TRAVEL IMMUNIZATIONS

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Travel immunizations

Travel is a good opportunity to review the immunization status of infants, children, adolescents and adults.

Travel immunizations

Vaccination is an effective way of avoiding a number of dangerous diseases that may be encountered abroad.

Travel immunizations

Immunized travelers will be less likely to contaminate other travelers or local population with a number of potentially serious diseases.

Three Broad Categories

ROUTINE: Update of the vaccinations recommended in the national immunization schedules, particularly but not only in children

Updating and catching-up with schedules are available from many authorities both in the US and other countries' health authorities.

REQUIRED: Vaccinations that are mandatory by international regulations for entry into certain areas or travel to certain countries.

RECOMMENDED: Vaccinations that may be advised before travel to disease-endemic places based on travel destination and patient risk.

REQUIRED VACCINATIONS

Yellow fever is the only vaccine required by International Health Regulations for travel to certain countries in sub-Saharan Africa and tropical South America.

Meningococcal vaccination is required by the government of Saudi Arabia for annual travel during the Hajj.

RECOMMENDED VACCINATIONS

Based on travel destination and patient risk

- Yellow fever
- Meningococcal disease
- Hepatitis A
- Typhoid
- Rabies

YELLOW FEVER

Countries that require proof of yellow fever vaccination for all arriving travelers

Angola Benin Bolivia (or signed affidavit at point of entry) Burkina Faso Burundi Cameroon Central African Republic Congo, Repubic of the Côte d'Ivoire Democratic Republic of Congo	French Guiana Gabon Ghana Liberia Mali Niger Rwanda São Tomé and Príncipe Sierra Leone Togo

Yellow fever-endemic zones in Africa, 2009

Travel immunizations

Yellow fever-endemic zones in the Americas, 2009

YELLOW FEVER VACCINE:

- As a part of an ongoing project, CDC, WHO, and other organizations have tried to harmonize the listed yellow fever vaccine requirements and recommendations.
- The latest information on country requirements and vaccine recommendations is available in the online version of the Yellow Book: www.cdc.gov/yellowbook
- Recommendations are subject to change at any time if disease conditions change. Therefore, travelers and doctors are encouraged to check for relevant travel notices on the website (www.cdc.gov/travel) prior to departure.

Travel immunizations

REQUIREMENTS FOR YELLOW FEVER VACCINE :

- Established by countries to prevent the importation and transmission of yellow fever virus.
- Travelers must comply to enter the country, unless they have been issued a medical waiver.
- Some countries require vaccination only for travelers coming from “a country with risk of yellow fever” even if only in transit, to prevent importation and indigenous transmission of YFV (Lebanon).
- Country requirements are subject to change at any time. Therefore, check with the country’s embassy or consulate prior to departure.

Example International Certificate of Vaccination or Prophylaxis (ICVP)

INTERNATIONAL CERTIFICATE OF VACCINATION OR PROPHYLAXIS
Certificat international de vaccination ou de prophylaxie

This is to certify that
Nous certifions que _____ (name – nom) _____ (date of birth – né(e) le) _____ (sex – de sexe) _____ (nationality – et de nationalité)

_____ (national identification document, if applicable – document d'identification nationale, le cas échéant)
whose signature follows
dont la signature suit _____

has on the date indicated been vaccinated or received prophylaxis against
a été vacciné(e) ou a reçu une prophylaxie à la date indiquée _____ (name of disease or condition – nom de la maladie ou de l'affection)
in accordance with the International Health Regulations
conformément au Règlement sanitaire international

Vaccine or prophylaxis Vaccin ou agent prophylactique	Date	Signature and professional status of supervising clinician Signature et titre du professionnel de santé responsable	Manufacturer and batch no. of vaccine or prophylaxis Fabricant du vaccin ou de l'agent prophylactique et numéro du lot	Certificate valid from: until: Certificat valable à partir du: jusqu'au:	Official stamp of administering center Cachet officiel du centre habilité

Example International Certificate of Vaccination or Prophylaxis (ICVP) medical contraindication to vaccination

MEDICAL CONTRAINDICATION TO VACCINATION
Ceontre-indication médicale à la vaccination

This is to certify that immunization against
Je soussigné(e) certifie que la vaccination contre

_____ for
(Name of disease – Nom de la maladie) pour

_____ is medically
(Name of traveler – Nom du voyageur) est médicalement

contraindicated because of the following conditions:
contre-indiquée pour les raisons suivantes:

_____

_____

_____

_____
(Signature and address of physician)
(Signature et adresse du médecin)

Yellow fever Risk for Travelers

Determined by various factors:

1. Immunization status
2. location of travel
3. Season
4. duration of exposure
5. occupational and recreational activities
6. Local rate of virus transmission at the time of travel.

