Yellow Fever

Traveler Summary

Key Points
- Yellow fever (YF) is a viral infection that is acquired through the bite of an infected mosquito in tropical sub-Saharan Africa and forested areas of tropical South America.
- Risk is low to very low in travelers and depends on the time of year and itinerary. The risk is 10 times greater in Africa than it is in South America.
- Symptoms are of an influenza-like illness with fever, which may progress to black vomiting, upper abdominal pain, and bleeding.
- Consequences of infection in unimmunized travelers include jaundice, coma, shock, organ failure, and death in up to 90% of those infected.
- Prevention includes wearing long sleeves and long pants and observing personal protective measures against mosquito bites.
- YF vaccine is a live virus 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 local reactions. Serious side effects are rare but include brain inflammation in young children, neurological reactions, and multiple organ dysfunction (first time vaccinees only, especially if aged ≥ 60 years).
- 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 high-risk areas, travel frequently to risk areas, or may have had an inadequate response to a previous YF vaccination.

Introduction
YF is a viral infection that causes fever, death of liver and kidney tissue, bleeding, shock, and results in death in up to 90% of unimmunized travelers.

Risk Areas
YF occurs in tropical sub-Saharan Africa and in the rainforests of tropical South America, where it is endemic in monkeys. On both continents, YF can be transmitted in jungle and savannah areas. Transmission in urban areas occurs periodically in Africa but almost never in South America.

Transmission
Yellow fever 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. Theoretically, transmission may occur through blood transfusions or needle sticks.

Risk Factors
From 1970 through 2017, 14 cases of YF were reported in unvaccinated travelers from the U.S. and Europe who had traveled to West Africa (5 cases) or South America (9 cases); 9 of the 14 travelers died. More than 15 unvaccinated long-stay travelers from Africa and Asia developed YF after visiting Angola during a large urban outbreak in 2016.

Risk depends on the time of year, the traveler's itinerary and activities, mosquito density, presence of YFV, and vaccination status. The rate of disease for unimmunized travelers is 10 times greater in Africa than it is in South America.
Symptoms
Symptoms are of an influenza-like illness with fever, which may progress to black vomiting, upper abdominal pain, and bleeding. The disease is mild in the local population but almost always progresses to complications in nonimmune travelers.

Consequences of Infection
Consequences of infection in unimmunized travelers include jaundice, coma, shock, organ failure, and death in up to 90% of those infected.

Need for Medical Assistance
Medical assistance should be sought if fever and symptoms of YF disease (described above) occur during travel or after returning from an endemic country. Treatment is supportive and frequently ineffective. Avoid the use of aspirin or nonsteroidal anti-inflammatory drugs, which may increase the risk for bleeding.

Prevention
Non-vaccine: Unvaccinated travelers should avoid areas where an ongoing outbreak of YF in humans is occurring. Mosquito precautions in daytime and nighttime are recommended when in risk areas, regardless of vaccination status, because the risk of other mosquito-borne illnesses may exist. See Insect Precautions.

Vaccine: YF vaccination is given for 2 distinctly different purposes: to prevent the spread of the disease in a country and to protect the individual traveler from infection. Vaccination is 100% protective in healthy travelers, and, in principle, every traveler going to an area in which a risk of YF transmission exists should be vaccinated. All travelers going to YF-risk areas of affected countries 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 YF vaccination for all travelers. Some YF-free countries may require vaccination only for travelers coming from another country with risk of YF transmission to prevent the importation of YFV 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.

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 have passed since the last possible exposure to infection, whichever is shorter. Travelers may be not be vaccinated at the port of entry of entry against their will but may 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.

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

Side Effects: The most common side effects with this live virus vaccine are injection-site reactions, such as fever, headache, and muscle pain. Most of these occur within the first 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 aged < 6 months of age, neurological reactions, and multiple organ dysfunction (which is life threatening but, to date, has occurred only in first-time vaccinees, especially those aged ≥ 60 years and older).

Timing: YF vaccine is given as a single injection and provides long-term immunity for most persons. A booster dose is recommended at intervals of 10 years (or less) only for persons who will be visiting high-risk areas or who may have had an inadequate response to a previous YF vaccination due to a health condition. Frequent travelers who might be at risk should consider a booster every 10 years.

Unvaccinated travelers who cannot receive the vaccine (e.g., due to an egg allergy or immunosuppression) 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.

**Medical Waivers**

A medical waiver letter may be given 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. A 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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