Yellow Fever

Traveler Summary

Key Points

- Yellow fever (YF), a viral infection that occurs in tropical sub-Saharan Africa and the rainforests of tropical South America, 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, jaundice (yellow eyes and skin), and bleeding.
- Consequences of infection in unvaccinated travelers include mental confusion, coma, shock, and multiple-organ failure; death may occur in up to 90% of those infected.
- Prevention includes wearing long sleeves and long pants and observing insect precautions effective against mosquito bites.
- YF vaccination for personal protection: A single dose should be administered at least 10 days prior to travel.
- YF vaccination for an entry requirement: Some countries require proof of vaccination for travelers coming from another country with risk of YF transmission; some countries require proof of vaccination for all travelers. A medical exemption/waiver letter may suffice to meet an entry requirement for persons who cannot receive the YF vaccine due to medical reasons.
- 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, mainly persons 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 an acute viral infection transmitted through the bite of infected mosquitoes in tropical sub-Saharan Africa and in the rainforests of tropical South America. Risk to travelers is very 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 to a lesser extent in the rainforests of tropical South America, where it is commonly found in monkeys. Large outbreaks occurred in Brazil during 2016-18 and large annual outbreaks have been occurring in Nigeria since 2017. Transmission is seasonal and highest during the rainy season. YF has never been reported in Asia, despite the presence of the mosquito that transmits the virus.

Transmission

YF virus (YFV) is mainly transmitted to humans through the bite of infected mosquitoes that previously acquired the virus by ingesting a blood meal from infected monkeys or infected humans. These mosquitoes, which are aggressive biters, become infectious 4 to 18 days later and remain infectious for life (approximately 2-4 months). Infected humans then transmit the virus back to mosquitoes that bite them.

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 rate of YFV transmission in the affected area. The rate of disease for unvaccinated travelers is 10 times greater in Africa than it is in South America.

Symptoms

Symptoms most 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, jaundice (yellow eyes and skin), kidney failure, and excessive bleeding. The disease is usually mild in the local population but almost always progresses to complications in nonimmune travelers.

Consequences of Infection

YF infection can lead to shock, mental confusion, multiple-organ failure, and coma. Death occurs in about 30% to 60% of severe cases and in 90% of unvaccinated 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. No medications exist to treat or cure YF; treatment is supportive and frequently ineffective. Aspirin or nonsteroidal anti-inflammatory drugs (which may increase the risk for bleeding) should be avoided. Infected persons should be protected from further mosquito exposure during the first few days of illness to prevent contributing to the transmission cycle.

Prevention

Nonvaccine

Unvaccinated travelers should avoid areas where an ongoing outbreak of YF 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 YF.

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; see Special Considerations.

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, including:

- Travelers planning to go to nonrisk areas of a YFV transmission risk country but without an established itinerary that may result in travel to risk areas within the country
- Long-stay travelers going to any country for which any part of that country has risk of YFV transmission
- Native-born residents in urban areas of countries with risk of YFV transmission if traveling to rural areas

Side Effects

The most common vaccine side effects are injection-site reactions (pain, swelling, redness, and warmth), which may occur for up to 1 week after vaccination. Low-grade fever, mild 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, mainly 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 dose 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 or weakened immune system.

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 YFV. Previously vaccinated persons who cannot receive an indicated vaccine booster can be assured of the general durability of immunity if they were previously vaccinated when healthy.

Special Considerations

Entry Requirements

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 recontact 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 < 10 days earlier) may be denied entry and quarantined until the ICVP becomes valid or until a period of not more than 6 days has 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 not be vaccinated at the point 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 (old format pre-2007 or new format 2007 or later), is valid for life for the purposes of meeting a country's entry requirement. However, the new format ICVP must be used to document any doses (primary or booster) administered after December 15, 2007, including booster doses given when a traveler is in possession of a valid old format ICVP showing pre-2007 doses.
- Fractional dosing (one-fifth dose; 0.1 mL) of the YF vaccine is not advocated or acceptable for meeting an entry requirement at an international border; travelers who received a fractional dose during the 2017-20 YF vaccine shortage should be revaccinated with a full dose of the vaccine regardless of the interval since the previous dose.

A medical exemption/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 exemption/waiver letter is valid only for the current trip. Acceptance of an exemption/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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