   However, case reports may be absent because of a low level of transmission, a high level of immunity in the population (e.g., due to vaccination), or failure of local surveillance systems to detect cases.

This "**epidemiologic silence**" does not mean absence of risk and should not lead to travel without the protection provided by vaccination.

Yellow Fever Virus

- Yellow fever virus (YFV) is a single-stranded RNA virus that belongs to the genus *Flavivirus*.
- Vector-borne transmission via the bite of an infected mosquito
- Nonhuman and human primates are the main reservoirs of the virus, with (human-to-vector-to-human) transmission.
- Humans infected with YFV experience high levels of viremia and can transmit the virus to mosquitoes shortly before onset of fever and for the first 3–5 days of illness.
- Bloodborne transmission can also occur (via transfusion, needlestick, and intravenous drug abuse).

Yellow fever Clinical Presentation

- Asymptomatic infection is believed to occur in the majority of persons.
- The incubation period is 3–6 days.
- The initial illness presents as a nonspecific influenza-like syndrome (sudden onset of fever, chills, headache, backache, myalgias, nausea, and vomiting).
- Most patients improve after the initial presentation.
- After a brief remission of hours to a day, approximately 15% of cases progress to develop a more serious or toxic form of the disease characterized by jaundice, hemorrhagic symptoms, and eventually shock and multisystem organ failure.
- The overall case–fatality ratio for cases with jaundice is 20%–50%.

Preventive Measures for Travelers

Personal Protection Measures

Avoid mosquito bites:

- Use insect repellent containing on exposed skin.
- Wear long sleeves, pants, and socks.
- Stay in screened or air-conditioned accommodations to keep mosquitoes out.
- Get rid of mosquito sources by emptying standing water from pots etc..

Yellow Fever Vaccine

- Relatively safe, effective vaccine.
- All yellow fever vaccines currently manufactured are live attenuated viral vaccines.
- YF-VAX, the only yellow fever vaccine approved for use in the United States, is manufactured by sanofi pasteur (Stamaril).

Yellow Fever Vaccine for Travelers

- Persons aged ≥9 months of age who are traveling to or living in areas with risk of yellow fever transmission in South America and Africa
- For all eligible persons, a single injection of 0.5 mL of reconstituted vaccine should be administered subcutaneously.
- The International Health Regulations (IHR) published by WHO require revaccination at 10-year intervals.

Contraindications YFV vaccine

- Infants <9 Months of Age
- Hypersensitivity
- Immunosuppression
- *AIDS or Symptomatic HIV*
- *History of Thymus Disease*
- *Immunosuppressive Medication*

YFV Vaccine Safety and Adverse Reactions

Common Adverse Events

- 10%–30% of vaccinees report mild systemic adverse events
- Reported events typically include low-grade fever, headache, and myalgias that begin within 1-2 days after vaccination and last 5–10 days.
- About 1% get their regular activities temporarily affected because of these reactions.

YFV Vaccine Safety and Adverse Reactions

Severe Adverse Events of YFV Vaccine

Hypersensitivity

- Immediate hypersensitivity reactions: rash, urticaria, asthma or a combination of these, are uncommon. Anaphylaxis following yellow fever vaccine is reported to occur at a rate of 1.8 cases per 100,000 doses

Yellow Fever Vaccine-Associated Neurologic Disease (YEL-AND)

- YEL-AND represents a group of different clinical syndromes, including meningoencephalitis, Guillain–Barré syndrome (GBS), acute disseminated encephalomyelitis (ADEM), bulbar palsy, and Bell's palsy.
- YEL-AND is rarely fatal.
- Seen primarily among infants as encephalitis, but more recent reports have been among persons of all ages.
- The onset ranges 3–28 days after vaccination, and almost all cases were in first-time vaccine recipients.
- The incidence of YEL-AND is 0.8 per 100,000 doses. The rate is higher in persons ≥60 years of age, reaching 2.3 per 100,000 in persons ≥70 years of age.

