in outbreak setting** (eg, in community or organizational settings and among MSM) and **additional meningococcal vaccination information** refer to www.cdc.gov/mmwr/volumes/69/rr/rr6909a1.htm.
  - MenB vaccines may be administered simultaneously with MenACWY vaccines if indicated, but at a different anatomic site, if feasible.
  - Adults may receive a single dose of Penbraya (MenACWY-TT/MenB-FHbp) as an alternative to separate administration of MenACWY and MenB when both vaccines would be given on the same clinic day. For adults not at increased risk, if Penbraya is used for dose 1 MenB, then MenB-FHbp (Trumenba) should be administered for dose 2 MenB. For adults at increased risk of meningococcal disease, Penbraya may be used for

additional MenACWY and MenB doses (including booster doses) if both would be given on the same clinic day **and** at least 6 months have elapsed since most recent Penbraya dose.

- **Contraindications and precautions:**
  - For contraindications and precautions to meningococcal ACWY (MenACWY) [MenACWY-CRM (Menveo); MenACWY-D (Menactra); MenACWY-TT (MenQuadfi)], refer to MenACWY Appendix.
  - For contraindications and precautions to meningococcal B (MenB) [MenB-4C (Bexsero); MenB-FHbp (Trumenba)], refer to MenB Appendix.

¥¥ ***Haemophilus influenzae*** **type b vaccination**

- **Special situations:**
  - **Anatomical or functional asplenia (including sickle cell disease):** 1 dose if previously did not receive Hib vaccine.
    - **Elective splenectomy:** 1 dose preferably at least 14 days before splenectomy.
  - **Hematopoietic stem cell transplant (HSCT):** 3-dose series 4 weeks apart starting 6-12 months after successful transplant, regardless of Hib vaccination history.
- **Contraindications and precautions:**
  - For contraindications and precautions to *Haemophilus influenzae* type b (Hib) vaccination, refer to Hib Appendix.

‡‡ **Mpox vaccination**

- **Special situations:**
  - **Any person at risk for mpox infection:** Complete 2-dose series, 28 days apart.
    Risk factors for mpox infection include:
    - Persons who are gay or bisexual and other MSM, transgender, or nonbinary people who in the past 6 months have had:
      - A new diagnosis of at least 1 sexually transmitted disease.
      - More than 1 sex partner.
      - Sex at a commercial sex venue.
      - Sex in association with a large public event in a geographic area where mpox transmission is occurring.
    - Persons who are sexual partners of the persons described above.
    - Persons who anticipate experiencing any of the situations described above.
  - **Pregnancy:** There is currently no ACIP recommendation for Jynneos use in pregnancy due to lack of safety data in pregnant persons. Pregnant persons with any risk factor described above may receive Jynneos.
  - **Health care personnel:** Vaccination to protect against occupational risk in health care settings is not routinely recommended.
- **Contraindications and precautions:**
  - For contraindications and precautions to mpox, refer to Mpox Appendix.

†† **Poliovirus vaccination**

- **Routine vaccination:**
  - **Adults known or suspected to be unvaccinated or incompletely vaccinated:** Administer remaining doses (1, 2, or 3 inactivated poliovirus [IPV] doses) to complete a 3-dose primary series (NOTE: Complete primary series consists of at least 3 doses of IPV or trivalent oral poliovirus vaccine [tOPV] in any combination). Unless there are specific reasons to believe they were not vaccinated, most adults who were born and raised in the United States can assume they were vaccinated against polio as children.
- **Special situations:**
  - **Adults at increased risk of exposure to poliovirus who completed primary series** (NOTE: Complete primary series consists of at least 3 doses of IPV or tOPV in any combination)**:** May administer one lifetime IPV booster.
  - For detailed information, refer to www.cdc.gov/vaccines/vpd/polio/hcp/recommendations.html.
- **Contraindications and precautions:**
  - For contraindications and precautions to Poliovirus vaccine, IPV, refer to Poliovirus Appendix.

*** Vaccinate after pregnancy, if indicated.

Reproduced from: Advisory Committee on Immunization Practices. Adult Immunization Schedule by Medical Condition and Other Indication, Recommendations for Ages 19 Years or Older, United States, 2025. Centers for Disease Control and Prevention. Available at: https://www.cdc.gov/vaccines/hcp/imz-schedules/adult-medical-condition.html (Accessed on December 10, 2024).

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