Yellow Fever

Traveler Summary

Key Points

- Yellow fever (YF) is a viral infection that occurs in tropical sub-Saharan Africa and forested areas of tropical South America and is acquired through the bite of an infected mosquito.
- Risk is low to very low in travelers and depends on the time of year and itinerary; risk is 10 times greater in Africa than it is in South America.
- Symptoms include fever, chills, and muscle aches, which may progress to vomiting, upper abdominal pain, and bleeding.
- Consequences of infection in unimmunized travelers include mental confusion, coma, shock, multiorgan failure, and death in up to 90% of those infected.
- Prevention includes wearing long sleeves and long pants as well as observing personal protective measures against mosquito bites.
- YF vaccine is given as a single dose at least 10 days prior to travel (for personal protection or to meet an entry requirement). Some YF-free countries may require vaccination only for travelers coming from another country with risk of YF transmission.
- Vaccine side effects are most commonly injection-site reactions. Serious side effects are rare but may include brain inflammation in young children, neurological reactions, and multiple organ dysfunction (first time vaccinees only, primarily those 60 years and older).
- Duration of vaccine protection is long term; a booster dose for personal protection is recommended every 10 years only for persons who will be visiting a high-risk area, travel frequently to risk areas, or may have had an inadequate response to a previous YF vaccination.

Introduction

YF is a viral infection that occurs in tropical sub-Saharan Africa and forested areas of tropical South America and is acquired through the bite of an infected mosquito. Risk to travelers is low, but high death rates may occur in unvaccinated travelers. Vaccination is about 100% protective in healthy travelers; however, no treatment for the disease exists.

Risk Areas

YF occurs in tropical sub-Saharan Africa and in the rainforests of tropical South America, where it is commonly found in monkeys. Large outbreaks occurred in Brazil and Nigeria in 2017-18.

Transmission

YF virus (YFV) is transmitted to humans through the bite of mosquitoes that become infected when they acquire the virus from infected monkeys or infected humans. These mosquitoes remain infectious for life (2-4 months) and are aggressive biters. Infected humans then transmit the virus back to mosquitoes that bite them.

YFV may be transmitted from mother to infant through breastfeeding.

Risk Factors

Risk is low to very low for travelers but may increase depending on the time of year, the traveler’s vaccination status, itinerary and activities, mosquito density, and presence of YFV. The rate of disease for unimmunized travelers is 10 times greater in Africa than it is in South America.

Symptoms

Symptoms commonly appear 3 to 6 days following exposure and include fever, headache, chills, and muscle aches lasting 2 to 4 days. Most patients recover, but about one-fifth of infected persons may relapse with high fever, vomiting, upper abdominal
pain, and excessive bleeding. The disease is mild in the local population but almost always progresses to complications in nonimmune travelers.

Consequences of Infection
Consequences of infection include shock, mental confusion, multiorgan failure, and coma. Death occurs in about 90% of symptomatic cases in travelers.

Need for Medical Assistance
Travelers who develop symptoms of YF during travel or after returning from an affected country should seek immediate medical attention. Treatment is supportive and frequently ineffective. Aspirin or nonsteroidal anti-inflammatory drugs (which may increase the risk for bleeding) should be avoided.

Prevention
Nonvaccine
Unvaccinated travelers should avoid areas where an ongoing outbreak of yellow fever is occurring.

Mosquitoes that transmit YFV (*Aedes* spp.) can bite throughout the day but have peak biting activity in the early morning and late afternoon and evening. Regardless of vaccination status, travelers should be especially vigilant in applying repellent during peak biting activity times. Treat outer clothing, boots, tents, and sleeping bag liners with permethrin (or other pyrethroid) when traveling in a very high risk area for yellow fever.

Additionally, containers with stagnant water can serve as breeding sites for mosquitoes and should be removed from the proximity of human habitation whenever possible. See *Insect Precautions*.

Vaccine
YF vaccination is given for 2 distinctly different purposes: 1) as a recommendation to protect the individual traveler from infection and 2) as an entry requirement to prevent the importation and spread of the disease in a country.

Vaccination is 100% protective in healthy travelers, and, in principle, every traveler going to an area where a risk of YF transmission exists should be vaccinated. Travelers going to nonrisk areas of countries where risk of YF transmission exists only in other regions of that country but who do not have assuredly fixed travel plans and long-stay travelers going to any country, any part of which has risk of YF transmission, should also be vaccinated.

Some countries require proof of YF vaccination for all travelers to enter the country. Some YF-free countries may require proof of vaccination only for travelers coming from another country with risk of YF transmission to prevent the importation of YF into that country. Travelers who do not know all their flight details at the time of their clinic visit should re-contact the clinic when flight details become available, in the event that transit stops trigger a YF vaccination requirement for their itineraries. Most receiving countries with YF entry requirements do not consider a transit stop of less than 12 hours in a YF-risk country as an exposure that would trigger an entry requirement for that country.

- For entry requirements, the vaccine must be given at least 10 days before entry into the country and documented in the *International Certificate of Vaccination or Prophylaxis* (ICVP).
- Travelers with an ICVP that is not yet valid (e.g., issued less than 10 days earlier) may be denied entry and quarantined until the ICVP becomes valid or until a period of not more than 6 days have passed since the last possible exposure to infection, whichever is shorter.
- Unvaccinated travelers for whom vaccination is required for entry may, upon arrival, be quarantined for up to 6 days.
- Travelers may be not be vaccinated at the port of entry against their will, but they may choose to do so voluntarily in lieu of quarantine.
- Any ICVP for YF vaccination, no matter when issued, is valid for life for the purposes of meeting a country’s entry requirement. However, uncertainty exists regarding recognition of this lifetime validity by all countries.

Side Effects
The most common vaccine side effects are injection-site reactions (pain, swelling, redness, and warmth). Fever, headache, and muscle aches commonly occur within 2 to 3 days after vaccination and last 5 to 10 days.
Serious side effects are rare but can include severe allergic reaction, brain inflammation in children younger than 6 months, neurological reactions, and multiple organ dysfunction (life threatening but restricted to first-time vaccinees, primarily those 60 years and older).

Persons with underlying medical conditions or those who have concerns about the vaccine should speak to their health care provider before vaccine administration.

**Timing**

YF vaccine is given as a single injection, and duration of vaccine protection is long term for most persons. A booster dose is recommended at intervals of 10 years (or less) only for persons who will be visiting a high-risk area, travel frequently to risk areas, or may have had an inadequate response to a previous YF vaccination due to a health condition.

Unvaccinated travelers who cannot receive the vaccine (e.g., due to an egg allergy or weak immune systems) should not travel to areas with significant ongoing transmission of YF. Previously vaccinated persons who cannot receive an indicated vaccine booster can be assured of the general durability of immunity if they were previously immunized when healthy.

**Special Considerations**

A medical waiver letter may be given to persons who cannot receive the YF vaccine due to medical reasons if the only reason for vaccination is to meet an entry requirement and if travel to a risk area of the country is not planned. The medical waiver letter is valid only for the current trip. Acceptance of a waiver letter is at the discretion of the destination country, which may quarantine the traveler for up to 6 days or request that the traveler be placed under surveillance.

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