Yellow Fever Vaccine-Associated Viscerotropic Disease (YEL-AVD)

- YEL-AVD is a severe illness similar to wild-type disease, often leading to multisystem organ failure and death.
- Since the initial cases of YEL-AVD were published in 2001, more than 40 confirmed and suspected cases have been reported throughout the world.
- The onset of illness for YEL-AVD cases averaged 3.5 days (range: 1–8 days) after vaccination. YEL-AVD appears to occur after the first dose of yellow fever vaccine rather than with booster doses.
- The case–fatality ratio for reported YEL-AVD cases is 53%.
- The incidence of YEL-AVD in the United States is 0.4 cases per 100,000 doses of vaccine administered. The rate is higher for persons ≥60 years of age

Simultaneous Administration of YFV Vaccine and Other Vaccines

- The immune response to yellow fever vaccine is not inhibited by administration of measles vaccine (also a live, attenuated vaccine) concurrently or at intervals of a few days to 1 month prior.
- To minimize the potential risk for interference, injectable or nasally administered **live vaccines** should be administered on the same day or should be given **at least 4 weeks apart.**

MENINGOCOCCAL DISEASE

MENINGOCOCCAL DISEASE

- The infectious agent is a gram-negative diplococci, *Neisseria meningitidis*.
- Meningococci are classified into serogroups on the basis of the composition of the capsular polysaccharide.
- The five major meningococcal serogroups associated with disease are A, B, C, Y, and W-135.
- Person-to-person transmission occurs by close contact with respiratory secretions or saliva.

MENINGOCOCCAL DISEASE

Occurrence

- *Neisseria meningitidis* is found worldwide.
- At any time, 5%–10% of the population may be carriers
- Invasive disease is much rarer, occurring at a rate of 0.5–10 cases per 100,000 population in nonepidemic areas and up to 1,000 cases per 100,000 population in epidemic regions.
- Young children have the highest risk for meningococcal disease.
- The incidence of meningococcal disease is highest in the “meningitis belt” of sub-Saharan Africa with periodic epidemics during the dry season (December–June).
- Serogroup A predominates in the meningitis belt, although serogroups C, X, and W-135 are also found.

Travel immunizations

MENINGOCOCCAL DISEASE

MENINGOCOCCAL DISEASE

Risk for Travelers

- Travelers to the meningitis belt may be at risk for meningococcal disease, particularly during the dry season.
- Risk is likely highest in travelers who will have prolonged contact with local populations in the meningitis belt during an epidemic.
- The Hajj pilgrimage to Saudi Arabia has been associated with outbreaks of meningococcal disease in returning pilgrims and their contacts.

MENINGOCOCCAL DISEASE

Clinical Presentation

- Disease occurs 1–14 days after exposure.
- Presents as meningitis in 50% or more of cases.
- Up to 20% of persons with meningococcal disease present with meningococcal sepsis. Meningococcal sepsis is characterized by an abrupt onset of fever and a petechial or purpuric rash. The rash may progress to purpura fulminans. Meningococcal sepsis may often involve hypotension, acute adrenal hemorrhage, and multiorgan failure.
- Among infants and children <2 years of age, meningococcal disease may have nonspecific symptoms. Neck stiffness may be absent.
- Early diagnosis and treatment are critical.
- Invasive meningococcal disease is potentially fatal and should always be viewed as a medical emergency

MENINGOCOCCAL DISEASE PREVENTIVE MEASURES FOR TRAVELERS

Vaccination recommended to:

- persons who travel to or reside in countries where *N. meningitidis* is hyperendemic or epidemic, particularly if contact with the local population will be prolonged.
- persons traveling to the meningitis belt of Africa during the dry season (December through June).
- Advisories for travelers to other countries will be issued when epidemics of meningococcal disease caused by vaccine-preventable serogroups are recognized (see the CDC Travelers' Health website at www.cdc.gov/travel).

Requirement for Travel

Proof of quadrivalent vaccination against meningococcal disease is required for persons traveling to Mecca during the annual Hajj and Umrah pilgrimage.

MENINGOCOCCAL VACCINE

- Quadrivalent meningococcal polysaccharide–protein conjugate vaccine (MCV4) is licensed for use among persons 2–55 years of age.
- Quadrivalent meningococcal polysaccharide vaccine (MPVS4) is licensed for use among persons 2 years of age or older.

- Both vaccines protect against meningococcal disease caused by serogroups A, C, Y, and W-135.
- Approximately 7–10 days are required following vaccination for development of protective antibody levels.
- MCV4 is the preferred vaccine for persons 2–55 years of age; MPSV4 should be used for persons >55 years of age.
- There is no licensed vaccine for persons <2 years old

Booster doses:

- Children previously vaccinated with MCV4 or MPVS4 at ages 2–6 years who remain at an increased risk for meningococcal disease should receive an additional dose of MCV4 three years after their previous meningococcal vaccine and every five years thereafter, if at continued risk.

- Persons who were previously vaccinated with MCV4 or MPVS4 at ages 7–55 years and who remain at an increased risk for meningococcal disease should receive an additional dose of MCV4 five years after their previous dose and every five years thereafter, if at continued risk.

HEPATITIS A

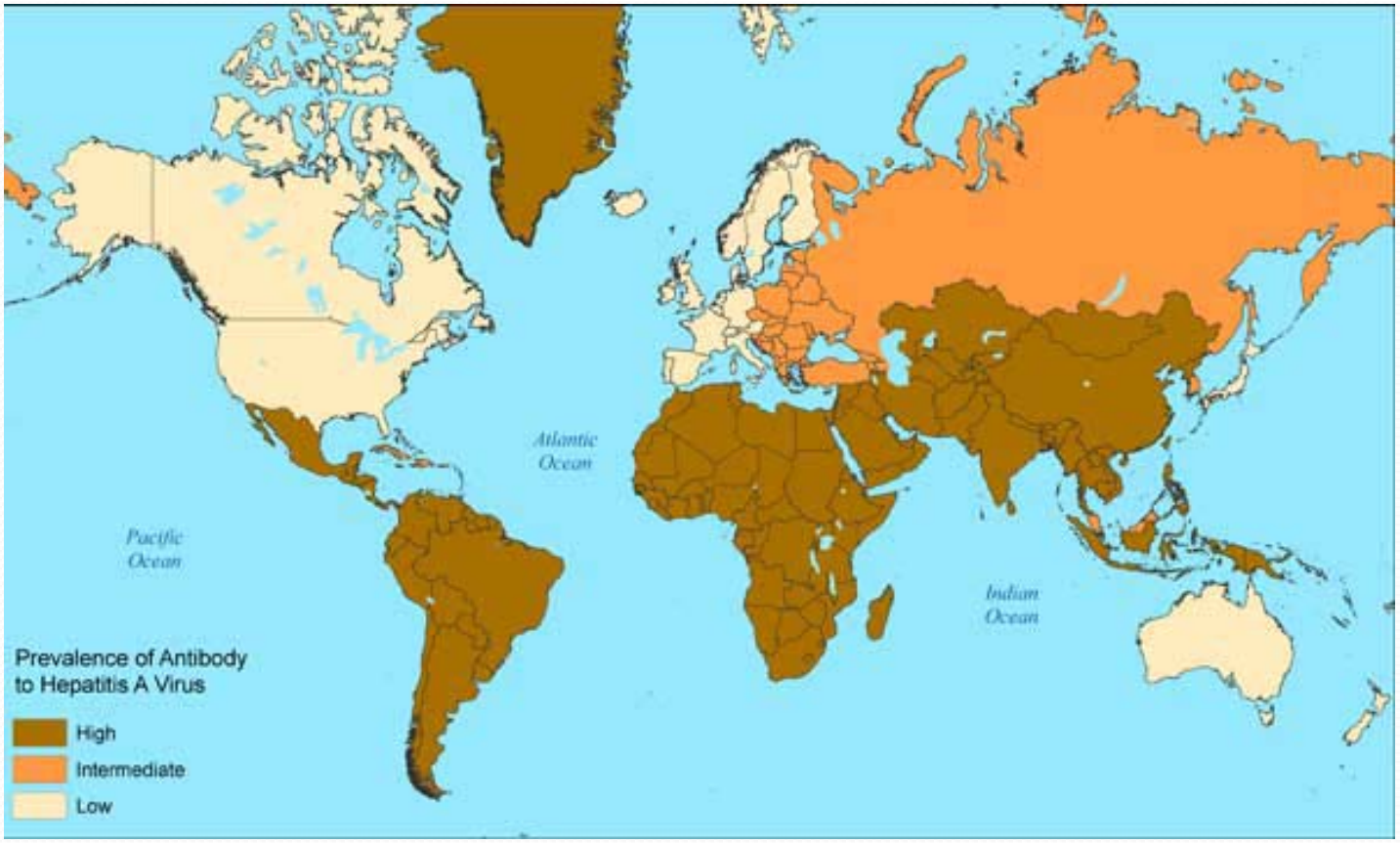
Hepatitis A

Risk for travelers and vaccine indication:

Frequent short term travel or extended stay in intermediate or high risk areas.

Travel immunizations

PREVALENCE OF ANTIBODY TO HEPATITIS A VIRUS, 2006[1]



[1]estimates of prevalence of antibody to hepatitis A virus (anti-hav), a marker of previous HAV infection, are based on limited data and might not reflect current prevalence. In addition, **anti-hav prevalence might vary within countries by subpopulation and locality.** As used on this map, the terms "high," "medium," and "low" endemicity reflect available evidence of how widespread HAV infection is within each country, rather than precise quantitative assessments.

Travel immunizations

In most intermediate and high endemic countries, many long-term residents are infected as children, with no symptoms. So cases of hepatitis A in the resident population will be very low But travelers from low endemic settings are at risk for HAV infection and should be protected.

Risk for travelers

- The risk of acquiring HAV infection varies with:
  - living conditions (risk is highest for those who live in or visit rural areas, or eat /drink in settings of poor sanitation)
  - length of stay (risk increases with duration of travel)
  - incidence of HAV infection in the area visited.
- **Nevertheless, many cases of travel-related hepatitis A occur in travel to developing countries with "standard" tourist itineraries, accommodations, and food consumption behaviors.**
- In the united states, the most frequently identified risk factor for hepatitis A was international travel (reported by 15% of case-patients overall).
- Hepatitis A is one of the most common vaccine-preventable infections acquired during travel.

Hepatitis A Vaccine

Prevention of hepatitis A in travelers with vaccination should be used liberally because the vaccine is safe and effective and will give long-term benefits that go beyond the risk posed by any specific trip.

Monovalent vaccines

- **Two monovalent hepatitis A vaccines are currently in use.**
- **Both vaccines are made of inactivated HAV adsorbed to aluminum hydroxide as an adjuvant.**
- **All hepatitis A vaccines should be administered intramuscularly in the deltoid muscle.**

Combination vaccine

- **TWINRIX, manufactured by glaxosmithkline, is a combined hepatitis A and hepatitis B vaccine licensed for persons ≥18 years of age, containing 720 EL.U. Of hepatitis A antigen (50% of the HAVRIX adult dose) and 20 µg of recombinant hepatitis B surface antigen protein (the same as the ENGERIX-B adult dose)**
- **Primary immunization consists of three doses, given on a 0-, 1-, and 6-month schedule, the same schedule as that commonly used for monovalent hepatitis B vaccine.**

REMEMBER

- Hepatitis A vaccine is preferred to IG.
- The first dose should be administered as soon as travel is considered.
- One dose administered at any time before departure can provide adequate protection for most healthy persons <40 years of age.
- Completion of the vaccine series is necessary for long-term protection.
- Many persons will have detectable antibody in response to the monovalent vaccine by 2 weeks after the first dose.
- Travelers who receive hepatitis A vaccine less than 2 weeks before traveling to an endemic area and who do not receive IG (either by choice or because of lack of availability) will still be at lower risk for infection than those who do not receive anything
- Older adults, immunocompromised persons, and persons with chronic liver disease or other chronic medical conditions planning to depart in <2 weeks should receive the initial dose of vaccine along with IG at a separate anatomic injection site.

Hepatitis A Immune Globulin

RECOMMENDED DOSES:

Setting	Duration of Coverage	Dose (mL/kg)[1]
Pre-exposure	Short-term (1–2 months)	0.02
	Long-term (3–5 months)	0.06[2]
Postexposure	NA	0.02

[1]IG should be administered by intramuscular injection into either the deltoid or gluteal muscle. For children<12 months of age, IG can be administered in the anterolateral thigh muscle.

[2]repeat every 5 months if continued exposure to hepatitis virus occurs.

Other Hep A vaccine considerations

- Using the vaccines according to schedule is preferable. However, an interrupted series does not need to be restarted.
- Given their similar immunogenicity, a series that has been started with one brand of monovalent vaccine may be completed with the other brand.
- Hepatitis A vaccine may be administered at the same time as IG or other commonly used vaccines for travelers, at different injection sites.
- In adults and children who have completed the vaccine series, anti-HAV has been shown to persist for at least 5–12 years after vaccination therefore booster doses of vaccine are not recommended.

Vaccine safety and adverse reactions

- These vaccines should not be administered to travelers with a history of hypersensitivity to any vaccine component.
- Among adults, the most frequently reported side effects occurring 3–5 days after a vaccine dose are tenderness or pain at the injection site (53%–56%) or headache (14%–16%).
- Among children, the most common side effects reported are pain or tenderness at the injection site (15%–19%), feeding problems (8% in one study), or headache (4% in one study).
- No serious adverse events in children or adults that could be definitively attributed to the vaccine have been identified.
- IG for intramuscular administration has few side effects (primarily soreness at the injection site) and has never been shown to transmit infectious agents (hepatitis b virus, hepatitis c virus [HCV], or HIV).

TYPHOID FEVER

TYPHOID FEVER

- An estimated 22 million cases of typhoid fever and 200,000 related deaths occur worldwide each year.
- An additional 6 million cases of paratyphoid fever are estimated to occur annually.
- Approximately 400 cases of typhoid and 150 cases of paratyphoid fever are reported to CDC each year in the united states, most of whom are recent travelers.

Risk for travelers

- Risk is greatest for travelers to South Asia (6 to 30 times higher than all other destinations).
- Other areas of risk include East and Southeast Asia, Africa, the Caribbean, and Central and South America.
- Travelers to South Asia are at highest risk for infections that are multidrug-resistant (i.e., Resistant to ampicillin, chloramphenicol, and trimethoprim–sulfamethoxazole)
- Although the risk increases with the duration of stay, travelers have acquired typhoid fever even during visits of less than 1 week to countries where the disease is endemic.

TYPHOID IMMUNIZATION

- CDC recommends typhoid vaccine for travelers to areas where there is increased risk of exposure
- The typhoid vaccines currently available do not offer protection against *s.* Paratyphi infection.
- Travelers should be reminded that typhoid immunization is not 100% effective, and typhoid fever could still occur.

TYPHOID IMMUNIZATION

- Two typhoid vaccines are available
  1. Oral live, attenuated vaccine (Vivotif vaccine) (manufactured from the ty21a strain of *s.* Typhi by Crucell/Berna) *(updated July 27, 2009)*
  2. Vi capsular polysaccharide vaccine (vicps) (typhim Vi) (manufactured by sanofi pasteur) for intramuscular use
- Both vaccines protect 50%–80% of recipients.
- The time required for primary vaccination differs for the two vaccines, as do the lower age limits.

Dosage and schedule for typhoid fever vaccination

Oral, live, attenuated Ty21a vaccine (Vivotif)					
Vaccination	**Age (Years)**	**Dose/Mode of Administration**	**No. of Doses**	**Dosing Interval**	**Boosting Interval**
Primary series	≥6	1 capsule[1], oral	4	48 hrs	Not applicable
Booster	≥6	1 capsule[1], oral	4	48 hrs	**Every 5 years**

Primary vaccination with oral ty21a vaccine:

- Four capsules, one taken every other day.
- The capsules should be kept refrigerated (not frozen)
- All four doses must be taken to achieve maximum efficacy.
- Each capsule should be taken with cool liquid no warmer than 37° C (98.6° F), approximately 1 hour before a meal.
- This regimen should be completed 1 week before potential exposure.
- Not recommended to infants or children<6 years of age
- Booster every 5 years

Dosage and schedule for typhoid fever vaccination

Vi Capsular polysaccharide vaccine (Typhim Vi)					
Vaccination	**Age (Years)**	**Dose/Mode of Administration**	**No. of Doses**	**Dosing Interval**	**Boosting Interval**
Primary series	≥2	0.50 mL,intramuscular	1	Not applicable	Not applicable
Booster	≥2	0.50 mL,intramuscular	1	Not applicable	**Every 2 years**

Primary vaccination with Vicps:

- One 0.5-ml dose intramuscularly.
- given at least 2 weeks before expected exposure.
- Not recommended for infants and children <2 years of age.
- Booster every 2 years

Typhoid Vaccine safety and adverse reactions

- Live, attenuated vaccine should not be given to immunocompromised travelers, including those infected with HIV. The intramuscular vaccine is a theoretically safer alternative for this group.
- The only contraindication to vaccination with the intramuscular vaccine is a history of severe local or systemic reactions after a previous dose.
- Neither of the available vaccines should be given to persons with an acute febrile illness. .
- Simultaneous administration of ty21 (oral) a and IG does not appear to pose a problem.
- Parenteral typhoid vaccine is a more appropriate choice for individuals taking antibiotics.(There is a concern that antibiotics or anti-malarials with antibiotic activity should not be taken at the same time as the oral vaccine as they may be active against the vaccine strain and prevent the immune response to the vaccine.)

RABIES

RABIES

- Acute, progressive, fatal encephalomyelitis caused by neurotropic viruses in the family *Rhabdoviridae*
- The disease is almost always transmitted by an animal bite that inoculates virus into wounds.
- Very rarely, rabies virus has been transmitted by exposures other than bites that introduce the virus into open wounds or mucous membranes.
- All mammals are believed to be susceptible, but reservoirs are carnivores and bats.
- Although dogs are the main reservoir in developing countries, the epidemiology of the disease differs sufficiently enough from one region or country to another to warrant the medical evaluation of all mammal bites.
- Bat bites anywhere in the world are a cause of concern and an indication for prophylaxis.

RABIES: PREVENTIVE MEASURES FOR TRAVELERS

- Avoiding bite exposures
- Pre-exposure vaccination
- Post-exposure management
- pre-exposure rabies vaccine may be recommended, based on:
  - the local incidence of rabies in the country to be visited
  - the availability of appropriate anti-rabies biologicals
  - the intended activity and duration of stay of the traveler.
  - repeat travel to at-risk destinations over time
  - veterinarians, animal handlers, field biologists, cavers, missionaries, and certain laboratory workers.

Rabies Pre-exposure vaccination

- Pre-exposure immunization does not eliminate the need for additional medical attention after a rabies exposure, but it greatly simplifies postexposure prophylaxis.
- Pre-exposure vaccination may also provide some degree of protection when there is an unapparent or unrecognized exposure to rabies virus and when postexposure prophylaxis might be delayed.
- Travelers should receive all three pre-exposure immunizations before travel.
- If three doses of rabies vaccine cannot be completed prior to travel, the traveler should not start the series, as it would be problematic to plan postexposure prophylaxis after a partial immunization series

Pre-exposure immunization for rabies[1]

Vaccine	Dose (Ml)	No. of Doses	Schedule (Days)	Route
HDCV	1.0	3	0, 7, 21 or 28	Intramuscular
PCEC	1.0	3	0, 7, 21 or 28	Intramuscular

[1]HDCV, human diploid cell vaccine; PCEC, purified chick embryo cell. Patients who are immunosuppressed by disease or medications should postpone pre-exposure vaccinations and consider avoiding activities for which rabies pre-exposure prophylaxis is indicated. When this course is not possible, immunosuppressed persons who are at risk for rabies should have their antibody titers checked after vaccination.

GENERAL CONSIDERATIONS FOR TRAVEL IMMUNIZATION

Spacing and Simultaneous Administration

- All commonly used vaccines can safely and effectively be given simultaneously at separate sites without impairing antibody responses or increasing adverse reactions.
- An inactivated vaccine If not given on the same day, may be given at any time before or after a different inactivated vaccine or a live-virus vaccine.
- Live-virus vaccines administered on different days should be given at least 28 days apart.
  - If less than 28 days apart, the second vaccine should be readministered at least 4 weeks after the first vaccine was administered.
- Live-virus vaccines can interfere with the response to tuberculin testing.
  - Tuberculin testing can be done either on the day that live-virus vaccines are administered or 4–6 weeks later.
- Tuberculin skin testing is not a prerequisite for administration of any vaccine.

Immunoglobulins

- When MMR and varicella vaccines are given shortly before, simultaneously with, or after an immune globulin (IG), response to the vaccine can be diminished.
- The duration of inhibition of MMR and varicella vaccines is related to the dose of IG in the product.
- MMR and varicella vaccines either should be administered at least 2 weeks before or should be delayed at least 3 months after receipt of the IG

Missed Doses and Boosters

- Travelers may forget to return for a follow-up dose of vaccine or booster at the specified time.
- Occasionally the demand for a vaccine may exceed its supply, and providers may have difficulty obtaining vaccines.
- It is unnecessary in these cases to restart the interrupted series or to add any extra doses (except for oral typhoid). The next scheduled dose should be given when the patient presents.
- Some vaccines require periodic booster doses to maintain protection

Vaccination of Persons with Acute Illnesses

- Every opportunity should be taken to provide appropriate vaccinations.
- The decision to delay vaccination because of a current or recent acute illness depends on the severity of the symptoms and their cause.
- minor illnesses are not contraindications to vaccination. (e.g., diarrhea, mild upper respiratory infection with or without low-grade fever)
- Persons with moderate or severe acute illness, with or without fever, should be vaccinated as soon as the condition has improved.

  (This is to avoid superimposing adverse effects from the vaccine on underlying illness or mistakenly attributing a manifestation of underlying illness to the vaccine)
- Antimicrobial therapy is not a contraindication to vaccination, with three exceptions.
  - Antibacterial agents may interfere with the response to oral typhoid vaccine.
  - Antiviral agents active against herpesviruses (e.g., acyclovir) may interfere with the response to varicella-containing vaccines (varicella, MMRV, zoster).
  - Antiviral agents active against influenza virus (e.g., zanamivir, oseltamivir) may interfere with the response to live attenuated influenza vaccine.

Travel immunizations

Vaccination Scheduling for Last-Minute Travelers

- Because some travelers visit their health-care providers without ample time for administration of the vaccine doses recommended for optimal protection, studies have been performed and others are ongoing to determine whether accelerated scheduling is adequate.
- All vaccine products can be given during one visit for persons anticipating imminent travel.
- Unless the vaccines given are booster doses of those typically given during childhood, vaccines may require a month or more to induce a sufficient immune response, depending on the vaccine and the number of doses in the series.
- Some vaccines require more than one dose for best protection. Recommended spacing should be maintained between doses
- Doses given at less than minimum intervals can lessen the antibody response.
- Administration of a vaccine earlier than the recommended minimum age or at an interval shorter than the recommended minimum is discouraged.
- It is unclear what level of protection any given traveler will have if a full series of multidose vaccination is not completed

Electronic Resources in Travel Medicine

- CDC Travelers' Health Homepage
  http://www.cdc.gov/travel
- CDC Travelers' Health Yellow Book Homepage
  http://www.cdc.gov/yellowbook
- U.S. Department of State Country-Specific Consular Information
  http://travel.state.gov/travel/cis_pa_tw/cis/cis_1765.html
- World Health Organization International Travel Health Homepage
  http://www.who.int/ith/en
- Guidelines by the Infectious Diseases Society of America
  http://www.journals.uchicago.edu/doi/pdf/10.1086/508782

Electronic Resources in Travel Medicine

The CDC website has an e-mail notification system called GovDelivery.

Subscribers select topics for which to receive e-mail updates from content developers when new information about that topic is added to the CDC website.

Although GovDelivery is available for many health topics, the Travelers' Health website has two topics available for subscription:

1) Homepage, News, and Announcements (Travel)

2) Notices and Outbreaks (Travel).

When new items are posted on the CDC Travelers' Health website, subscribers can receive an e-mail informing them about what items were recently added.

Users can set up a profile with details such as adding a password; deleting, adding, or modifying subscription topics; and specifying how frequently e-mails are sent.

For more information or to subscribe, see www.cdc.gov/emailupdates/index.html.

Thank you